

# **The Public Library's Contribution to Economic Growth and Development: a Path Analysis**

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## Declaration

I, Lara Michelle Skelly, declare that

- The research reported in this thesis, except where otherwise indicated, is my original research.
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## **Abstract**

This study examined the relationship that different aspects of public library use have with economic growth and development. The literature on the economic effects of public libraries is focused on proving worth to stakeholders. The measures of impact on economic growth and development are not as common. The lack of data on public libraries makes these measures more difficult to quantify. This thesis seeks to address that gap.

A systematic review of the literature on public library use covers five services: the use of the library as a place, the use of the book stock, interaction with the public librarian, attendance at library programmes and use of public Internet-enabled computers. Library programmes were the most popular topic in the literature, circulation the least popular.

The study built on the theoretical design of the Solow-Swan neoclassical growth model. From this, economic development was taken to be five aspects: employment, health, education, social capital and savings.

Using available data, the study tested whether public libraries impact on any of these economic variables, thereby answering the primary question in this thesis: what kind of relationship exists between different parts of public library use and economic growth and development?

This study used pre-existing data sourced from a variety of different datasets. The availability of the data necessitated a two-part split of the study: one that focused on results using an international dataset, and another that focused only on data from the United States of America, as it had a rich dataset available. The study employed a quantitative, empirical, method, namely regression path analysis.

When looking at the results of the regressions run with international data, it was found that the circulation of library books contributes positively to all aspects of economic

growth and development. The dataset from the United States of America included more features of public library use. Here, the relationship between public library use and economic growth and development was not found to be a consistently positive one. Use of public computers, for example, was found to have a negative relationship with education, the savings rate and gross domestic product. Other services, such as visits to the library, contributed in a positive way. These findings lead to the conclusion that the relationship between public library use and economic growth and development is complex. The results of this study can be used to plan public library services and effectively allocate appropriate funds. This thesis ends with a call for better data collection on public libraries and raises the question of what is the role of public libraries in the economy.

Dedicated to the memory of Helena Susanna Coetzee  
(1939 - 2013)

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## List of acronyms

ABI	Abstracted Business Information
AIDS	Acquired Immunodeficiency Syndrome
CBA	Cost-benefit analysis
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CV	Curriculum vitae
DVD	Digital Versatile Disc
ERIC	Education Resource Information Center
FDI	Foreign direct investment
FTE	Full-time equivalent
GDP	Gross domestic product
HIV	Human Immunodeficiency Virus
IBSS	International Bibliography of Social Science
IFLA	International Federation of Library Associations and Institutions
LISA	Library and Information Science Abstracts
LRS	Library Research Service
MEDLINE	Medical Literature Analysis and Retrieval System Online
OECD	Organisation for Economic Co-operation and Development
PC	Personal computer
PLACE	Public Libraries Arenas for Citizenship
ROI	Return-on-investment
UIS	UNESCO Institute for Statistics
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USA	United States of America
WTP	Willingness-to-pay
WTR	Willingness-to-receive

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## Chapter 1: Introduction

“[Libraries] have an important role in the development and maintenance of a democratic society by giving the individual access to a wide and varied range of knowledge, ideas and opinions” (Koontz and Gubbin 2010: 2). Libraries have a broad mission in the economy. This thesis is concerned with demonstrating how public libraries impact economic growth and development. Economic growth occurs when an economy increases the amount that it produces (McConnell and Brue 2005: 30). It is commonly measured by gross domestic product (GDP) (McConnell and Brue 2005: 131). While economic growth does implicitly give a measure of living standard, it is occasionally useful to look at more explicit measures of living standards which are captured by indicators of economic development.

As state-funded institutions, public libraries often have to prove their worth to stakeholders. One method of doing so is to measure the benefits that libraries provide. Libraries usually measure the benefits and compare these with costs. The methods of doing so include cost-benefit analysis (CBA), return-on-investment (ROI), willingness-to-pay/willingness-to-receive (WTP/WTR), contingent valuation, discovering stated and revealed preferences, and a measurement of consumer surplus. This chapter will give a brief background on these methods. This thesis employs an entirely alternative method, but these more traditional methods are given for the dual purpose of setting this thesis apart, that is demonstrating its originality and showing also how it fits in with other methods.

The literature on the economic effects of public libraries is focused on proving worth to stakeholders. The measures of impact on economic growth and development are not as common. The lack of data on public libraries makes these measures more difficult to quantify. This thesis seeks to address that gap. In addition, this thesis will draw together different ideas of how libraries contribute to economic growth and development. It will then seek to develop a single empirical and quantitative model. Herein lies the originality of this thesis. Not only will this thesis be employing an uncommon method of showing how libraries contribute to economic growth, but it will do so for a variety

of different factors which are usually dealt with independently. Using available data, it will test whether public libraries impact on any of these economic variables. This will answer the primary question in this thesis: what kind of relationship exists between different aspects of public library use and economic growth and development?

In order to explore this question, a theoretical framework is needed. This chapter gives this macroeconomic framework, as well as offering some evidence of the interrelated nature of economic variables. It is important to note that nothing in the economy operates in isolation; libraries are no exception.

It is hypothesised that the link between public libraries and economic growth will lie in development factors, such as social capital. A systematic review of the literature, which will comprise the next chapter, will provide evidence to support this hypothesis. Many case studies show how libraries contribute to literacy, for example, which in turn contributes to economic growth. This chapter will outline this hypothesis more fully.

The remainder of this chapter covers a discussion on the traditional methods of measuring value, definitions of key terms used in this thesis, evidence of links between economic variables, the theoretical framework, and a summary of all the chapters in this thesis.

## ***1.1 Traditional methods of measuring value***

Economic value is a topic that has been long discussed by librarians in the literature. Establishing the economic value of a library is one way to prove value to stakeholders. Methods of exploring economic worth are given in this section. These methods are not employed in this thesis, as the focus of this thesis is a contribution to the economy and not economic value, which is more of an accounting measure. They are given here as a way of setting this thesis apart as well as showing how it integrates with these existing models.

The most basic method of looking at the economic value of a firm is to look at the profit. The profit represents the added value that the firm contributed to the inputs of the firm. This simple method does not work with institutions that do not raise a profit though. Yet these institutions may still add value. There are several methods that calculate added value without looking at the profit. This section explains those methods giving examples of where they have been applied to libraries.

### **1.1.1 Cost-benefit analysis (CBA)**

At the most basic level, public libraries express their value as benefits versus the costs. Usually these benefits are expressed in monetary value to make it comparable to the cost. It would not make much sense to say that a library costs  $x$  amount and the benefit is an increase in reading in the community. The challenge is to express these benefits in a meaningful way. It is not easy to put a monetary value on the friendliness of a librarian, on the happiness a good book brings or on the safety that school children feel in a library. However, some researchers have tried to do this for libraries (for example, Holt, Elliott and Moore 1999). They employ one of the methods below to calculate the monetary value of the benefits.

### **1.1.2 Return-on-investment (ROI)**

When the costs and benefits are expressed in monetary terms, one can refer to it as ROI. ROI is an accounting ratio that shows how much profit is made as a fraction of investment. In libraries the costs are usually easy to calculate, but as they are non-profit organisations, one cannot use the income that is stated in the accounting records as a true reflection of the return. Libraries need to find other ways to put a monetary value on the returns.

The simplest method to put a monetary value on returns is to find a commercial equivalent and extrapolate to the library. For example, if a book costs \$100<sup>1</sup> and was taken out ten times, the return on the investment of \$100 would be \$1000 (price of the book multiplied by the number of times it was taken out). This method has been used by numerous libraries. However, it does not take into account the law of demand: that, if the price of a product increases, the quantity demanded would decrease, and vice versa. Taking a \$100 book out of the library is free, but if each user had to pay \$100 for the title, perhaps only three would have bought the book. This would give a return of \$300, far less than the estimated \$1000.

At the most basic application of this method, the running costs of the library are not included. A \$100 book does not cost only \$100: there are acquisition costs, processing costs and costs for storing and circulating, as Sumsion, Hawkins and Morris (2002: 668) explain. However, many libraries use ROI for its simplicity. In his meta-analysis of studies that use this method of valuation, Aabø (2009: 322) concludes, tentatively, that libraries are valued, on average, at four to five times the amount that they cost.

### **1.1.3 Willingness-to-pay/Willingness-to-receive (WTP/WTR)**

In an effort to overcome the problems that the law of demand creates with a simple ROI, some studies have employed a WTP/WTR method. In this method, library users are surveyed and asked what they would be willing to pay for a library service, should it become a profit running organisation (WTP) or what they would accept as compensation for the loss of a free library service (WTR). WTR is sometimes known as willingness-to-accept.

These estimates are not without their flaws. WTP is always a more conservative figure, and the WTR is a more generous one. If humans were perfectly rational beings, with perfect information, the WTP figure should exactly equal the WTR figure. However,

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<sup>1</sup> The use of US Dollars here is an arbitrary choice of currency. Any other would have sufficed in its place.

humans are not perfectly rational economic beings. Users are less willing to part with their cash than they are to receive more benefits.

Nevertheless, studies have used this method to show the economic value of public libraries. One example is Aabø's (2005) study. This study explores the disparity between WTR and WTP. It finds that the most conservative estimate of the benefits of the public library is close to the average library cost (Aabø 2005: 195). As this is the most conservative, the article concludes that the benefits provided by the public library do outweigh the cost.

#### **1.1.4 Contingent valuation**

The underlying idea of contingent valuation is to ask survey participants whether they would prefer one scenario to another. WTP/WTR are methods of contingent valuation: participants are asked if they would prefer receiving money to having a public library service. There are other methods of contingent valuation that do not refer to money so explicitly. For example, users could be asked if they would prefer a cinema, Internet café or copy-shop to a public library. By ranking the public library among these for-profit organisations, a measure of the economic worth of the public library can be calculated.

#### **1.1.5 Stated and revealed preferences**

Any method that employs surveys as a method of data collecting is one that focuses on stated preferences. Users do not always say what they truly feel. A good example of the discrepancy between stated and revealed preferences comes from anecdotal evidence. Many people claim that they love libraries (stated preference), but few actually use them (revealed preference). Totterdell and Bird (1976: 57) found this to be the case. In interviews, many of their respondents claimed membership of a public library, but in reality they did not belong to one. It is possible that in WTP/WTR and other contingent

valuation surveys that the preferences stated differ from the actual preferences of the library user. Kim (2011) gives an overview of several studies that use revealed preferences. Most of these studies use the ROI method explained earlier.

### **1.1.6 Consumer surplus**

Kim defines consumer surplus as “the difference between what a consumer is willing to pay and what actually is paid for a good or service” (2011: 113). All of the previously discussed methods are ways of calculating the consumer surplus.

### **1.1.7 Summary**

The terms explained in this section refer to those methods that are traditionally used to calculate the economic value of non-profit resources, including libraries. They are given here to set them apart from the method used in this thesis. Rather than employ these measures, this thesis will draw on economic theory of growth and development, and generate a model from there. In order to introduce this theory, key terms are explained in the next section.

## **1.2 Definitions**

This thesis employs a different method to those traditionally used to measure economic value, which were explained in the previous section. In order to introduce this method, some definitions are necessary. These are essential to an understanding of the theoretical framework which this thesis employs. This section gives these definitions.

### 1.2.1 Gross domestic product (GDP)

GDP is the way that economies measure their economic growth. It is the figure that represents the total amount of products made and services offered in a particular country. *The Economist* (2013: GDP) gives the sum as:

$$\text{GDP} = \text{private\_consumption} + \text{investment} + \text{public\_spending} + \\ \text{the\_change\_in\_inventories} + (\text{exports} - \text{imports})$$

It is calculated on a quarterly basis, and it is a retrospective figure: that is, the GDP of a particular quarter reflects the economic activity of the previous quarter.

### 1.2.2 Economic growth

An economy is said to be growing when it reflects two or more consecutive quarters of an increase in GDP. On the converse, when an economy does not reflect growth for two or more quarters, it is said to have negative growth. Such economies are in recession. If a recession continues for a “prolonged” period it is said that the economy is in a depression (*The Economist* 2013: Depression). Economists disagree about the quantification of “prolonged”. Because recessions are often accompanied by unemployment and a decline in living standards, economic growth is often thought to be the goal of all economies.

### 1.2.3 Economic development

Economic growth has a very narrow focus on GDP only. Some think that this narrow focus excludes important issues, like the living standards of the people. Some economies have grown without improving the conditions of the majority of the citizens. This observation suggests that the argument should focus on economic development,

rather than economic growth. The International Economic Development Council gives this definition of economic development: “Economic development can ... be described as a process that influences growth and restructuring of an economy to enhance the economic well being of a community” (2013: 2).

#### **1.2.4 Education**

“Education is defined as organised and sustained communication designed to bring about learning” (Organisation for Economic Co-operation and Development [OECD] 2003: Education). There are several measures of education such as literacy rate, school enrolment and primary completion rate (World Bank 2013c: Indicators). Education is important in living a full and economically productive life. The idea is that the higher the level of education one has attained, the better job one can get and the more one can provide to society in terms of goods and resources.

#### **1.2.5 Literacy**

The definition of literacy is contested (Owusu-Ansah 2005; United Nations Educational, Scientific and Cultural Organization [UNESCO] 2006: ch.6). UNESCO gives this definition: “A person is literate who can, with understanding, both read and write a short statement on his or her everyday life” (UNESCO 2006: 158). Libraries are often concerned with information literacy. The American Library Association provides a functional definition: “Information literacy is a set of abilities requiring individuals to recognise when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (American Library Association 2013). This thesis will adopt the American Library Association definition.



### **1.2.6 Health**

“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization 2006: 1). As with education, there are several indicators of health. The United Nations uses life expectancy at birth in their Human Development Indicator (United Nations Development Programme 2013: Health index). Other indicators include infant mortality, prevalence of Human Immunodeficiency Virus (HIV) and malnutrition (World Bank 2013c: Indicators). Health is important not only for the well being of a person, but also because it promotes economic activity. Illness often excludes a person from creating a product or providing a service. It is in the interest of economic growth to promote health among citizens.

### **1.2.7 Health literacy**

“Health Literacy has been defined as the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health” (World Health Organization 2013: Track 2: Health literacy and health behaviour). This definition effectively combines health and literacy in that it puts forward the use of literacy to promote health.

### **1.2.8 Employment**

Employment is often understood through its opposite: unemployment, which is simply the number of people without a job (*The Economist* 2013: Unemployment). Some unemployment is seasonal. For example nomadic workers could be employed on a farm during harvest season, and then leave their work once the harvest is in. Some unemployment is voluntary. For example, a mother could choose to be unemployed while her children are young, provided that she has another source of income. The type

of unemployment that concerns economists, is structural unemployment. If the economy is structured in such a way that work cannot be found by everyone who would like to work, then there is still room for growth within the economy.

### **1.2.9 Human capital**

“Human capital refers to the productive capacities of human beings as income producing agents in the economy” (Rosen 2008: par. 1). This includes the “stock of skills and productive knowledge embodied in people” (Rosen 2008: par. 1). Human capital theory has its origins in 1676, when Petty looked at the loss of human life as akin to the loss of machinery (Rosen 2008). Adam Smith, the heralded father of economics, referred to it in his seminal text, *The Wealth of Nations* (Smith 1776: II.1.16). Human capital theory came into vogue in the period of the late 1950s to early 1960s, when scholars like Schultz, Denison and Kendrick entered the discussions on human capital theory (Rosen 2008). One of the leading theorists was Gary Becker, whose work in human capital theory earned him a Nobel Prize (Mulligan 2008). Both Becker and Schultz had their academic homes in the University of Chicago (Reder 2008). As a result, human capital theory is often associated with the Chicago School of Economics (Reder 2008).

If humans can add value to the productive process, then the growth of human capital comes in the form of education, training and health care (*The Economist* 2013: Human capital).

### **1.2.10 Social capital**

Social capital refers to the “institutions, relationships, and norms that shape the quality and quantity of a society’s social interactions” (World Bank 2013c: What is social capital?). It is the idea that two people working together can achieve more than could be achieved if those two people worked alone. People who trust one another are more

likely to enter into a business transaction than those who do not. Putnam (2000), in his seminal work on social capital, *Bowling alone*, refers to two types of social capital: bonding and bridging. Bonding social capital is that social capital that draws people who are already bonded together, for example familial units and other homogeneous groups (Putnam 2000: 22). Bridging social capital brings together people from disparate backgrounds (Putnam 2000: 22-23). It forms social ties where there previously were none. There is no single measure of social capital, only proxy indicators are currently used (World Bank 2013c: What is social capital?).

### **1.2.11 Physical capital**

Usually, physical capital is the term used for any physical asset such as buildings, machinery and computers (Dearlorff 2010: Physical capital), financial capital refers to cash or cash equivalents, like debt (Dearlorff 2010: Financial capital), and capital is the term used to encompass both physical and financial capital (Dearlorff 2010: Capital). This thesis will use the term ‘physical capital’ instead of ‘capital’. The qualification explicitly sets it apart from the other forms of capital: human and social.

### **1.2.12 Savings/Investment**

Savings are “any income not spent” (*The Economist* 2013: Savings). These savings can be used for investment. For example, if one were to put some money into a long-term savings account at the bank, the bank could then loan that money to an entrepreneur - invest in the entrepreneur - who would be creating goods or supplying services that would be contributing to the economy. The level of saving and investment is an indication of the confidence that consumers and investors have in financial institutions and the economy as a whole. One is unlikely to deposit money at a bank if one suspects that the bank might foreclose shortly. Similarly, one is unlikely to invest into a business if one fears that the business might not survive. The level of savings and investment then represents not only a potential economic growth, but also confidence in the

economy. Where savings or investment are referred to in this thesis, it must be read in the broader context of physical capital, and the terms can be used interchangeably.

### **1.2.13 Public libraries**

“A public library is an organisation established, supported and funded by the community, either through local, regional or national government or through some other form of community organisation” (Koontz and Gubbin 2010: 1). This definition comes from the International Federation of Library Associations and Institutions (IFLA) *Public library service guidelines*. The guidelines go on to explain the socially inclusive nature of public libraries as well as their very wide function of providing “access to knowledge, information, lifelong learning, and works of the imagination through a range of resources and services” (Koontz and Gubbin 2010: 1).

### **1.2.14 Summary**

These terms are used regularly in this thesis. Now that they have been defined, and their usage in this thesis clarified, the theoretical framework can be discussed.

## **1.3 Theoretical framework**

The previous section defined the terms that are commonly used in this thesis. Some of the economic terms are used to outline the theoretical framework which this thesis employs. The framework is drawn from economic theory. This section discusses those models, with particular reference to how they are applicable. To begin, a general explanation of economics is given. From that, growth and development models are put forward. These models are not without contention. Some discussion around the debated contentious areas is provided, although a full exploration of the debate is not within the scope of this thesis.

Economics is the study of the efficient allocation of resources (McConnell and Brue 2005: 3). The study of economics can be at a very micro level – what motivates people to spend their time and money on the things that they do - to the macro level of looking at how resources are used on a global scale. In countries, resources refer to the people and their skills, and the natural resources such as minerals, arable land and climate. These factors of production must be allocated efficiently to achieve the maximum output (or GDP) that a country can attain. The basis is that these resources should be combined in such a way that they produce the maximum level of output.

Resources are classified into four factors of production: land, labour, capital and entrepreneurship. Land represents the physical (or virtual) space in which production happens. Capital (financial capital) buys the equipment which labour uses. Labour supplies the physical and mental activity required for tasks. These three factors are combined with the ingenuity that the entrepreneur brings.

The Solow-Swan neoclassical growth model (Todaro and Smith 2011: 129) shows how the factors of production combine to produce the output. Mathematically this is shown as:

$$Y=K^{\alpha}AL^{\alpha-1}$$

Where:

- Y: Output or GDP
- A: Labour productivity
- K: Capital stock (i.e. physical capital)
- L: Labour
- $\alpha$ : elasticity of output with respect to capital (so the percentage change in Y resulting from a 1% change in K or L)

Accordingly, economies can grow due to positive changes in capital, labour or technology (Todaro and Smith 2011: 129). Improvements in technology allow for labour and capital to be used more efficiently, as the industrial revolution has shown.

The Solow-Swan model assumes that the technological factor is an outside factor, or exogenous to the model.

Some theorists have argued that technology is endogenous, that it is part of the economy. This view has given rise to the endogenous growth theory and its model (Howitt 2008). This model is not without its problems, as discussed by Barro and Sala-i-Martin (1995), and does not yet explain why the economies of some countries grow faster than others (Howitt 2008). That is where development theories come to assist with probing the related issues. The model does, however, provide a point of departure for this thesis, which uses the Solow-Swan model.

Economic development theory takes knowledge of economic growth a step further than a more general focus on economic theory. Not only is it concerned with the efficient allocation of resources, but it is also concerned with the living standards of people, through economic, social and institutional mechanisms (Todaro and Smith 2011: 25). Public libraries can be viewed as belonging to these social and institutional mechanisms. The United Nations offers a quantitative measure of development in its Human Development Index. This index looks at health, income and schooling (United Nations 2012). As the literature review shows, public libraries link into these development factors via health literacy, aiding job-seekers, and contributing to literacy and education.

Public libraries do impact on the productivity of workers, by improving literacy rates, encouraging labour force participation through job finding tools, and so on (Celano and Neuman 2001, Dent 2007, Liu 2004, McClure and others 2000, Rooney-Browne 2009, Skelly 2011). Libraries can also encourage innovation in technology by providing links and resources for entrepreneurs (Collins 2012, Paberza and Rutkauskiene 2010). The literature shows that libraries contribute to a healthier workforce through health literacy (Birkenhead and Grant 2012, Malachowski 2011). Through these channels, libraries could contribute to economic growth and development. Chapter 2 will give a more thorough examination of the link between libraries and the economic variables.

In this Solow-Swan framework, it would appear that the economic factors are independent of one another. Empirical evidence shows that this is not the case. The following section discusses that.

## **1.4 Economic links**

One of the premises of this thesis is that employment, education, health, social capital and savings all contribute to economic growth, as given by the theoretical model put forward in the previous section. While a thorough discussion of these contributions is beyond the scope of this thesis, as its focus is on the relationship that different aspects of public library use have with economic growth and development, this section provides some evidence of these contributions.

These factors - growth, employment, education, health, social capital and savings - are not independent of one another. Influencing one often has a domino effect on others. This section also provides some evidence of this effect. The works cited in this section are not necessarily seminal works, they are simply there to illustrate concepts.

### **1.4.1 Employment**

If labour represents a resource in the economy, then unemployment represents an inefficient use of that resource. Where such inefficiencies exist, the economy is not operating at the optimal level and still has some capacity for growth. Exploring the causes and solutions for unemployment is a major theme within economics.

#### ***1.4.1.1 Employment and education***

Employment levels and education levels are linked through human capital theory, which was defined earlier. The underlying theory is that if one has a higher education qualifications, then finding employment would be easier. Other things being equal, finding a job when one has some education is easier than finding a job when one has no education. These two factors have been linked in a multitude of studies, in a variety of countries around the world. For example, Van Leeuwen and Foldvari (2008) looked at Asian countries in a time-series analysis that spanned over a century; Rao, Gounder and Loening (2010) examined what could be the cause of growth in Guatemala. Halder and Mallik (2010) studied the case of India, and Abbas and Foreman-Peck (2008) focused on Pakistan.

#### ***1.4.1.2 Employment and health***

A similar link exists between health and employment. The basic idea is that if one is sick, one cannot work. Thus in the interests of economic growth, a healthy workforce is desirable as it enables a better use of the labour resource. This link has been examined in many studies. Ngepah (2012) looked at South Africa, Oliva-Moreno (2012) focused on Spain, and Kumar and Kober (2012) did an international study.

#### ***1.4.1.3 Employment and social capital***

Putnam links social capital to job finding. “Economists have developed an impressive body of research suggesting that social ties can influence who gets a job, a bonus, a promotion, and other employment benefits” (Putnam 2000: 319). Particularly, bridging social capital, the form that exists in the weak ties between dis-similar individuals, proves to be more useful than bonding social capital (Putnam 2000: 322). This link is also shown by Johnson in her study of information seeking behaviour in Mongolia. She



reports that many Mongolians find work through their social networks, rather than through the official channels such as newspaper advertisements (2007: 891).

#### **1.4.1.4 Employment and savings**

Akerlof and Stiglitz (1969) postulated that there was a cyclical relationship between employment and the savings rate. They explain it as follows:

High levels of employment are likely to lead to high wages. High wages lead to a decreased average savings rate for the economy (if the proportion of wages saved is smaller than that of profits) and, if the high wages are expected to continue, to more capital intensive machines being constructed. Both of these lead to fewer jobs in the future, i.e., to a low level of employment (Akerlof and Stiglitz 1969: 269).

This argument gives evidence that these two factors are interrelated.

#### **1.4.2 Education**

Education contributes to economic growth and development through its contribution to human capital. The theory is that if people are better educated, they will perform better at their jobs and thus contribute positively to output.

“The low level of literacy partly accounts for the low level of development in Nigeria” according to Akparobore (2011: 48). Blaug sums up six ways in which adult literacy can contribute to economic growth, by:

- (1) raising the productivity of new literates;
- (2) raising the productivity of individuals working in association with literates - the so-called spillover benefits of literacy;
- (3) expediting the flow of general knowledge of individuals (say, instructions about health and nutrition) and thus reducing the cost of transmitting useful information;

- (4) stimulating the demand for vocational training and technical education;
- (5) acting as a device for selecting the more able and enhancing their occupational mobility; and, finally and perhaps most important,
- (6) strengthening economic incentives, meaning the tendency for people to respond positively to a rise in the rate of reward for their efforts (1966: 393-394).

#### ***1.4.2.1 Education and health***

There is an established link between health and education levels: “Years of formal schooling completed is the most important correlate of good health” (Grossman 2000: 395-396). Sequeira (2011) shows that a relationship exists in the other direction too: that health is an important causal element to levels of education. Rahman (2011) found this bi-directional relationship in a time-series analysis of Bangladesh, giving further evidence of its existence. Focusing on the case of Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), Huang, Fulginiti and Peterson (2010) found this relationship there too. Death resulting from AIDS results in a lower investment into human capital and a lower economic growth. Torssander (2013) makes the observation that an investment into children’s education leads to a longer life of the parents. This could be one way in which this inter-relationship between education and health manifests itself.

#### ***1.4.2.2 Education and social capital***

Celano and Neuman (2001: 39) found that literacy programmes for children resulted in parents spending more time with their offspring. Caidi and Allard (2005) show the link between information access and social inclusion: by providing access to information, libraries can transform the have-nots into haves.

Children from states in the United States of America (USA) with a higher social capital index are also reported to do better at school. Putnam (2000: 301) attributes this to two factors: television and civil engagement. States with a higher social capital are also the states with the lowest television viewership. Arguably, if children are not watching

television they have more time for school. If the parents are more likely to be involved in the schooling system, perhaps through a parent-teacher association, then their children are far more likely to behave and attend school (Putnam 2000: 301). These links are not causal, however. Coleman illustrates the link between social capital and human capital with reference to John Stuart Mill. By the time Mill was of school-going age, he was fluent in Greek and Latin. His father had invested the time into his son's education, evidence of bonding social capital (1988: S109).

#### ***1.4.2.3 Education and physical capital***

The direction of causation between an investment into human capital and the investment into physical capital is not clear. Evidence from Kalyoncu (2009) shows that there is a bi-directional relationship between growth, human capital and physical capital. The lack of uni-directionality, however, is not cause for concern. The evidence shows that they are related somehow, which is a sufficient premise for this thesis. Lopez-Bazo and Moreno (2008) showed that investment into human capital makes the use of physical capital more cost effective, and thus leads to economic growth indirectly. Halдар and Mallik (2010) showed that the investment into education is the influencing factor when it comes to investment into human capital, thus leading to growth.

#### **1.4.3 Health**

Investment in health is a form of investment in human capital. As previously discussed, investments in human capital have been positively correlated with an increase in economic growth. Again, there are several studies that make this connection, using a variety of different methods. Gong, Li and Wang (2012) used an extended Ramsey model; Odubunmi, Saka and Oke (2012) a multivariate cointegration technique; and Mehrara and Musai (2011) used an autoregressive distributed lag approach.

### ***1.4.3.1 Health and social capital***

There are strong ties between social capital and health, with health indicators improving the more an individual has links to others in his/her community (Putnam 2000: 330). Putnam reports that many studies do support this link, and not a single one against. A causal effect cannot be shown: it could well be that healthy individuals have more time to connect to others but the link, as Putnam shows it, is well supported. J. Williams (2012) claims to show a causal effect, by reflecting on the social capital generated by physicians. Tampubolon, Subramanian and Kawachi (2013) also find an empirical link in their Welsh study.

### ***1.4.3.2 Health and physical capital***

The link between health and physical capital is not an intuitive one, but the literature does report that this link exists, through a variety of mechanisms. The Gong, Li and Wang (2012) article referred to earlier, makes the connection between health and economic growth through physical capital accumulation. Chen (2013) links health, savings and language together, by showing that certain linguistic patterns can be associated with greater savings and better health investments. However, he does not give evidence of causal links in any direction.

## **1.4.4 Social capital**

Drawing on the empirical literature, Chou (2005) seeks to present a theoretical mechanism through which social capital affects economic growth. He relies on three factors that link social capital and growth: human capital, financial development and innovation. In an analysis of 102 European regions, Akçomak and ter Weel (2009), argue that, although social capital has been linked to economic growth by several authors, the channel of influence in fact lies in innovation.

#### **1.4.4.1 Social capital and physical capital**

One way in which social capital could be affecting the economy positively, is by attracting foreign direct investment (FDI) into the country. Looking at eighty-five countries, Kim, Lin and Suen (2013) argue that social capital matters as much as other forms of capital when it comes to FDI. Entrepreneurs who contribute to charity - one measure of social capital - are more likely to attract financing, according to Talavera, Xiong and Xiong (2012). The relationship also flows in the other direction. Shoji and others (2012) found that a reduced access to credit lowers social capital.

#### **1.4.5 Physical capital**

If an individual citizen saves more, then there is more money for businesses to use for investment, which should result in a greater economic growth. That is the underlying assumption linking these two factors. An alternative to saving is FDI, which brings foreign financing into a country which businesses can tap into. Abaidoo (2012) found this to be the case in an empirical study on sub-Saharan African countries. In addition Abdelhafidh (2013) confirmed this for north African countries. Using the same method as Abaidoo (2012) and Abdelhafidh (2013), Ludosean (2012) found that the direction of causality ran in the other direction: from economic growth to FDI. Regardless of the direction of causality, these studies, however, show that there is a link between physical capital and economic growth.

#### **1.4.6 In summary**

The purpose of this section was simply to provide evidence that these economic factors do not operate independently of one another. A relationship was found between all of them, sometimes causal, sometime bi-directional. Without attempting to enter into a

debate on the relationships, this section provides some of the premises on which this thesis is built. The section that follows gives the research question that this thesis seeks to answer.

## ***1.5 Research questions***

This thesis is built on the framework of economic growth and development theories. The primary research question was: How do public libraries contribute to economic growth and development? This question was explored by asking two subsidiary questions.

Subsidiary questions were:

1. What can be learnt from the literature on the relationship between public library use and economic growth and development?
2. What kind of relationship exists between different parts of public library use and economic growth and development?

The expected outcome in answering these two questions is to provide a theoretical and quantitative empirical link between the economy and public libraries. This outcome complements the methods of calculating value already available to public libraries, and strengthens the argument of proving their worth to stakeholders. These methods were given earlier in the chapter.

Answering these research questions strengthened the objective that many libraries have in proving their worth to stakeholders. The traditional methods of measuring the value of public libraries (for example return-on-investment) only show part of the effects that libraries have on the economy. This research adds to these methods by providing methods of showing economic contribution.

The results of this research can be used to inform economic policy. Public libraries are publicly funded and so must prove their worth to government. If it can be shown that public libraries contribute to economic growth, then this evidence can be used to inform government funding decisions and policy around public libraries.

Similarly, the results of this research can be used to inform library policy, at a local, provincial and national level. If contributing to economic growth and development is desirable for libraries, then libraries can undertake projects that will aid the contribution. For example, if libraries contribute to economies through social capital, then libraries can examine ways of contributing more to social capital. Likewise, if libraries contribute to literacy, then adding a reading programme to promote literacy could in turn contribute to economic development. This will be explored in the final chapter.

## ***1.6 Summary of chapters***

A summary of the chapters of this thesis is given here to provide direction for the research that sought to answer the research questions in the previous section.

### **Chapter 1: Introduction**

The first chapter outlines the focus of this thesis and its importance. It offers an introduction to the problem by way of a theoretical background. This theoretical background is based on theories of economic growth and development. Definitions of important terms are given. This chapter shows how this research fits in with the literature on the more traditional ways of valuing libraries, such as cost-benefit analysis and willingness-to-pay/willingness-to-receive.

## **Chapter 2: Literature review**

The second chapter reviews the literature on the indirect economic benefits of public libraries. This includes research in how libraries contribute to GDP, literacy, education, employment, social capital, physical capital and health. This thesis will draw together the ideas presented in this literature. The literature review is presented in the form of a systematic review.

## **Chapter 3: Methods**

The methods of study will be explored in the third chapter. The third chapter will provide more detail on the choice of variables and a thorough discussion of the statistical method employed, namely path analysis.

## **Chapter 4: International results**

Chapter 4 presents the results of the statistical tests performed with international data. These results are obtained using data from UNESCO, and will show the correlation between the circulation of stock in public libraries and the economy.

## **Chapter 5: USA results**

Chapter 5 presents the results of the path analysis which employs data from USA. Data on public libraries are more complete from USA, and several library variables will be covered.



## **Chapter 6: USA lagged results**

The delayed effects that public library use might have on economic growth and development are considered in the sixth chapter. Here the data are lagged and a path analysis is performed again.

## **Chapter 7: Discussion, recommendations and conclusion**

Chapter 7 provides a discussion of the results of the previous three chapters. Implications are drawn from both parts of this study: implications for USA libraries, taken from the statistical tests and consequent discussions, as well as implications for public libraries worldwide. This chapter details the limitations of this study. Conclusions and suggestions for further research are offered in this chapter.

### ***1.7 Conclusion***

This chapter gave an introduction to this thesis. It set this study apart from the methods of measuring economic value traditionally used by libraries. It defined important terms, provided the theoretical framework and discussed the independence of economic variables. The research questions central to this thesis were introduced. This chapter concluded with a summary of the chapters contained in this thesis.

The following chapter reviews the literature on the relationship between public library use and economic growth and development. It does so by means of a systematic review.

## **Chapter 2: A systematic review of the literature**

This chapter presents and discusses the literature considered relevant to the study using a systematic review method.

A systematic review is a comprehensive review of literature which differs from a traditional literature review in that it is conducted in a methodical (or systematic) and unbiased manner, according to a pre-specified protocol, with the aim of synthesising the retrieved information through meta-analysis, often using statistical tests (Dempster 2003).

It seeks to answer a specific question, reviewing articles that were included based on predetermined criteria. It presents the findings as a meta-analysis in the case of quantitative studies and as a narrative analysis if the studies are qualitative. This review follows the format outlined by Dempster (2003).

Systematic reviews are popular in the medical studies discipline and have been used for a variety of different studies in the library and information science discipline. Koufogiannakis (2012) gives a systematic review of the latter in her paper.

The advantage of a systematic review is that it creates an unbiased synthesis from a great body of literature (Sayers 2007: 425). Not only does it synthesise, it also draws conclusions from existing evidence (Koufogiannakis 2012: 91). This allows for a robust literature review that is impartial and focused. For this study a systematic review was particularly useful, as the literature in the library science discipline is predominantly professional. A systematic review provided an unbiased method of selecting the more academic literature.

This chapter begins with the details of the systematic method used. The selected readings are discussed in groupings around the economic variable in question. A summary concludes this chapter.

## **2.1 The method of the systematic review**

This section outlines the method of a systematic literature review. It outlines what kind of literature was considered, what criteria the eligibility of the literature was measured by, the search strategy that was used and an overview of the included research. The remainder of the chapter discusses the literature that was included by the criteria set out in this section.

### **2.1.1 The research question of the systematic review**

Systematic reviews start with the definition of the research question. In this chapter, the systematic review will answer the following question: What aspects of the public library service contribute to economic growth and development factors?

Public libraries are often looked at as if they were a single service, while in reality there are multiple aspects to that service. Totterdell and Bird state “Particular services are effective not libraries as a whole” (1976: 132). The library could be used as a place, the book stock or computing facilities could be the reason for use, patrons might frequent the library to talk to the librarian or the library programmes could be drawing users. Not all aspects are offered equally in all libraries, highlighting many ways that libraries could be different. This question focuses on revealing what variables of a public library service might be contributing to the economic factors. For example, the reading programmes run in libraries might provide better support for encouraging education than the book stock. Another example is that employment might be furthered more by the provision of free computer and Internet tools rather than word-processing assistance from the librarian. The identification of which public library variables might impact the economy will inform the quantitative study in the remainder of this thesis.

The economic factors are those that were introduced in the previous chapter, namely: economic growth or GDP, savings, economic development, social capital, education, health, and employment.

### **2.1.2 Eligibility criteria**

A key feature of a systematic review is that the criteria for including or excluding a study are predetermined. In this review the eligibility criteria are as follows.

Only English language items were considered. Formats were limited to books, journal articles, published conference proceedings, theses and dissertations. Resources had to discuss public libraries specifically; articles where public libraries were one of many types of libraries were included. Other libraries have different mechanisms through which they influence the economy. Academic libraries, for example, impact on the education of the students they serve. The libraries' influence is through the academic institutions, and not directly on the public as it is in the case of public libraries. Where studies make no mention of public libraries, they were excluded.

It is acknowledged that in restricting the review using these criteria, one runs the risk of excluding telling articles. Where such articles have been discovered, they have been included elsewhere in this thesis but not in this review.

### **2.1.3 Search strategy**

The following terms were used in the search:

- (“public library” OR “public libraries”) AND “social capital”
- (“public library” OR “public libraries”) AND (education OR “information literacy”)
- (“public library” OR “public libraries”) AND health

- (“public library” OR “public libraries”) AND (employment OR entrepreneur\*)
- (“public library” OR “public libraries”) AND (savings OR financial)
- (“public library” OR “public libraries”) AND (GDP OR “gross domestic” OR growth)
- (“public library” OR “public libraries”) AND development

The databases that were searched ranged from multidisciplinary databases such as Academic Search Complete and subject specific ones like EconLit. In addition to databases, Google Scholar was included as the only general search engine. These are outlined in Table 1.

*Table 1: Databases and search engines included in the systematic review*

Platform	Databases and Search engines
EBSCOHost	Academic Search Complete, Africa-Wide Information, Business Source Complete, CINAHL with Full Text, EconLit, ERIC, Health Source - Consumer Edition, Health Source: Nursing/Academic Edition, Humanities Full Text (H.W. Wilson), Humanities Source, Library, Information Science & Technology Abstracts, MasterFILE Premier, MEDLINE
ProQuest	ABI/INFORM Global, Biological Sciences, International Bibliography of the Social Sciences (IBSS), Library and Information Science Abstracts (LISA), ProQuest Dissertations & Theses A&I, ProQuest Research Library, ProQuest Sociology, ProQuest Sociology Collection, Social Services Abstracts, Sociological Abstracts
Emerald	Emerald Insight
SciVerse	ScienceDirect
SciVerse	Scopus
Google	Google Scholar

A maximum of the first 100 results in a relevancy ranked list for each search in each database were examined. Most result lists included results that counted well above 100. In many cases relevant studies were only found within the first fifty. However, the search was expanded to include the first 100 to ensure that studies that were incorrectly

ranked were not overlooked. Unfortunately the high volume of hits precluded a complete examination of all results found.

Further results were found by examining the end-of-text reference list of the included (at full-text) articles for other articles that matched this predetermined criteria. In addition, alerts were set up in all the platforms that continued giving results after the initial search was done. These alerts were either as really-simple syndication (RSS) feeds or email alerts.

Search results were managed in Mendeley. Mendeley is a bibliographic management tool, similar to RefWorks, Endnote, Zotero or BibTeX. These tools allow for the management of search results and articles. Another feature is that they assist with citing when writing in a word-processor, although Mendeley was not used in that way in this thesis. The choice of Mendeley was arbitrary.

The search results were examined for title relevancy. This yielded 527 documents for examination. Of those, eighteen could not be found. The abstracts were looked at next, and examined for relevancy in answering the central question. All those that did not explicitly mention public libraries were excluded. Where the abstract was not available, the first paragraph of the paper was examined.

Of the remaining articles, those included had to have used a research method that was judged to be relevant to the present study, repeatable and empirical; in particular, the method had to suggest or explore a probable link between economic variables and library variables. An example of an excluded article would be a paper that looks at the demographics of the user population using surveys, and then concludes that the library can be used by all (Elbert, Fuegi and Lipeikaite 2012). It is acknowledged that including only repeatable and empirical research will bias the results toward journal articles and dissertations, and may exclude books and other forms. Journals and theses are likely to use primary sources more, while monographs collate and review existing publications. Both qualitative and quantitative studies were included. Papers pursuing theoretical and anecdotal approaches, including simple case studies, were excluded.

While anecdotal evidence has its value in that it reveals the qualitative aspect of studies, and paints a picture of what is, it does not provide evidence that can be extended to situations beyond the specific case. Illustration 1 is a summary of how the search results were winnowed down.

<b>Initial search</b>
• De-duplication: 509
• Included at abstract level: 397
• Included at full-text level: 33
+ Results included from alerts
• De-duplication: 52
• Included at abstract level: 37
• Included at full-text level: 4
+ Results included from end-of-text reference lists
• De-duplication: 22
• Included at abstract level: 11
• Included at full-text level: 2
= Total number of results included: 39
<i>Illustration 1: Search results</i>

Appendix A gives details of which results representing full-text items were excluded.

**2.1.4 Overview of the included articles**

Of the thirty-nine results, twenty-nine were journal articles covering twenty unique titles. All articles were from peer-reviewed journals. Four theses were included. Only one of these discussed Canadian public libraries (May 2007), the remainder were from

the USA. Three reports from the USA, two reports from Australia and a chapter from a book which covered a Canadian study were also included (McKenzie and others 2007).

Table 2 outlines the country in which the study was placed.

*Table 2: Countries covered*

Country	Number of studies
United State of America	22
Canada	4
Norway	4
Australia	3
United Kingdom	2
Japan	1
Nigeria	1
Scotland	1
International	1

This result follows publication patterns in general, with the large majority originating from developed countries, particularly North American countries.

In discussing the library aspects, programmes for users, such as adult reading programmes, were most heavily discussed (n=20) by the researchers. This could be attributed to the fact that library programmes are auxiliary to the core functions of the library, and librarians need to prove the effectiveness of such programmes to ensure their continuation. The library as a place came up second (n=12), with interaction with librarian (n=10) and Internet services (n=6) following. The least discussed aspect was books (n=2). This is surprising as books are considered to be core to most library services. Perhaps their importance is taken as given, and thus did not need to be defended in the literature; or perhaps electronic resources are more in vogue as a research topic.



Some economic themes were more prevalent than others in the literature. GDP was the only economic theme that was not included at all. The others were: social capital (n=19), health (n=14), education (n=12), employment (n=5), and savings (n=1). Some articles dealt with more than one economic factor. As a result of this uneven distribution, the discussion of these articles in the remainder of the chapter will also be uneven. This does not imply that themes that are discussed in greater length are more important than others; it is simply a reflection of their popularity as revealed in the literature.

The remainder of this chapter discusses the included papers in depth, according to the economic variables.

## ***2.2 Social capital***

Social capital was revealed to be the most popular economic aspect discussed in the selected literature (n=19). Five library services were found to contribute to social capital: library as a place (n=12), interactions with library staff (n=6), computing services (n=4), library programmes (n=3), and books (n=1). This section discusses each of these in turn. Some papers covered more than one library service, and so will be discussed more than once.

It will be shown that, according to the literature, libraries contribute to both bridging and bonding social capital, a distinction made by Putnam (2000: 22-23). As explained in Chapter 1, bonding social capital brings together people of similar background, strengthening their bonds, while bridging social capital creates links between those of dissimilar backgrounds. Putnam explains that both are important for creating feelings of trust, but bonding social capital is particularly important for economic growth (2000: 23).

### **2.2.1 Library as a place**

The first aspect that is reported to contribute to social capital is the library as a place. It is the most often cited aspect in the literature with regard to social capital. The library as a place refers to the physical environment that the library encapsulates, a destination and an environment. It is one of the most complex aspects of the public library service. The discussion that follows highlights some aspects of how the library functions as a place.

The Norwegian Research Council funded a project in 2006 specifically designed to examine how public libraries as a place contribute to social capital, named PLACE, Public Libraries Arenas for Citizenship (Aabø and Audunson 2012: 139). Several papers which were relevant to this thesis came from that project. Audunson and others (2007) examined what kind of meetings were taking place in libraries. They dichotomised these meetings into high intensive and low intensive. High intensive meetings revolved around factors which epitomized “primary involvements and values” (Audunson and others 2007: 4), while low intensive meetings revolved around secondary or other interests. This dichotomy was created to explore how libraries contribute to bridging and bonding social capital. Audunson and others (2007: 4) postulated that if a library functioned as a high intensive meeting place then it would contribute to bonding social capital, and if it was a low intensive meeting place it would be contributing to bridging social capital.

The study surveyed 750 Norwegians from a variety of backgrounds. Social capital was measured with two aspects: community involvement and feelings of trust. The use of the library as a meeting place was examined with a variety of questions. The study revealed that libraries are used to meet friends (high intensive and bonding social capital) as well as a place for random encounters with strangers (low intensive and bridging social capital) (Audunson and others 2007: 9). It was highlighted that the library was often used as a place by people of “other” cultural backgrounds (that is, not Norwegian) (Audunson and others 2007: 10).

Aabø, Audunson and Vårheim (2010) took the PLACE study further and looked at whether or not the demographics of the respondents could account for the varied use of the library as a meeting place. Their surprising finding was that people with lower education profiles used the library more (Aabø, Audunson and Vårheim 2010: 40-41) as a meeting place than those with higher education profiles. This finding contrasts with the established positive correlation between library use and education (Aabø, Audunson and Vårheim 2010: 41 citing Audunson [1995], D'Elia [1980], and Sin and Kim [2008]). Use of the library as a meeting place by those with lower education tends to be more intensive. Those with a lower income also use the library more as a meeting place and their meetings are of higher intensity (Aabø, Audunson and Vårheim 2010: 41). This could be because the library is a cheap venue when compared to a coffee shop or the movie theatre.

Those who are more involved with the community report a greater use of the library as a meeting place. The authors propose that this could be because people who are more involved in the community know more people, increasing the probability of a chance encounter (Aabø, Audunson and Vårheim 2010: 41). Frequent library users report that they meet strangers more often than those who use the library less frequently (Aabø, Audunson and Vårheim 2010: 41-42). This finding raises the question about whether greater community involvement can be regarded as an outcome of using a library, or if community involvement is responsible for increased library usage. The causal route is not clear, if there indeed is one.

Picking up on the earlier work, Audunson, Essmat and Aabø (2011) explore how immigrant women make use of public libraries as a meeting place. This paper also resulted from the PLACE project. The library is used as a place for immigrant women to integrate themselves into society. A visit to the library is a social outing as well as an informative one to learn about the host country. The library represents a safe, known meeting place for these women. The library is also used to keep up to date with the news of the home country (Audunson, Essmat and Aabø 2011: 11-15). These uses highlight the role that the library as a place plays in creating bridging social capital between immigrant women and their host country.

Aabø, Audunson and Vårheim (2010) make it clear that the use of the library as a place and its contribution to social capital is a complex matter. Aabø and Audunson (2012) attempt to unpack this issue further. Still using the PLACE study, they confirmed that the library is used as a low and high intensive meeting place (Aabø and Audunson 2012: 146). Their anecdotal evidence reveals that the library is considered to be a private, public and parochial realm (Aabø and Audunson 2012: 147). Use of the library as a meeting place is not restricted by any socio-economic boundaries (Aabø and Audunson 2012: 146), making it socially inclusive and thus contributing to social capital.

Rather than look at which distinguishing features in the users result in differences in library use, Klopfer and Nagata (2011) tried to examine what features of the library could result in a difference in library use. Their interest arose out of an exceptional library in Echigawa, created so out of the “vigor and vision” of the library director (Klopfer and Nagata 2011: 68). They found that this director had arranged the library to appeal to the Japanese people’s sense of belonging. “Extending from [the director’s] vision, the physical design of the Echigawa library was not just designed on a mundane open stacks model, but explicitly relies on culturally appropriate aspects of traditional Japanese houses.” (Klopfer and Nagata 2011: 75). In light of the finding by Audunson, Essmat and Aabø (2011) of the use of libraries by immigrants discussed previously, one questions whether the library discussed by Klopfer and Nagata (2011) would be as inviting to immigrants as it is to the native Japanese. It would seem that the use of the library as a place is culturally relative and what might be socially inclusive to one culture might not necessarily be considered so by another.

The relative nature of inclusion is picked up by Gould and Gomez (2010) in their study of the “coolness” of libraries in comparison to telecentres and cybercafés. Libraries were found to be less cool, indicating that they are less socially inclusive to the youth (Gould and Gomez 2010: 260). However, libraries were seen as the safest of the three locations (Gould and Gomez 2010: 260) showing that they are contributing to feelings of trust and therefore to social capital. On the other hand, Swinbourne (2000: 8) found

that there was a high use of the library among youths, the attraction being that it was a safe space, yet without a chaperon.

Libraries are still the least preferred location for accessing the Internet. The Gould and Gomez (2010) study ranged over twenty-five countries, mostly developing countries. It represents one of the few papers included here on developing countries. The findings do not suggest a difference from perceptions in developed countries.

Johnson and Griffis report on teenagers “hanging about” the library lounge area in a Canadian study (2009: 168). Again, the library was shown to be a social and safe space (Johnson and Griffis 2009: 187), used by patrons across demographic boundaries. The library is used by young and old, rich and poor, and for a variety of different purposes (Johnson and Griffis 2009). In this study, the authors highlight the exposure to “people from all walks of life” (Johnson and Griffis 2009: 188). It is a place for low-intensive [sic] meetings, to use the dichotomy introduced by the PLACE studies (Aabø and Aundunson 2012; Aabø, Audunson and Vårheim 2010; Aundunson and others 2007) and contributes to bridging social capital.

Also looking at Canadian libraries, May says “These observations indicate that patrons value libraries for providing technology but and also [sic] as physical spaces to sit, read, relax and socialize” and “patrons at all libraries [in the study] valued them as physical spaces where they felt comfortable” (May 2007: 112). May found that the way that each library in her study was used as a place was relative to its community (May 2007: 113), a finding that echoes Klopfer and Nagata (2011). The design and arrangement of the library plays an important role in the use of the library as a place (May 2007: 115). This is something that the director of the library in Klopfer and Nagata (2011) used to his advantage.

Heuertz (2009), in her study of three rural libraries in the USA, found that libraries do build communities through involvement with those same communities. As the groups differ, the library involvement differs (Heuertz 2009: 279). One of the libraries partnered with schools, another with business entities, and the third with civic

organisations (Heuertz 2009: 279). The library offers a venue to these outside partners (Heuertz 2009: 280), amongst other things, and brings together people who would not normally mix (Heuertz 2009: 279). This gives evidence of the libraries contribution to bridging social capital. Heuertz highlights again the important role that library leaders play in ensuring that the library contributes to its community (2009: 282).

“Library attributes perhaps begin with friendly, professional, and importantly, steady staffs that create welcoming, helpful, neutral environments where paths of different community groups cross” (Heuertz 2009: 281). The positive nature of libraries is not only true in the USA. Speaking of libraries in Victoria, Australia, Rosenfeldt says “Public libraries are clearly seen to be safe and comfortable places for people to gather, a focal point for community” (2006: 190). The study that Rosenfeldt is reporting on surveyed over 8000 citizens, and found that 22 percent spoke to people in the library who would not normally be their friend, and 18 percent reported that they have met new people in the library (Rosenfeldt 2006: 190). This, yet again, gives evidence of bridging social capital.

A similar study was done in New South Wales two years after the Rosenfeldt study (J. L. Management Services 2008). The library fostered a sense of community and belonging, 26.2 percent of the respondents said (J. L. Management Services 2008: iii). The library was reported to be a “safe and pleasant place to visit” (98.3 percent), it encouraged social behaviour (88.7 percent), and it operated in a “non-discriminatory manner” (J. L. Management Services 2008: iv). One can conclude that the libraries in New South Wales are inclusive and contribute to the social capital of their communities.

These studies have painted a picture of libraries being safe, socially inclusive places to visit, giving evidence that the library as a place contributes to social capital. Several factors make the library such a place, including the leadership of a good director, community responsiveness, and the librarians themselves. The involvement of the librarian is a theme that will be discussed in the next section.

## **2.2.2 Interaction with the librarian**

Heuertz (2009) shows that the librarian contributes to the creation of social capital by creating a professional yet welcoming environment. She found, however, that high staff turn-over did not aid in feelings of community (Heuertz 2009: 269), staffing should be stable; “skillful and competent” (Heuertz 2009: 269). Swinbourne (2000: 26), too, found that length of service contributed positively to the relationships that the community formed with their librarian.

Rosenfeldt (2006) reports that 71 percent of library visitors talk to the library staff. This came out of a survey of over 8000 residents in Victoria, Australia (Rosenfeldt 2006: 190). These visitors were not asking for help: a separate question in the survey covered that issue (Rosenfeldt 2006: 190). These visitors were making their library trip a social one by reaching out and connecting to the librarians (also reported by May 2007: 100, 103, 106). It would seem that even if library users do not talk to each other, they still would talk to the librarian. It is the librarians themselves who would then contribute to social capital. A trip to the library would not be as social without their presence. Particularly among elderly people, Swinbourne (2000: 28) found that the interaction with the librarian was a major selling point of a visit to the library.

An in-depth study of the relationship between patrons and library staff was done by Johnson (2012). The librarians surveyed reported knowing their patrons on a personal level, making it easier (the librarians believed) for the patrons to ask questions and make full use of the library resources (Johnson 2012: 56). This is a trust relationship (Johnson 2012: 56), trust being an indicator of social capital. These relationships go beyond the professional role of the librarian (Johnson 2012: 60), and bring into question whether the relationship between librarians and their users can be assumed to be this good in all libraries.

In an earlier study that Johnson did with Griffis (2009) she demonstrated how librarians knew what books their patrons liked and would suggest authors and titles to them

(Johnson and Griffis 2009: 184). To another patron, the librarian suggested a Saturday programme that she thought the patron would be interested in (Johnson and Griffis 2009: 185). This offers proof that the librarians know their patrons on a more personal level. This particular patron would come to the librarian for the emotional support of the librarian: on his “down” days he could depend on a “bubbly” librarian to cheer himself up (Johnson and Griffis 2009: 186). These case studies that Johnson and Griffis gave were indicative of many interviews that reported the same relationship that librarians have with their patrons. The interaction with the librarians contributed to the feeling of inclusion, community and, so, social capital.

Kelly (2012) also found evidence of this trust relationship in her study on the perceptions of libraries in regard to health information. “[The users] saw the library as second only to physicians as a source of trustworthy information” (Kelly 2012: 123). However, the main point of her article differs from the others: that both users and the librarians were uncertain as to the role that libraries should play in providing health information (Kelly 2012: 123). Librarians lacked expertise and training, and this was obvious to the users. If, as Heuertz (2009: 269) asserted, librarians should be “skillful and competent”, then the lack of skill or competence might provide a negative contribution to social capital.

Librarians appear to be a fundamental part of how libraries contribute to the creation of social capital, by being trustworthy participants in the community they serve.

### **2.2.3 Library programmes**

Library programmes are another aspect of the library service that contribute to social capital, as reported in the literature. Library programmes bring together members of a community who might not have been brought together otherwise, so the connection to bridging social capital is clear. This connection has been shown empirically in several studies.



McKenzie and others (2007) examined two library programmes, story-time and a knitters' group, and examined how the women attending these programmes interacted. When the women started attending, they were strangers, who later became friends after a few weeks within the programmes (McKenzie and others 2007: 128). The distinction between bridging and bonding social capital becomes blurred: what started out as a contribution to bridging social capital transformed into bonding social capital as friendships were formed. The researchers observed sharing of resources between members of the two groups (McKenzie and others 2007: 129) showing trust relationships. One is often hesitant to offer for loan items if one does not trust that the item will be cared for and returned. No hesitation was in evidence in the sharing of resources by members of the groups (McKenzie and others 2007: 129).

While a knitting group is not an obvious library programme, story-time definitely is. Libraries have books, and books are there to be read: the first law of Ranganathan's *The Five Laws of Library Science* (Ranganathan 1931: 1) states. Books can only be read by those who can read: literacy programmes are another obvious choice for a library. These programmes can include not only reading literacy but computer literacy too. K. Williams (2012) shows this to be the case, where she observed that patrons participating in a computer literacy class assisted one another (Williams, K. 2012: 59) which is evidence of bridging social capital where strangers interact. It is unlikely that these strangers would have had reason to interact with one another if they had not been brought together by this digital literacy programme which was run by a library.

The New South Wales study (J. L. Management Services 2008) reports on outreach programmes, another example of how programmes contribute to social capital, in this case through social inclusion. By bringing reading programmes to the community, non-English speakers were attracted to the library. These residents would not have been exposed to the library otherwise (J. L. Management Services 2008: 10). The respondents reported that the existence of such outreach programmes contributed to their feelings of community (J. L. Management Services 2008: 69).

Library programmes bring people together. They provide an opportunity to meet new friends and spend time with old ones. These opportunities contribute to the social capital of a community.

#### **2.2.4 Internet services**

Hand-in-hand with library programmes are Internet and computing services. Johnson and Griffis (2009: 186) give an example of a mother who comes into the library with her three children to use the computers that the library provides. Even though the family has a computer at home, in the library the children do not need to share. This engagement with the library the mother calls “family cohesiveness” (Johnson and Griffis 2009: 184). It helps in creating bonding social capital within the family unit.

The free Internet facilities that libraries in the USA offer, enable citizens to access disaster relief resources (Bertot, McClure and Jaeger 2008: 290). Citizens who usually would be economically inactive after a disaster are able to return to a state of economic productivity sooner than would have been the case, due to the services of the library. The Internet facilities also provide citizens access to e-government (Bertot, McClure and Jaeger 2008: 290) and civil participation, further evidence of how Internet facilities contribute to social capital.

Access to e-government was a theme picked up by Becker and others (2010: 118). They found the users who were using the library to exercise their civil rights were from a lower income group, older people, and possibly from minority cultural groups (Becker and others 2010: 118). Such access goes some way to overcoming the digital divide. This usage speaks strongly to the role that libraries play in social inclusion through their Internet facilities.

Some library users make use of the Internet facilities to manage clubs, associations or organisations (Becker and others 2010: 137). This use fosters bonding social capital. It

was the decline of such organisations that led to the writing of Putnam's seminal book (Putnam 2000) on social capital. The library offers facilities that aid the continued existence of such organisations.

Social capital is also built through the use of Internet services to keep in contact with family, friends and interests (Becker and others 2010: 159). Immigrants, in particular, are users of this aspect, as they need information technologies to keep contact with those outside of the host country (Becker and others 2010: 167). Social networking is a natural use of the Internet, and the Internet offered in libraries is no different (Becker and others 2010: 173). Keeping in contact with family and friends is a form of bonding social capital that the library fosters. DeMaagd, Chew and Huang (2012: 114) found that email and social networking were in the top three reasons for using the library computers. Even those who had access to the Internet elsewhere used library computers to connect to friends and family.

Putnam (2000: 174) recognised the potential that the Internet would have in bringing people together. These studies give evidence that it does in some cases perform this role.

### **2.2.5 Books**

Only one study reported that books were used to create community links. Audunson, Essmat and Aabø share a tale of an immigrant woman who used library books to inform herself on the customs of her host country (2011: 12). It is interesting to note that the traditional function of the library, the book collection, is the aspect of the library that is least cited in the literature as contributing to social capital.

## **2.2.6 Summary**

The literature makes it clear that libraries contribute to social capital through a variety of services. The use of the library as a place fosters bridging social capital as it encourages interactions between strangers who would not have interacted otherwise. Library programmes too bring together people from different walks of life. Those participating in library programmes often start off as strangers but end up as friends, blurring the distinction between bonding and bridging social capital. Library staff play an important role in ensuring the effectiveness of the library as a place as well as in library programmes. Over and above that, they themselves foster social capital through their interactions with patrons. By creating personal relationships with users beyond that which the professional role prescribes, they create a sense of community among their users. The book stock also provides a route to community involvement, although it is the least cited aspect. Internet facilities also contribute to social capital. They facilitate access by minority groups to disaster relief information and a way of participating in civil society. In addition, they provide a way for people to create and maintain clubs, associations and organisations. They provide a means to stay in contact with friends, family and interests. This is evidence of bonding social capital. Thus the library contributes to social capital, both bonding and bridging.

## **2.3 Health**

Health was the second most popular topic discussed in the literature (n=14). Libraries can contribute to health by providing health information in books or via online databases. Often the use of these databases requires some training, another way in which libraries can contribute. This section discusses librarian interaction (n=3), Internet resources (n=2), library programmes (n=8) and books (n=1). In the literature, health literacy is often referred to, and health libraries and public libraries can form partnerships in achieving the goal of health literacy (for an example, see Pifalo and others 1997). This aspect is discussed in more detail in Chapter 1.

As Xie (2011b: 941) reports “It is well documented that low health literacy has significant negative effects on health outcomes and the cost of healthcare”. Health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (U.S. Department of Health and Human Service 2000, cited in Xie 2011b: 933).

### **2.3.1 Interaction with the library staff**

In a survey of librarians in North Carolina, Linnan and others found that librarians answer on average 10.3 health-related reference queries per week (2004: 185). They rated themselves as quite comfortable in answering health-related questions: three-plus on a Likert scale where one was very uncomfortable and five was very comfortable (Linnan and others 2004: 186). However, they did indicate that they would like more training on health information/resources, matching resources to user needs and ethical issues (Linnan and others 2004: 186). Librarians referred to print resources, indicating that print sources are a source for health information (Linnan and others 2004: 187). It is unfortunate that the study did not indicate whether or not users were using these sources without the intervention of the librarian.

Print was also the favourite resource of librarians surveyed by Flaherty (2013: 160); however some cited Google as their first resource consulted (Flaherty 2013: 158). Flaherty’s survey tested the ability of librarians to answer a specific question: Do vaccines cause autism? Of the print titles recommended by the librarians, only one answered the question. This raises the concern that librarians are not properly equipped to deal with these questions.

This concern was more fully addressed by Kelly (2012). Librarians had no formal training in health resources, and were hesitant in interpreting health information for their users (Kelly 2012: 123). Kelly also found that librarians do not have proper knowledge of the health resources available to them and their users (Kelly 2012: 123).

If, as Kelly asserts, libraries fill the gap that health professionals are unable to fill, then the skills of the librarians are of particular importance. If librarians are not recommending appropriate resources, one cannot say for certain that they are then contributing to the health of citizens. They might inadvertently be doing harm.

Public librarians, who will be inevitably faced with health-related reference questions, should seek to equip themselves with the knowledge needed to provide reliable answers to their patrons.

### **2.3.2 Internet**

One disadvantage of print sources, is that they are not so easily kept up to date, compared with online sources. In the extensive study by Becker and others (2010) on the use of Internet in libraries, they found that patrons use the Internet for a variety of health-related issues: improving health, learning about medical conditions, finding information on health care providers and accessing health insurance (Becker and others 2010: 97).

The study reveals that seventeen million citizens of the USA use library Internet facilities to access health-related information. Fourteen million are looking for information about exercise and fitness (Becker and others 2010: 103). Those without access to the Internet elsewhere are more likely to make use of the Internet facilities in public libraries to look for health information (Kwon and Kim 2009: 197-198). In looking for a medical practitioner, ten million citizens reported that they use the Internet in the library, five million will make an appointment using the facilities in the library to see such a practitioner, which implies that five million citizens could receive medical care due to the resources provided by the library (Becker and others 2010: 112).

An example is given of a young woman who used the Internet provided by her library to contact her breast cancer support group (Becker and others 2010: 99). This example illustrates that the economic and development factors discussed here are not, perhaps, as discrete as the analytical framework adopted by this thesis makes them out to be. Indeed, they are interrelated, as was discussed in Chapter 1. This example shows how social capital (the support group) springs out of a health need (breast cancer).

The Internet available in public libraries provides health information which could help communities to manage their health better.

### **2.3.3 Library programmes**

Freedman and Nickell (2010) examined a library programme aimed at teaching children to make healthier choices when eating. They found that participation in their programme yielded a beneficial effect that was great enough to be considered statistically significant: however, this change of behaviour was not long lasting (Freedman and Nickell 2010: 194). The exception was water consumption: immediately following the programme there was no significant change in quantity of water drunk but, four weeks later, there were significant lasting effects. The authors thought that seasonal change might have been a factor (Freedman and Nickell 2010: 194).

San Diego has many HIV/AIDS affected and at-risk citizens. In an effort to address this, Pacific College of Oriental Medicine Library partnered with San Diego Public Library to offer HIV/AIDS information workshops (Broering, Chauncey and Miller 2012). The response was unexpectedly good, with extra unplanned sessions requested (Broering, Chauncey and Miller 2012: 12). Attendees returned for refresher sessions and asked more specific questions (Broering, Chauncey and Miller 2012: 12), illustrating a breakdown in stigma barriers. The libraries reported an increase in the usage of their reference material relating to health issues, and an increase in reference

queries (Broering, Chauncey and Miller 2012: 12). The programme served as a marketing tool for the health-related services that the libraries could offer.

Iowa City Public Library joined forces with the National Library of Medicine to create a Consumer Health Project (Smith, Logsdan and Clark 2005). Classes on where to find reliable information were given both in the library and at outreach venues (Smith, Logsdan and Clark 2005: 503, 504). It was found that basic search skills needed to be taught to create a foundation for learning (Smith, Logsdan and Clark 2005: 504). The authors reported that there was a significant change in the number of respondents who used the Internet to find health information. Before the class, only 45 percent of the respondents were reported to have used the Internet to search for health-related issues; this figure jumped to 75 percent after the intervention (Smith, Logsdan and Clark 2005: 509). The authors concluded that the programme was a success, that it achieved its goal of educating Iowa residents on the reliable resources for health information. One can assume that, if one has reliable health information, then one will be healthier. If this is the case, then the Consumer Health Project in Iowa contributed to the health of its citizens.

Library programmes on how to use online health sources are a popular method in which libraries can contribute indirectly to the health of the citizens of a nation. Reporting on an intervention aimed at older adults, Xie (2011a) found that there was a significant improvement in a variety of skills. Post-intervention, there was a statistically significant improvement in computer knowledge, Internet skills and health literacy (Xie 2011a). The intervention improved the participants' attitude to ageing, an unexpected result (Xie 2011b: 939). This study also revealed that while all the respondents expected the library to have health information, only 73 percent thought that the library actually had such information (Xie 2012: 69).

A similar project was reported on by Oermann (2005). By providing a workshop on the quality of health resources on the Internet, the librarians were able to market good-quality tools that were available to their users. Hoffman-Goetz, Friedman and Celestine



(2006) tell of an intervention in a Canadian public library. Their programme reported similar effects on the health-literacy levels of their participants.

Library programmes serve to highlight the issues that they address. Health-related library programmes are no different.

### **2.3.4 Books**

The only study that highlighted the use of library books in the provision of health information was done by Ape, Uganneya and Ode (2012). They focused on HIV/AIDS information. While they did not report it to be so, books are a discreet provision of information on a disease that is still stigmatised.

### **2.3.5 Summary**

As providers of information, public libraries can be key players in linking their communities with health-related resources. Librarians and library programmes highlight information found in books and online.

## **2.4 Education**

The link between libraries and education is an obvious one, and well established in the literature. This link is entrenched in the purpose of a library. Education is one of the most direct ways that libraries can contribute to human development and, so, economic growth. The literature on the link between education and library aspects draws on library programmes (n=11) and Internet resources (n=2).

## 2.4.1 Programmes

Roman and Fiore report that summer reading programmes have long been popular activities held in the library, but recently funding agencies have questioned the effectiveness of these programmes (2010: 27). The authors set out to prove that these summer reading programmes are indeed effective. A partnership was formed between Dominican University, Colorado State Library Agency, Texas Library and Archives Commission, and Center for Summer Learning at Johns Hopkins University (Roman and Fiore 2010: 27). The programme was run over eleven sites and it was found that participants, who were mostly girls who had finished the third grade and were moving to the fourth, experienced no loss of reading ability when they began school in the new grade (Roman and Fiore 2010: 30). Teachers reported that the learners who had participated had a better attitude towards reading and school in general (Roman and Fiore 2010: 30). The authors acknowledge that their study did have some limitations. For one, there was not a control group with which they could validate their findings (Roman and Fiore 2010: 30). Another is that there was a selection bias. Learners who participated in the library summer reading programmes had a background of higher library use and were exposed to more literacy activities at home (Roman and Fiore 2010: 30).

Celano and Neuman (2001: 42) reported on a summer reading programme that did have a control group. Using the John's Reading Inventory Test, the third grade children who attended the programme were assessed as reading at a grade level of 2.9, just below their actual grade level, while the children who did not attend this programme, but another non-reading programme, were assessed as reading at 2.2, significantly lower than the former group (Celano and Neuman 2001: 43). There appeared to be no significant difference between the two groups, but one cannot rule out a selection bias (Celano and Neuman 2001: 46). Another study that included a control group was that done by Fehrenbach and Hurford (1998). They found that their literacy programme aimed at preschool children had a statistically significant impact on the children included, regardless of age or gender.

When the children were asked what the greatest benefit of the reading programme was, reading more and enjoying it more were popular answers (Celano and Neuman 2001: 24). In other words, the children were more comfortably literate. Celano and Neuman claim “For thousands of children throughout Pennsylvania, preschool and summer reading programs offer a strong step up in their climb toward reading achievement, and ultimately, success in school” (2001: 40). One can extend this beyond school and say that summer reading programmes may work toward economic success.

Children are not the only beneficiaries of library literacy programmes: adults are too, as Crawford and Irving (2012) report. Participating in a programme in Inverclyde were women who had completed school and had no further qualifications (Crawford and Irving 2012: 85). The biggest impact reported by both the participants and the tutor was on the participants’ confidence (Crawford and Irving 2012: 85), which is a big factor in employability (Crawford and Irving 2012: 86). The authors were unable to report on the actual effects that the programme had on the employment opportunities of the participants.

Confidence was also an important factor in Internet literacy programmes for older adults, Revercomb reports (2005: 154). In her study, strategies for confidence building received 30 percent of the class focus. This contrasts with classes for younger generations, where confidence-focused strategies were only 15 percent of the content for Grades 3-8 (Revercomb 2005: 154). The participants reported that they gained in confidence through attending the programme (Revercomb 2005: 145). They also reported that they did indeed gain the Internet-searching skills that they aimed to develop by attending the programme (Revercomb 2005: 144).

Development of Internet skills seems to be the primary adult programme offered by libraries. The Inverclyde programme was based on online literacy (Crawford and Irving 2012). Others have focused more strongly on Internet skills. Bertot, McClure and Jaeger (2008: 288) say that providing free training is one of the key ways that public libraries can support their communities. They report that 45.7 percent of public libraries in the USA provide training in information literacy skills, 37.6 percent provide training

in general technology skills, and only 23.8 percent offer no training whatsoever (Bertot, McClure and Jaeger 2008: 290). This service has led to the suggestion that libraries need to rethink their roles within their communities. As more and more Internet-based services are offered by public libraries, the purpose of the public library needs to be realigned to reflect this (Bertot, McClure and Jaeger 2008: 295). Librarians need to re-look at what skills they have in order to best address this changing need (Bertot, McClure and Jaeger 2008: 297). Alternatively, communities need to explore the possibility that such services are not the responsibility of the library, and that the communities need to find a different way to address this need that does not involve the libraries (Bertot, McClure and Jaeger 2008: 299).

McClure and others acknowledge that providing library programmes that support education is one way in which the libraries in the State of Florida can support the economy (2001: 4). McClure and others recommend that such programmes should be marketed more, and perhaps a formal, more responsive, programme should be developed (McClure and others 2001: 6).

In an intensive study on educational programmes in rural libraries, Hancks found that the most successful programmes were those centred around computer and technology use (2011: 135). Successful was defined as “best attended”. The library programmes were well marketed thanks to outreach programmes (Hancks 2011: 136). Hancks concluded that libraries are able to contribute to the economy through the development of human capital: by contributing to education through library programmes, citizens are able to contribute more to the economy.

Xie, whose research was introduced in the previous section on health, reported that there was a statistically significant improvement in Internet and Web skills following an intervention aimed at equipping older adults with e-health knowledge (2012: 68). These older adults were also more confident in using technology. Anxiety decreased, while computer interest and efficiency increased to the point where the changes were regarded as statistically significant (Xie 2012: 67). In an earlier paper, Xie claims that these improvements were “large” (2011a). This, Xie clarifies: “a learner increased from

the 50th percentile on the pre test to the 99th percentile on the post test on this measure [of efficiency]” (2011a). In another paper examining the same intervention, Xie reports that there was not a statistically significant improvement in efficiency (2011b: 937). This might make one question the validity of his reporting.

Library programmes are an informal kind of schooling. Their purpose is to educate the community, even if it is in some skill. These studies show an empirical link between attendance at library programmes and education.

## **2.4.2 Internet**

Not all library users are in need of library programmes. Libraries can still contribute to the education of these users by providing access to educational resources, such as the Internet. Becker and others report that thirty-six million people in the USA use computers in the library for educational uses (2010: 58). The youth are most likely to be among those thirty-six million (Becker and others 2010: 58), using the library computers mostly to do their homework (Becker and others 2010: 59). Taking an online class on library computers was also reported (Becker and others 2010: 59), with adults taking the opportunity to enrol in distance learning (Becker and others 2010: 68). It would appear that Internet in the library is more likely to be used by those with lower income, and those whose first language is not English (Becker and others 2010: 71). The library provision of Internet facilities contributes to achieving social equality.

Bertot, McClure and Jaeger (2008: 289) state that the public Internet services offered by libraries include education resources. They list the following as “content of public access Internet services critical to the role of the public library” (Bertot, McClure and Jaeger 2008: 289):

- Provide education resources and databases for K–12 students
- Provide education resources and databases for adult/continuing education students
- Provide education resources and databases for students in higher education

- Provide education resources and databases for home schooling
- Provide information for college applicants

Whether or not these resources are actually used for their intended purposes is not addressed. However, it would not seem likely that they go completely unused.

These two studies show that even without the programmes, the Internet facilities provided by public libraries can contribute to the education of library patrons.

### **2.4.3 Summary**

A library is often referred to as an educational resource. It is evident from the literature that libraries do contribute to education through a variety of different ways, such as literacy programmes and Internet sources. One can infer that if online information is used as an education tool, then print information can be used similarly. However, this is not reported in the literature, perhaps because it is an *a priori* assumption.

## **2.5 Employment**

Supporting employment efforts of its users is another way in which libraries can contribute to economic growth and development. A search of the literature revealed five studies that showed empirically how libraries are contributing to the increased employment of their community members. These five studies cite that there are several library aspects which can be contributing: Internet and computer facilities (n=4), library programmes (n=3) and interaction with the librarian (n=1).

## 2.5.1 Internet and computer facilities

Becker and others (2010: 73) report that about 40 percent of the survey respondents claimed to use the libraries' Internet and public-access computer to support their employment activities. The Internet and computer facilities aid library users to find job opportunities and prepare résumés and applications (Becker and others 2010: 75). As many as fourteen million users make use of the libraries' computers to prepare résumés (Becker and others 2010: 78). The computers are used to submit job applications. Becker and others (2010: 80) claim that four million citizens in the USA have found employment due to the free public-access computers and Internet services that their public libraries provide. Those without access to the Internet elsewhere are more likely to use the Internet facilities in public libraries than those who can access the Internet from work or home (DeMaagd, Chew and Huang 2012: 113).

Once employment has been found, some library users continue to use the Internet and computer facilities to do their jobs (Becker and others 2010: 87). "Many users also indicated that they used the library as a substitute office while traveling" (Becker and others 2010: 87). This gives an example of how the libraries assist users in maintaining their employment status.

The Internet and computer facilities aid in entrepreneurship too (Becker and others 2010: 90). Instead of simply facilitating work during travel, the facilities enable the creation of businesses. The computers with their Internet connections in libraries can be used to locate potential customers, start a new business, or to write a business plan (Becker and others 2010: 92).

Bertot, McClure and Jaeger (2008) claim that the public access Internet services are critical to the role of the public libraries. Of the uses of these services reported, the services for job seekers and for skills training were the second and third most used (44 percent and 29.8 percent respectively). Educational services came up top (67.7 percent) (Bertot, McClure and Jaeger 2008: 289). This result highlights how important the

public access Internet facilities are to the role of the public library, in that they support the employment objectives of the community.

Reporting on public library usage during the economic recession of 2007/2008, Child and Goulding (2012: 655-656) mention that a higher demand for the public access Internet computers for job-seeking activities was reported by library staff. This would be a logical use of the Internet resources as employment decreases during economic recessions. Employment-seekers would make use of every available resource to find gainful employment, particularly if those resources are free, as they are in a public library.

The Internet is a source of information, including information that aids employment. As many public libraries provide free access to the Internet, it is clear how the public libraries assist in finding employment through the channel of the Internet.

### **2.5.2 Programmes**

As previously stated, Child and Goulding reported an increased demand for the public-access Internet facilities in public libraries during the time of the economic recession (2012: 655). They postulate that this could be as a result of the targeted programmes that public libraries were running during the recessionary period, such as “CV Surgery” (Child and Goulding 2012: 655). Other programmes included tax workshops, training and educational courses.

Library programmes offer users an opportunity to upskill themselves in order to find better employment, claim Becker and others (2010: 85). These programmes can be formal or informal, groups or individual (Becker and others 2010: 85).

Libraries could undertake “economic gardening” projects that promote entrepreneurship. This is one of the ways that libraries can contribute to financial



capital, as reported by Hancks (2011: 140). While this support does not fall within the traditional role of a public library, some libraries have included economic-gardening programmes within their portfolio of services (Hancks 2011: 141).

Where library programmes are focused on employment issues, they can contribute to the state of employment in a community.

### **2.5.3 Librarian interaction**

One of the ways in which libraries assist the unemployed is through interaction with the librarian. Child and Goulding (2012: 655) report that librarians assist job-seekers in drawing up curricula vitae and completing job application forms. Although they do not offer quantitative evidence of this assistance, one can see how this could contribute to job finding among the unemployed.

### **2.5.4 Summary**

Through Internet services, library programmes, and interactions with the librarian, libraries are able to assist job seekers to find employment, which in turn contributes to economic growth and development.

## **2.6 Finances**

Libraries can contribute to the financial state of citizens and thus to the nation's economic growth. Although there are multiple ways in which libraries can do so, the literature only provides evidence of one: Internet facilities.

### **2.6.1 Internet**

The public access Internet facilities at a public library are used by households to better manage their finances (Becker and others 2010: 144). This included doing online banking, online shopping and managing debt (Becker and others 2010: 148). One can hope that if individuals and households are able to manage their finances better, then they would make more-informed financial decisions, and contribute more to the financial state of an economy.

### **2.6.2 Summary**

The library should not be viewed as a single service when examining its contribution to economic growth and development. Public libraries have various aspects of their service that could be contributing differently to economic growth and development. This is evident in the literature.

## ***2.7 Summary of this chapter***

Table 3 details the readings that covered the various aspects of economic growth and development as well as the uses for a library.

Table 3: Summary of the readings

	Social capital	Health	Education	Employment	Finances
<b>Library as a place</b>	Aabø and Audunson 2012; Aabø, Audunson and Vårheim 2010; Audunson and others 2007; Audunson, Essmat and Aabø 2011; Gould and Gomez 2010; Heuertz 2009; Klopfer and Nagata 2011; J. L. Management Services 2008; Johnson and Griffis 2009; May 2007; Rosenfeldt 2006; Swinbourne 2000				
<b>Interaction with librarian</b>	Heuertz 2009; Johnson 2012; Johnson and Griffis 2009; Kelly 2012; May 2007; Rosenfeldt 2006; Swinbourne 2000	Flaherty 2013; Kelly 2012; Linnan and others 2004		Child and Goulding 2012	
<b>Programmes</b>	J. L. Management Services 2008; McKenzie and others 2007; Williams, K. 2012	Broering, Chauncey and Miller 2012; Freedman and Nickell 2010; Hoffman-Goetz, Friedman and Celestine 2006; Oermann 2005; Smith, Logsdon and Clark 2005; Xie 2011a; Xie 2011b; Xie 2012	Bertot, McClure and Jaeger 2008; Celano and Neuman 2001; Crawford and Irving 2012; Fehrenbach and Hurford 1998; Hancks 2011; McClure and others 2001; Revercomb 2005; Roman and Fiore 2010; Xie 2011a; Xie 2011b; Xie 2012	Becker and others 2010; Child and Goulding 2012; Hancks 2011	
<b>Internet</b>	Becker and others 2010; Bertot, McClure and Jaeger 2008; DeMaagd, Chew and Huang 2012; Johnson and Griffis 2009	Becker and others 2010; Kwon and Kim 2009	Becker and others 2010; Bertot, McClure and Jaeger 2008	Becker and others 2010; Bertot, McClure and Jaeger 2008; Child and Goulding 2012; DeMaagd, Chew and Huang 2012	Becker and others 2010
<b>Books</b>	Audunson, Essmat and Aabø 2011	Ape, Uganmeya and Ode 2012			

It is clear from the thirty-nine papers included that the literature is uneven when examining the topic of public library contribution to economic development factors.

Certain topics, such as the role of the library as a place in social capital, are more popular than others. This is no indication of the relative importance, however. The books in the library are thought to be a fundamental part of the public library service, yet they do not feature predominantly in this examination. It is entirely plausible that their absence is due to the fact that their role is not believed to require defending. Other aspects, like library programmes, are considered auxiliary services by some libraries. Thus their existence needs to be defended in order to ensure continued funding. This difference could be one reason for the uneven reporting in the literature.

What this chapter demonstrated is that there is empirical evidence that libraries do contribute to economic growth and development, through a variety of different aspects. It lends weight to the central hypothesis of this thesis and shows that the claim made for the potential contribution of this thesis is not unwarranted.

The next chapter discusses in detail the method that this study employed, which will be followed by results, discussions and conclusions.

## **Chapter 3: Methods**

Chapter 1 described the theoretical model which was used in the study, namely the Solow-Swan neoclassical growth model. Economic development was defined as “a process that influences growth and restructuring of an economy to enhance the economic well being of a community” (International Economic Development Council 2013: 2), and was taken to include five aspects: employment, health, education, social capital and savings. Chapter 2 presented a systematic review and meta-analysis of the findings from the relevant quantitative studies and a narrative analysis of the qualitative studies identified.

This chapter outlines the method used in this thesis. The study employed empirical, quantitative methods to test whether public libraries impact on any of the economic variables identified above, thereby answering the primary question in this thesis: what kind of relationship exists between different parts of public library use and economic growth and development?

The chapter begins with a discussion on the geographical selections. The countries included in this study were determined by the availability of data. The two sections that follow the discussion on geographical selections give details on the data that was used: library and economic data respectively. These two sections explain where the data was sourced from and why specific indicators were chosen to represent certain variables. It also gives the specific limitations associated with the data. The following section discusses the statistical method employed, namely path analysis.

### ***3.1 Geographical selections***

This section explains which countries were included in the study. The countries selected for inclusion in this thesis were determined by the availability of data.

### **3.1.1 International dataset**

UNESCO Institute for Statistics (2012) provided data at an international level which allowed for an international analysis.

The countries included in the international dataset provided by UNESCO Institute for Statistics (2012) are shown in Table 4. The availability of the data for the various variables determined which countries were included. This selection changed according to the variables used for the specific statistical tests. The selections are given in Appendix B.

*Table 4: Countries included in at least one statistical test, figures taken from World Bank (2013a)*

Country	GDP per capita (1999) constant US\$	Population (1999)
Armenia	840.86	3,093,820
Bahamas	23,228.80	293,442
Bulgaria	2,548.00	8,210,624
Burkina Faso	346.63	11,281,942
China, Macao Special Administrative Region	15,089.75	425,448
Costa Rica	4,178.29	3,841,734
Croatia	7,626.62	4,554,000
Cuba	2,838.64	11,101,580
Cyprus	20,100.01	925,491
Czech Republic	9,933.78	10,283,860
Denmark	43,940.95	5,321,799
Ecuador	2,636.90	12,286,995
Estonia	6,522.28	1,375,654
Finland	31,603.61	5,165,474
Hungary	8,430.99	10,237,530
Iceland	45,658.89	277,381
Japan	33,264.84	126,650,000
Latvia	4,234.68	2,390,482
Lithuania	4,902.82	3,524,238
Mexico	7,103.73	102,316,781
Norway	59,195.69	4,461,913
Poland	6,477.63	38,660,271
Portugal	17,416.87	10,171,949
Republic of Moldova	570.02	3,646,999
Romania	3,266.72	22,472,040
Russian Federation	3,525.40	146,309,000
Rwanda	207.97	7,853,015
Saint Vincent and the Grenadines	4,143.10	107,879
Saudi Arabia	12,735.73	19,620,692
Sierra Leone	265.94	4,030,443
Slovakia	8,824.55	5,396,020
Slovenia	14,461.20	1,983,045
Sweden	35,073.43	8,857,874
Turkey	5,816.68	62,243,779
Uganda	268.81	23,507,800
United Kingdom of Great Britain and Northern Ireland	32,436.33	58,682,466

Table 4 shows that a variety of different countries were included in this study, ranging over different development levels and different continents.

### 3.1.2 USA

The USA was the only country studied in depth, as it is the only country that provides detailed data on public libraries. This set of data is collected by Molyneux (2013). This dataset consists of data on a number of library variables at a library level which was then easily aggregated to represent state-level data. A more extensive discussion of this is included in the next section. Until recently, Molyneux's dataset only included the fifty states, and it excluded the territories which fell directly under the USA government. These states, grouped by regions, are shown in Table 5.

*Table 5: States in USA by regional groupings (adapted from United States Census Bureau 1994)*

Region	States
East North Central	Illinois, Indiana, Michigan, Ohio, Wisconsin
East South Central	Alabama, Kentucky, Mississippi, Tennessee
Middle Atlantic	New Jersey, New York, Pennsylvania
Mountain	Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming
New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Pacific	Alaska, California, Hawaii, Oregon, Washington
South Atlantic	Delaware, District of Columbia, Georgia, Florida, Maryland, North Carolina, South Carolina, Virginia, West Virginia
West North Central	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
West South Central	Arkansas, Louisiana, Oklahoma, Texas

The regional groupings were given by the United States Census Bureau (1994).

The state-level data provided by Molyneux (2013) allowed for a country-level analysis. No other country provided data that was sufficiently granular.



## **3.2 Library data**

The choice of the library data that was used in this thesis was determined by the data already available. Given the scale of the proposed project, namely an international level including as many countries as possible over a maximum amount of years, it was not considered feasible to collect original data. This approach of using an existing dataset was followed, for example, by Liu (2004).

### **3.2.1 International library data**

A complete set of international library data does not exist. The UNESCO dataset was used by Liu (2004), and was the most complete dataset available for international library data (UNESCO Institute for Statistics 2012). Twelve variables are collected. These are:

- Administrative Units
- Annual additions. Other materials
- Annual additions. Volumes
- Collections. Audio-visual documents
- Collections. Books: Number of Volumes
- Collections. Microforms
- Collections. Other library materials
- Library employees. Holding a diploma
- Library employees. Trained on the job
- Loans to users
- Registered users
- Service Points

The only variable of use, as identified by the literature review is ‘Loans to users’.

The years of coverage that this indicator includes varies for the included countries.

Table 6 shows the included countries as well as the years of coverage:

*Table 6: Countries included in the UNESCO dataset*

Country	Years
Argentina	1995
Armenia	1999
Austria	1995-1998
Bahamas	1999
Barbados	1995
Belarus	1995
Belgium	1995-1997
Belize	1995
Belize	1995
Benin	1995
Bolivia (Plurinational State of)	1995
Bulgaria	1995-1999
Burkina Faso	1995, 1999
Canada	1995
Canada	1995
China	1996-1996
China, Hong Kong Special Administrative Region	1995
China, Macao Special Administrative Region	1999
Costa Rica	1995, 1999
Croatia	1995, 1999
Cuba	1995, 1999
Cyprus	1995, 1999
Czech Republic	1995-1999
Denmark	1995-1999
Dominica	1995
Ecuador	1999
Estonia	1995-1999
Finland	1995-1999
France	1995-1997
Georgia	1995
Germany	1995-1998
Greece	1995-1997
Hungary	1995-1997, 1999
Iceland	1995-1997, 1999
Iran (Islamic Republic of)	1995
Ireland	1995-1998
Italy	1995-1997
Japan	1999
Kenya	1995
Latvia	1995-1999
Liechtenstein	1995-1997
Lithuania	1995-1999
Luxembourg	1995-1997
Malaysia	1995
Malta	1995
Mexico	1995, 1999
Monaco	1995

Country	Years
Myanmar	1995-1996
Netherlands	1995-1997
Norway	1995-1999
Oman	1995
Poland	1995-1997, 1999
Portugal	1995-1999
Qatar	1995
Republic of Korea	1995-1996
Republic of Moldova	1999
Romania	1995-1997, 1999
Russian Federation	1995, 1999
Rwanda	1999
Saint Vincent and the Grenadines	1996, 1999
Saudi Arabia	1999
Senegal	1995
Sierra Leone	1999
Slovakia	1995-1999
Slovenia	1995-1999
Spain	1995-1998
Sweden	1995-1997, 1999
Switzerland	1995-1997
Togo	1996
Turkey	1995, 1999
Uganda	1999
Ukraine	1995
United Kingdom of Great Britain and Northern Ireland	1995-1999
Venezuela (Bolivarian Republic of)	1995
The former Yugoslav Republic of Macedonia	1995

This table shows how patchy the data coverage is. In summary the number of countries that have data per year is as follows:

- 1995 = 61
- 1996 = 35
- 1997 = 29
- 1998 = 16
- 1999 = 36

It was decided to use data from 1999, due to the availability of economic data in that year, which will be discussed in the next section.

### 3.2.2 USA library data

Library data from the USA were drawn from Library Research Services (LRS). Their home page explains more about them:

The Library Research Service generates library statistics and research for library and education professionals, public officials, and the media. LRS reports and analyses statistics on school, public, and academic libraries, and conducts studies on major library issues that are reported in the Fast Facts and Closer Look series. Topics of continuing interest to the LRS and its clients are the impact of school librarians on student achievement, public libraries and the use of web technologies, and the changing library workforce (Library Research Services 2013: About).

Data on public library services, hosted by Library Research Services, is curated by Molyneux (2013). A wide number of variables are reported (Molyneux 2013: State Summary/State Characteristics Longitudinal Data File). They are listed here to demonstrate the richness of the dataset:

- Population of the Legal Service Area
- Official state population estimate
- Number of central libraries
- Number of branch libraries
- Number of bookmobiles
- Librarians with an American Library Association approved Masters degree
- Total number of full-time equivalent (FTE) employees holding the title of librarian
- All other paid FTE employees
- Total paid FTE employees
- Operating income from local government
- Operating income from state government
- Operating income from federal government
- Other operating income
- Total income
- Salaries and wages for all library staff
- Employee benefits for all library staff
- Total staff expenditures

- Operating expenditures for print materials (including books, serial back files, current serial subscriptions, government documents)
- Operating expenditures for library materials in electronic format
- Operating expenditures for all other library materials (microform, audio, video, DVD, and new formats)
- Total expenditures on library collections
- Other operating expenditures
- Total operating expenditures
- Expenditures for capital outlay
- Capital revenue for major capital expenditures
- Federal government capital revenue
- Local government capital revenue
- Other capital revenue
- State government capital revenue
- Number of books and serial volumes
- Electronic books (E-books) (digital documents, including non-serial government documents in digital format)
- Number of audio materials
- Audio - downloadable titles
- Audio - physical units
- Number of video materials
- Video - downloadable titles
- Video - physical units
- Locally licensed databases
- State licensed databases
- Other licensed databases
- Databases (locally mounted or remote, full-text or not, for which temporary or permanent access rights have been acquired)
- Number of current serial subscriptions
- Current electronic serial subscriptions
- Total annual public service hours for all service outlets
- Total annual library visits
- Total annual reference transactions
- Registered borrowers
- Total annual circulation transactions

- Total annual loans provided to other libraries (i.e. Interlibrary Loans)
- Total annual loans received from other libraries (i.e. Interlibrary Loans)
- Total annual circulation (including renewals) of all children's materials in all formats to all users
- Total annual attendance at all library programs
- Total annual attendance at all programs intended primarily for children (Includes adults who attend programs intended primarily for children)
- Total audience at all young adult programs
- Total library programs
- Total children's programs
- Total young adult programs
- Operating expenditures for electronic access
- Number of library materials in electronic format
- Internet terminals used by staff only
- Internet terminals used by general public
- Users of electronic resources per typical week
- Users of public Internet terminals per year

As identified by the systematic literature review of Chapter 2, several library variables were desired: use of library as a place, library programmes for adults or children, computer facilities, interaction with the librarian and use of book stock. Each of these will be discussed in turn.

### ***3.2.2.1 Use of library as a place***

How libraries are used as a place is a qualitative measure, one that is not included in Molyneux's dataset. The closest quantitative measure is 'Total annual library visits'. The underlying assumption is that if a library is being visited, it is being used as a place to some extent. 'Total annual library visits' is the indicator that will be used.

### **3.2.2.2 *Interaction with the librarian***

The dataset records ‘Total annual reference transactions’. While interactions with librarians could extend beyond a reference transaction - and many do - this measure is the best approximation of interaction with the librarian.

### **3.2.2.3 *Library programmes***

There are many variables that record the different aspects of library programmes. Some record the number of programmes offered by the library, others the number of attendees. For this thesis, the variables that record the latter are more desirable. A library could host hundreds of programmes in a year, all very poorly attended. A better measure of how library programmes add to the economy would be the number of people attending library programmes. That way a library that has few highly popular programmes will outweigh a library with many poorly attended programmes. The two variables selected were ‘Total annual attendance at all library programs’ and ‘Total annual attendance at all programs intended primarily for children’. The latter variable was included as the literature review revealed that library programmes could impact on the literacy and education of children.

### **3.2.2.4 *Computer access***

Given the available variables that record various aspects of computer and Internet access in a public library, the ideal indicator is ‘Users of public Internet terminals per year’.

### **3.2.2.5 Book stock**

The final variable should indicate the usage of the book stock. Here, 'Total annual circulation transactions' is the best indicator. Book stock can be used in-library. This usage would not be captured in this indicator. This makes the chosen indicator not perfect, however it is a reasonable figure that shows usage of the book stock, even in the limited nature of circulation.

All of these figures represent real figures. In order to make the variable comparable between states, the figures need to be normalised for the size of the population of each state. By doing this, each of the variables represent a per person figure.

## **3.3 Economic data**

The section below discusses the choice of economic variables. Each variable had to come from the same source: a single measure could not be constructed from two different sources, although different variables could come from different sources. The economic data had to match the geographical coverage of the library data as closely as possible. Annual data was collected as this was the standard unit of time for most datasets.

### **3.3.1 International economic data**

This section discusses what economic variables were used for the international examination.



### **3.3.1.1 Growth**

The standard variable for growth is GDP. This is a measure of how much the economy is making in a particular time period. It is a quarterly measure and always measured retrospectively. That is, the GDP figure released in April is a measure of the economic activity for January to March. It is a reliable measure because of its retrospective nature.

Figures at an international level were taken from the World Bank (2013a). They represent GDP per capita at a constant United States (US) dollar (2005) rate. If GDP were kept in local currency, it would not be comparable between countries, hence the transformation to the US dollar. The value of the dollar changes with inflationary pressures. What is known as a constant US dollar rate takes inflation into account, and thus represents the real value of GDP rather than the nominal value.

### **3.3.1.2 Employment**

Employment is usually measured by its inverse: unemployment. There are several definitions of unemployment, as discussed in Chapter 1. Unemployment is measured at differing intervals, monthly being a common interval. Unemployment is seasonal; farmworkers for one are employed or unemployed as the seasons change. A month-by-month comparison is not advisable therefore. However, a seasonal adjustment can be made. Unemployment is a retrospective measure, and thus reliable.

At an international level, the World Bank (2013a) was the source again; the figures were for unemployment levels in each country. Unemployment is expressed as a percentage of the population.

### **3.3.1.3 Education**

Education is measured at various levels. For example, education could be measured by high-school completion, or by enrolments into higher-education institutions.

Here, ‘Gross intake ratio in first grade of primary education, total (% of relevant age group)’ was used as a measure of education. One could reason that if the libraries were positively influencing adults in thinking about education, more children would be enrolled into the first grade. This indicator could explore that reason. The World Bank (2013a) was the source.

### **3.3.1.4 Health**

There are a variety of measures for health. The World Bank offers thirty-six indicators, ranging from prevalence of HIV to health expenditure (World Bank 2013a). The United Nations uses life expectancy at birth in their Human Development Index (United Nations Development Program 2013) and defines it as the “number of years a newborn infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant’s life.” It is assumed that the better the state of health in a country, the longer the expected life will be.

Life expectancy levels were used as indicators of health. Here, again, the World Bank (2013a) was the source.

### **3.3.1.5 Social capital**

Social capital is one of the most problematic factors to measure. It is multidimensional, and encompasses “inherently ambiguous concepts such as ‘community’, ‘network’ and ‘organization’” (World Bank 2013b: How is social capital measured?). Putnam’s

approach is to triangulate different data sources. He claims “no single source of data is flawless, but the more numerous and diverse the sources, the less likely that they could all be influenced by the same flaw” (Putnam 2000: 415). The World Bank has begun to collect data on various measures of social capital: groups and networks, trust, collective action, social inclusion, and information and communication (World Bank 2013b: Measuring the dimensions of social capital). However, the dataset does not yet cover enough years to be a suitable set for this study.

Putnam gives many options for indicators which might be suitable for social capital (2000), one being newspaper readership: “The evidence makes quite clear that newspaper reading and good citizenship go together” (Putnam 2000: 218). The indicator chosen for social capital was thus: ‘Daily newspapers: Total average circulation per 1,000 inhabitants’ provided by UNdata (2013), in the UNESCO Institute for Statistics (UIS) Data Centre collection. This indicator is available for the years following and including 1996. This excluded 1995 as a viable year for this study, and led to the choice of 1999 as the chosen year. 1999 had the most library data available (n=36).

### **3.3.1.6 Savings**

Household savings, which are in cash form, can be invested in companies where the cash would be used to buy physical assets. This possibility makes savings and investment synonymous conceptually with physical capital. As defined in Chapter 1, physical capital includes cash or cash equivalents as well as physical assets such as land and equipment. Part of the Solow-Swan model introduced in Chapter 1 is physical capital.

Savings rate is the indicator chosen to represent this variable. It is the percentage of total disposable income that was saved as opposed to spent. This figure was calculated using the household savings and household income figures given by UNdata (2013: National Accounts Official Country Data). Both savings and income were provided in

current local currency, but as it was the savings rate that was desired, a transformation out of the current local currency was not necessary.

### **3.3.2 USA economic data**

This section explains which economic variables were chosen for the USA study and why. It also shows where the data was sourced from.

#### **3.3.2.1 *Economic growth***

For USA, the GDP figures were taken at the state level from Bureau of Economic Analysis (United States, Department of Commerce, Bureau of Economic Analysis 2012). GDP was available at quarterly intervals, but the annual figure was used as this was the standard unit of time for most of the other datasets. The per-capita rate was chosen, as it normalises the economic activity according to the size of the population.

#### **3.3.2.2 *Employment***

The unemployment figures for the United States were taken from the Bureau of Labour Statistics (United States, Department of Labor, Bureau of Labor Statistics 2012). They represent an unemployment rate. Figures for 2009 reflect a model re-estimation. The Bureau of Labor Statistics explains: “In most years, historical data for the most recent five years (both seasonally adjusted and not seasonally adjusted) are revised near the beginning of each calendar year, prior to the release of January estimates” (United States, Department of Labor, Bureau of Labor Statistics 2012: Economic News Release | Regional and State Employment and Unemployment Technical Note).

### **3.3.2.3 Literacy and education**

Due to a lack of other suitable data, for the United States the percentage of those over twenty-five years of age who have at least a high school diploma was used. This figure covered all the states, where other variables were incomplete. It was sourced from the Census Bureau (United States Census Bureau 2009a).

### **3.3.2.4 Health**

Life expectancy rates were not available for USA (United States, Centers for Disease Control and Prevention 2013b). As a proxy measure, child-mortality rates were used. This figure shows how healthy the general population is. If parents are healthy, they are more likely to have healthy children: sicknesses are less likely to be passed on, and they are able to get medical care should they need to for both themselves and their children. This figure is sourced from the Centers for Disease Control and Prevention (2013a).

The figures represent the number of deaths per year per 100 000 of the population. A child is defined to be anyone under the age of four years.

### **3.3.2.5 Social capital**

The variable chosen to represent social capital was number of persons arrested. Putnam discusses crime as a valid indicator for the lack of trust and honesty in a community. Trust and honesty are hallmarks of social capital (2000: 114-146). Figures were sourced from the Federal Bureau of Investigation (United States, Federal Bureau of Investigation 2013). Where a person was arrested twice or more in a year, he/she is counted as a single person arrested.

This measure is not without flaws: states that have a more proactive police force could show a higher number of persons arrested than one without a proactive police force, other things being equal. However, it is an indicator for social capital that has sufficient data to be of use in this thesis.

### **3.3.2.6 Savings, investment and financial literacy**

Chapter 2 showed that libraries can impact physical-capital levels through financial literacy. Data on financial literacy at a state level is not available. Suitable proxies - savings or investment - are also not freely available at a state level. Neither is the household-savings ratio, which is the ratio between household income and household expenditure, available. The credit ratio, the inverse of the household savings ratio, could also not be found through reliable sources.

The measure that is used is the number of tax returns detailing taxable interest by state. The unit of analysis here is adult individuals. The rationale behind selecting taxable interest lies in the idea that if more households are saving money, more taxable-interest returns are filed. Thus the number of tax returns can be used to show the number of households saving. If libraries are positively impacting on financial literacy, then more saving should occur. (Whether or not savings have a positive effect on the economy is a topic of debate. For the purposes of this thesis, savings are taken to be desirable for economic growth). The source of taxable interest is the Internal Revenue Service (United States, Internal Revenue Service 2013).

In all cases of USA data, a rate was calculated by dividing the indicator by the number of people in the state. This was done to make the figures comparable between units of analyses. The population figures were taken from the United States Census Bureau (2013).

The time period selected for the USA study was 2005 to 2009. This is the latest time period that has data available for all variables.

### **3.4 Data transformations**

In both the case of the library data and that of the economic data, data were transformed to make the variables comparable.

To standardise variables across all indicators, the rate per 100 persons was taken. Where a series showed a figure of less than one, a constant was added to increase the smallest number in that series to one. This method is described by Osborne (2008). The final transformation was to take the logarithmic value, as this enables a percentage change to be reflected in the statistical method.

### **3.5 Methods**

This thesis employs empirical, quantitative methods. The availability of data dictated which methods could be employed to explore the relationships between economic variables and the library variables. Path analysis was the method of choice. This section explains how it was employed. This explanation is based on the one given by Retherford and Choe (1993: Chapter 4). The statistical software package used is known as 'R'. This package included the necessary functions for this thesis and is available free of charge from <http://www.r-project.org/>.

#### **3.5.1 Causality**

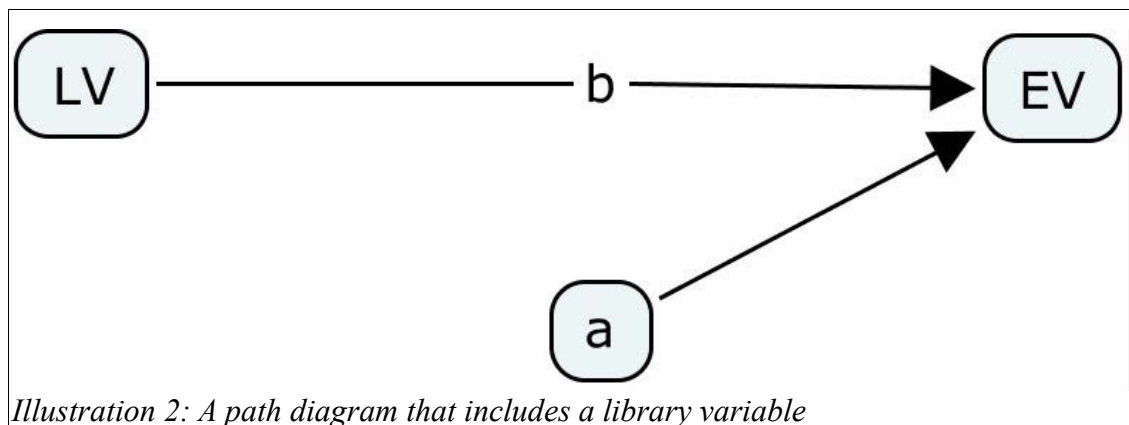
Central to this thesis is the notion of causality. It is hypothesised that library usage has a causal effect on the economy. For causality, *qua* causality, to exist, two factors must be in place. Firstly, there must be a direct causal link between the two variables. An instance of the one must always, and without exception, cause an instance of the other. Secondly, an instance of the first variable must always precede an instance of the second. The first condition, establishing a direct causal link, is not possible to prove

(Hammersley 2006). The second condition can be shown through Granger causality. The mathematical discussion of what is included in showing Granger causality can be read at Testing for causality (1994). Granger causality relies on the data to be stationary, that is, to have no underlying trend (Gujarati 2003: 698). Unfortunately the data that this thesis uses is non-stationary, and could not be transformed into stationary data. Path analysis was thus chosen as a method.

In the real sense of causality, path analysis does not prove causality. The direction of causality, which would be from library usage to the economy in this case, is drawn from theory; path analysis shows a correlation between variables and makes no confirmation of the existence or direction of causality (Retherford and Choe 1993: 64). Thus where this thesis refers to a causal relationship between variables it is a theoretical causal relationship.

### 3.5.2 Model A

Linear regression looks at how an independent variable might influence a dependent variable. Illustration 2 shows how it would look when drawn in a path diagram.



Where:

- LV represents the library variable
- EV represents the economic variable
- b is the relationship between them



Mathematically this could be written as:

$$EV = a + bLV \quad \text{Equation 3.1}$$

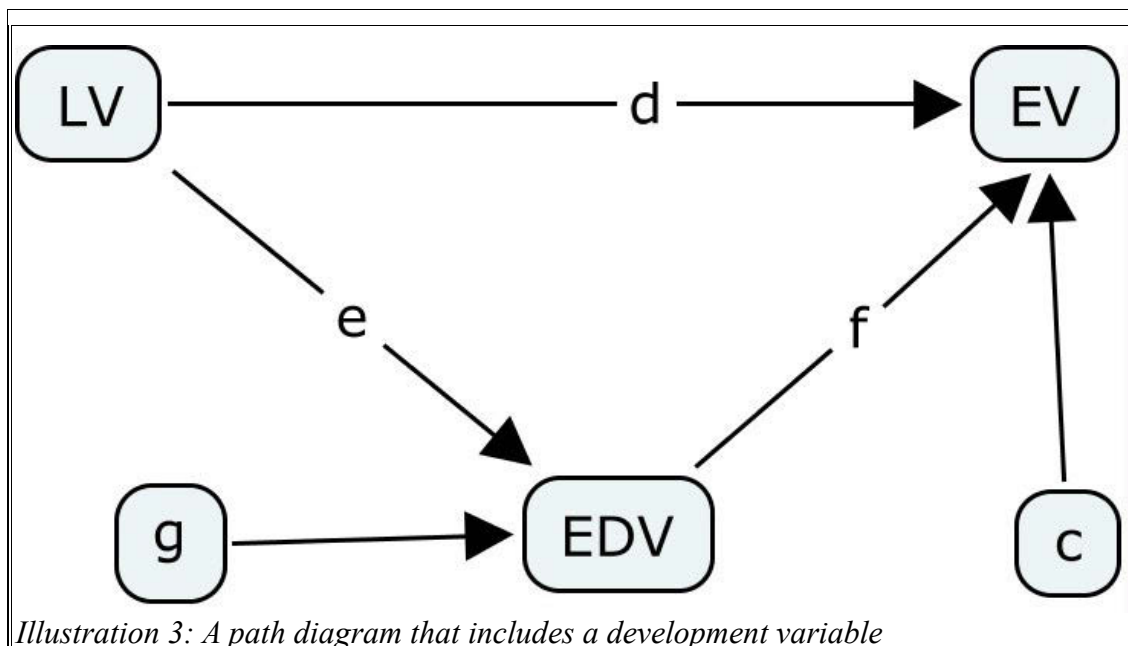
Where  $a$  is the effect on economic variables that non-library variables have.

The figure of interest here would be  $b$ , the coefficient of the library variable. The sign that  $b$  takes shows the positive or negative nature of the relationship, while the size of  $b$  give the magnitude of the relationship.

This model is used to show how circulation, and other library variables, affect GDP.

### 3.5.3 Model B

From Chapter 2, it would seem that there are many ways in which library use could affect economic growth. It could influence it directly, as would be shown in the first model, or it could do so indirectly through economic development factors. As a path diagram, it is depicted in Illustration 3.



Mathematically this would be:

$$EDV = g + eLV \quad \text{Equation 3.2}$$

$$EV = c + dLV + fEDV \quad \text{Equation 3.3}$$

Where  $EDV$  is an economic development variable,  $g$  and  $c$  are constants, or influences outside the model,  $e$ ,  $d$ , and  $f$  are relationships between the variables,  $EV$  and  $LV$  are as before, economic variable and library variable respectively.

Substituting Equation 3.2 into Equation 3.3, one would get:

$$EV = c + dLV + f(g + eLV)$$

With a little rearranging it would be:

$$EV = (c + fg) + (d + fe)LV$$

Here  $d$  represents the direct relationship that  $LV$  has with  $EV$ , and  $fe$  is the indirect relationship.

This model will be used to show how library variables influences economic growth through each one of the following: education, employment, health, social capital and savings.

### 3.5.4 Model C

Model C takes all the variables available into the same model. The mathematical representation would follow the same format as before and is not given here as the complexity does not add any additional insight into the model.

### **3.5.5 Regression analysis**

At the heart of path analysis is regression analysis. When calculating a regression, two figures show how good the model is at predicting the variation in the dependent variable. The first is the adjusted R-squared. This is called the coefficient of determination and represents how much of the variation in the dependent variable is explained by the independent variables included in the model. The closer the figure gets to 1 the more variation is explained (Keller and Warrack 2003: 622).

The second is the F-statistic. This statistic shows how closely the predicted variables are to the observed variables. The higher the difference, the less statistical confidence one can have in the model. The F-statistic is usually calculated along with a p-value which is the probability of erroneously assuming a relationship where none exists (Keller and Warrack 2003: 477).

### **3.5.6 Stepwise regressions**

At times, it would be useful to examine which independent variables would make up the best model to explain the variation in the dependent variable. This examination is done through a stepwise regression. Keller and Warrack (2003: 718) explain what a stepwise regression is: “Stepwise regression is an iterative procedure that adds and deletes one variable at a time. The decision to add or delete a variable is made on the basis of whether that variable improves the model.” In this regression one of the economic variables, usually GDP, will be chosen as the dependent variable. The independent variables will be the indicators of the various library services and occasionally those of the development factors. Stepwise regression will test to see which independent variables provide the best explanation for the change in the dependent variable.

### **3.5.7 Path analysis in the literature on libraries**

Within the literature on libraries, there are two papers that use path analysis to examine relationships. The first is by Liu (2004), first introduced in this thesis in Chapter 1. He links library usage to economic growth through education, as is the case in this thesis. This thesis expands Liu's model to other development variables as well as adding more specific purposes of library use, and introducing a time-lag.

The second paper is by Kronus (1973). Here, library use is used as the dependent variable, rather than the independent variable as is the case in this thesis. Kronus used path analysis to explore which variables influence library use.

### **3.6 *Work-plan summary***

This section outlines the step-by-step process which was employed to generate the results:

1. Library, economic and population data was sourced.
2. Variables were normalized for the population where necessary. This was discussed in Section 3.4.
3. The minimum value of each variable was examined. Where this number was less than 1, a constant was added to all values of that variable such that the minimum value in the variable would equal 1.
4. A logarithmic transformation was performed on all variables.
5. Dependent and independent variables were identified by way of diagrams.
6. Step-wise regressions were run. Results were put in a tabular format and the diagrams were updated to include the statistically significant coefficients.
7. A correlation test was run between all variables to reveal relationships that could be hidden by the step-wise regression.
8. These steps were repeated for the lagged regressions.
9. All results were discussed, as shown in Chapters 4,5 and 6.

### **3.7 Summary**

This chapter detailed the method used in this thesis. It began with a discussion of the geographical selections which were based on the availability of data. It showed which countries were included in the international analysis. It explained why a USA state-level analysis was done.

The second part of this chapter discussed which indicators were used to represent the library variables of interest, as identified by the literature review. For USA, a variety of indicators were found for the library variables. However at the international level, only one indicator was found to be suitable: library loans, which represent the use of book stock.

The third section outlined where the economic data was sourced from. It gave motivations for why certain indicators were included and why others were deemed unsuitable.

Next, this chapter discussed the method used in this thesis, namely path analysis. It explained how path analysis is used to explore the theoretical relationships between variables.

Chapters 4 to 6 give the results generated with the methods discussed here.

## Chapter 4: International results

This chapter outlines the first part of the results of this study. The other results follow in Chapters 5 and 6. This chapter starts by looking at the result of the path analysis carried out by using international data. As discussed in the previous chapter, path analysis is performed with a series of regressions. Regressions are a statistical test that shows the relationship between an independent variable, or variables, and a dependent variable. This relationship could be strong or weak, positive or negative. This relationship is not an empirically causal relationship, for reasons discussed in Section 3.5.1, instead, theoretical causality is assumed based on the evidence given in the literature as shown in Chapter 2.

The structure of this section is as follows: the discussion starts with the simplest model and works toward the most complicated. For the section with international data, the simplest model is the regression between book issues and GDP. It moves to more complicated models each bringing a development variable into the model, and finally the most complex model looks at all the variables in the same regression. The chapter concludes with a summary of the results given in this chapter.

Unless stated otherwise, all figures are rounded off to the fourth decimal point. Engineering notation is used for small numbers. For the purposes of this thesis, they can be understood to be approximating zero. Direct effects are written in a bold typeface, while indirect effects are italicised. Total effects are written in both bold and italics.

The only library variable chosen for this international analysis was book issues. This indicator represents how the book stock is used in the public library. It does not, however, take in-house library use into account. In addition to GDP, which is the indicator for economic growth, the other economic indicators considered are unemployment, gross intake ratio in first grade of primary education (for the education variable), life expectancy at birth (for the health variable), newspaper readership (for

social capital) and the savings rate. The reasons for choosing these particular indicators for economic growth and development are given in Chapter 3. Table 7 summarises these while giving details of the transformations that have been done to all the variables used in this chapter.

*Table 7: Variables used in Chapter 4*

Variable name	Variable	Representing	Transformations
circ_int_99	Library book issues	Loans to users	Per capita; constant of 0.4788 added*; logarithmic value taken
gdp_int_99	GDP	GDP at constant (2005) US dollar	Per capita; logarithmic value taken
unem_int_99	Employment	Unemployment rate	Constant of 0.3 added*; logarithmic value taken
educ_int_99	Education	Gross intake ratio in first grade of primary education, total (% of relevant age group)	Logarithmic value taken
health_int_99	Health	Life expectancy (in years)	Logarithmic value taken
sc_int_99	Social capital	Daily newspapers: Total average circulation per 1,000 inhabitants	Logarithmic value taken
save_int_99	Savings	Savings rate	Logarithmic value taken
*Where the figures are smaller than 1, the logarithmic value would be negative. This would skew the results. To remedy this, a constant figure is added to all the values in the series. This constant would increase the smallest value in the series to a value of $\approx 1$ , which would ensure that all the logarithmic values are positive.			

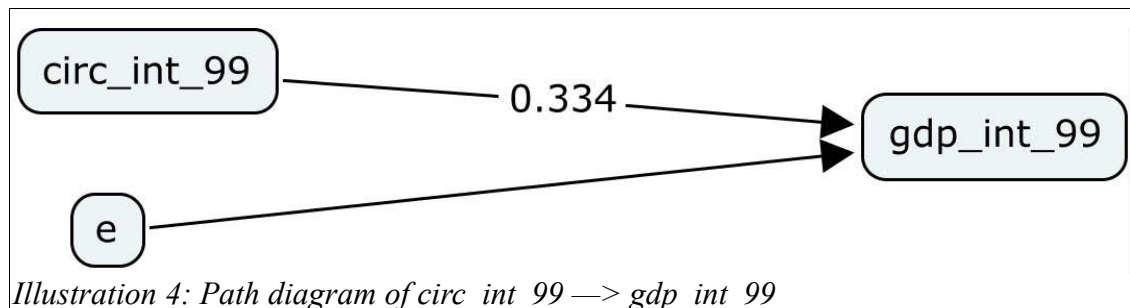
These are the variables that will be used in the models that follow.

#### 4.1 Direct relationship between library book issues and GDP

The simplest model looks at the relationship between `circ_int_99` and `gdp_int_99`. The causal relationship assumed here is a theoretical one, and is not proved by the regression. This relationship was fully explained in the previous chapter. The results of the regression are given in Table 8. The path analysis is shown in Illustration 4.

Table 8: Regression result from `circ_int_99`  $\rightarrow$  `gdp_int_99`

	Coefficients	p-value
Intercept	2.8002	2.63E-13 ***
<code>circ_int_99</code>	0.334	0.0001 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.5467 on 34 degrees of freedom		
Multiple R-squared: 0.3545, Adjusted R-squared: 0.3355		
F-statistic: 18.67 on 1 and 34 DF, p-value: 0.0001		



Mathematically this is shown as:

$$\text{gdp\_int\_99} = e + 0.334(\text{circ\_int\_99}) \quad \text{Equation 4.1}$$

where  $e$  refers to an error term.



Table 8 shows that the relationship between circ\_int\_99 and gdp\_int\_99 is statistically significant at the 0.0001 level. The coefficient shows that the relationship is a positive one. Where circ\_int\_99 increases by 1 percent, gdp\_int\_99 will increase by 0.33 percent.

The model predicts only 34 percent of the observed variation in gdp\_int\_99. This result is given by the adjusted R-squared figure. It implies that there are other factors which the model does not account for that have a relationship with gdp\_int\_99. However, the model is statistically sound, as the F-statistic is suitably high and the associated p-value is less than 0.01.

This result shows that taking a book out of a public library has a theoretical impact on economic growth. The positive relationship is encouraging: the use of the library in this aspect could be seen to be contributing positively to the state of the economy.

#### ***4.2 Indirect relationship between library book issues and GDP through unemployment***

Now that the simplest model has been given, the model was elaborated by bringing in the development indicators. This introduction of indicators was done to account for the possible indirect effects that the library variables might have on economic growth. The first of these brings in unem\_int\_99. Theoretically, unem\_int\_99 should be negatively correlated with gdp\_int\_99, as unem\_int\_99 means that not all the resources in the economy are being used to their full potential. Given the result of the first model, one would expect that circ\_int\_99 is similarly negatively correlated with unem\_int\_99. The literature discussed in Chapter 2 leads to the same conclusion.

The results of the regressions are shown in Table 9 and Table 10.

Table 9: Regression result from *circ\_int\_99*; *unem\_int\_99* → *gdp\_int\_99*

	Coefficients	p-value
Intercept	4.6962	2.8E-13 ***
<i>circ_int_99</i>	0.1385	0.1064
<i>unem_int_99</i>	-1.3047	0.0005 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.3844 on 27 degrees of freedom		
Multiple R-squared: 0.3761, Adjusted R-squared: 0.3299		
F-statistic: 8.138 on 2 and 27 DF, p-value: 0.0017		

Table 10: Regression result from *circ\_int\_99* → *unem\_int\_99*

	Coefficients	p-value
Intercept	0.7501	3.52E-05 ***
<i>circ_int_99</i>	0.0458	0.331
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.2238 on 29 degrees of freedom		
Multiple R-squared: 0.0326, Adjusted R-squared: -0.0007		
F-statistic: 0.9786 on 1 and 29 DF, p-value: 0.3307		

*circ\_int\_99* is not shown to be statistically significant in either regression shown in Table 9 and Table 10. No meaningful conclusions can be drawn. A path diagram is not included here as it would not show any statistically valid result.

### **4.3 Indirect relationship between library book issues and GDP through education**

The education indicator used in this regression was 'Gross intake ratio in first grade of primary education, total (% of relevant age group)' as outlined in the previous chapter. Table 11 gives the results of the regression which uses *educ\_int\_99* and *circ\_int\_99* as independent variables, and *gdp\_int\_99* as a dependent variable.

Table 11: Regression result from *circ\_int\_99*; *educ\_int\_99* → *gdp\_int\_99*

	Coefficients	p-value
Intercept	2.5043	0.3169
<i>circ_int_99</i>	0.3314	0.0021 **
<i>educ_int_99</i>	0.1497	0.9062
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.5232 on 25 degrees of freedom		
Multiple R-squared: 0.3381, Adjusted R-squared: 0.2851		
F-statistic: 6.384 on 2 and 25 DF, p-value: 0.0058		

The coefficient for *circ\_int\_99* was statistically significant. This result reveals that there is a direct correlation between *gdp\_int\_99* and *circ\_int\_99* in this model. A percentage increase in *circ\_int\_99* correlates with a 0.33 percentage increase in *gdp\_int\_99*. The effect is thus slight.

As the coefficient for *educ\_int\_99* was not statistically significant, no conclusions can be drawn from the possible indirect effects. A path diagram is not included here, as there are no indirect effects to show.

The regression shown in Table 11 is statistically reliable, and so the conclusions drawn from it are statistically confident. However the conclusions that are drawn are no different from those drawn in Section 4.1.

#### ***4.4 Indirect relationship between library book issues and GDP through health***

The third development indicator included in the path analysis was life expectancy at birth, which was used as the proxy indicator for health. The results of the regression analysis are shown in Table 12 and Table 13 and a path diagram is shown in Illustration 5.

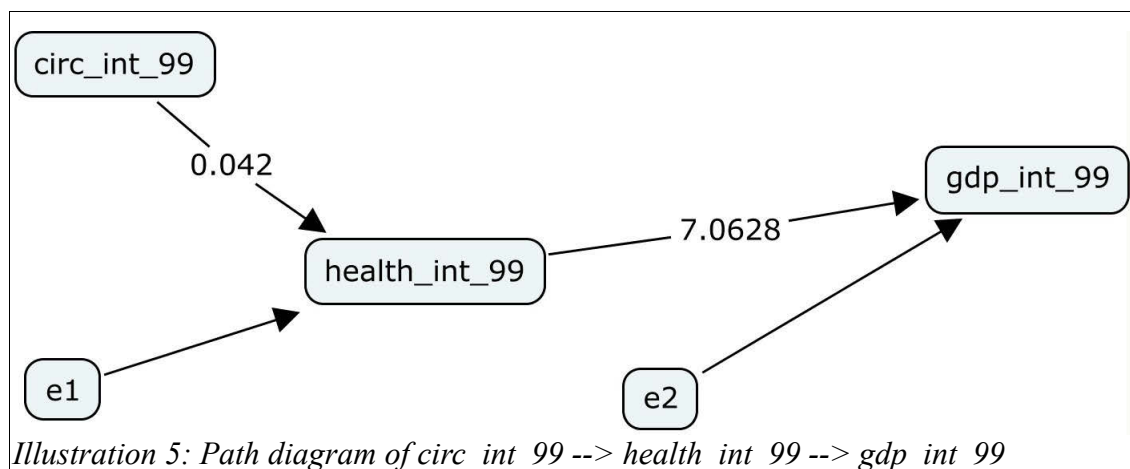
Table 12: Regression result from *circ\_int\_99*; *educ\_int\_99*  $\rightarrow$  *gdp\_int\_99*

	Coefficients	p-value
Intercept	-9.3513	8.15E-05 ***
<i>circ_int_99</i>	0.0375	0.619
<i>health_int_99</i>	7.0628	1.46E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.3885 on 33 degrees of freedom		
Multiple R-squared: 0.6836, Adjusted R-squared: 0.6644		
F-statistic: 35.64 on 2 and 33 DF, p-value: 5.685E-09		

Table 13: Regression result from *circ\_int\_99*  $\rightarrow$  *health\_int\_99*

	Coefficients	p-value
Intercept	1.7205	< 2E-16 ***
<i>circ_int_99</i>	0.042	5.63E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.05527 on 34 degrees of freedom		
Multiple R-squared: 0.4592, Adjusted R-squared: 0.4433		
F-statistic: 28.87 on 1 and 34 DF, p-value: 5.632E-06		

The two models shown in Table 12 and Table 13 are statistically reliable, as shown by their sufficiently-high F-statistics, and their low p-values. They can thus be used in a path diagram as shown in Illustration 5. It is important to note that the coefficient for *circ\_int\_99* in Table 12 is not statistically significant (shown by a high associated p-value). This shows that in this model there is no direct effect between *circ\_int\_99* and *gdp\_int\_99*.



Mathematically this can be expressed as:

$$\text{health\_int\_99}' = e1 + 0.042(\text{circ\_int\_9}) \quad \text{Equation 4.2}$$

$$\text{gdp\_int\_99}' = e2 + 7.0628(\text{health\_int\_99}) \quad \text{Equation 4.3}$$

where  $e1$  and  $e2$  represent the variables not shown in this model.

Substituting Equation 4.2 into Equation 4.3, the indirect effect can be calculated:

$$\text{gdp\_int\_99}' = e2 + 7.0628(e1 + 0.042)(\text{circ\_int\_99})$$

$$\text{gdp\_int\_99}' = (e2 + 7.0628*e1) + (7.0628*0.042)(\text{circ\_int\_99})$$

$$\text{gdp\_int\_99}' = (e2 + 7.0628*e1) + 0.2966(\text{circ\_int\_99}) \quad \text{Equation 4.4}$$

This shows that the indirect effect that  $\text{circ\_int\_99}$  has on  $\text{gdp\_int\_99}$  is a positive one. An increase in  $\text{circ\_int\_99}$  by 1 percent correlates with an increase in  $\text{gdp\_int\_99}$  of 0.29 percent.

Including the health variable, which in this case is a measure of life expectancy, the relationship between circulation and economic growth is an indirect relationship. Circulation has a theoretically positive effect on health, perhaps through the provision of health literature. Life expectancy in turn has a theoretically positive effect on economic growth. It could be that the provision of health literature is the mechanism through which circulation has a positive effect on the life expectancy.

#### **4.5 Indirect relationship between library book issues and GDP through social capital**

Using readership of daily newspapers as a proxy indicator for social capital, regressions were run. The results are shown in Table 14 and Table 15. The corresponding path analysis in Illustration 6 was drawn from the results.

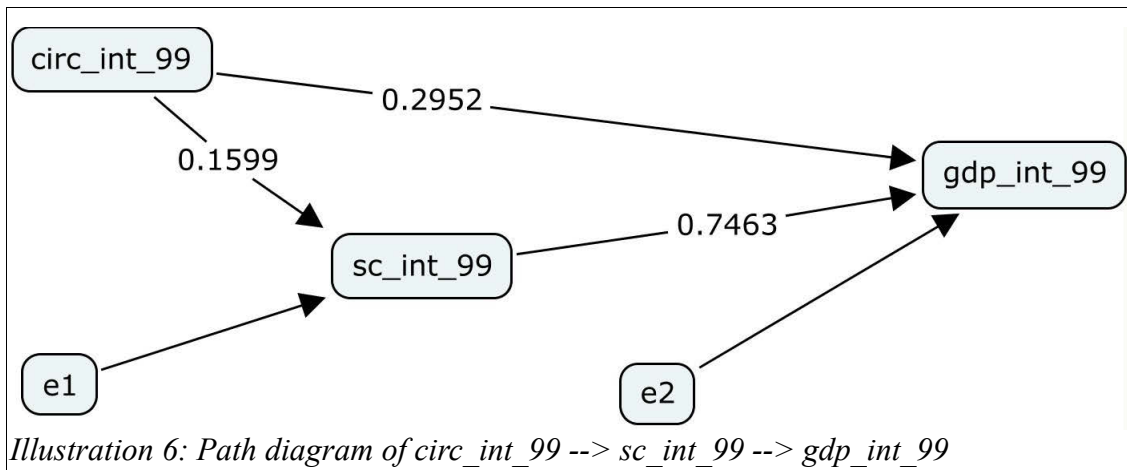
*Table 14: Regression result from circ\_int\_99; sc\_int\_99 → gdp\_int\_99*

	Coefficients	p-value
Intercept	1.343	0.0106 *
circ_int_99	0.2952	0.0032 **
sc_int_99	0.7463	0.0036 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.3465 on 16 degrees of freedom		
Multiple R-squared: 0.7142, Adjusted R-squared: 0.6785		
F-statistic: 20 on 2 and 16 DF, p-value: 4.447E-05		

*Table 15: Regression result from circ\_int\_99 → sc\_int\_99*

	Coefficients	p-value
Intercept	1.7587	1.08E-05 ***
circ_int_99	0.1599	0.0809 †
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.3836 on 17 degrees of freedom		
Multiple R-squared: 0.1684, Adjusted R-squared: 0.1195		
F-statistic: 3.443 on 1 and 17 DF, p-value: 0.081		

Both models showed statistical reliability, even though the F-statistic shown in Table 15 was quite low. All coefficients were shown to be statistically significant, and can be included in a path analysis. This is shown in Illustration 6.



Mathematically:

$$\text{sc\_int\_99}' = e1 + 0.1599(\text{circ\_int\_99}) \quad \text{Equation 4.5}$$

$$\text{gdp\_int\_99}' = e2 + \mathbf{0.2952}(\text{circ\_int\_99}) + 0.7463(\text{sc\_int\_99}) \quad \text{Equation 4.6}$$

Where  $e1$  and  $e2$  capture the variance in  $\text{sc\_int\_99}$  and  $\text{gdp\_int\_99}$  respectively that is unexplained by the other variables.

With some mathematical manipulation, one can express the  $\text{gdp\_int\_99}$  as follows:

$$\text{gdp\_int\_99}' = e2 + \mathbf{0.2952}(\text{circ\_int\_99}) + 0.7463(e1 + 0.1599(\text{circ\_int\_99}))$$

$$\text{gdp\_int\_99}' = (e2 + 0.7463*e1) + (\mathbf{0.2952} + 0.7463*0.1599)(\text{circ\_int\_99})$$

$$\text{gdp\_int\_99}' = (e2 + 0.7463*e1) + (\mathbf{0.2952} + 0.1193)(\text{circ\_int\_99})$$

$$\text{gdp\_int\_99}' = (e2 + 0.7463*e1) + \mathbf{0.4154}(\text{circ\_int\_99}) \quad \text{Equation 4.7}$$

The direct effect here is 0.2952 and the indirect is 0.1193. This means that if  $\text{circ\_int\_99}$  goes up by a percent, then  $\text{gdp\_int\_99}$  will show a correlated increase of 0.29 percent and newspaper readership an increase of 0.16 percent. If newspaper readership increases by a percent,  $\text{gdp\_int\_99}$  will show an increase of 0.75.

Previous sections have shown that circulation has a theoretically positive relationship with economic growth. Considering social capital, in the form of newspaper readership, it shows the same relationship. Circulation has a direct effect on economic growth as well as an indirect effect through newspaper readership. It would appear, then, that using the library increases newspaper readership which in turn increases economic growth.

#### **4.6 Indirect relationship between library book issues and GDP through savings**

The final development variable considered was that of `save_int_99`. Table 16 and Table 17 show the results of the regression.

*Table 16: Regression result from `circ_int_99`; `save_int_99`  $\rightarrow$  `gdp_int_99`*

	Coefficients	p-value
Intercept	1.6292	0.0014 **
<code>circ_int_99</code>	0.3372	0.0023 **
<code>save_int_99</code>	6.7362	0.0038 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.3976 on 19 degrees of freedom		
Multiple R-squared: 0.5879, Adjusted R-squared: 0.5445		
F-statistic: 13.55 on 2 and 19 DF, p-value: 0.00022		

*Table 17: Regression result from `circ_int_99`  $\rightarrow$  `save_int_99`*

	Coefficients	p-value
Intercept	0.1443	0.0007 ***
<code>circ_int_99</code>	0.0052	0.6263
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0437 on 20 degrees of freedom		
Multiple R-squared: 0.0121, Adjusted R-squared: -0.0373		
F-statistic: 0.2445 on 1 and 20 DF, p-value: 0.6263		



The regression shown in Table 16 was a statistically good model. The F-statistic was suitably high and the associated p-value was sufficiently low. The coefficient for circ\_int\_99 was statistically significant, as shown by its associated p-value.

However, the same cannot be said of the regression that uses save\_int\_99 as the dependent variable. Table 17 shows that the F-statistic of that regression was too low to be statistically significant, as the associated p-value confirms. No statistically reliable conclusion can be drawn from those results.

There was a direct effect, though: a positive one. Where circ\_int\_99 goes up by a percent, the associated increase in gdp\_int\_99 will be 0.3 percent. This conclusion is in line with the results already shown in this chapter.

#### ***4.7 Indirect relationship between library book issues and GDP through all development variables***

The previous five models entertained only one development variable in each. From the literature one can build a theory that circ\_int\_99 can indirectly feed into GDP through all of these development variables. The final model on international data shows a stepwise regression that considers circ\_int\_99 and all the development variables as possible independent variables. Table 18 shows the result.

Table 18: Stepwise regression result from circ\_int\_99; development variables —> gdp\_int\_99

	Coefficients	p-value
Intercept	-7.9249	0.3313
unem_int_99	-1.0207	0.0202 *
educ_int_99	-5.5735	0.0408 *
health_int_99	11.9288	0.0032 **
circ_int_99	0.4848	0.0081 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.1382 on 6 degrees of freedom		
Multiple R-squared: 0.9414, Adjusted R-squared: 0.9024		
F-statistic: 24.11 on 4 and 6 DF, p-value: 0.0008		

The next step was to test the relationship that circ\_int\_99 had with each of the development variables that were shown to be statistically significant in Table 18.

Table 10 shows the regression results of unem\_int\_99 as a dependent variable and circ\_int\_99 as the independent one. However the model was not a statistically good one, and thus could not be included in the path diagram. Table 19 shows the regression where educ\_int\_99 was taken as the dependent variable and regressed against circ\_int\_99 as the independent one.

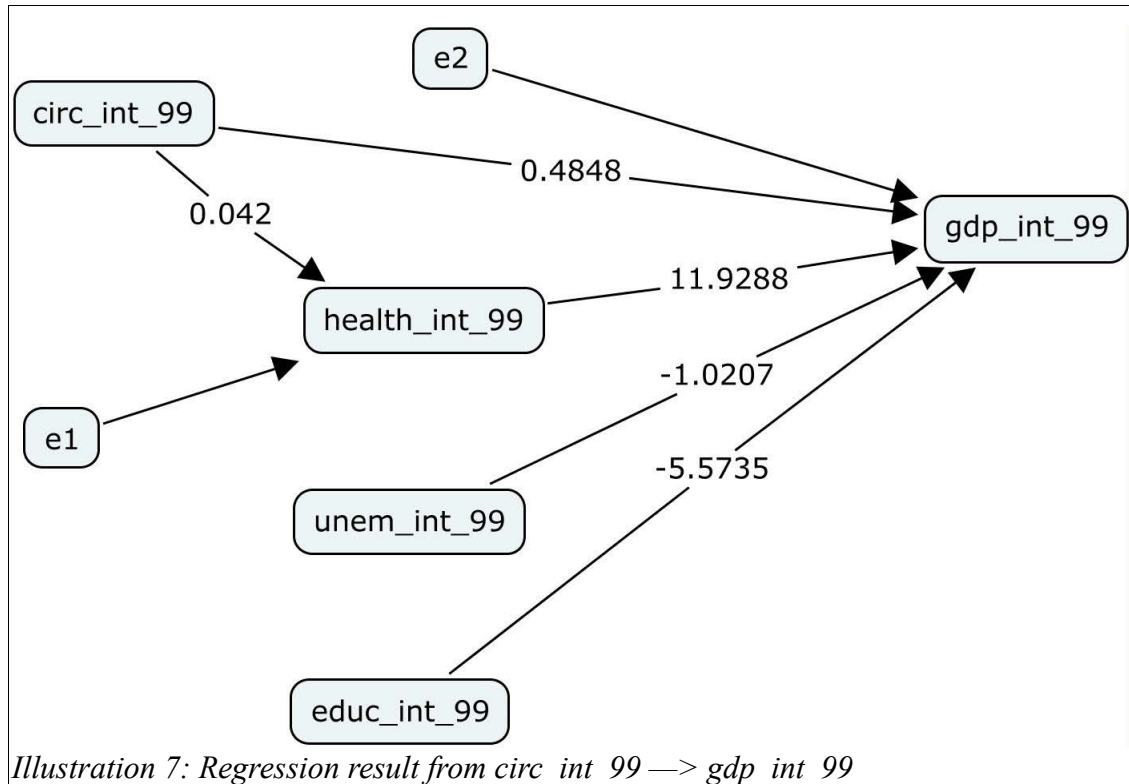
Table 19: Regression result from circ\_int\_99 —> educ\_int\_99

	Coefficient	p-value
Intercept	1.9347	<2E-16 ***
circ_int_99	0.0189	0.21
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.08162 on 26 degrees of freedom		
Multiple R-squared: 0.0599, Adjusted R-squared: 0.0237		
F-statistic: 1.656 on 1 and 26 DF, p-value: 0.2095		

The regression shown in Table 19 was not statistically reliable and so could not be included in the path analysis.

The final development indicator that was shown to be statistically significant in Table 18 was health\_int\_99. Table 13 showed the regression that uses health\_int\_99 as the dependent variable and circ\_int\_99 as the independent one. As it was discussed, it was a statistically reliable model and so could be included in the path analysis here.

Illustration 7 shows the path analysis, taking into account the regressions discussed here.



Mathematically this can be expressed as:

$$\text{health\_int\_99}' = e1 + 0.042(\text{circ\_int\_99}) \quad \text{Equation 4.8}$$

$$\text{gdp\_int\_99}' = e2 + -1.0207(\text{unem\_int\_99}) + -5.5735(\text{educ\_int\_99}) + 11.9288(\text{health\_int\_99}) + \mathbf{0.4848}(\text{circ\_int\_99}) \quad \text{Equation 4.9}$$

Where *e1* and *e2* are substitutes for the variables not included in this model.

Considering Equation 4.8 and Equation 4.9 as simultaneous equations, the indirect effect for circ\_int\_99 can be calculated:

$$\text{gdp\_int\_99}' = e2 + -1.0207(\text{unem\_int\_99}) + -5.5735(\text{educ\_int\_99}) + 11.9288(e1 + 0.042)(\text{circ\_int\_99}) + \mathbf{0.4848}(\text{circ\_int\_99})$$

$$\text{gdp\_int\_99}' = (e2 + 11.9288*e1) + -1.0207(\text{unem\_int\_99}) + -5.5735(\text{educ\_int\_99}) + (\mathbf{0.4848} + 11.9288*0.042)(\text{circ\_int\_99})$$

$$\text{gdp\_int\_99}' = (e2 + 11.9288*e1) + -1.0207(\text{unem\_int\_99}) + -5.5735(\text{educ\_int\_99}) + (\mathbf{0.4848} + 0.501)(\text{circ\_int\_99})$$

$$\text{gdp\_int\_99}' = (e2 + 11.9288*e1) + -1.0207(\text{unem\_int\_99}) + -5.5735(\text{educ\_int\_99}) + \mathbf{0.9858}(\text{circ\_int\_99}) \quad \text{Equation 4.10}$$

This result shows that the total effect that circ\_int\_99 has on gdp\_int\_99 was positive. Where circ\_int\_99 goes up by a percent, the correlated increase in gdp\_int\_99 is 0.99 percent. De-constructing this effect, one can see that it was made up of a direct effect of 0.48 and an indirect effect, through health\_int\_99, of 0.501.

This model, which takes into consideration the possible effect that circulation might have through any development variable without focusing on any particular one, shows that health was the development variable which best links circulation with economic growth.

## **4.8 Correlations between variables**

One would expect that the indicators would be more statistically significant than they are. One reason that they are not, could be because they are correlated with one another. Table 20 shows the correlations.

Table 20: Correlation coefficients, p-values are shown in bracket

	unem_int_99	educ_int_99	health_int_99	save_int_99	sc_int_99	circ_int_99
unem_int_99	1	-0.36 (0.2787)	-0.56 (0.073)	-0.24 (0.4755)	-0.21 (0.5427)	0.45 (0.1618)
educ_int_99	-0.36 (0.2787)	1	0.04 (0.8969)	-0.32 (0.3307)	0.25 (0.4545)	0.3 (0.3704)
health_int_99	-0.56 (0.073)	0.04 (0.8969)	1	0.25 (0.4562)	0.68 (0.0218)	-0.09 (0.7942)
save_int_99	-0.24 (0.4755)	-0.32 (0.3307)	0.25 (0.4562)	1	0.1 (0.7656)	-0.01 (0.979)
sc_int_99	-0.21 (0.5427)	0.25 (0.4545)	0.68 (0.0218)	0.1 (0.7656)	1	0.58 (0.0624.)
circ_int_99	0.45 (0.1618)	0.3 (0.3704)	-0.09 (0.7942)	-0.01 (0.979)	0.58 (0.0624.)	1

The closer the correlation approaches the absolute value of 1 the more highly correlated the two variables are. Where the correlation is perfectly 1, the correlation is strongly positive, -1 it would be negative. The closer the correlation coefficient approaches 0, the less correlated the two variables are. If two variables are correlated with one another, then they could effectively be used as substitutes in the regression.

Only three correlations are statistically significant: unem\_int\_99 and health\_int\_99; health\_int\_99 and sc\_int\_99; and sc\_int\_99 and circ\_int\_99. In all three cases the correlation is relatively strong, being greater than 0.5. The existence of these correlations could be obscuring the statistically significant effects that some of the variables could be having, explaining why so few development variables were included in the model in Table 18.

## 4.9 Summary

This chapter discussed the results of the regressions run with international data. Statistical reliability limited the conclusions that could be made. However, there were some statistically significant results. These are summarised in Table 21.

*Table 21: Summary of results*

Model	Direct	Indirect
circ_int_99 → gdp_int_99	0.334	
circ_int_99 → educ_int_99 → gdp_int_99	0.3314	
circ_int_99 → health_int_99 → gdp_int_99		0.2966
circ_int_99 → sc_int_99 → gdp_int_99	0.2952	0.1193
circ_int_99 → save_int_99 → gdp_int_99	0.3372	
circ_int_99 → (unem_int_99/educ_int_99/health_int_99/sc_int_99/save_int_99) → gdp_int_99	0.4848	0.501

These results show that circulation has a theoretically positive relationship with economic growth. This result provides support for the relationship that was expressed in the literature, as discussed in Chapter 2. Even when considering the different development variables through which circulation could be affecting economic growth, circulation still shows a positive relationship. In the next chapter, a similar set of tests are done with data from the USA.

## Chapter 5: USA results

The previous chapter gave the results of regressions done with international data. This chapter shows the results from regressions done with data from the USA.

The models are more complex for the regressions done with data from the USA than the models that were done with international data. The USA dataset offers six suitable library indicators where the international dataset only had one.

The initial section covers two models: all library variables as possible independent variables in a stepwise regression with GDP as the dependent variable, and then a second stepwise regression that includes all the development variables as well.

The second section takes each library variable, along with all the development variables, as the independent variables. The final section takes each development variable, along with all the library variables, and runs a similar analysis. This analysis was done to isolate the effects that the library usage might be having through each of the development indicators.

The format of this chapter follows that of the chapter on international results: the regression results are introduced, followed by the path diagram, the mathematical expression and a discussion. As before, direct effects are written in a bold font, and indirect effects are italicised. Total effects are written in both bold and italic font.

The variables used in this chapter are summarised in Table 22.

Table 22: Summary of US variables used in this chapter

Variable	Variable name	Representing	Transformations
Book issues	circ_us_09	Total annual circulation transactions	Normalised for population (per 100 people), logarithmic value taken
Reference queries	ref_us_09	Total annual reference transactions	Normalised for population (per 100 people), logarithmic value taken
Library visits	vis_us_09	Total annual library visits	Normalised for population (per 100 people), logarithmic value taken
Library programmes	prog_us_09	Total annual attendance at all library programs	Normalised for population (per 100 people), logarithmic value taken
Children's programmes	child_us_09	Total annual attendance at all programs intended primarily for children	Normalised for population (per 100 people), logarithmic value taken
Public computers (PCs)	pc_us_09	Users of public Internet terminals per year	Normalised for population (per 100 people), logarithmic value taken
GDP	gdp_us_09	GDP per capita	Normalised for population (per 100 people), logarithmic value taken
Unemployment	unem_us_09	Unemployment rate	Logarithmic value taken
Education	educ_us_09	Percentage of the those over twenty five years of age that have at least a high school diploma was used	Logarithmic value taken
Health	health_us_09	Child deaths per 100 000 of the populations	Normalised for population(per 100 people), constant of 0.8961 added*, logarithmic value taken
Social capital	sc_us_09	Number of arrests made	Normalised for population(per 100 people), logarithmic value taken
Savings	save_us_09	Number of tax returns that include a taxable interest line-item	Normalised for population(per 100 people), logarithmic value taken
*Where the the figures are smaller than 1, the logarithmic value would be negative. This would skew the results. To remedy this, a constant figure is added to all the values in the series. This constant would increase the smallest value in the series to a value of $\approx 1$ , which would ensure that all the logarithmic values are positive.			

## 5.1 Simple models

The simple models here echo those created in the previous chapter, with the exception of considering more variables that represent public library use. Where the previous chapter used data from a number of countries, these models only use data from USA.



### 5.1.1 Direct relationship between library variables and GDP

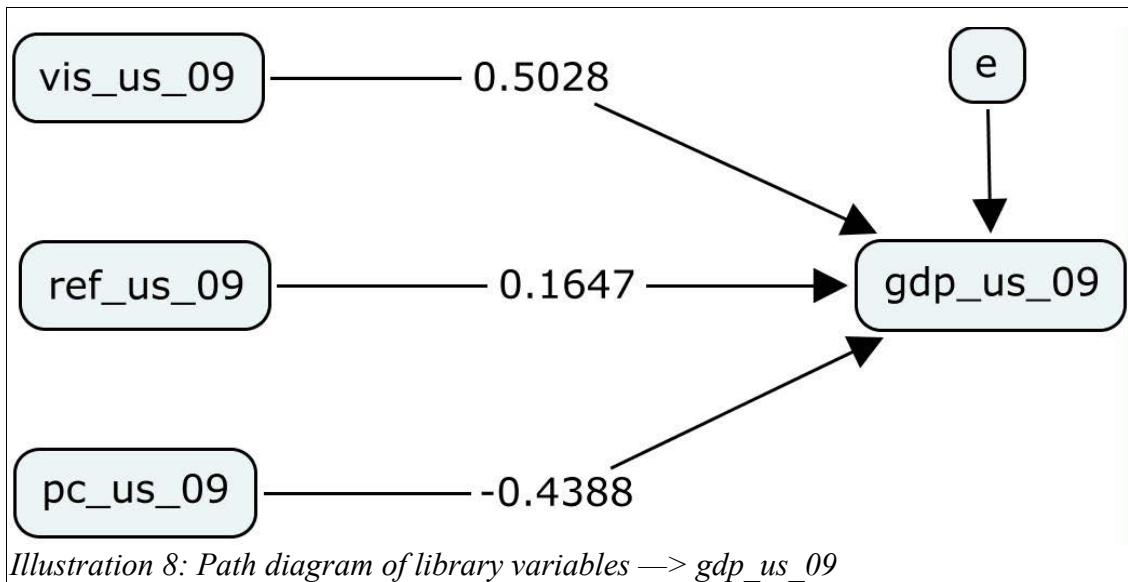
As the simplest model, a stepwise regression was done using only the library variables as the independent variables and `gdp_us_09` as the dependent variable. The results are given in Table 23, and the path diagram is laid out in Illustration 8.

Table 23: Stepwise regression result from library variables  $\longrightarrow$  `gdp_us_09`

	Coefficient	p-value
Intercept	5.832	< 2E-16 ***
<code>vis_us_09</code>	0.5028	0.0012 **
<code>ref_us_09</code>	0.1647	0.0799 †
<code>pc_us_09</code>	-0.4388	4.01E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0882 on 47 degrees of freedom		
Multiple R-squared: 0.4395, Adjusted R-squared: 0.4037		
F-statistic: 12.28 on 3 and 47 DF, p-value: 4.664E-06		

The regression given in Table 23 shows that only three of the six library variables were used to create the strongest possible model. Forty percent of the observed variation in GDP was captured, as shown by the adjusted R-squared statistic. The model was statistically reliable, however, as the F-statistic was above the critical value and the p-value was less than 0.1.

This is expressed as a path diagram in Illustration 8.



Mathematically this can be expressed as:

$$gdp\_us\_09' = e + 0.5028(vis\_us\_09) + 0.1647(ref\_us\_09) + -0.4388(pc\_us\_09)$$

Equation 5.1

where  $e$  refers to all other variables not already included in the model.

vis\_us\_09, ref\_us\_09 and pc\_us\_09 were revealed as being statistically significant, with a 1 percent change in each collating with a 0.5, 0.16 and -0.4 percent change in GDP. The positive relationship between vis\_us\_09 and ref\_us\_09 and gdp\_us\_09 was expected, while the negative relationship between pc\_us\_09 and gdp\_us\_09 was unexpected. In theory, this would lead to the assumption that visits to public libraries, as well as the asking of reference questions have a positive impact on economic growth. Conversely, the use of public computers in public libraries is negatively linked to economic growth.

## 5.1.2 Indirect relationship between library variables and GDP through development variables

The second analysis used all the library variables and all the development variables as possible independent variables in a stepwise regression, with gdp\_us\_09 as the dependent variable. The results are shown in Table 24.

*Table 24: Stepwise regression result from library variables; development variables —> gdp\_us\_09*

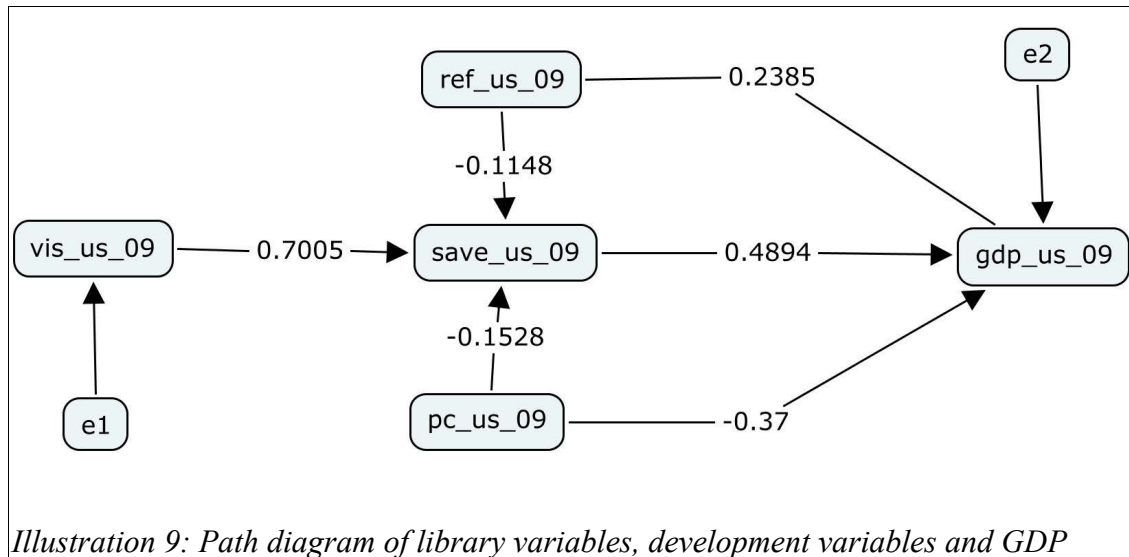
	Coefficient	p-value
Intercept	6.0998	< 2E-16 ***
ref_us_09	0.2385	0.0051 **
child_us_09	0.1398	0.1432
pc_us_09	-0.37	1.9E-05 ***
save_us_09	0.4894	0.003 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.0831 on 46 degrees of freedom		
Multiple R-squared: 0.513, Adjusted R-squared: 0.4706		
F-statistic: 12.11 on 4 and 46 DF, p-value: 8.332E-07		

Three library variables were revealed to be statistically significant: ref\_us\_09, child\_us\_09 and pc\_us\_09. One development variable was shown to be statistically significant: save\_us\_09. This variable was used as the dependent variable in a further stepwise regression. The results are shown in Table 25.

Table 25: Stepwise regression result from library variables —> save\_us\_09

	Coefficient	p-value
Intercept	-0.0842	0.72
vis_us_09	0.7005	1.19E-08 ***
ref_us_09	-0.1148	0.0788 †
pc_us_09	-0.1528	0.0119 *
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 '.' 1		
Residual standard error: 0.0612 on 47 degrees of freedom		
Multiple R-squared: 0.5082, Adjusted R-squared: 0.4768		
F-statistic: 16.19 on 3 and 47 DF, p-value: 2.306E-07		

All the stepwise regressions shown here were statistically significant, given the F-statistics and the associated p-values. The coefficients can be expressed in a path diagram, shown in Illustration 9.



Mathematically this can be expressed as:

$$\text{save\_us\_09}' = e1 + 0.7005(\text{vis\_us\_09}) + -0.1148(\text{ref\_us\_09}) + -0.1528(\text{pc\_us\_09})$$

Equation 5.2

$$\text{gdp\_us\_09}' = e2 + \mathbf{0.2385}(\text{ref\_us\_09}) + \mathbf{-0.37}(\text{pc\_us\_09}) + 0.4894(\text{save\_us\_09})$$

Equation 5.3

where  $e1$  and  $e2$  are variables that capture any variation that is not already expressed in the other variables.

Equation 5.2 can be substituted in Equation 5.3 to calculate the indirect effects:

$$\begin{aligned} \text{gdp\_us\_09}' &= e2 + \mathbf{0.2385}(\text{ref\_us\_09}) + \mathbf{-0.37}(\text{pc\_us\_09}) + 0.4894(e1 + \\ &0.7005(\text{vis\_us\_09}) + -0.1148(\text{ref\_us\_09}) + -0.1528(\text{pc\_us\_09})) \\ \text{gdp\_us\_09}' &= (e2 + 0.4894*e1) + (\mathbf{0.2385} + 0.4894*-0.1148)(\text{ref\_us\_09}) + (\mathbf{-0.37} + \\ &0.4894*-0.1528)(\text{pc\_us\_09}) + (0.4894*0.7005)(\text{vis\_us\_09}) \\ \text{gdp\_us\_09}' &= (e2 + 0.4894*e1) + (\mathbf{0.2385} + -0.0562)(\text{ref\_us\_09}) + (\mathbf{-0.37} + -0.0748) \\ &(\text{pc\_us\_09}) + 0.3428(\text{vis\_us\_09}) \\ \text{gdp\_us\_09}' &= (e2 + 0.4894*e1) + \mathbf{0.1823}(\text{ref\_us\_09}) + \mathbf{-0.4448}(\text{pc\_us\_09}) + \\ &0.3428(\text{vis\_us\_09}) \end{aligned} \quad \text{Equation 5.4}$$

Three library variables had a theoretical effect on  $\text{gdp\_us\_09}$ :  $\text{ref\_us\_09}$  and  $\text{pc\_us\_09}$  have a direct and indirect effect; and  $\text{vis\_us\_09}$  had only an indirect effect. The expected relationship was a positive one:  $\text{ref\_us\_09}$ , and  $\text{vis\_us\_09}$  conformed to this expectation. However,  $\text{pc\_us\_09}$  had a negative relationship with  $\text{gdp\_us\_09}$ . In all cases, the relationship between  $\text{gdp\_us\_09}$  and the library variable was small. A percentage change in the library variable associated with a smaller change in  $\text{gdp\_us\_09}$ .

The relationships here were similar to the relationships expressed in Section 5.1.1, although the magnitudes were different. The effects of  $\text{ref\_us\_09}$  and  $\text{pc\_us\_09}$  were greater when considering the inclusion of  $\text{save\_us\_09}$ , while the effect of  $\text{vis\_us\_09}$  was slightly smaller.

With the inclusion of the development variables, the same conclusions can be drawn: visits to the library and engaging in reference questions theoretically have a positive effect on economic growth; while the use of public computers in libraries seem to have

a negative effect. Looking at the theoretical relationship that Table 25 expresses, one can say that visits to the library have a positive relationship with the savings rate of a state, while reference questions and public computer use have a negative relationship.

### 5.1.3 Correlations between variables

The regression of the previous section considered all library and development variables for inclusion in a regression. However, not all were included in the final stepwise regression. One reason could be that variables considered for inclusion could be correlated with one another. Table 26 shows the correlations.

*Table 26: Correlations of all us\_09 variables*

	gdp_us_09	vis_us_09	ref_us_09	circ_us_09	prog_us_09	child_us_09	pc_us_09	unem_us_09	educ_us_09	health_us_09	sc_us_09	save_us_09
gdp_us_09	1	0.26 (0.0623)	0.3 (0.0308)	0.08 (0.5886)	0.23 (0.101)	0.21 (0.1378)	-0.4 (0.0033)	-0.1 (0.4809)	0.29 (0.0372)	0.11 (0.4366)	-0.23 (0.0979)	0.45 (0.0009)
vis_us_09	0.26 (0.0623)	1	0.41 (0.0028)	0.86 (0.0000)	0.75 (0.0000)	0.67 (0.0000)	0.44 (0.0013)	0.06 (0.6713)	0.65 (0.0000)	-0.48 (0.0003)	-0.18 (0.2169)	0.64 (0.0000)
ref_us_09	0.3 (0.0308)	0.41 (0.0028)	1	0.32 (0.0232)	0.22 (0.1216)	0.2 (0.1585)	0.15 (0.2834)	0.29 (0.0356)	0.01 (0.9413)	0.14 (0.3407)	-0.19 (0.179)	0.1 (0.4804)
circ_us_09	0.08 (0.5886)	0.86 (0.0000)	0.32 (0.0232)	1	0.58 (0.0000)	0.53 (0.0000)	0.49 (0.0002)	0.02 (0.9013)	0.62 (0.0000)	-0.58 (0.0000)	0 (0.9958)	0.51 (0.0001)
prog_us_09	0.23 (0.101)	0.75 (0.0000)	0.22 (0.1216)	0.58 (0.0000)	1	0.92 (0.0000)	0.36 (0.01)	-0.16 (0.2756)	0.6 (0.0000)	-0.38 (0.006)	-0.17 (0.2264)	0.54 (0.0000)
child_us_09	0.21 (0.1378)	0.67 (0.0000)	0.2 (0.1585)	0.53 (0.0000)	0.92 (0.0000)	1	0.37 (0.0082)	-0.19 (0.1922)	0.59 (0.0000)	-0.35 (0.0131)	-0.13 (0.3684)	0.44 (0.0014)
pc_us_09	-0.4 (0.0033)	0.44 (0.0013)	0.15 (0.2834)	0.49 (0.0002)	0.36 (0.01)	0.37 (0.0082)	1	0.04 (0.7685)	0.18 (0.2027)	-0.42 (0.0019)	0.12 (0.4201)	0.04 (0.763)
unem_us_09	-0.1 (0.4809)	0.06 (0.6713)	0.29 (0.0356)	0.02 (0.9013)	-0.16 (0.2756)	-0.19 (0.1922)	0.04 (0.7685)	1	-0.44 (0.0012)	0.19 (0.1823)	-0.12 (0.4062)	-0.3 (0.0299)
educ_us_09	0.29 (0.0372)	0.65 (0.0000)	0.01 (0.9413)	0.62 (0.0000)	0.6 (0.0000)	0.59 (0.0000)	0.18 (0.2027)	-0.44 (0.0012)	1	-0.46 (0.0006)	0.01 (0.9688)	0.78 (0.0000)
health_us_09	0.11 (0.4366)	-0.48 (0.0003)	0.14 (0.3407)	-0.58 (0.0000)	-0.38 (0.006)	-0.35 (0.0131)	-0.42 (0.0019)	0.19 (0.1823)	-0.46 (0.0006)	1	-0.2 (0.1608)	-0.52 (0.0000)
sc_us_09	-0.23 (0.0979)	-0.18 (0.2169)	-0.19 (0.179)	0 (0.9958)	-0.17 (0.2264)	-0.13 (0.3684)	0.12 (0.4201)	-0.12 (0.4062)	0.01 (0.9688)	-0.2 (0.1608)	1	-0.18 (0.1944)
save_us_09	0.45 (0.0009)	0.64 (0.0000)	0.1 (0.4804)	0.51 (0.0001)	0.54 (0.0000)	0.44 (0.0014)	0.04 (0.763)	-0.3 (0.0299)	0.78 (0.0000)	-0.52 (0.0000)	-0.18 (0.1944)	1

In Table 26 one can see how certain variables were strongly correlated with one another. For example, prog\_us\_09 and child\_us\_09 were strongly correlated. They could then be thought of as substitutes for one another: where prog\_us\_09 had been shown to have a statistically significant relationship with gdp\_us\_09, child\_us\_09 probably had a similar relationship. Without this correlation analysis, this relationship would not have been known. Another pair of variables that were quite strongly correlated were vis\_us\_09 and circ\_us\_09.

For example, the results in Section 5.1.1 and Section 5.1.2 showed that vis\_us\_09 has a positive relationship with gdp\_us\_09. As vis\_us\_09 and circ\_us\_09 are correlated, one can conclude that there is a theoretical positive relationship between public library circulation and economic growth.

#### **5.1.4 Summary**

This section tested the relationship between all library variables, all the development variables and gdp\_us\_09. Only some variables were shown to have a statistically significant relationship. This outcome could be as a result of correlations between the variables. To examine the relationships more carefully, the next two sections isolate the library variables and development variables respectively. This examination will give a better insight as to how the library usage could be affecting the economy.

#### ***5.2 Indirect relationship through development variables***

The previous section considered all the library variables and development variables as possible independent variables. This section considers a single library variable at a time with all the development variables in the same manner. Regressions that use gdp\_us\_09 as the dependent variable were stepwise regressions, others were straight-forward

regressions. These regressions were done to calculate the possible indirect effect the library variable might have through the development variables.

As before, this section discusses each variable of interest in the same format: the results of the regressions are given in tables, out of which a path diagram is drawn. This diagram informs the mathematical consideration. A discussion concludes each subsection.

### 5.2.1 Indirect relationship between library visits and GDP through development variables

Library visits is the first library variable examined. Table 27, Table 28 and Table 29 detail the results of the regressions.

*Table 27: Stepwise regression result from vis\_us\_09; development variables —> GDP*

	Coefficient	p-value
Intercept	5.3146	< 2E-16 ***
health_us_09	3.8032	0.0008 ***
save_us_09	0.9493	3.52E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.0924 on 48 degrees of freedom		
Multiple R-squared: 0.3719, Adjusted R-squared: 0.3457		
F-statistic: 14.21 on 2 and 48 DF, p-value: 1.42E-05		

The regression in Table 27 was statistically sound, as shown by the suitably high F-statistic and the p-value that is less than 0.1. This model only explained 34.6 percent of the variation in gdp\_us\_09. As health\_us\_09 and save\_us\_09 were shown to be statistically significant here, they were used as dependent variables in Table 28 and Table 29. vis\_us\_09 was used as the independent variable.



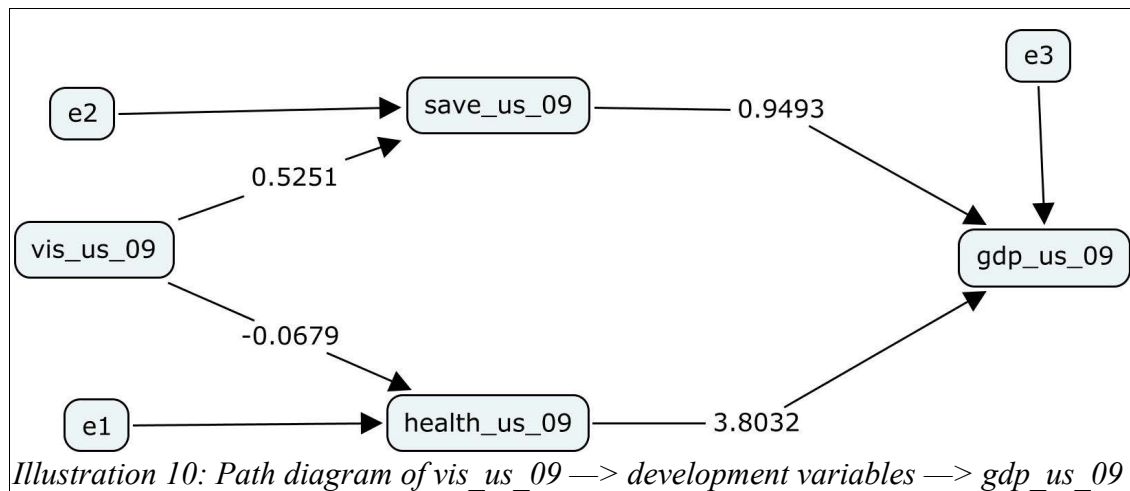
Table 28: Regression result from *vis\_us\_09*  $\rightarrow$  *health\_us\_09*

	Coefficient	p-value
Intercept	0.2056	7.48E-05 ***
vis_us_09	-0.0679	0.0003 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1		
Residual standard error: 0.0128 on 49 degrees of freedom		
Multiple R-squared: 0.234, Adjusted R-squared: 0.2184		
F-statistic: 14.97 on 1 and 49 DF, p-value: 0.0003		

Table 29: Regression result from *vis\_us\_09*  $\rightarrow$  *save\_us\_09*

	Coefficient	p-value
Intercept	-0.1449	0.558
vis_us_09	0.5251	4.99E-07 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1		
Residual standard error: 0.0659 on 49 degrees of freedom		
Multiple R-squared: 0.4059, Adjusted R-squared: 0.3938		
F-statistic: 33.48 on 1 and 49 DF, p-value: 4.994E-07		

The regressions shown in Table 28 and Table 29 are statistically sound. Together with the results shown in Table 27 they were used to create Illustration 10.



Mathematically, they can be expressed as:

$$\text{health\_us\_09}' = e1 + -0.0679(\text{vis\_us\_09}) \quad \text{Equation 5.5}$$

$$\text{save\_us\_09}' = e2 + 0.5251(\text{vis\_us\_09}) \quad \text{Equation 5.6}$$

$$\text{gdp\_us\_09}' = e3 + 3.8032(\text{health\_us\_09}) + 0.9493(\text{save\_us\_09}) \quad \text{Equation 5.7}$$

where  $e1$ ,  $e2$  and  $e3$  are proxy variables for the unexplained variance. Equation 5.5 and Equation 5.6 can be substituted into Equation 5.7:

$$\text{gdp\_us\_09}' = e3 + 3.8032(e1 + -0.0679(\text{vis\_us\_09})) + 0.9493(e2 + 0.5251(\text{vis\_us\_09}))$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e1 + 0.9493*e2) + (3.8032*-0.0679 + 0.9493*0.5251)(\text{vis\_us\_09})$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e1 + 0.9493*e2) + (-0.2582 + 0.4985)(\text{vis\_us\_09})$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e1 + 0.9493*e2) + 0.2403(\text{vis\_us\_09}) \quad \text{Equation 5.8}$$

These calculations show that  $\text{vis\_us\_09}$  did not have a direct effect on  $\text{gdp\_us\_09}$ . This result was contrary to the effects found in the previous section, where a direct relationship was found. Here, however, through the variables of  $\text{health\_us\_09}$  and  $\text{save\_us\_09}$ , it did have an indirect effect. A percentage increase in  $\text{vis\_us\_09}$  correlated with a 0.26 percentage decrease through  $\text{health\_us\_09}$  and a 0.5 percentage increase through  $\text{save\_us\_09}$ .

Again one can say that visits to the public library have a positive impact on economic growth as well as the savings rate. It has a negative and indirect relationship with the child-mortality rate. The literature that links health with library use does not cover the link between library visits and a health indicator, as shown in Section 2.3. This result complements the existing literature and fills the gap by linking visits to the public library with the child-mortality rate.

## 5.2.2 Indirect relationship between reference questions and GDP through development variables

The second library variable of interest was ref\_us\_09. As with vis\_us\_09, a stepwise regression was run using ref\_us\_09 and the development variables as the independent variables and gdp\_us\_09 as the dependent variable. The development variables identified as statistically significant in this stepwise regression were then used as dependent variables and regressed against ref\_us\_09. This was done to calculate the possible indirect effect that ref\_us\_09 might have on gdp\_us\_09 through the identified development variables. Table 30 shows the result.

*Table 30: Stepwise regression result from ref\_us\_09; development variables —> gdp\_us\_09*

	Coefficient	p-value
Intercept	5.1329	< 2E-16 ***
ref_us_09	0.1357	0.1357
health_us_09	3.4385	0.0025 **
save_us_09	0.8927	1.22E-05 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.0911 on 47 degrees of freedom		
Multiple R-squared: 0.4013, Adjusted R-squared: 0.3631		
F-statistic: 10.5 on 3 and 47 DF, p-value: 2.109E-05		

As before, health\_us\_09 and save\_us\_09 were shown to be statistically significant in Table 30. They were then used as the dependent variable in their own regressions with ref\_us\_09 as the independent variable.

Table 31: Regression result from ref\_us\_09 → health\_us\_09

	Coefficient	p-value
Intercept	-0.0037	0.889
ref_us_09	0.0132	0.341
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 Residual standard error: 0.0144 on 49 degrees of freedom Multiple R-squared: 0.0185, Adjusted R-squared: -0.0015 F-statistic: 0.9259 on 1 and 49 DF, p-value: 0.3407		

Table 32: Regression result from ref\_us\_09 → save\_us\_09

	Coefficient	p-value
Intercept	1.166	1.38E-09 ***
ref_us_09	0.0576	0.48
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 Residual standard error: 0.0851 on 49 degrees of freedom Multiple R-squared: 0.0102, Adjusted R-squared: -0.01 F-statistic: 0.5056 on 1 and 49 DF, p-value: 0.4804		

The regressions shown in Table 31 and Table 32 were not statistically sound as shown by the low F-statistic and high p-value that is associated with the F-statistic. These results were excluded from further analysis. As ref\_us\_09 was not shown to be statistically significant in Table 30, no conclusions can be drawn from the relationship between ref\_us\_09 and gdp\_us\_09.

### 5.2.3 Indirect relationship between library circulation and GDP through development variables

The next library variable that received the same examination as those before is circ\_us\_09. Table 33 shows the results of the stepwise regression results which considered circ\_us\_09 as one of the independent variables.

Table 33: Stepwise regression result from *circ\_us\_09*; development variables —> *gdp\_us\_09*

	Coefficient	p-value
Intercept	5.3146	< 2E-16 ***
health_us_09	3.8032	0.0008 ***
save_us_09	0.9493	3.52E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.09235 on 48 degrees of freedom		
Multiple R-squared: 0.3719, Adjusted R-squared: 0.3457		
F-statistic: 14.21 on 2 and 48 DF, p-value: 1.42E-05		

*circ\_us\_09* had not come up as a statistically significant variable. The stepwise regression included *health\_us\_09* and *save\_us\_09*. Table 34 and Table 35 show considerations of *health\_us\_09* and *save\_us\_09* as the dependent variable, with *circ\_us\_09* as the independent variable.

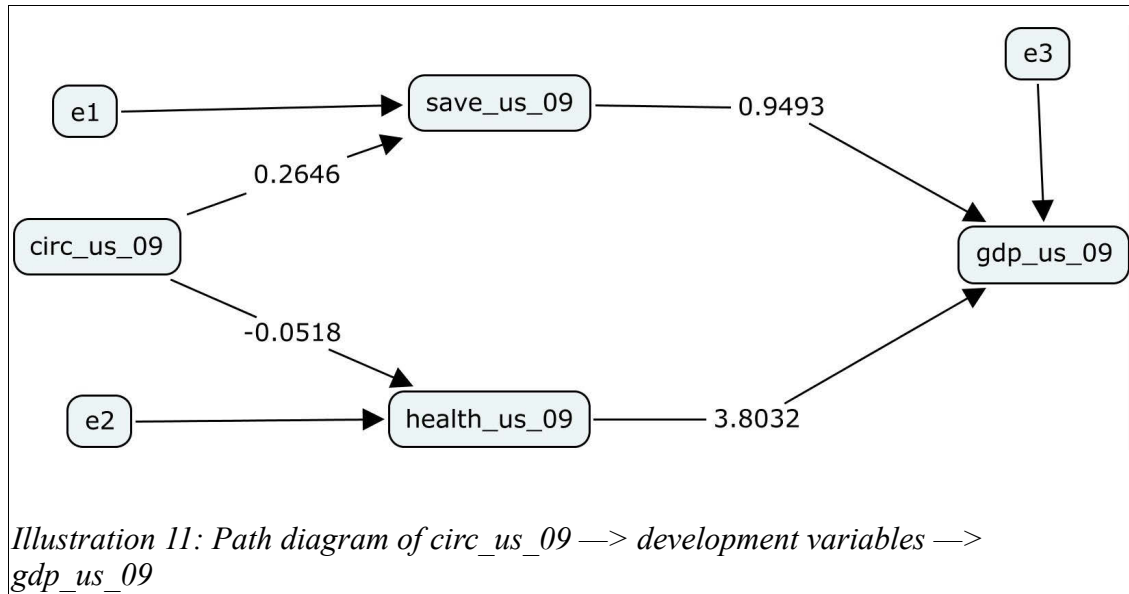
Table 34: Regression result from *circ\_us\_09* —> *health\_us\_09*

	Coefficient	p-value
Intercept	0.1705	5.49E-07 ***
circ_us_09	-0.0518	6.93E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0118 on 49 degrees of freedom		
Multiple R-squared: 0.3407, Adjusted R-squared: 0.3272		
F-statistic: 25.32 on 1 and 49 DF, p-value: 6.934E-06		

Table 35: Regression result from *circ\_us\_09* —> *health\_us\_09*

	Coefficient	p-value
Intercept	0.5175	0.0072 **
circ_us_09	0.2646	0.0001 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0737 on 49 degrees of freedom		
Multiple R-squared: 0.2575, Adjusted R-squared: 0.2424		
F-statistic: 17 on 1 and 49 DF, p-value: 0.0001		

The result from Table 33, Table 34, and Table 35 were statistically reliable and could be shown in a path diagram and mathematically, see Illustration 11.



Mathematically:

$$\text{save\_us\_09}' = e1 + 0.2646(\text{circ\_us\_09}) \quad \text{Equation 5.9}$$

$$\text{health\_us\_09}' = e2 + -0.0518(\text{circ\_us\_09}) \quad \text{Equation 5.10}$$

$$\text{gdp\_us\_09}' = e3 + 3.8032(\text{health\_us\_09}) + 0.9493(\text{save\_us\_09}) \quad \text{Equation 5.11}$$

where  $e1$ ,  $e2$  and  $e3$  are as before. Substituting the first two equations into the third one shows the indirect effects:

$$\text{gdp\_us\_09}' = e3 + 3.8032(e2 + -0.0518(\text{circ\_us\_09})) + 0.9493(e1 + 0.2646(\text{circ\_us\_09}))$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e2 + 0.9493*e1) + (3.8032*-0.0518 + 0.9493*0.2646)(\text{circ\_us\_09})$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e2 + 0.9493*e1) + (-0.197 + 0.2512)(\text{circ\_us\_09})$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e2 + 0.9493*e1) + 0.0542(\text{circ\_us\_09}) \quad \text{Equation 5.12}$$

Through the development variables of save\_us\_09 and health\_us\_09 there was a negative relationship, equalling to a -0.05 percentage change in gdp\_us\_09 for a percentage change in circ\_us\_09. This figure was made up from the positive contribution that circ\_us\_09 has through save\_us\_09 and the negative contribution through health\_us\_09.

Table 26 showed that circ\_us\_09 and vis\_us\_09 were correlated with one another. It was, therefore, no surprise that circulation was shown to have a similar relationship with economic growth, savings and the child-mortality rate as to that which was found between library visits and the three economic variables, as shown in Section 5.2.1. The magnitude of the relationship was bigger when considering library visits.

#### 5.2.4 Indirect relationship between attendance at library programmes and GDP through development variables

The next variable under examination was attendance at library programmes. As before, a stepwise regression was done, followed by regressions with the variables identified in the stepwise regression.

*Table 36: Stepwise regression result from prog\_us\_09; development variables —> gdp\_us\_09*

	Coefficient	p-value
Intercept	5.3146	< 2E-16 ***
health_us_09	3.8032	0.0008 ***
save_us_09	0.9493	3.52E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0924 on 48 degrees of freedom		
Multiple R-squared: 0.3719, Adjusted R-squared: 0.3457		
F-statistic: 14.21 on 2 and 48 DF, p-value: 1.42E-05		

Again, two more regressions were run, with health\_us\_09 and save\_us\_09 as the dependent variables and prog\_us\_09 as the independent variable.

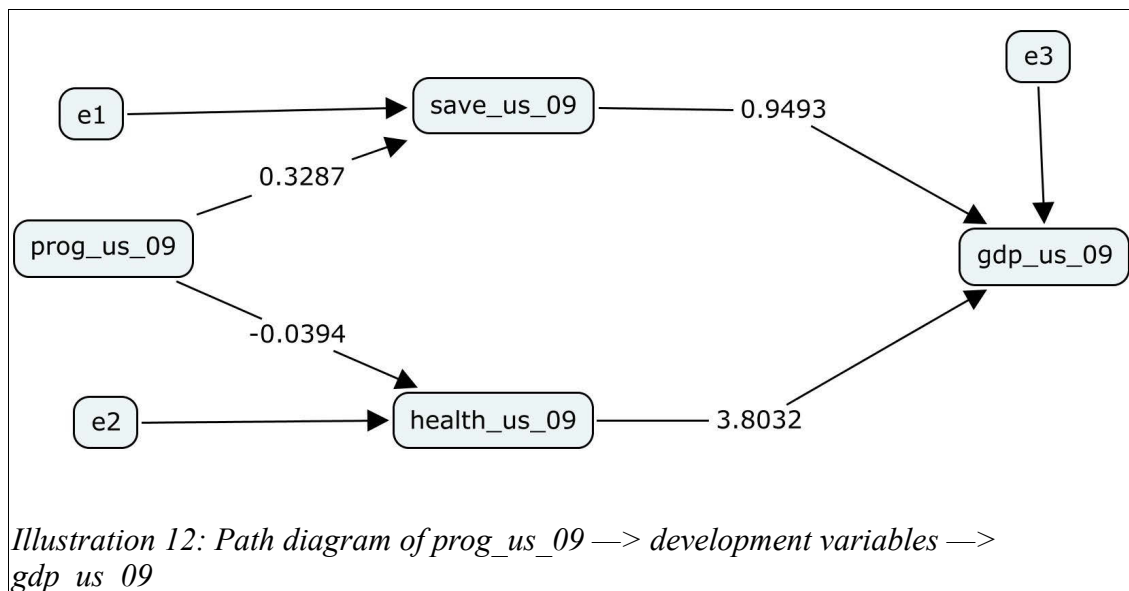
Table 37: Regression result from prog\_us\_09 —> health\_us\_09

	Coefficient	p-value
Intercept	0.0794	0.0003 ***
prog_us_09	-0.0394	0.006 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0135 on 49 degrees of freedom		
Multiple R-squared: 0.1441, Adjusted R-squared: 0.1266		
F-statistic: 8.248 on 1 and 49 DF, p-value: 0.006		

Table 38: Regression result from prog\_us\_09 —> save\_us\_09

	Coefficient	p-value
Intercept	0.7961	1.66E-09 ***
prog_us_09	0.3287	4.42E-05 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.072 on 49 degrees of freedom		
Multiple R-squared: 0.2909, Adjusted R-squared: 0.2765		
F-statistic: 20.11 on 1 and 49 DF, p-value: 4.422E-05		

The regressions shown in Table 36, Table 37 and Table 38 were statistically significant and were included in the diagrammatic depiction and the mathematical handling, see Illustration 12.





Mathematically:

$$\text{save\_us\_09}' = e1 + 0.3287(\text{prog\_us\_09}) \quad \text{Equation 5.13}$$

$$\text{health\_us\_09}' = e2 + -0.0394(\text{prog\_us\_09}) \quad \text{Equation 5.14}$$

$$\text{gdp\_us\_09}' = e3 + 3.8032(\text{health\_us\_09}) + 0.9493(\text{save\_us\_09}) \quad \text{Equation 5.15}$$

Substituting Equation 5.13 and Equation 5.14 into Equation 5.15:

$$\text{gdp\_us\_09}' = e3 + 3.8032(e2 + -0.0394(\text{prog\_us\_09})) + 0.9493(e1 + 0.3287(\text{prog\_us\_09}))$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e2 + 0.9493*e1) + (3.8032*-0.0394 + 0.9493*0.3287)(\text{prog\_us\_09})$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e2 + 0.9493*e1) + (-0.1498 + 0.312)(\text{prog\_us\_09})$$

$$\text{gdp\_us\_09}' = (e3 + 3.8032*e2 + 0.9493*e1) + 0.1622(\text{prog\_us\_09}) \quad \text{Equation 5.16}$$

Illustration 12 showed that prog\_us\_09 does not have a direct effect on gdp\_us\_09. However, it did have an indirect effect through save\_us\_09 and health\_us\_09. The effect was positive: an increase of 1 percent in prog\_us\_09 correlated with an increase of 0.16 percent in gdp\_us\_09. In simple terms, attendance at programmes at public libraries had a positive effect on economic growth, a positive effect on the savings rate and a negative effect with the child-mortality rate.

### **5.2.5 Indirect relationship between attendance at children's programmes and GDP through development variables**

This subsection describes analysis which took child\_us\_09 as an independent variable together with the development variables. The stepwise regression in Table 39 identified which independent variables were included to explain the greatest amount of variation

in gdp\_us\_09. These variables were then used as dependent variables; the regressions are shown in Table 40 and Table 41.

*Table 39: Stepwise regression result from child\_us\_09; development variables —> gdp\_us\_09*

	Coefficient	p-value
Intercept	5.3146	< 2E-16 ***
health_us_09	3.8032	0.0008 ***
save_us_09	0.9493	3.52E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0924 on 48 degrees of freedom		
Multiple R-squared: 0.3719, Adjusted R-squared: 0.3457		
F-statistic: 14.21 on 2 and 48 DF, p-value: 1.42E-05		

Table 40 and Table 41 show the results of stepwise regressions that used health\_us\_09 and save\_us\_09 as the dependent variables.

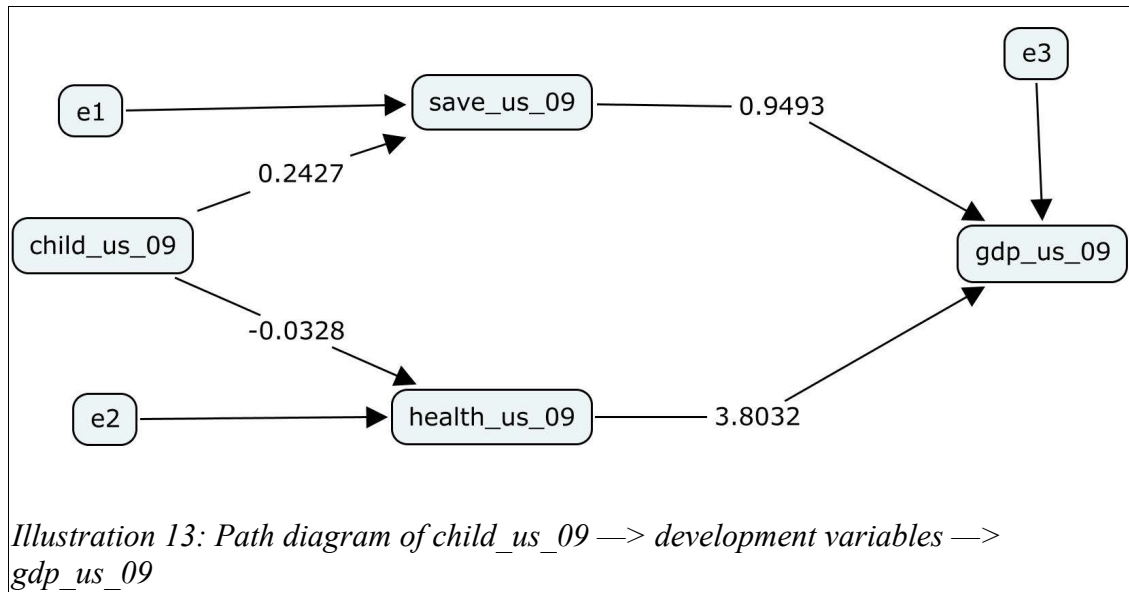
*Table 40: Regression result from child\_us\_09 —> health\_us\_09*

	Coefficient	p-value
Intercept	0.0651	0.0003 ***
child_us_09	-0.0328	0.0131 *
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0137 on 49 degrees of freedom		
Multiple R-squared: 0.1193, Adjusted R-squared: 0.1013		
F-statistic: 6.635 on 1 and 49 DF, p-value: 0.0131		

*Table 41: Regression result from child\_us\_09 —> save\_us\_09*

	Coefficient	p-value
Intercept	0.9558	1.9E-13 ***
child_us_09	0.2427	0.0014 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.077 on 49 degrees of freedom		
Multiple R-squared: 0.1899, Adjusted R-squared: 0.1734		
F-statistic: 11.49 on 1 and 49 DF, p-value: 0.0014		

Again, these results are shown in a path diagram in Illustration 13.



Mathematically:

$$save\_us\_09' = e1 + 0.2427(child\_us\_09) \quad \text{Equation 5.17}$$

$$health\_us\_09' = e2 + -0.0328(child\_us\_09) \quad \text{Equation 5.18}$$

$$gdp\_us\_09' = e3 + 3.8032(health\_us\_09) + 0.9493(save\_us\_09) \quad \text{Equation 5.19}$$

where  $e1$ ,  $e2$  and  $e3$  are proxy variables for the unexplained variance. Expressing this as a simultaneous equation:

$$gdp\_us\_09' = e3 + 3.8032(e2 + -0.0328(child\_us\_09)) + 0.9493(e1 + 0.2427(child\_us\_09))$$

$$gdp\_us\_09' = (e3 + 3.8032*e2 + 0.9493*e1) + (3.8032*-0.0328 + 0.9493*0.2427)(child\_us\_09)$$

$$gdp\_us\_09' = (e3 + 3.8032*e2 + 0.9493*e1) + (-0.1247 + 0.2304)(child\_us\_09)$$

$$gdp\_us\_09' = (e3 + 3.8032*e2 + 0.9493*e1) + 0.1057(child\_us\_09) \quad \text{Equation 5.20}$$

Through save\_us\_09, child\_us\_09 had a positive indirect relationship with gdp\_us\_09. Where child\_us\_09 increased by a percent, gdp\_us\_09 increased with 0.23 percent. Through health\_us\_09, there was a negative indirect relationship. Where child\_us\_09 increased by a percent, gdp\_us\_09 decreased by 0.12 percent. The net effect was a positive relationship: where child\_us\_09 increased by 1 percent, gdp\_us\_09 increased by 0.11 percent.

This library variable, attendance at children's programmes, showed the same relationship as the other library variables: positive with the savings rate and economic growth and negative with the child-mortality rate.

## 5.2.6 Indirect relationship between public computer usage and GDP through development variables

The last library variable of interest was pc\_us\_09. Again, the same steps were taken as before: a stepwise regression to identify the development variables of note, normal regressions with those development variables as dependent variables, a path diagram and a mathematical expression.

*Table 42: Stepwise regression result from pc\_us\_09; development variables —> gdp\_us\_09*

	Coefficient	p-value
Intercept	5.8904	< 2E-16 ***
pc_us_09	-0.205	0.0209 *
health_us_09	2.5031	0.0348 *
save_us_09	0.8506	1.72E-05 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.0881 on 47 degrees of freedom		
Multiple R-squared: 0.44, Adjusted R-squared: 0.4042		
F-statistic: 12.31 on 3 and 47 DF, p-value: 4.575E-06		

Three variables were shown to be statistically significant: pc\_us\_09, health\_us\_09, and save\_us\_09. The following two tables show the relationship between pc\_us\_09 and the two development variables: health\_us\_09 and save\_us\_09.

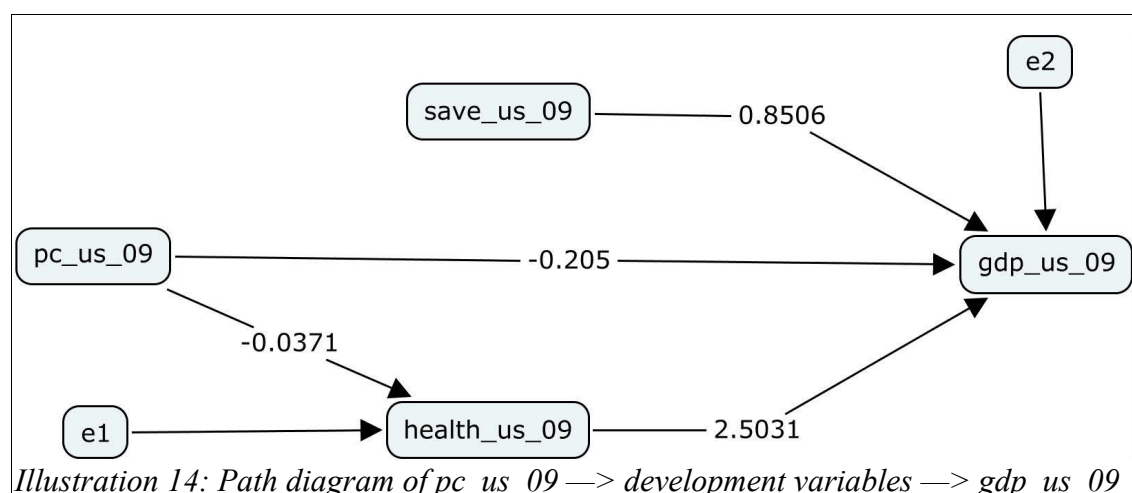
*Table 43: Regression result from pc\_us\_09  $\rightarrow$  health\_us\_09*

	Coefficient	p-value
Intercept	0.0981	0.0001 ***
pc_us_09	-0.0371	0.0019 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0132 on 49 degrees of freedom		
Multiple R-squared: 0.1803, Adjusted R-squared: 0.1636		
F-statistic: 10.78 on 1 and 49 DF, p-value: 0.0019		

*Table 44: Regression result from pc\_us\_09  $\rightarrow$  save\_us\_09*

	Coefficient	p-value
Intercept	1.2314	1.12E-10 ***
pc_us_09	0.0222	0.76
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0855 on 49 degrees of freedom		
Multiple R-squared: 0.0019, Adjusted R-squared: -0.0185		
F-statistic: 0.0919 on 1 and 49 DF, p-value: 0.763		

The regression shown in Table 44 was not statistically significant and has been omitted from the path diagram below. Illustration 14 expresses Table 42 and Table 43 as a path diagram.



*Illustration 14: Path diagram of pc\_us\_09  $\rightarrow$  development variables  $\rightarrow$  gdp\_us\_09*

Mathematically:

$$\text{health\_us\_09}' = e1 + -0.0371(\text{pc\_us\_09}) \quad \text{Equation 5.21}$$

$$\text{gdp\_us\_09}' = e2 + \mathbf{-0.205}(\text{pc\_us\_09}) + 2.5031(\text{health\_us\_09}) + 0.8506(\text{save\_us\_09})$$

Equation 5.22

where  $e1$  and  $e2$  are proxy variables for the constant and other variables not already expressed. Substituting Equation 5.21 into Equation 5.22, calculates the indirect effect of  $\text{pc\_us\_09}$  on  $\text{gdp\_us\_09}$ :

$$\begin{aligned} \text{gdp\_us\_09}' &= e2 + \mathbf{-0.205}(\text{pc\_us\_09}) + 2.5031(e1 + -0.0371(\text{pc\_us\_09})) + \\ &0.8506(\text{save\_us\_09}) \\ \text{gdp\_us\_09}' &= (e2 + 2.5031*e1) + 0.8506(\text{save\_us\_09}) + (\mathbf{-0.205} + 2.5031*-0.0371) \\ &(\text{pc\_us\_09}) \\ \text{gdp\_us\_09}' &= (e2 + 2.5031*e1) + 0.8506(\text{save\_us\_09}) + (\mathbf{-0.205} + -0.0929)(\text{pc\_us\_09}) \\ \text{gdp\_us\_09}' &= (e2 + 2.5031*e1) + 0.8506(\text{save\_us\_09}) + \mathbf{-0.2979}(\text{pc\_us\_09}) \end{aligned}$$

Equation 5.23

This calculation shows that  $\text{pc\_us\_09}$  had a slight negative direct correlation with  $\text{gdp\_us\_09}$ . Where  $\text{pc\_us\_09}$  increased by a percent,  $\text{gdp\_us\_09}$  decreased by 0.21 percent. Through  $\text{health\_us\_09}$ , this effect was added to, resulting in a cumulative negative effect of 0.3.

The use of public library computers had the same negative relationship with the child-mortality rate that one could come to expect after looking at the relationship the other library variables have with the child-mortality rate. Unlike the other library variables, however, public library computer use had a negative relationship with economic growth. This surprising relationship is explored more fully in Section 7.3.1.

## 5.2.7 Summary

This subsection attempted to tease out the direct and indirect effects of the library variables on `gdp_us_09`. It did so through stepwise regressions that took each library variable in turn and regressed it with all the development variables as possible independent variables. Table 45 summarises the results:

*Table 45: Summary of the results of this subsection*

Library variable	Direct effect	Indirect effect through <code>health_us_09</code>	Indirect effect through <code>save_us_09</code>
<code>vis_us_09</code>		-0.2582	0.4985
<code>ref_us_09</code>			
<code>circ_us_09</code>		-0.197	0.2512
<code>prog_us_09</code>		-0.1498	0.312
<code>child_us_09</code>		-0.1246	0.2304
<code>pc_us_09</code>	-0.205	-0.0929	

Only two development variables were shown as statistically significant: `health_us_09` and `save_us_09`. The effect through `health_us_09` was negative, while the effect through `save_us_09` was positive. `pc_us_09` was the only library variable to show a direct relationship, a negative one.

To gain a clearer description of the possible indirect effect that the library variables might have through a development variable, without being obscured by the other development variables, the following subsection considers each development variable in turn.

### 5.3 Indirect relationship between library variables and GDP through each development variable

The previous subsection looked at how each library variable might be contributing to the economy. This subsection isolates the development variables, examining how each might play an intermediary role between the library variables and gdp\_us\_09. This subsection follows the same format as the previous ones.

#### 5.3.1 Indirect relationship between library variables and GDP through unemployment

Taking the library variables and unem\_us\_09 as the independent variables, a stepwise regression was run. The results are given in Table 46.

Table 46: Stepwise regression result from library variables; unem\_us\_09 —> gdp\_us\_09

	Coefficient	p-value
Intercept	5.8051	< 2E-16 ***
vis_us_09	0.7463	0.0032 **
ref_us_09	0.2042	0.0352 *
circ_us_09	-0.2044	0.182
pc_us_09	-0.406	1.84E-05 ***
unem_us_09	-0.2069	0.0959 †
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0859 on 45 degrees of freedom		
Multiple R-squared: 0.4903, Adjusted R-squared: 0.4336		
F-statistic: 8.656 on 5 and 45 DF, p-value: 8.301E-06		

The regression shown in Table 46 was statistically significant. As the coefficient for unem\_us\_09 was shown to be statistically significant, it can be used as the dependent variable in a stepwise regression. This is shown in Table 47.



Table 47: Stepwise regression result from library variables  $\rightarrow$  unem\_us\_09

	Coefficient	p-value
Intercept	0.6768	0.0016 **
ref_us_09	0.2444	0.0141 *
child_us_09	-0.1761	0.0667 †

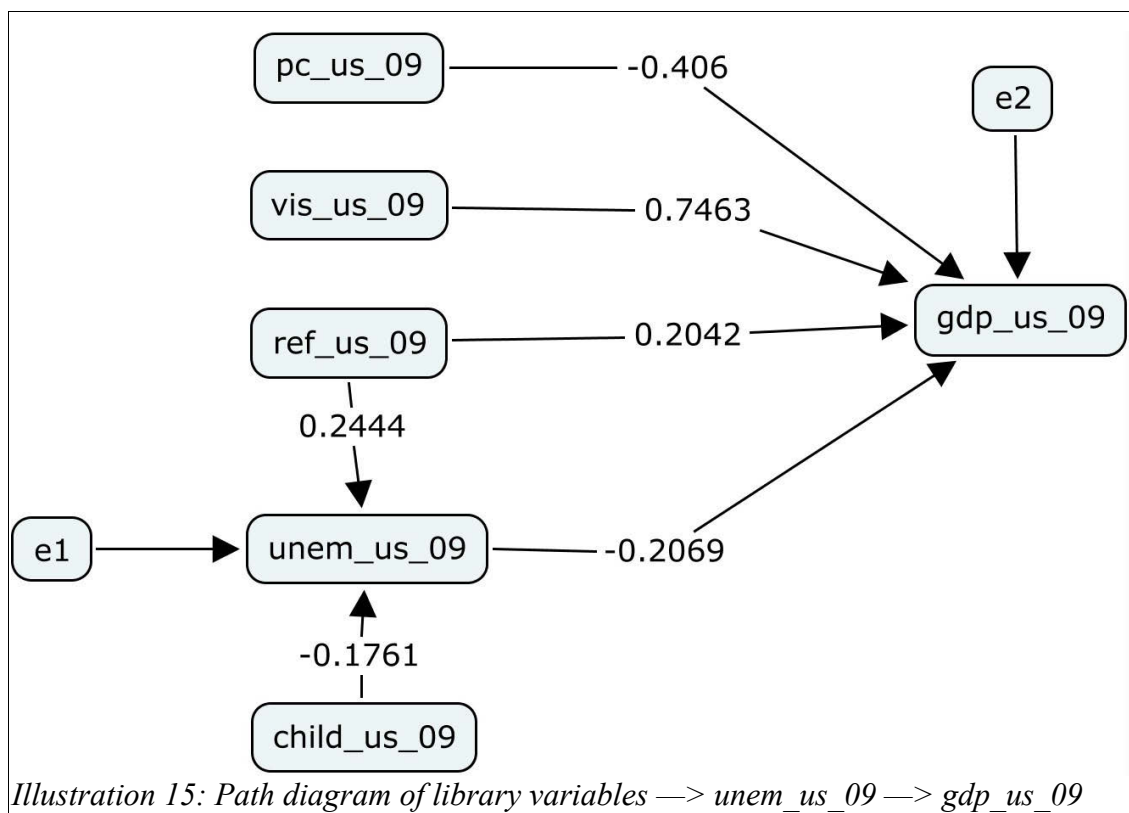
Signif. codes: <0.001 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '†' 0.1 ' ' 1

Residual standard error: 0.0988 on 48 degrees of freedom

Multiple R-squared: 0.1494, Adjusted R-squared: 0.114

F-statistic: 4.215 on 2 and 48 DF, p-value: 0.0206

Expressing these results as a path diagram, see Illustration 15.



Mathematically:

$$\text{unem\_us\_09}' = e1 + 0.2444(\text{ref\_us\_09}) + -0.1761(\text{child\_us\_09}) \quad \text{Equation 5.24}$$

$$\text{gdp\_us\_09}' = e2 + 0.7463(\text{vis\_us\_09}) + 0.2042(\text{ref\_us\_09}) + -0.406(\text{pc\_us\_09}) + -0.2069(\text{unem\_us\_09}) \quad \text{Equation 5.25}$$

where  $e1$  and  $e2$  are terms that cover the intercept, error terms, as well as any variables that are not already included in the model. Substituting Equation 5.24 into Equation 5.25:

$$\text{gdp\_us\_09}' = e2 + \mathbf{0.7463}(\text{vis\_us\_09}) + \mathbf{0.2042}(\text{ref\_us\_09}) + \mathbf{-0.406}(\text{pc\_us\_09}) + \\ -0.2069(e1 + 0.2444(\text{ref\_us\_09}) + -0.1761(\text{child\_us\_09}))$$

$$\text{gdp\_us\_09}' = (e2 + -0.2069*e1) + \mathbf{0.7463}(\text{vis\_us\_09}) + (\mathbf{0.2042} + -0.2069*0.2444) \\ (\text{ref\_us\_09}) + \mathbf{-0.406}(\text{pc\_us\_09}) + (-0.2069*-0.1761)(\text{child\_us\_09})$$

$$\text{gdp\_us\_09}' = (e2 + -0.2069*e1) + \mathbf{0.7463}(\text{vis\_us\_09}) + (\mathbf{0.2042} + -0.0506)(\text{ref\_us\_09}) \\ + \mathbf{-0.406}(\text{pc\_us\_09}) + 0.0364(\text{child\_us\_09})$$

$$\text{gdp\_us\_09}' = (e2 + -0.2069*e1) + \mathbf{0.7463}(\text{vis\_us\_09}) + \mathbf{0.1536}(\text{ref\_us\_09}) + \\ \mathbf{-0.406}(\text{pc\_us\_09}) + 0.0364(\text{child\_us\_09}) \quad \text{Equation 5.26}$$

The above calculations show that the  $\text{child\_us\_09}$  and  $\text{ref\_us\_09}$  had an indirect relationship with  $\text{gdp\_us\_09}$  through  $\text{unem\_us\_09}$ . Direct relationships existed between  $\text{vis\_us\_09}$ ,  $\text{ref\_us\_09}$  and  $\text{pc\_us\_09}$ , with the first two showing positive relationships, and  $\text{pc\_us\_09}$  showing a negative relationship. Looking at the size of the coefficients one can get a sense of the magnitude of the effects;  $\text{vis\_us\_09}$  showed the greatest correlation: a 1 percent increase in  $\text{vis\_us\_09}$  related with a 0.74 percent increase in  $\text{gdp\_us\_09}$ .

The effect of the library variables on economic growth in this model is unsurprising: positive in all cases save for use of public computers. Unemployment showed the expected negative relationship with GDP. The positive relationship between reference questions and unemployment was unexpected. Reasons for this will be explored in Section 7.3.2. Attendance at children's programmes and unemployment had a negative relationship. As attendance at children's programmes and attendance at library programmes in general were strongly correlated, one can expect that attendance at library programmes in general will have a similar negative relationship with unemployment.

### 5.3.2 Indirect relationship between library variables and GDP through education

Similarly, educ\_us\_09 was taken as the development variable of interest. Table 48 outlines the regression which examines gdp\_us\_09 as a function of any combination of the independent variables.

*Table 48: Stepwise regression result from library variables; educ\_us\_09 — > gdp\_us\_09*

	Coefficient	p-value
Intercept	2.5412	0.1642
vis_us_09	0.5539	0.0403 *
ref_us_09	0.222	0.0264 *
circ_us_09	-0.2432	0.1194
pc_us_09	-0.3777	7.44E-05 ***
educ_us_09	1.8646	0.0821 †
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0857 on 45 degrees of freedom		
Multiple R-squared: 0.4931, Adjusted R-squared: 0.4368		
F-statistic: 8.756 on 5 and 45 DF, p-value: 7.375E-06		

Using educ\_us\_09 as a dependent variable, another stepwise regression was run. The results are shown in Table 49.

Table 49: Stepwise regression result from library variables —> educ\_us\_09

	Coefficient	p-value
Intercept	1.7349	<2E-16 ***
vis_us_09	0.059	0.1209
ref_us_09	-0.0314	0.0129 *
circ_us_09	0.0366	0.0811 †
child_us_09	0.0342	0.0256 *
pc_us_09	-0.0223	0.0586 †

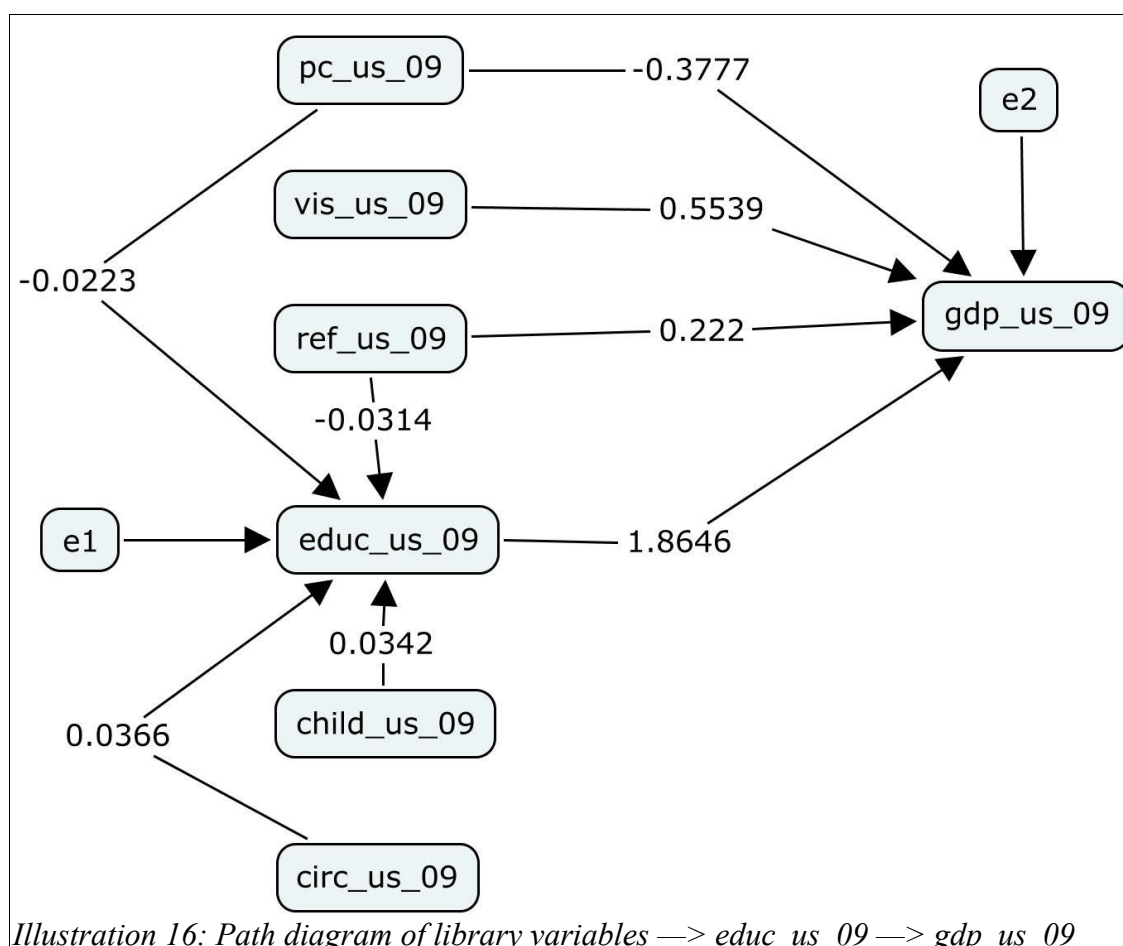
Signif. codes: <0.001 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '†' 0.1 '.' 1

Residual standard error: 0.0115 on 45 degrees of freedom

Multiple R-squared: 0.5882, Adjusted R-squared: 0.5425

F-statistic: 12.86 on 5 and 45 DF, p-value: 8.773E-08

Expressing these two stepwise regressions in a path diagram, as shown in Illustration 16:



Mathematically:

$$\text{educ\_us\_09}' = e1 + -0.0314(\text{ref\_us\_09}) + 0.0366(\text{circ\_us\_09}) + 0.0342(\text{child\_us\_09}) + -0.0223(\text{pc\_us\_09}) \quad \text{Equation 5.27}$$

$$\text{gdp\_us\_09}' = e2 + \mathbf{0.5539}(\text{vis\_us\_09}) + \mathbf{0.222}(\text{ref\_us\_09}) + \mathbf{-0.3777}(\text{pc\_us\_09}) + 1.8646(\text{educ\_us\_09}) \quad \text{Equation 5.28}$$

where  $e1$  and  $e2$  are variables representing all other factors that might be influencing  $\text{educ\_us\_09}$  and  $\text{gdp\_us\_09}$  respectively. Examining these as a simultaneous equation:

$$\text{gdp\_us\_09}' = e2 + \mathbf{0.5539}(\text{vis\_us\_09}) + \mathbf{0.222}(\text{ref\_us\_09}) + \mathbf{-0.3777}(\text{pc\_us\_09}) + 1.8646(e1 + -0.0314(\text{ref\_us\_09}) + 0.0366(\text{circ\_us\_09}) + 0.0342(\text{child\_us\_09}) + -0.0223(\text{pc\_us\_09}))$$

$$\text{gdp\_us\_09}' = (e2 + 1.8645 * e1) + \mathbf{0.5539}(\text{vis\_us\_09}) + (\mathbf{0.222} + 1.8646 * -0.0314)(\text{ref\_us\_09}) + (\mathbf{-0.3777} + 1.8646 * -0.0223)(\text{pc\_us\_09}) + (1.8646 * 0.0366)(\text{circ\_us\_09}) + (1.8645 * 0.0342)(\text{child\_us\_09})$$

$$\text{gdp\_us\_09}' = (e2 + 1.8645 * e1) + \mathbf{0.5539}(\text{vis\_us\_09}) + (\mathbf{0.222} + -0.0585)(\text{ref\_us\_09}) + (\mathbf{-0.3777} + -0.0416)(\text{pc\_us\_09}) + 0.0682(\text{circ\_us\_09}) + 0.0638(\text{child\_us\_09})$$

$$\text{gdp\_us\_09}' = (e2 + 1.8646 * e1) + \mathbf{0.5539}(\text{vis\_us\_09}) + \mathbf{0.1635}(\text{ref\_us\_09}) + \mathbf{-0.4193}(\text{pc\_us\_09}) + 0.0682(\text{circ\_us\_09}) + 0.0638(\text{child\_us\_09}) \quad \text{Equation 5.29}$$

Through  $\text{educ\_us\_09}$ ,  $\text{ref\_us\_09}$ ,  $\text{pc\_us\_09}$ ,  $\text{circ\_us\_09}$  and  $\text{child\_us\_09}$  each had an indirect effect on  $\text{gdp\_us\_09}$ . The relationship between  $\text{pc\_us\_09}$  and  $\text{gdp\_us\_09}$  was negative, while the others were positive. In all cases the effect was small: a percentage change in the library variable was correlated with a smaller change in  $\text{gdp\_us\_09}$ .

The literature, as discussed in Chapter 2, leads one to expect a positive relationship throughout the correlations. The previous results lead one to believe that public computer use was counter to the expectation created by the literature. Given these

assumptions, the negative relationship between reference questions and education was unexpected. Reasons for this will be explored in Section 7.3.3.

### 5.3.3 Indirect relationship between library variables and GDP through health

This section details a path analysis that considered health\_us\_09 as the development variable of interest. Table 50 considers gdp\_us\_09 as the dependent variable. The path diagram is shown in Illustration 17.

*Table 50: Stepwise regression result from library variables; health\_us\_09 → gdp\_us\_09*

	Coefficient	p-value
Intercept	5.832	< 2E-16 ***
vis_us_09	0.5028	0.0012 **
ref_us_09	0.1647	0.0799 †
pc_us_09	-0.4388	4.01E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 '.' 1		
Residual standard error: 0.0882 on 47 degrees of freedom		
Multiple R-squared: 0.4395, Adjusted R-squared: 0.4037		
F-statistic: 12.28 on 3 and 47 DF, p-value: 4.664E-06		

The model was statistically reliable, shown by the F-statistics and the p-values. health\_us\_09 was not shown as a statistically significant variable, and cannot be used as the dependent variable in a stepwise regression.

This regression can be expressed diagrammatically, as shown in Illustration 17.

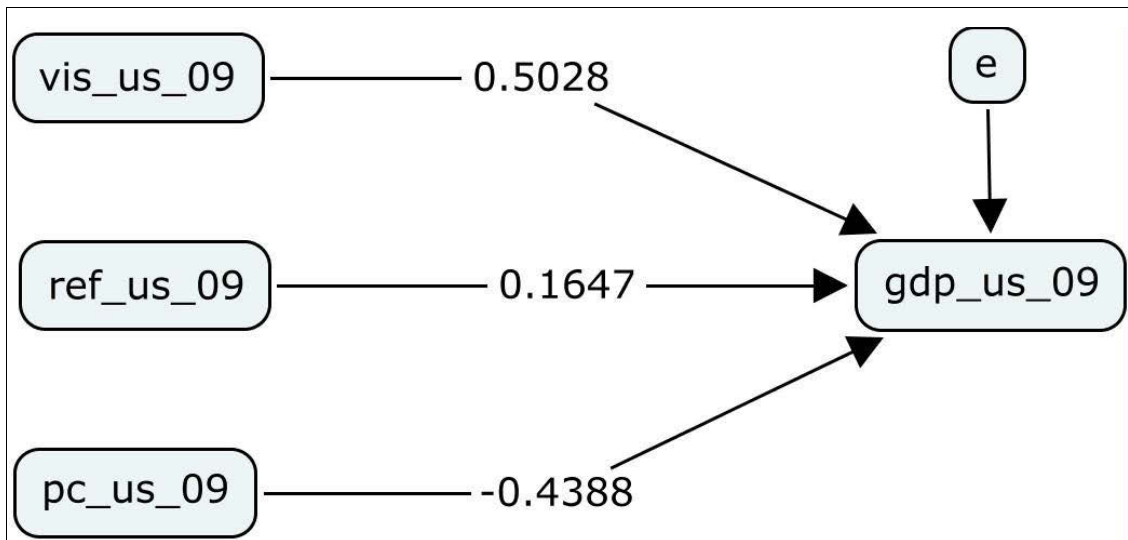


Illustration 17: Path diagram of library variables  $\rightarrow$  health\_us\_09  $\rightarrow$  gdp\_us\_09

Mathematically:

$$\text{gdp\_us\_09}' = e + 0.5028(\text{vis\_us\_09}) + -0.4388(\text{pc\_us\_09}) + 0.1647(\text{ref\_us\_09})$$

Equation 5.30

Three variables are shown to have theoretical effects on gdp\_us\_09: vis\_us\_09, pc\_us\_09 and ref\_us\_09. Whilst vis\_us\_09 and ref\_us\_09 had a positive direct effect, pc\_us\_09 had a negative direct effect. All the effects were small: a percentage change correlated with a less than a percentage change in gdp\_us\_09. This is the same regression that was discussed in Section 5.1.1.

### 5.3.4 Indirect relationship between library variables and GDP through savings

Using save\_us\_09 as the development variable of interest, stepwise regressions were run, as before. The details of these regressions are shown in Table 51 and Table 52. gdp\_us\_09 and save\_us\_09 were used as the dependent variables in each case.

Illustration 18 shows the results in a path diagram which is then dealt with mathematically.

*Table 51: Stepwise regression result from library variables; save\_us\_09 —> gdp\_us\_09*

	Coefficient	p-value
Intercept	6.0998	< 2E-16 ***
ref_us_09	0.2385	0.0051 **
child_us_09	0.1398	0.1432
pc_us_09	-0.37	1.9E-05 ***
save_us_09	0.4894	0.0029 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0831 on 46 degrees of freedom		
Multiple R-squared: 0.513, Adjusted R-squared: 0.4706		
F-statistic: 12.11 on 4 and 46 DF, p-value: 8.332E-07		

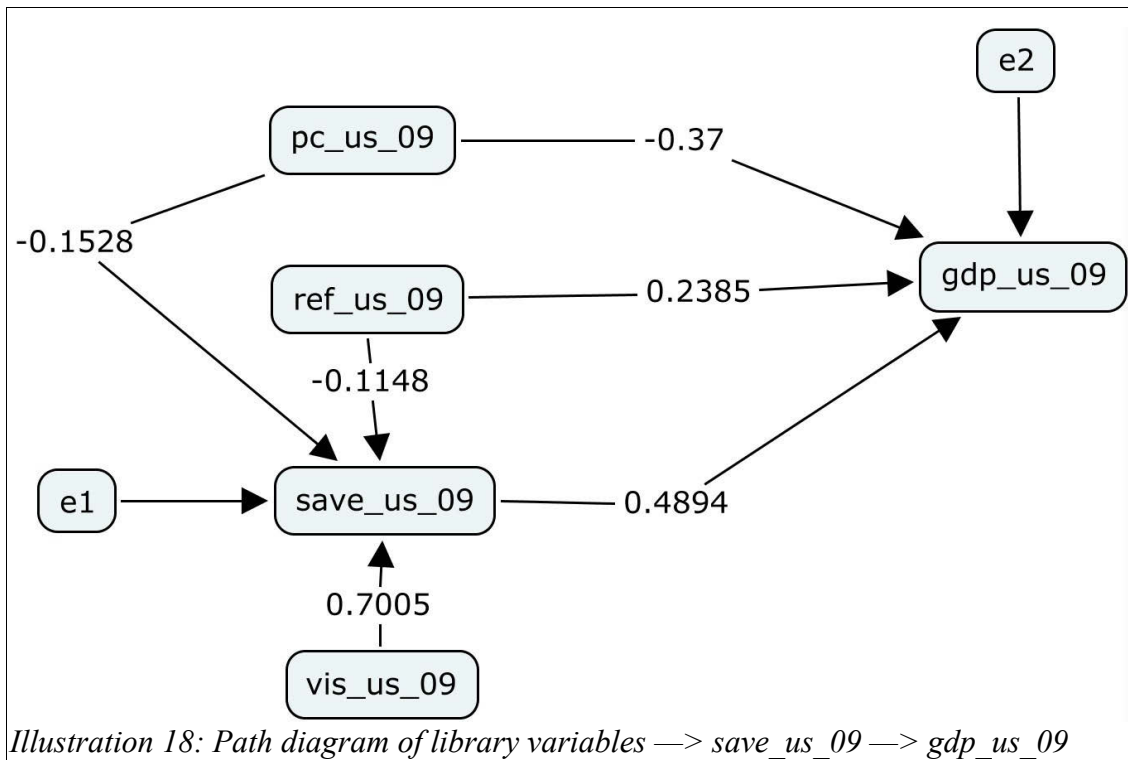
The coefficients in the regression shown in Table 51 were all statistically significant, except for child\_us\_09. Table 52 shows the results of the stepwise regression which used save\_us\_09 as the dependent variable.

*Table 52: Stepwise regression result from library variables —> save\_us\_09*

	Coefficient	p-value
Intercept	-0.0842	0.7154
vis_us_09	0.7005	1.19E-08 ***
ref_us_09	-0.1148	0.0788 †
pc_us_09	-0.1528	0.0119 *
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0612 on 47 degrees of freedom		
Multiple R-squared: 0.5082, Adjusted R-squared: 0.4768		
F-statistic: 16.19 on 3 and 47 DF, p-value: 2.306E-07		

Both stepwise regressions were statistically reliable. Expressing these results in a path diagram, as shown in Illustration 18:





Mathematically:

$$\text{save\_us\_09}' = e1 + 0.7005(\text{vis\_us\_09}) + -0.1148(\text{ref\_us\_09}) + -0.1528(\text{pc\_us\_09})$$

Equation 5.31

$$\text{gdp\_us\_09}' = e2 + \mathbf{0.2385}(\text{ref\_us\_09}) + \mathbf{-0.37}(\text{pc\_us\_09}) + 0.4894(\text{save\_us\_09})$$

Equation 5.32

where  $e1$  and  $e2$  are as before: the variation uncaptured by the other variables. As a simultaneous equation:

$$\text{gdp\_us\_09}' = e2 + \mathbf{0.2385}(\text{ref\_us\_09}) + \mathbf{-0.37}(\text{pc\_us\_09}) + 0.4894(e1 + 0.7005(\text{vis\_us\_09}) + -0.1148(\text{ref\_us\_09}) + -0.1528(\text{pc\_us\_09}))$$

$$\text{gdp\_us\_09}' = (e2 + 0.4894 \cdot e1) + (\mathbf{0.2385} + 0.4894 \cdot -0.1148)(\text{ref\_us\_09}) + (\mathbf{-0.37} + 0.4894 \cdot -0.1528)(\text{pc\_us\_09}) + (0.4894 \cdot 0.7005)(\text{vis\_us\_09})$$

$$\text{gdp\_us\_09}' = (e2 + 0.4894 \cdot e1) + (\mathbf{0.2385} + -0.0562)(\text{ref\_us\_09}) + (\mathbf{-0.37} + -0.0748)(\text{pc\_us\_09}) + 0.3479(\text{vis\_us\_09})$$

$$\text{gdp\_us\_09}' = (\epsilon_2 + 0.4894 \cdot \epsilon_1) + 0.1823(\text{ref\_us\_09}) + -0.4448(\text{pc\_us\_09}) + 0.3479(\text{vis\_us\_09})$$

Equation 5.33

Again, pc\_us\_09 had a negative relationship with gdp\_us while the relationship between ref\_us\_09 and vis\_us\_09 was positive. Direct and indirect relationships were seen between gdp\_us\_09 and the two library variables of ref\_us\_09 and pc\_us\_09. Only an indirect relationship existed between gdp\_us\_09 and vis\_us\_09 in this model. As before the relationships were small.

The relationships that the library variables had with economic growth, with the consideration of the savings rate, resemble the relationships already found in this chapter. The relationships with the library variables and the savings rate were similar to the ones between the library variables and education. Again, reference questions had a surprising negative relationship with the development variable in question.

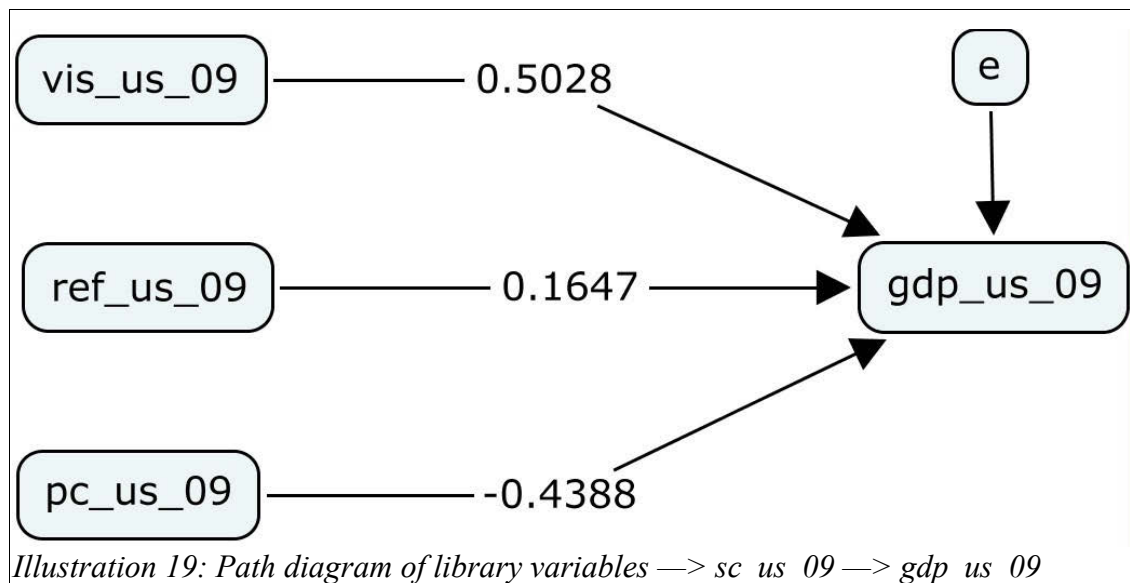
### **5.3.5 Indirect relationship between library variables and GDP through social capital**

sc\_us\_09 was taken as the last development variable of interest in this set of regressions. Table 53 shows the results, which were used to create Illustration 19. A mathematical handling follows.

Table 53: Stepwise regression result from Library variables;  $sc\_us\_09 \rightarrow gdp\_us\_09$

	Coefficient	p-value
Intercept	5.832	< 2E-16 ***
vis_us_09	0.5028	0.0012 **
ref_us_09	0.1647	0.0799 †
pc_us_09	-0.4388	4.01E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0882 on 47 degrees of freedom		
Multiple R-squared: 0.4395, Adjusted R-squared: 0.4037		
F-statistic: 12.28 on 3 and 47 DF, p-value: 4.664E-06		

In Table 53,  $sc\_us\_09$  was not revealed to be statistically significant and thus was not used as a dependent variable in a stepwise regression. The results in Table 53 are expressed as a diagram in Illustration 19.



Mathematically:

$$gdp\_us\_09' = e + 0.5028(vis\_us\_09) + 0.1647(ref\_us\_09) + -0.4388(pc\_us\_09)$$

Again,  $e$  is a proxy variable for the unexplained variance.

There were no indirect effects through `sc_us_09` between the library variables and `gdp_us_09`. There were only direct effects. These effects were already discussed in Section 5.1.1.

### 5.3.6 Summary

Table 54 summarises the results of the stepwise regressions run in this section:

*Table 54: Summary of effects of library variables through specific development variables*

	<code>vis_us_09</code>		<code>ref_us_09</code>		<code>circ_us_09</code>		<code>prog_us_09</code>		<code>child_us_09</code>		<code>pc_us_09</code>	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
Library variables → <code>unem_us_09</code> → <code>gdp_us_09</code>	0.7463		0.2042	-0.55						0.0364	-0.406	
Library variables → <code>educ_us_09</code> → <code>gdp_us_09</code>	0.5539		0.222	-0.0586		0.0682				0.0638	-0.3777	-0.0415
Library variables → <code>health_us_09</code> → <code>gdp_us_09</code>	0.5028		0.1647								-0.4388	
Library variables → <code>save_us_09</code> → <code>gdp_us_09</code>		0.3479	0.2385	-0.0562							-0.37	-0.0748
Library variables → <code>sc_us_09</code> → <code>gdp_us_09</code>	0.5028		0.1647								-0.4388	

Public computer use showed a consistently negative relationship with economic growth in both the direct and indirect effects. This was contrary to what was expected from the literature. Reference questions showed a mixed relationship: positive when the direct effects were considered, but negative when the indirect relationship was examined. This was surprising too. The other relationships were as expected.

Attendance at library programmes was not shown to have either a direct or indirect relationship with GDP. As attendance at children's programmes was strongly correlated with attendance at library programmes, one can consider them to be substitutes. Thus the relationships observed with attendance at children's programmes can be extended to attendance at library programmes in general.

The unexpected relationships described in this chapter will be explored in Section 7.3. The following chapter examines if a delayed effect between the library variables and the economic variables was possible and statistically significant.

## Chapter 6: USA lagged results

The previous chapter explored the theoretical direct effect that the library variables might have on the GDP variable with data from the USA. It also explored what the indirect effects could be through a number of development variables. Data from the year 2009 was used for this.

It would be naïve to think that the possible effects of library usage on the economy are limited to a single year. It is more likely that the library usage affects not only the current year but spills over into subsequent years too. In order to explore this, data from five years dating back from 2009 was used and regressed as independent variables with GDP data of 2009 as the dependent variable. This chapter presents the results of this analysis.

These regressions were run over five time periods. The adjusted R-squared values, which are a measure of how well the independent variable explains the variation in the dependent variable, were compared. Of the set of regressions, the one with the highest adjusted R-squared was highlighted. This highlighting was done with all the library and development variables.

The highlighted variables were then included in a stepwise regression, akin to those run in Chapter 5. This stepwise regression showed which variables might have a direct effect on the GDP variable. The development variables revealed to be statistically significant in this stepwise regression were used as dependent variables in their own regressions, once again using library variables of up to five years prior as independent variables. An examination of the adjusted R-squared revealed which time delay would be the most significant. This measure, as before, formed the criterion for selecting which year's library variable was included in a stepwise regression. This criterion was chosen to calculate the possible indirect effects.

The notation of the variables used in this chapter follows the same format as the notation in the previous chapter: two figures were suffixed to denote the year. For example, vis\_us\_09 denoted the variable for library visits in the year 2009; pc\_us\_97 is the variable for users of public Internet terminals in 1997.

As with the variables in the previous chapter, the raw figures were transformed in various ways. Firstly they were normalised per 100 people of the population. If this figure was less than 1, a constant was added. Table 55 shows which variables were summed with a constant. The final transformation was a logarithmic transformation. This transformation was done to enable ease of discussion: the resulting coefficients represent a percentage change.

*Table 55: Added constants for variables in Chapter 6*

Variable name	Constant added
sc_us_08	0.8386
sc_us_06	0.9955
sc_us_05	0.7942
sc_us_04	0.6303
health_us_09	0.5177
health_us_08	0.5075
health_us_07	0.5067
health_us_06	0.5006
health_us_05	0.4774
health_us_04	0.4655

## **6.1 Lagged direct relationships between variables and GDP**

What follows details the direct relationships that both the library variables and the development variables might have on GDP.

### 6.1.1 Lagged direct relationship between library visits and GDP

The first library variable that was used as an independent variable was that representing library visits. Table 56 details the coefficients resulting from six regressions. The first used vis\_us\_09 as the independent variable: this regression was the one used in the previous chapter. The remainder of the regressions used vis\_us\_08 through to vis\_us\_04 as independent variables.

Table 56: Regressions results for vis\_us —> gdp\_us\_09

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
vis_us_09	0.2922	0.0623 †	0.0501	3.639	0.0623
vis_us_08	0.311	0.038 *	0.0663	4.55	0.038
vis_us_07	0.2515	0.102	0.0343	2.774	0.102
vis_us_06	0.1819	0.214	0.0116	1.586	0.214
vis_us_05	0.1983	0.186	0.0157	1.798	0.186
vis_us_04	0.2401	0.115	0.0305	2.575	0.115
Signif. codes: <0.001 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘†’ 0.1 ‘ ’ 1					

Looking at the column that details the adjusted R-squared, the regression that explained most of the variation in the dependent variable, gdp\_us\_09, was the one that uses vis\_us\_08 as the independent variable. This variable explained 6 percent of the variation in gdp\_us\_09 as indicated by the adjusted R-squared statistic of 0.0663. It will be used in a later stepwise regression.

It is interesting to note that vis\_us\_08 had a stronger relationship with gdp\_us\_09 than vis\_us\_09 did. It would appear, therefore, that this result provides evidence that the relationship between library visits and GDP is not immediate.



## 6.1.2 Lagged direct relationship between reference questions and GDP

The second library variable that was examined was the one representing referencing questions: ref\_us. Table 57 shows the results of the six regressions that were run exploring the possible lagged effect on gdp\_us\_09.

*Table 57: Regressions results for ref\_us —> gdp\_us\_09*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
ref_us_09	0.2325	0.0308 *	0.0731	4.943	0.0308
ref_us_08	0.2353	0.0345 *	0.0694	4.731	0.0345
ref_us_07	0.2299	0.0395 *	0.065	4.476	0.0395
ref_us_06	0.3218	0.0041 **	0.1393	9.089	0.0041
ref_us_05	0.3356	0.0027 **	0.1524	9.989	0.0027
ref_us_04	0.293	0.0068 **	0.1224	7.976	0.0068
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

The referencing variable ref\_us\_05 was the variable that explains more of the variation in gdp\_us\_09 than any other reference variable. The adjusted R-squared of the regression that used ref\_us\_05 as the independent variable is 0.15 showing that 15 percent of the variation in gdp\_us\_09 was explained by ref\_us\_05. This result qualified ref\_us\_05 for use in the stepwise regression that will be discussed at the end of the chapter.

There seemed to be a greater lag in the relationship between ref\_us and gdp\_us\_09. Asking a public librarian a reference question in 2005 affected the GDP in 2009 more than asking in the other years. As with the previous chapter, the causal relationship here was an assumed relationship: there could be other factors influencing both variables.

### 6.1.3 Lagged direct relationship between circulation and GDP

As with referencing questions and library visits, the circulation variables for the years 2004 to 2009 were used as independent variables and regressed against gdp\_us\_09.

Table 58 shows the results of those regressions.

*Table 58: Regressions results for circ\_us —> gdp\_us\_09*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
circ_us_09	0.0545	0.5886	-0.0143	0.2964	0.5886
circ_us_08	0.0221	0.8227	-0.0194	0.0508	0.8227
circ_us_07	-0.0053	0.9566	-0.0204	0.003	0.9566
circ_us_06	-0.0309	0.7464	-0.0182	0.1058	0.7464
circ_us_05	-0.0647	0.5089	-0.0113	0.4429	0.5089
circ_us_04	-0.0769	0.4377	-0.0078	0.6123	0.4377
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

None of the regressions were statistically significant. This lack of significance was shown by the low F-statistics, which were all below 1, and the correlated high p-values. The stepwise regression shown at the end of this section did not include a circulation variable in its set of independent variables because none were shown to be statistically significant.

The lack of significance between the circulation variable and the GDP variable echoes the lack of literature linking those two variables. However, nothing more can be concluded with statistical certainty about the relationship between the circulation variable and the GDP variable.

## 6.1.4 Lagged direct relationship between attendance at library programmes and GDP

Turning the attention to the variable for attendance at library programmes, Table 59 details the results of the regressions that were run using prog\_us for the years from 2004 until 2009 as the independent variables against gdp\_us\_09 as the dependent variable.

Table 59: Regressions results for prog\_us → gdp\_us\_09

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
prog_us_09	0.1909	0.101	0.0347	2.794	0.101
prog_us_08	0.1711	0.1107	0.0318	2.639	0.1107
prog_us_07	0.1835	0.0851 †	0.0401	3.088	0.0851
prog_us_06	0.2075	0.0436 *	0.0617	4.289	0.0436
prog_us_05	0.1809	0.0607 †	0.0510	3.685	0.0607
prog_us_04	0.2417	0.0246 *	0.0856	5.400	0.0246
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

prog\_us\_04 explained more of the variation in gdp\_us\_09 than any other variable considered. The adjusted R-squared shows that over 8 percent of the variation is explained. prog\_us\_04 is included in the stepwise regression at the end of this section.

Attendance at library programmes in general appeared to have a great delayed effect on GDP. Attendance in 2004 affected the economic condition five years later, in 2009. This result suggested that librarians who are waiting to see the effects of their library programmes on economic growth should not limit their time horizon to only one year.

### 6.1.5 Lagged direct relationship between attendance at children's programmes and GDP

Attendance at children's library programmes was represented by the variable `child_us`. Table 60 shows the results of the regressions that were run for the variables `child_us_04` through to `child_us_09` as the independent variables. `gdp_us_09` was used as the dependent variable, as before.

*Table 60: Regressions results for `child_us` → `gdp_us_09`*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
<code>child_us_09</code>	-0.1282	0.1922	0.0147	1.748	0.1922
<code>child_us_08</code>	0.1775	0.0952 †	0.0365	2.895	0.0952
<code>child_us_07</code>	0.1719	0.1034	0.0339	2.754	0.1034
<code>child_us_06</code>	0.222	0.0363 *	0.0678	4.635	0.0363
<code>child_us_05</code>	0.2022	0.0336 *	0.0702	4.777	0.0336
<code>child_us_04</code>	0.2496	0.014 *	0.099	6.491	0.014
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

The adjusted R-squared for the regression that used the 2004 variable as the independent variable was the highest of all the adjusted R-squareds in Table 60. This figure showed that almost 10 percent of the variation in `gdp_us_09` can be explained using `child_us_04`. This was the criterion used to select which variable would be included in the stepwise regression that would be used to construct the path diagram. In this case, the variable would be `child_us_04`.

As with attendance at library programmes in general, there was a five year delayed effect between the attendance at children's programmes and GDP.

## 6.1.6 Lagged direct relationship between public computer usage and GDP

The last library variable that was examined was ‘users of public Internet terminals per year’ represented by pc\_us. This variable was first collected in 2006, thus the examination begins there and goes through to 2009. Table 61 details the regressions that used pc\_us for the years 2006 through to 2009 as the independent variable and gdp\_us\_09 as the dependent variable

*Table 61: Regressions results for pc\_us → gdp\_us\_09*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
pc_us_09	-0.2791	0.0034 **	0.1455	9.513	0.0034
pc_us_08	-0.2418	0.0147 *	0.0974	6.396	0.0147
pc_us_07	-0.224	0.0128 *	0.1019	6.673	0.0128
pc_us_06	-0.114	0.2157	0.0113	1.573	0.2157
Signif. codes: <0.001 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘†’ 0.1 ‘ ’ 1					

The pc\_us variable for 2009 explained more of the variation of gdp\_us\_09 than the pc\_us variable of any other year: over 14 percent as shown by the adjusted R-squared. pc\_us\_09 was included in the stepwise regression, which is discussed later in this subsection.

The previous chapter showed a negative relationship between usage of public computers and GDP. The lagged regressions showed a similar negative relationship. The effect was more immediate than that of library programmes, for example, where there was a considerable lag in the effect.

Now that all the library variables have been dealt with, the results of the similar treatment of the development variables are presented.

### 6.1.7 Lagged direct relationship between unemployment and GDP

Unemployment, represented by `unem_us`, was the first development variable examined. Table 62 shows the results of the regression that explored the possible lagged effect between unemployment and GDP.

*Table 62: Regressions results for `unem_us` —> `gdp_us_09`*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
<code>unem_us_09</code>	-0.1098	0.4809	-0.01	0.5045	-0.01
<code>unem_us_08</code>	-0.043	0.7755	-0.0187	0.0822	-0.0187
<code>unem_us_07</code>	-0.0272	0.8659	-0.0198	0.0288	-0.0198
<code>unem_us_06</code>	-0.0201	0.900	-0.0201	0.0159	-0.0201
<code>unem_us_05</code>	0.0227	0.895	-0.02	0.0176	-0.02
<code>unem_us_04</code>	0.0994	0.5929	-0.0144	0.2897	-0.0144
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

None of the unemployment variables were shown to be statistically significant. The adjusted R-squared values were all negative, the F-statistics were smaller than one and the associated p-values are larger than 0.1. Consequently, there was not an `unem_us` variable included in the stepwise regression at the end of this section.

No further comments can be made on the relationship between unemployment and GDP, due to the lack of statistical significance in the regressions.

### 6.1.8 Lagged direct relationship between education and GDP

The second development variable was `educ_us`, which represents percentage of those over twenty-five years of age who have at least a high school diploma, as introduced in Chapter 3. Table 63 details the results of the regressions for `educ_us_05` through to

educ\_us\_09 as independent variables, and gdp\_us\_09 as the dependent variable.

Figures for 2004 were unavailable.

*Table 63: Regressions results for educ\_us —> gdp\_us\_09*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
educ_us_09	1.9612	0.0372 *	0.0669	4.586	0.0372
educ_us_08	1.6805	0.0635 †	0.0495	3.604	0.0635
educ_us_07	1.8269	0.0348 *	0.0691	4.712	0.0348
educ_us_06	1.5938	0.066 †	0.0483	3.535	0.066
educ_us_05	1.5438	0.0774 †	0.0431	3.254	0.0774
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

There appeared to be a two-year lag period between educ\_us and gdp\_us. This result was shown by the fact that educ\_us\_07 explains the greatest majority of the variation in gdp\_us\_09. The adjusted R-squared was 0.06 showing that almost 7 percent of the variation in gdp\_us\_09 was explained by educ\_us\_07. educ\_us\_07 has been included in the stepwise regression which is discussed at the end of the chapter. It is noteworthy that educ\_us\_09 explains the second greatest amount of variation.

Table 63 shows that education had a positive effect on GDP, as one would expect from the literature. There was evidence of a delayed effect: the education figures from 2007 have the strongest relationship with the GDP figures from 2009.

### 6.1.9 Lagged direct relationship between health and GDP

Table 64 shows the results of the six regressions that explored the possible lagged effect between the health variable, health\_us, and gdp\_us.

Table 64: Regressions results for *health\_us* —> *gdp\_us\_09*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
health_us_09	0.8817	0.4366	-0.0078	0.6151	0.4366
health_us_08	1.9136	0.0474 *	0.059	4.136	0.0474
health_us_07	1.6061	0.0807 †	0.0418	3.181	0.0807
health_us_06	1.0599	0.2789	0.004	1.199	0.2789
health_us_05	1.2418	0.1798	0.0168	1.852	0.1798
health_us_04	1.5207	0.1223	0.0286	2.473	0.1223
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

Over 5 percent of the variation in *gdp\_us\_09* can be explained by *health\_us\_08*. This result was shown by the adjusted R-squared value that associated with *health\_us\_08*. The health variable that explained the greatest amount of variation in *gdp\_us\_09* has been included in the path analysis discussed at the end of this section. It was *health\_us\_08* in this case.

The child mortality rate had a positive relationship with GDP. This relationship was not what was expected when one looked at the literature, as Section 2.3 indicated. Possible reasons for this anomalous relationship will be explored in Section 7.3.4.

### 6.1.10 Lagged direct relationship between social capital and GDP

The second last economic variable discussed was the variable for social capital, *sc\_us*. Table 65 details the results of the regressions that used *sc\_us\_04* through to *sc\_us\_09* as independent variables with *gdp\_us* as the dependent variable.



Table 65: Regressions results for *health\_us* —> *gdp\_us\_09*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
sc_us_09	-0.1741	0.0979 †	0.0356	2.847	0.0979
sc_us_08	-0.0849	0.3609	-0.003	0.8505	0.3609
sc_us_07	-0.1397	0.1385	0.0253	2.269	0.1385
sc_us_06	-0.1247	0.1533	0.0225	2.107	0.1533
sc_us_05	-0.214	0.0261 *	0.0786	5.264	0.0261
sc_us_04	-0.0736	0.4184	-0.0069	0.6663	0.4184
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

The social capital variable *sc\_us\_05* was the variable that was chosen to be included in the stepwise regression and path analysis at the end of this section. It was chosen because, of all the social capital variables, it explained the greatest amount of variation in *gdp\_us\_09*. This variation was shown by the high adjusted R-squared value.

Social capital was represented here by the number of arrests made per capita. It had a negative relationship with GDP, as one would expect. More affluent areas are commonly associated with less crime (Bjerk 2010). There appeared to be a somewhat delayed effect between the number of arrests and GDP. This delayed effect was shown by the strength of the correlations between GDP figures from 2009 and arrest numbers from years previous to that.

### 6.1.11 Lagged direct relationship between savings and GDP

The final development variable discussed was savings. Table 66 shows the results of those regressions.

Table 66: Regressions results for *save\_us* —> *gdp\_us\_09*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
save_us_09	0.6099	0.0009 ***	0.1883	12.6	0.0009
save_us_08	0.6185	0.0008 ***	0.1890	12.65	0.0008
save_us_07	0.5853	0.0029 **	0.1497	9.804	0.0029
save_us_06	0.5804	0.0021 **	0.1606	10.57	0.0021
save_us_05	0.5207	0.0035 **	0.1446	9.451	0.0035
save_us_04	0.4715	0.0079 **	0.1176	7.666	0.0079
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Savings were shown to have a highly significant correlation with GDP. This correlation was shown by the comparatively high adjusted R-squared values, as compared to the other adjusted R-squared values shown in this section. The highest correlation was between *gdp\_us\_09* and *save\_us\_08*. *save\_us\_08* was included in the model at the end of this section.

The number of tax returns that declared taxable interest was represented by the variable *save\_us*. This was the figure for the level of savings in each state. According to economic theory, savings should be positively correlated with economic growth, given here by GDP. The results in Table 66 confirm this positive relationship. The effect was not necessarily immediate: savings from previous years had a positive and statistically significant relationship with GDP of 2009. The strongest relationship existed between the savings variable of 2008 and the economic growth variable of 2009.

### 6.1.12 Stepwise regression and path analysis

The above discussions facilitated the choosing of independent variables for a stepwise regression. This regression explored the possible lagged direct effect that both the library and development variables might be having on *gdp\_us*. The following variables were chosen for inclusion:

- vis\_us\_08
- ref\_us\_05
- prog\_us\_04
- child\_us\_04
- pc\_us\_09
- educ\_us\_07
- health\_us\_08
- sc\_us\_05
- save\_us\_08

The results of this regression are shown in Table 67.

Two variables were not included: the variable for circulation and the variable for unemployment. They were excluded as none of the regressions were shown to be statistically significant.

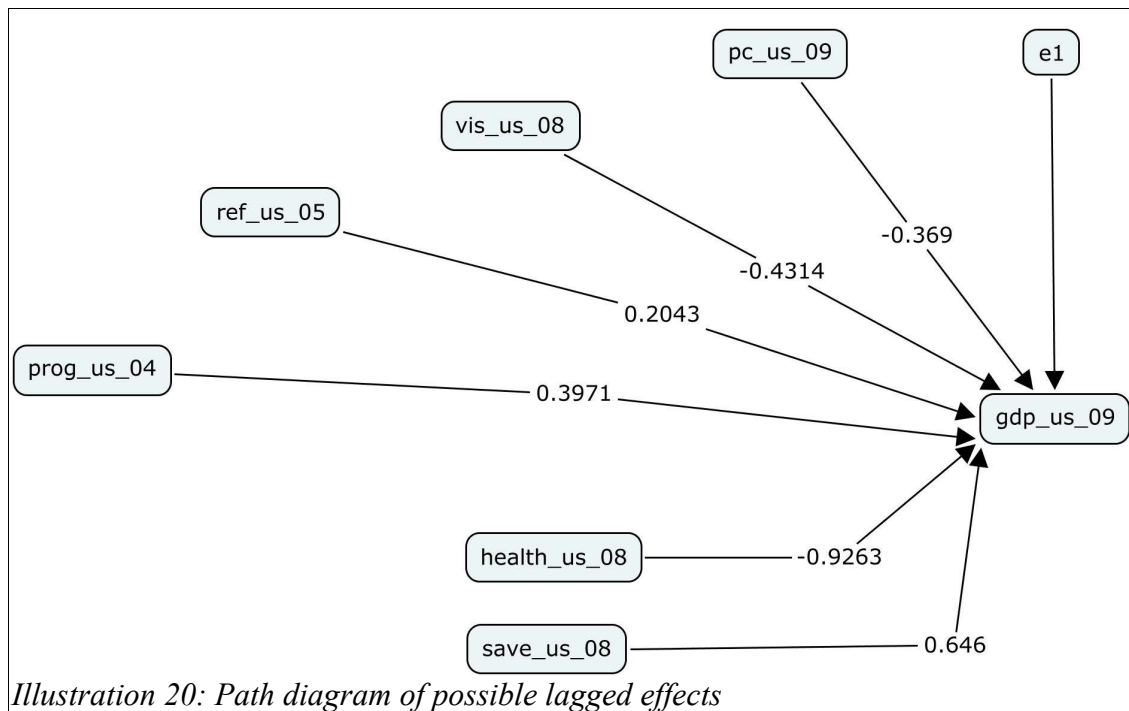
*Table 67: Results of the stepwise regression that explores the possible lagged direct effects on gdp\_us*

	Coefficient	p-value
Intercept	6.8464	< 2E-16 ***
vis_us_08	-0.4314	0.0453 *
ref_us_05	0.2043	0.0149 *
prog_us_04	0.3971	3.78E-05 ***
pc_us_09	-0.369	5.39E-06 ***
health_us_08	-0.9263	0.0005 ***
save_us_08	0.6460	0.0026 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.0669 on 41 degrees of freedom		
Multiple R-squared: 0.7126, Adjusted R-squared: 0.6705		
F-statistic: 16.94 on 6 and 41 DF, p-value: 1.011E-09		

The results of the stepwise regression shown in Table 67 were statistically significant. This significance was shown by a suitably high F-statistic and a correlated low p-value. The adjusted R-squared showed that 67 percent of the variation in gdp\_us\_09, the

dependent variable, can be explained by the model. This result instils further confidence in its statistical reliability. The model that did not consider the lagged effects, given in Section 5.1.1, had an adjusted R-squared of 0.4037, notably lower than the one shown in this section. This difference showed that by considering lagged variables, a greater amount of variation that is observed in gdp\_us\_09 can be explained.

Nine independent variables were considered for inclusion in this model. Six were shown to be statistically significant. The excluded variables were: child\_us\_04, educ\_us\_07, sc\_us\_05. The included variables were used to create the path diagram shown in Illustration 20. The mathematical formulation follows the diagram.



Mathematically:

$$\text{gdp\_us\_09}' = e1 + \mathbf{-0.4314}(\text{vis\_us\_08}) + \mathbf{0.2043}(\text{ref\_us\_05}) + \mathbf{0.3971}(\text{prog\_us\_04}) + \mathbf{-0.369}(\text{pc\_us\_09}) + \mathbf{-0.9263}(\text{health\_us\_08}) + \mathbf{0.646}(\text{save\_us\_08}) \quad \text{Equation 6.1}$$

Of the four library variables that came up as statistically significant, and so showed a direct effect with gdp\_us\_09, two have a positive effect and two a negative effect. The

positive effects of ref\_us\_05 and prog\_us\_04 were expected while the negative effects of vis\_us\_08 and pc\_us\_09 are unexpected. The negative effect shown by the coefficient of vis\_us\_08 was inconsistent with the results of the previous chapter. There, the relationship between library visits and GDP was shown to be consistently positive, where it was statistically significant. The direction of the relationship for the other variables here were as expected, given the results of the previous chapter.

### **6.1.13 Correlations between the independent variables**

Not all of the variables considered for inclusion were included in the final stepwise regression. Some were excluded as their inclusion did not add to the strength of the model. One possible reason for this result is a correlation between the independent variables. Table 68 shows the results of the correlations. The first number in each cell represents the strength of the correlation: the closer the number gets to the absolute value of 1 the stronger the correlation is. The second number in each cell, shown in brackets, indicates the p-value for the correlation. The closer the p-value approaches zero, the more statistically significant the correlation is.

Table 68: Correlations between the independent variables

	vis_us_0 8	ref_us_0 5	prog_us _04	child_us _04	pc_us_0 9	educ_us _07	health_u s_09	sc_us_0 5	save_us_ 08
vis_us_0 8	1	0.42 (0.0022)	0.62 (0.0000)	0.6 (0.0000)	0.41 (0.0026)	0.71 (0.0000)	-0.43 (0.0015)	-0.18 (0.1938)	0.71 (0.0000)
ref_us_0 5	0.42 (0.0022)	1	0.29 (0.0447)	0.26 (0.0628)	0.05 (0.7342)	0.03 (0.8548)	0.2 (0.1584)	-0.22 (0.1146)	0.17 (0.244)
prog_us _04	0.62 (0.0000)	0.29 (0.0447)	1	0.95 (0.0000)	0.37 (0.0094)	0.37 (0.0099)	-0.12 (0.3985)	-0.14 (0.3457)	0.33 (0.021)
child_us _04	0.6 (0.0000)	0.26 (0.0628)	0.95 (0.0000)	1	0.36 (0.0092)	0.42 (0.0019)	-0.07 (0.6069)	-0.15 (0.3065)	0.34 (0.0152)
pc_us_0 9	0.41 (0.0026)	0.05 (0.7342)	0.37 (0.0094)	0.36 (0.0092)	1	0.2 (0.1504)	-0.43 (0.0016)	0.21 (0.1451)	0.07 (0.6496)
educ_us _07	0.71 (0.0000)	0.03 (0.8548)	0.37 (0.0099)	0.42 (0.0019)	0.2 (0.1504)	1	-0.4 (0.0038)	-0.08 (0.5883)	0.8 (0.0000)
health_u s_09	-0.43 (0.0015)	0.2 (0.1584)	-0.12 (0.3985)	-0.07 (0.6069)	-0.43 (0.0016)	-0.4 (0.0038)	1	-0.26 (0.0629)	-0.45 (0.001)
sc_us_0 5	-0.18 (0.1938)	-0.22 (0.1146)	-0.14 (0.3457)	-0.15 (0.3065)	0.21 (0.1451)	-0.08 (0.5883)	-0.26 (0.0629)	1	-0.24 (0.0959)
save_us_ 08	0.71 (0.0000)	0.17 (0.244)	0.33 (0.021)	0.34 (0.0152)	0.07 (0.6496)	0.8 (0.0000)	-0.45 (0.001)	-0.24 (0.0959)	1

The three variables that were excluded from the stepwise regression discussed above were child\_us\_04, educ\_us\_07, and sc\_us\_05. educ\_us\_07 correlated with vis\_us\_08 and save\_us\_08, and child\_us\_04 correlated very strongly with prog\_us\_04. child\_us\_04 could be thought of as having the same relationship with gdp\_us\_09 as prog\_us\_04 does. educ\_us\_07 was similar. This insight gives some reason for why so few of the independent variables considered for the stepwise regression were included. The ones that were statistically significant and included in the model can be thought of as proxies for those with which they were closely correlated.

This section explored the possible lagged direct effects that the library and development variables might have on GDP. The results of this section have been used to create a complete effects path analysis which is discussed at the end of this chapter. The results of this section will be discussed more fully in Chapter 7.

## 6.2 Lagged indirect relationships between library variables and health

The previous section explored the possible direct lagged effects that the library and development variables might have on gdp\_us\_09. Two development variables were revealed to be statistically significant and were thus included in the model:

health\_us\_08 and save\_us\_08. It was through these two development variables that a possible indirect effect might exist, linking library variables to gdp\_us\_09. In order to explore this, health\_us\_08 and save\_us\_08 were used as dependent variables in a similar exploration as that conducted in the previous section. The first subsection discusses health\_us\_08 and the second save\_us\_08. Each subsection concludes with a path analysis.

### 6.2.1 Lagged indirect relationship between library visits and health

The first library variable that was examined in this section is library visits. Table 69 outlines the results of the regressions that were run comparing the values of regressions run with vis\_us of various years.

Table 69: Regressions results for vis\_us —> health\_us\_08

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
vis_us_08	-0.0673	0.0015 **	0.1706	11.28	0.0015
vis_us_07	-0.0798	0.0002 ***	0.2385	16.66	0.0002
vis_us_06	-0.0827	2.68E-05 ***	0.2905	21.48	2.68E-05
vis_us_05	-0.0834	3.91E-05 ***	0.28	20.44	3.91E-05
vis_us_04	-0.078	2E-04 ***	0.2328	16.17	2.00E-04
vis_us_03	-0.0748	0.0005 ***	0.2034	13.77	0.0005
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

The biggest correlation was shown between vis\_us\_06 and health\_us\_08, a two-year lagged effect. The adjusted R-squared for the regression that used vis\_us\_06 as the independent variable is 0.29. This result means that vis\_us\_06 explained about 29 percent of the variation of health\_us\_08. vis\_us\_06 was the variable chosen in the stepwise regression shown later in this section.

Table 69 confirms that a positive relationship between visits to the library and health was evident. More visits to the library were correlated with a lower child mortality.

## 6.2.2 Lagged indirect relationship between reference questions and health

As with vis\_us, ref\_us received the same statistical treatment. Regressions were run using the ref\_us figures from various years, regressing them against health\_us\_08 as the dependent variable. The results are shown in Table 70.

*Table 70: Regressions results for ref\_us —> health\_us\_08*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
ref_us_08	1.69E-002	0.3067	0.0013	1.067	0.3067
ref_us_07	0.0187	0.2581	0.0061	1.309	0.2581
ref_us_06	0.0246	0.1439	0.0235	2.206	0.1439
ref_us_05	0.0238	0.1584	0.0206	2.051	0.1584
ref_us_04	0.0228	0.1598	0.0203	2.038	0.1598
ref_us_03	0.0184	0.2617	0.0057	1.289	0.2617
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1					

There was no ref\_us variable that was shown to have a statistically significant relationship with health\_us\_08. Thus the stepwise regression at the end of this section does not consider any reference questions variable for possible inclusion in the final model. As there was no evidence of a significant relationship here, no further comments can be made regarding the link between reference questions and child mortality.



## 6.2.3 Lagged indirect relationship between circulation and health

The circulation variable, circ\_us was the third variable examined. Table 71 shows the results of the regressions that used circ\_us\_08 through to circ\_us\_03 as independent variables, keeping health\_us\_08 as the dependent variable.

*Table 71: Regressions results for circ\_us —> health\_us\_08*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
circ_us_08	-0.0537	5.06E-05 ***	0.2727	19.74	5.06E-05
circ_us_07	-0.0554	2.22E-05 ***	0.2958	22	2.22E-05
circ_us_06	-0.0565	7.39E-06 ***	0.3255	25.13	7.39E-06
circ_us_05	-0.0607	2.15E-06 ***	0.3576	28.83	2.15E-06
circ_us_04	-0.0617	1.91E-06 ***	0.3607	29.21	1.91E-06
circ_us_03	-0.0613	3.33E-06 ***	0.3464	27.5	3.33E-06
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

circ\_us\_04 explained about 36 percent of the variation in health\_us\_08, as shown by the adjusted R-squared value. The 2004 variable was chosen to be included in the stepwise regression shown in Section 6.2.7.

One way in which libraries could be contributing positively to health is through providing books on healthy living and dealing with illness. This service could be the reason that circulation was shown to have a negative relationship with child mortality. The relationship was not necessarily immediate: the strongest relationship was between child mortality of 2008 and circulation of 2004, giving evidence of a probable delay.

## 6.2.4 Lagged indirect relationship between attendance at library programmes and health

Table 72 shows the results of the regressions exploring the relationships between health\_us\_08 and the various years' values of prog\_us. prog\_us was first collected in 2004, thus there are no figures for prog\_us\_03.

*Table 72: Regressions results for prog\_us —> health\_us\_08*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
prog_us_08	-0.0302	0.052 †	0.056	3.968	0.052
prog_us_07	-0.0268	0.0846 †	0.0403	3.099	0.0846
prog_us_06	-0.0201	0.1862	0.0157	1.797	0.1862
prog_us_05	-0.0124	0.3847	-0.0046	0.7695	0.3847
prog_us_04	-0.0135	0.3985	-0.0059	0.7263	0.3985
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

The 2008 variable of library programmes, prog\_us\_08, shows the strongest relationship with health\_us\_08. The relationship was very slight however: prog\_us\_08 only explains 5 percent of the observed variation in health\_us\_08. Never-the-less, as it was shown to be statistically significant by both p-values and the F-statistic, it was included in the stepwise regression at the end of this section.

Many libraries have health literacy programmes. These programmes, theoretically, would contribute positively to the health status of a state. The negative relationship between attendance at library programmes and child mortality is evident in Table 72. The immediate relationship was the strongest: attendance at library programmes in 2008 has a statistically negative relationship with child mortality of the same year.

## 6.2.5 Lagged indirect relationship between attendance at children's programmes and health

The results shown in Table 73 detail the regressions for child\_us, years 2003 through to 2008, as the independent variable, and health\_us\_08 as the dependent variable.

Table 73: Regressions results for child\_us → health\_us\_08

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
child_us_08	-0.0261	0.0918 †	0.0377	2.958	0.0918
child_us_07	-0.0231	0.1343	0.0257	2.318	0.1343
child_us_06	-0.0161	0.3075	0.0013	1.063	0.3075
child_us_05	-0.0088	0.5331	-0.0123	0.394	0.5331
child_us_04	-0.0079	0.6069	-0.0149	0.2682	0.6069
child_us_03	-0.029	0.1143	0.0307	2.585	0.1143
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

As with prog\_us, child\_us\_08 was chosen to be the variable to be included in the stepwise regression in 6.2.7. Again this variable explained very little of the observed variation in health\_us\_08, only 3 percent, even less than the amount that prog\_us\_08 explained.

Previous correlation tables have shown that there is a strong relationship with attendance at programmes in general and attendance at children's programmes. It was therefore, not surprising that the relationship between child mortality and attendance at children's programmes echoed that of the relationship between attendance at programmes in general and child mortality. Again it was a negative, and mostly immediate, relationship.

## 6.2.6 Lagged indirect relationship between using public computers and health

The availability of data for the public computer usage variable, *pc\_us*, began in 2006. Table 74, therefore, details only the results of four regressions: those that used *pc\_us\_06* through to *pc\_us\_08* as independent variables.

*Table 74: Regressions results for *pc\_us* —> *health\_us\_08**

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
<i>pc_us_08</i>	-0.0471	0.0008 ***	0.1901	12.74	0.0008
<i>pc_us_07</i>	-0.0373	0.0041 **	0.1391	9.081	0.0041
<i>pc_us_06</i>	-0.0401	0.0018 **	0.1645	10.85	0.0018
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

The variable from Table 74 chosen for the stepwise regression in the next subsection was *pc\_us\_08*. It explained 19 percent of the variation in *health\_us\_08* and was shown to be statistically significant.

Public computers in public libraries offer access to health-care professionals, through websites and email contacts. These Internet-enabled terminals connect library users to health care. The negative relationship shown in Table 74 was an expected one: access to the Internet was negatively correlated to child mortality.

## 6.2.7 Lagged indirect relationship between library variables and health

The results shown in this subsection revealed five library variables for possible consideration in a stepwise regression: *vis\_us\_06*, *circ\_us\_04*, *prog\_us\_08*, *child\_us\_08* and *pc\_us\_08*. The only variable not included was one for *ref\_us*. These variables were considered for inclusion as independent variables, while *health\_us\_08*

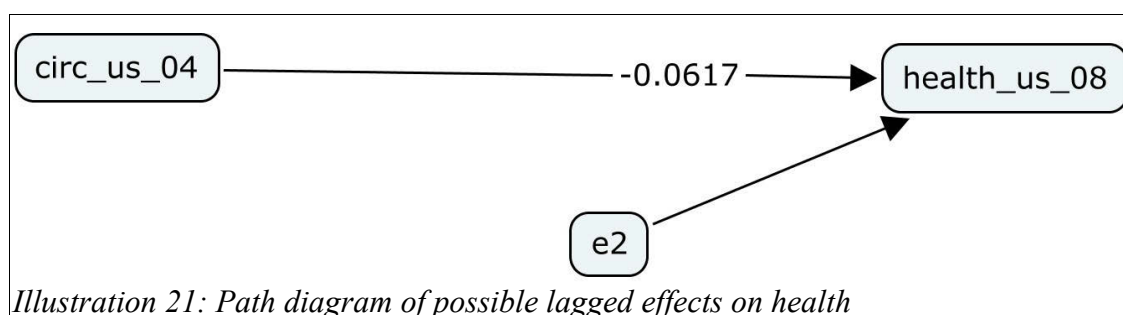
was used as the dependent variable. The results of this stepwise regression are shown in Table 75.

*Table 75: Regressions for the stepwise regression: vis\_us\_06; circ\_us\_04; prog\_us\_08; child\_us\_08; pc\_us\_08 → health\_us\_08*

	Coefficient	p-value
Intercept	0.2061	5.49E-08 ***
circ_us_04	-0.0617	1.91E-06 ***
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.01331 on 49 degrees of freedom		
Multiple R-squared: 0.3735, Adjusted R-squared: 0.3607		
F-statistic: 29.21 on 1 and 49 DF, p-value: 1.905E-06		

Of the five independent variables considered in this stepwise regression, only one, circ\_us\_04, was included in the final model. The coefficient for this variable was negative, showing a negative relationship between circ\_us\_04 and health\_us\_08. This relationship was as expected: health\_us\_08 was a variable that reflects the child mortality rate in 2008.

This stepwise regression was statistically sound. The F-statistic was sufficiently high, and the associated p-value was smaller than the critical value of 0.1. Only 36 percent of the variation in health\_us\_08 was explained in this model, indicating that there was room for improvement. This result is shown graphically in Illustration 21.



Equation 6.2 expresses these results mathematically:

$$\text{health\_us\_08}' = e2 + -0.0617(\text{circ\_us\_04}) \quad \text{Equation 6.2}$$

where  $e_2$  is the variable that captures all the unexplained variance in `health_us_08`.

The only variable included in this regression was the circulation variable. The others that were considered would not have added to the explanation of the variation observed in `health_us_08`. One reason for this result was that the variables that were considered for inclusion could be correlated with one another. These correlations are explored in the next section.

### **6.2.8 Correlations between `vis_us_06`, `circ_us_04`, `prog_us_08`, `child_us_08` and `pc_us_08`**

One of the reasons that the other library variables were not included in the stepwise regression could be that these variables were correlated with `circ_us_04`. Table 76 shows the results of the correlations between the five independent variables considered in the stepwise regression shown in Table 75. The first number in each cell shows how strong the correlation is. The closer the number gets to the absolute value of 1 the stronger the correlation is. The closer the number gets to 0, the weaker the correlation is. The second number, the one in brackets, is the p-value. The smaller the p-value is, the more statistically significant the correlation is. As all the p-values shown in Table 76 are smaller than 0.1, they are all considered to be statistically significant.

Table 76: Correlations between vis\_us\_06, circ\_us\_04, prog\_us\_08, child\_us\_08 and pc\_us\_08

	vis_us_06	circ_us_04	prog_us_08	child_us_08	pc_us_08
vis_us_06	1	0.87 (0.0000)	0.73 (0.0000)	0.71 (0.0000)	0.56 (0.0000)
circ_us_04	0.87 (0.0000)	1	0.53 (0.0000)	0.53 (0.0000)	0.63 (0.0000)
prog_us_08	0.73 (0.0000)	0.53 (0.0000)	1	0.95 (0.0000)	0.45 (0.0008)
child_us_08	0.71 (0.0000)	0.53 (0.0000)	0.95 (0.0000)	1	0.43 (0.0017)
pc_us_08	0.56 (0.0000)	0.63 (0.0000)	0.45 (0.0008)	0.43 (0.0017)	1

Table 76 shows that circ\_us\_04 and vis\_us\_06 were strongly correlated. This strong correlation would explain why vis\_us\_06 was not shown to be statistically significant in the stepwise regression shown in Section 6.2.7. The two variables can be thought of as substitutes: vis\_us\_06 can be used in the same manner as circ\_us\_04 and be correct almost 90 percent of the time. The correlations of circ\_us\_04 suggested a relationship with the other three variables too, although not as strongly as the one it had with vis\_us\_06. This result explains why the other variables were also not included: they could be substitutes for circ\_us\_04.

The reasons that prog\_us\_08 and child\_us\_08 were excluded could be gathered by looking at the results shown in Table 72 and Table 73. These show a very slight relationship between the health variable and the two library variables.

This section explored the possibility that there might be a lagged effect between the library variables and health\_us\_08. health\_us\_08 was chosen as the dependent variable as it was revealed to be one of the statistically significant independent variables in the discussion in Section 6.1.12. health\_us\_08 was one of two development variables identified in this way, the other was save\_us\_08. The next subsection deals with the

relationship between save\_us\_08 and the library variables in a similar fashion to the exploration in this section.

### ***6.3 Lagged indirect relationships between library variables and savings***

The previous section looked at how there might be a delayed effect between health\_us\_08 and the library variables. health\_us\_08 was one of the variables identified in Section 6.1.12. A similar exploration was done between save\_us\_08 and library variables. This exploration was carried out to explore the possible lagged indirect effects that the library variables might have on gdp\_us\_09 through save\_us\_08.

#### **6.3.1 Lagged indirect relationship between library visits and savings**

The first relationship that was explored was between vis\_us and save\_us\_08. The values for each year of vis\_us were taken, from the years 2003 to 2008, as the independent variables, and regressed against save\_us\_08. Table 77 shows the results of these regressions.



Table 77: Regressions results for vis\_us —> save\_us\_08

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
vis_us_08	0.5571	4.41E-09 ***	0.4981	50.62	4.41E-09
vis_us_07	0.5773	1.7E-09 ***	0.5169	54.51	1.70E-09
vis_us_06	0.5389	3.44E-09 ***	0.5031	51.62	3.44E-09
vis_us_05	0.5358	1.66E-08 ***	0.4708	45.47	1.66E-08
vis_us_04	0.5418	2.38E-08 ***	0.463	44.11	2.38E-08
vis_us_03	0.5809	1.88E-09 ***	0.5149	54.07	1.88E-09
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1					

The two variables, vis\_us\_03 and save\_us\_08, had a strong relationship, the strongest being between vis\_us\_07 and save\_us\_08. vis\_us\_07 explained over 51 percent of the variation in save\_us\_08. This relationship was shown by the adjusted R-squared figure. This figure was statistically significant: the F-statistic was sufficiently high and the associated p-value was sufficiently low. vis\_us\_07 was the library visits variable that was included in the stepwise regression discussed in Section 6.3.7.

The relationship between savings and visits to the library was a positive one. This positive relationship was what was expected from the evidence given in the literature, as discussed in Section 2.6. Not only does a library provide a free source of entertainment, which frees up some disposable income which can be saved, but it also provides material which could increase financial literacy.

### 6.3.2 Lagged indirect relationship between reference questions and savings

Table 78 displays the results of the regressions between  $ref\_us\_i$  and  $save\_us\_08$  (for values of  $i$  from 03 to 08). These regressions explored the relationship between the reference questions variable and the savings variable.

*Table 78: Regressions results for  $ref\_us \rightarrow save\_us\_08$*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
$ref\_us\_08$	0.0773	0.352	-0.0023	0.8829	0.352
$ref\_us\_07$	0.08	0.3365	-0.0012	0.9422	0.3365
$ref\_us\_06$	0.1095	0.1967	0.0141	1.713	0.1967
$ref\_us\_05$	0.0992	0.244	0.0077	1.39	0.244
$ref\_us\_04$	0.0699	0.3941	-0.0052	0.7391	0.3941
$ref\_us\_03$	0.0927	0.2596	0.006	1.301	0.2596
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

None of the regressions shown in Table 78 were statistically significant. The adjusted R-squared values were small, and in some cases negative. This corresponded with a low F-statistic and an associated high p-value.

There was not a statistically significant relationship between reference questions and savings. Nothing can be assumed about the relationship between these two variables.

### 6.3.3 Lagged indirect relationship between circulation and savings

As with the other two variables,  $circ\_us$  was dealt with in a similar fashion. Table 79 shows the results of the regressions that examine the relationships between the circulation variables and  $save\_us\_08$ .

Table 79: Regressions results for *circ\_us* → *save\_us\_08*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
<i>circ_us_08</i>	0.2696	5.14E-05 ***	0.2722	19.7	5.14E-05
<i>circ_us_07</i>	0.2616	8.16E-05 ***	0.259	18.47	8.16E-05
<i>circ_us_06</i>	0.2497	0.0001 ***	0.2471	17.41	0.0001
<i>circ_us_05</i>	0.2455	0.0003 ***	0.2247	15.49	0.0003
<i>circ_us_04</i>	0.2418	0.0004 ***	0.2118	14.44	0.0004
<i>circ_us_03</i>	0.2632	0.0001 ***	0.2471	17.41	0.0001
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Unlike *ref\_us*, *circ\_us* was shown to have a statistically significant relationship with *save\_us\_08*. Whilst the values for all the years showed a possible contribution to *save\_us\_08*, the values for 2008 were the best at explaining the variation with *save\_us\_08*. Twenty-seven percent of the variation in *save\_us\_08* was explained with *circ\_us\_08*. This circulation variable was used in the stepwise regression discussed in Section 6.3.7.

Public libraries often provide literature on managing personal finances. Such an example was Westminster Libraries in the United Kingdom, as reported by Rooney-Browne (2009: 344). This service could be one way in which library circulation is contributing positively to financial literacy, which in turn contributes to the level of savings in a state. This theoretical positive relationship was substantiated by the results of the regressions shown in Table 79. There was a statistically significant relationship between the savings variable and the circulation variable.

### 6.3.4 Lagged indirect relationship between attendance at library programmes and savings

This subsection deals with prog\_us in a similar way to the treatment of the four library variables discussed previously. The variable representing attendance at library programmes, prog\_us, was first collected in 2004. Thus the regressions start with the data in 2004 and go through to 2008. The results are shown in Table 80.

Table 80: Regressions results for prog\_us → save\_us\_08

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
prog_us_08	0.2692	0.0003 ***	0.2202	15.12	0.0003
prog_us_07	0.2565	0.0006 ***	0.1997	13.48	0.0006
prog_us_06	0.2267	0.002 **	0.1623	10.69	0.002
prog_us_05	0.1546	0.0276 *	0.0767	5.154	0.0276
prog_us_04	0.177	0.021 *	0.0911	5.713	0.021
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

The values for prog\_us\_08 explained more than 22 percent of the variation observed in save\_us\_08, as shown by the adjusted R-squared. This was more than the values for any other year of prog\_us. Thus the prog\_us variable for 2008 was the one that was included in the stepwise regression at the end of this subsection.

Public libraries could contribute to financial literacy by giving workshops on working with money, as described by Špiranec, Zorica and Simončič (2012). It was therefore unsurprising to see that the results here confirm the positive relationship between attendance at library programmes and the savings variable, which was the number of tax returns that include a line-item on taxable interest.

### 6.3.5 Lagged indirect relationship between attendance at children's programmes and savings

The variable that represents attendance at library programmes for children was child\_us. Table 81 shows the results of regressions that used child\_us as the independent variable, and save\_us\_08 as the dependent variable.

*Table 81: Regressions results for child\_us —> save\_us\_08*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
child_us_08	0.2585	0.0005 ***	0.2046	13.86	0.0005
child_us_07	0.2395	0.0013 **	0.1762	11.69	0.0013
child_us_06	0.2253	0.003 **	0.1487	9.735	0.003
child_us_05	0.165	0.0173 *	0.0922	6.075	0.0173
child_us_04	0.1809	0.0152 *	0.0964	6.336	0.0152
child_us_03	0.2894	0.0011 **	0.1808	12.03	0.0011
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

As with prog\_us, child\_us was shown to have a relationship with save\_us\_08. The strongest relationship was between child\_us\_08 and save\_us\_08, where child\_us\_08 explained over 20 percent of the variation in save\_us\_08. This was shown with the adjusted R-squared value. child\_us\_08 was one of the independent variables included in the stepwise regression of Section 6.3.7.

Again, the relationships shown by levels of attendance of library programmes in general were very similar to the relationships shown by levels of attendance of children's programmes. This was because the two library variables were strongly correlated with one another. Table 81 shows a positive relationship between attendance at children's programmes and the savings variable.

### 6.3.6 Lagged indirect relationship between using public computers and savings

The final library variable discussed was pc\_us. Table 82 shows the results of the regressions between pc\_us and save\_us\_08. The figures for pc\_us were only collected from 2006. Thus the regressions for 2004 and 2003 are not included here.

*Table 82: Regressions results for pc\_us —> save\_us\_08*

	Coefficient	p-value (for coefficient)	Adjusted R-squared	F-Statistic	p-value (for F-Statistic)
pc_us_08	0.0618	0.4076	-0.0061	0.6978	0.4076
pc_us_07	0.0552	0.4154	-0.0066	0.6746	0.4154
pc_us_06	0.1207	0.0711 †	0.0459	3.403	0.0711
Signif. codes: <0.001 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘†’ 0.1 ‘ ’ 1					

There was not a strong relationship between save\_us\_08 and pc\_us. The best relationship existed between pc\_us\_06 and save\_us\_08. A mere 4 percent of the variation found in save\_us\_08 was explained by pc\_us\_06, which was very slight when compared with the adjusted R-squared values from Section 6.3.1, for example. However, the regression between pc\_us\_06 and save\_us\_08 was statistically valid, and so pc\_us\_06 was included in the stepwise regression shown in the next section.

The Internet, which can be accessed by the public computer terminals in a library, was another source of financial information which could theoretically contribute to the level of savings in an economy. Becker and others (2010: 144) thought this to be the case. Table 82 shows that these two variables did indeed have a positive and statistically significant relationship. There was evidence of a lagged effect: usage of computers in 2006 has the strongest relationship with the savings variable of 2008.

### 6.3.7 Lagged indirect relationship between library variables and savings

Through the above regressions shown in Table 77 to Table 82, the following variables were chosen as possible independent variables included in a stepwise regression. This stepwise regression was done so that the indirect effects of these variables on gdp\_us\_09 through save\_us\_08 can be ascertained. Table 83 shows the results of this stepwise regression. The following variables were included as possible independent variables:

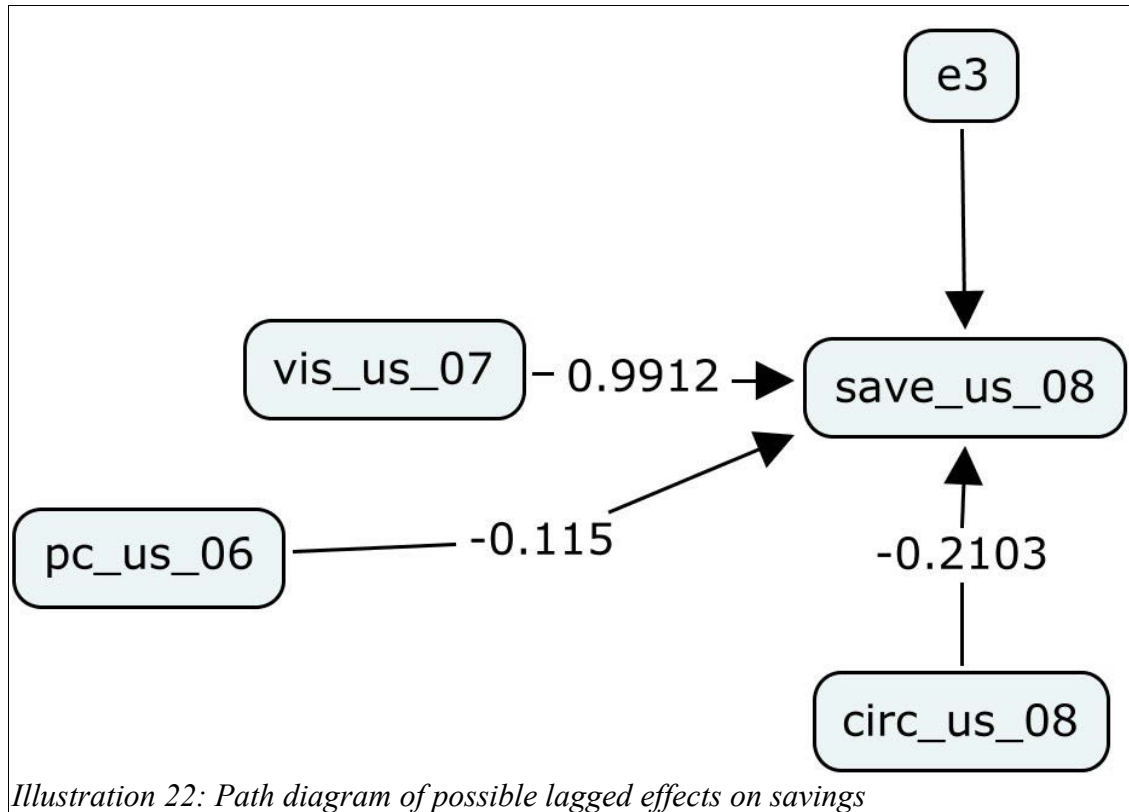
- vis\_us\_07
- circ\_us\_08
- prog\_us\_08
- child\_us\_08
- pc\_us\_06

*Table 83: Regressions for the stepwise regression: vis\_us\_07; circ\_us\_08; prog\_us\_08; child\_us\_08; pc\_us\_06 —> save\_us\_08*

	Coefficient	p-value
Intercept	-0.5045	0.0217 *
vis_us_07	0.9912	1.03E-07 ***
circ_us_08	-0.2103	0.0451 *
pc_us_06	-0.115	0.0443 *
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '†' 0.1 ' ' 1		
Residual standard error: 0.05329 on 47 degrees of freedom		
Multiple R-squared: 0.6183, Adjusted R-squared: 0.5939		
F-statistic: 25.38 on 3 and 47 DF, p-value: 6.559E-10		

The regression shown in Table 83 was statistically significant. The F-statistic was sufficiently high and the associated p-value was sufficiently low to instil statistical confidence in the model. This model explained almost 60 percent of the variation found in the dependent variable, save\_us\_08.

Of the five library variables which were considered for possible inclusion, only three were shown to contribute to the explanation of the variation found in save\_us\_08. These library variables were vis\_us\_07, circ\_us\_08 and pc\_us\_06. The coefficients of these variables were all statistically significant as the p-value for the coefficients showed. The coefficient for vis\_us\_07 was positive, while the coefficients for the other two were negative. A positive relationship was expected throughout. The expression of this relationship is shown graphically in Illustration 22.



Expressing these results mathematically:

$$\text{save\_us\_08}' = e + 0.9912(\text{vis\_us\_07}) + -0.2103(\text{circ\_us\_08}) + -0.115(\text{pc\_us\_06})$$

Equation 6.3

where  $e$  is a proxy variable that explains the remainder of the variance found in save\_us\_08 that is not already explained by the other three independent variables. This formula was used to calculate the total effects that the library variables might have on gdp\_us\_08 and the results are shown in Section 6.4



From the results already given in this section the positive relationship between library visits and the savings variable was to be expected. The negative relationship between circulation and the savings variable, and usage of public computers and the savings variable was not expected. The reason for this is probably mathematical. The total effect of library usage on the savings variable was given by the sum of the three coefficients of the library variables: 0.6659. The coefficient associated with the library visits variable was higher here than the one shown in Table 83. The coefficients for the other two library variables in Equation 6.3 were negative to account for this difference.

### **6.3.8 Correlations between vis\_us\_07, circ\_us\_08, prog\_us\_08, child\_us\_08, pc\_us\_06**

There could be many reasons that not all the library variables were considered for inclusion in the stepwise regression in Table 83. One such reason could be that the library variables are correlated with each other. Table 84 shows the results of the calculated correlations. As with the other correlations, the closer the first figure in the cell is to the absolute value of 1, the more highly correlated the two variables are. The second figure in the cell, the one in brackets, is the p-value which gives a measure of statistical confidence. In this case, all the p-values are low and the correlations can be considered to be statistically significant.

*Table 84: Correlations between vis\_us\_07, circ\_us\_08, prog\_us\_08, child\_us\_08 and pc\_us\_06*

	vis_us_07	circ_us_08	prog_us_08	child_us_08	pc_us_06
vis_us_07	1	0.89 (0.0000)	0.74 (0.0000)	0.72 (0.0000)	0.61 (0.0000)
circ_us_08	0.89 (0.0000)	1	0.58 (0.0000)	0.58 (0.0000)	0.63 (0.0000)
prog_us_08	0.74 (0.0000)	0.58 (0.0000)	1	0.95 (0.0000)	0.48 (0.0000)
child_us_08	0.72 (0.0000)	0.58 (0.0000)	0.95 (0.0000)	1	0.45 (0.0000)
pc_us_06	0.61 (0.0000)	0.63 (0.0000)	0.48 (0.0000)	0.45 (0.0000)	1

There was a particularly strong correlation between attendance at library programmes in general and attendance at library programmes for children. This correlation was not unexpected. The variable for attendance at library programmes in general, prog\_us\_08, was also correlated with the library visits variable, vis\_us\_07, although not as strongly as it was correlated with child\_us\_08. This difference might explain why prog\_us\_08 and child\_us\_08 were not included in the stepwise regression shown in Table 83.

The strong correlation between vis\_us\_07 and circ\_us\_08 might have obscured the effects that each has on the dependent variable in question, save\_us\_07. This effect might explain why the coefficient for circ\_us\_08 was negative in the stepwise regression of Table 83.

This section discussed the possible lagged relationship between save\_us\_07 and the library variables. The results of this section were used in the next section, Section 6.4, to calculate the direct, indirect and total lagged effects that the library variables might have on gdp\_us\_09 through a path analysis.

## 6.4 Total effects

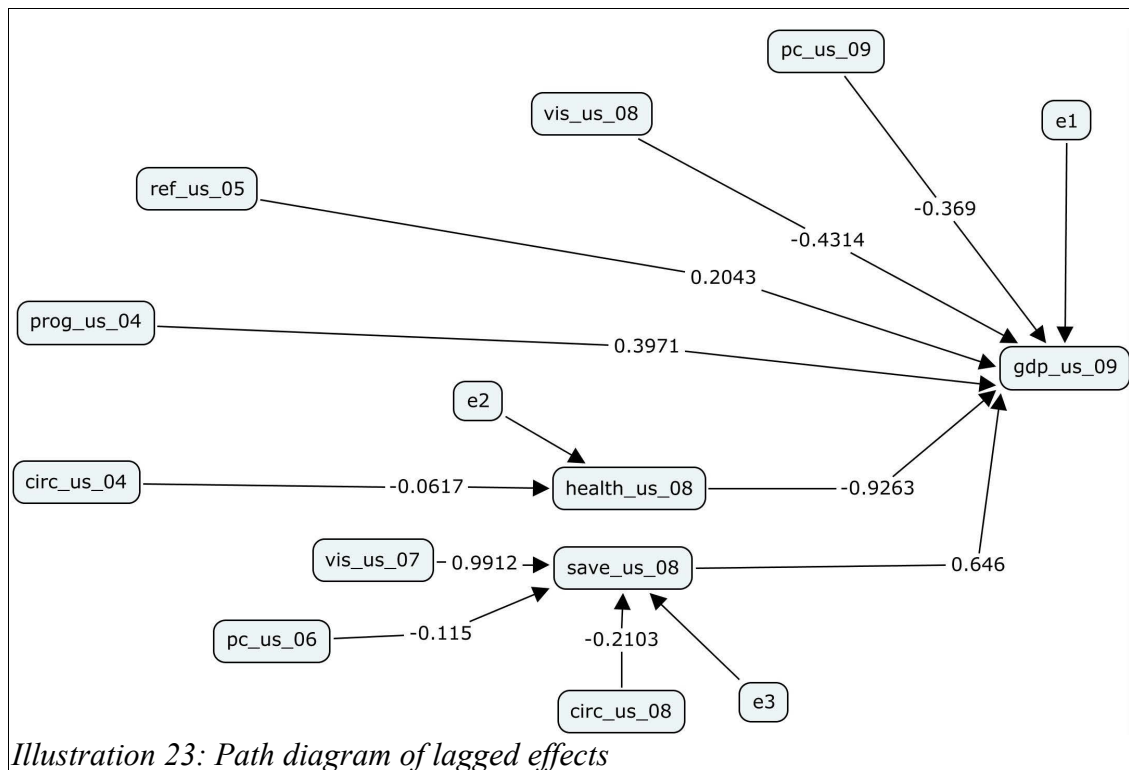
This chapter has explored the possible lagged effects that library variables might have on `gdp_us_09`, the GDP variable for 2009. It has done so by regressing the independent variable of different years with the dependent variable of a particular year. In Section 6.1 the independent variables were both library and development variables and the dependent variable was `gdp_us_09`. In Section 6.2 and Section 6.3 the independent variables were the library variables and the dependent variables were `health_us_08` and `save_us_08`. These results led to the following mathematical equations:

$$\text{gdp\_us\_09}' = e1 + -0.4314(\text{vis\_us\_08}) + 0.2043(\text{ref\_us\_05}) + 0.3971(\text{prog\_us\_04}) + -0.369(\text{pc\_us\_09}) + -0.9263(\text{health\_us\_08}) + 0.646(\text{save\_us\_08}) \quad \text{Equation 6.1}$$

$$\text{health\_us\_08}' = e2 + -0.0617(\text{circ\_us\_04}) \quad \text{Equation 6.2}$$

$$\text{save\_us\_08}' = e + 0.9912(\text{vis\_us\_07}) + -0.2103(\text{circ\_us\_08}) + -0.115(\text{pc\_us\_06}) \quad \text{Equation 6.3}$$

Illustration 23 shows these equations as a path diagram.



Equation 6.2 and Equation 6.3 can be substituted into Equation 6.1 to calculate the indirect effects.

$$\text{gdp\_us\_09}' = e1 + \mathbf{-0.4314}(\text{vis\_us\_08}) + \mathbf{0.2043}(\text{ref\_us\_05}) + \mathbf{0.3971}(\text{prog\_us\_04}) + \mathbf{-0.369}(\text{pc\_us\_09}) + -0.9263(e2 + -0.0617(\text{circ\_us\_04})) + 0.646(e3 + 0.9912(\text{vis\_us\_07}) + -0.2103(\text{circ\_us\_08}) + -0.115(\text{pc\_us\_06}))$$

$$\text{gdp\_us\_09}' = (e1 + -0.9263*e2 + 0.646*e3) + \mathbf{-0.4314}(\text{vis\_us\_08}) + (0.646*0.9912)(\text{vis\_us\_07}) + \mathbf{0.2043}(\text{ref\_us\_05}) + (0.646*-0.2103)(\text{circ\_us\_08}) + (-0.9263*-0.0617)(\text{circ\_us\_04}) + \mathbf{0.3971}(\text{prog\_us\_04}) + \mathbf{-0.369}(\text{pc\_us\_09}) + (0.646*-0.115)(\text{pc\_us\_06})$$

$$\text{gdp\_us\_09}' = (e1 + -0.9263*e2 + 0.646*e3) + \mathbf{-0.4314}(\text{vis\_us\_08}) + 0.6403(\text{vis\_us\_07}) + \mathbf{0.2043}(\text{ref\_us\_05}) + -0.1359(\text{circ\_us\_08}) + 0.0572(\text{circ\_us\_04}) + \mathbf{0.3971}(\text{prog\_us\_04}) + \mathbf{-0.369}(\text{pc\_us\_09}) + -0.0743(\text{pc\_us\_06}) \quad \text{Equation 6.4}$$

Equation 6.4 shows that there were both direct and indirect effects between the library variables and gdp\_us\_09. There was a mixture between positive and negative results: a positive relationship was expected throughout. The pc\_us variables, for example, were both negative for the direct and indirect relationships, which was consistent with what was found in Chapter 5. However the direct relationship was stronger than the indirect relationship. A percentage change in pc\_us\_09 correlated with a 0.37 percentage change in gdp\_us\_09 while a percentage change in pc\_us\_06 resulted in a 0.07 change in gdp\_us\_09.

This chapter explored the idea that there might be a delayed effect between library use and the economy. The relationship between library usage and economic growth was clearly a complex one. Effects could be indirect, delayed, and vary between different ways of how libraries are used. For example, the relationship between vis\_us\_07 and gdp\_us\_09 was stronger than that between pc\_us\_06 and gdp\_us\_09. This shows that when library usage is taken as a whole, the possible nuances of the different parts of usage could be lost.

Chapter 7 provides a discussion on the possible causes for the results given in Chapters 4, 5 and 6. It presents possible implications of the results and suggestions for future research.

## **Chapter 7: Discussion, recommendations and conclusion**

This final chapter provides a discussion of the findings, recommendations and conclusion of this study. The main finding of this thesis is that the relationship between public library use and economic growth and development is one of complexity. This chapter starts with a summary of the chapters which leads into a discussion of some of the results. This section flows into another which discusses the implications of the results. These include recommendations for policy and practice, which could fuel further studies. Before closing the chapter with a conclusion, recommendations for further study are offered.

No thesis is without limitations. This chapter includes a discussion on the limitations of this thesis. These are grouped under time, data, budget and scope limitations.

### ***7.1 Summary of the chapters***

Chapter 1 introduced this thesis. It introduced the primary question: what kind of relationship exists between different parts of public library use and economic growth and development? The chapter sets this thesis apart from the traditional methods of measuring the economic value of libraries. These traditional methods include cost-benefit analysis and contingent valuation. It provided definitions for the important terms in this thesis, particularly the economic terms. Chapter 1 discussed how economic development indicators, such as health or unemployment, are not independent of one another. Evidence from the literature was given to support that discussion. A critical section of Chapter 1 was the theoretical framework. This thesis leans on the Solow-Swan neoclassical growth model as its primary framework. The use of this economic theoretical framework brings together themes of public library use and economic growth and development in a unique way.

Chapter 2 reviewed the relevant literature. It did so through a systematic review of any works that linked public libraries and the economy in an empirical fashion. Library programmes were discussed in the literature more than any other aspect of library services. Social capital was the predominant economic variable connected with library usage. A surprising result of Chapter 2 was the lack of literature that discussed the circulation services of the library. Book circulation is considered to be a fundamental part of the library services. This view could explain why scholars have not felt the need to defend it as a service in the literature. The systematic review of the literature is one of the points that make this thesis original: no previous study has explored the possible links between public library use and economic growth and development in this way.

Chapter 3 outlined the methods that this thesis employed. It began with a discussion of which countries were included in this thesis. The geographic selections were determined by the availability of the data. Chapter 3 detailed where the data was sourced from, both the library data and the economic data. The availability of data gave rise to a two-part split in this study: one that focused on international data and another that focused on data from the USA. That chapter explained the statistical methods used in this thesis, namely regression and path analysis.

Chapter 4 gave the results that were generated from the international data. The only measure of library use available at an international level was circulation figures. It was found that circulation contributes positively to economic growth and development.

In Chapter 5 the results from the USA study were presented and only the data from 2009 was considered. It was shown that public library use does not necessarily contribute positively to economic growth and development in all cases.

Chapter 6 considered the results from tests done with USA data over multiple years. Again it was found that public library use does not always contribute positively to economic growth and development. What was shown was that the effects of public library use are not limited to a single calendar year, but that the effects are spread out over multiple years.

This chapter, Chapter 7, gives a brief discussion which summarises the results. Some implications for this study are given, such as policy decisions leading from these results, as well as some recommendations for further study. The limitations of this study were given in this chapter, the most concerning of which is data: data availability and data reliability. This chapter closes with a conclusion to the thesis.

## **7.2 Discussion**

The previous three chapters gave the results of this study. This chapter discusses those results. The sequence of this chapter follows the sequence in which the results were shown: it begins with a discussion of the international results, followed by a discussion of the results created from the data from USA. This section ends with a discussion on the possible delayed effect that library use might have on the economy.

This discussion will show that the relationship between library use and economic growth and development is a complex one. It must be remembered that where a causal relationship is inferred, the relationship is only theoretically causal. The literature gave evidence of theoretical causality. Statistical causality is impossible to prove, as was discussed in Chapter 3 but, as causality was central to this thesis and its deliberations, the evidence of theoretical causality was sufficient to assume causality.

The method that this thesis employs, namely path analysis, is one that is uncommon in the discipline of library science. A thorough search of the literature suggests that this thesis is the first to use path analysis to explore the complexity of the relationship between public library use and economic growth and development. It complements the more traditional methods of measuring economic contribution such as ROI.



## 7.2.1 International results

The only indicator of library use available for the international analysis was circulation. The results showed various models where the circulation variable, *circ\_int\_99*, could have a direct and indirect relationship with *gdp\_int\_99*, the GDP variable. The indirect relationship was decomposed to be examined through five development variables. The final model considered all of the development variables in one model.

Table 85 is a reproduction of Table 21. It shows the summary of the results of the analysis done with international data.

*Table 85: Summary of results*

Model	Direct	Indirect
<i>circ_int_99</i> → <i>gdp_int_99</i>	0.334	
<i>circ_int_99</i> → <i>educ_int_99</i> → <i>gdp_int_99</i>	0.3314	
<i>circ_int_99</i> → <i>health_int_99</i> → <i>gdp_int_99</i>		0.2966
<i>circ_int_99</i> → <i>sc_int_99</i> → <i>gdp_int_99</i>	0.2952	0.1193
<i>circ_int_99</i> → <i>save_int_99</i> → <i>gdp_int_99</i>	0.3372	
<i>circ_int_99</i> → ( <i>unem_int_99</i> / <i>educ_int_99</i> / <i>health_int_99</i> / <i>sc_int_99</i> / <i>save_int_99</i> ) → <i>gdp_int_99</i>	0.4848	0.501

Without taking into consideration any of the development variables, it would appear that *circ\_int\_99* had a direct effect on *gdp\_int\_99*. This effect is positive. Where *circ\_int\_99* goes up by a percentage, *gdp\_int\_99* increases with a corresponding 0.33 percent. The effect is slight. This positive and slight effect is evidenced in the other models as well.

Table 85 shows that library use does contribute positively to economic growth and development. Not only is there evidence of a direct contribution to GDP, but there is evidence of an indirect effect through economic development. The relationship is thus not a simple one: it is perhaps more complex than the models here might suggest, particularly because the variables are not independent of one another: for example,

education often leads to greater savings, as it was discussed in Chapter 1. There is also evidence that the relationships between the development variables are not uni-directional, as these models assume.

The contribution that public library use makes to economic growth is small. Considering the other influences on the economy it is not a concern that the public libraries' effects are so slight. That they are statistically significant is sufficiently relevant for some conclusions to be drawn.

The international analysis makes no distinction between the different countries. It is conceivable that the relationship between the library usage and the economy might be different between the different countries. Unfortunately the data restricts further analysis on this point.

These results should be treated with a measure of caution. This chapter will later discuss the questionable reliability of the data on library use that the international analysis used. The samples were also relatively small, further eroding reliability of the results. This lack of confidence in the reliability of the results lead to the analysis in the thesis of the relationship between library use and economic growth in development in USA. Even though narrowing the focus to one country limits the transferability of the results, the dataset is more reliable, and contains more data points. It serves to support the results derived from the use of the international dataset. The model of testing the relationship between economic variables and library variables could be used in studies on other countries, should data become available.

### **7.2.2 USA results**

The dataset for the USA analysis contained more variables of library use than the international dataset did. In addition to circulation, the USA analysis considered: visits

to the library, reference questions asked, attendance at library programmes in general, attendance at library programmes for children, and usage of public computers.

The first model looked at only the relationship between the library variables and the GDP variable, `gdp_us_09`. The results were shown in Equation 5.1, reproduced here as Equation 7.1.

$$\text{gdp\_us\_09}' = e + \mathbf{0.5028}(\text{vis\_us\_09}) + \mathbf{0.1647}(\text{ref\_us\_09}) + \mathbf{-0.4388}(\text{pc\_us\_09})$$

Equation 7.1

From this equation, one would draw the conclusion that `circ_us_09` does not contribute to `gdp_us_09`, nor does the attendance at library programmes variables, `prog_us_09` and `child_us_09`. Only visiting the library and interacting with the librarian contributes positively to `gdp_us_09`. Using the public computers contributes negatively. It was expected that all the contributions would be positive.

Other studies which aggregate library use into one variable, such as circulation or library visits, would not reveal the subtleties that occur in the relationship between different parts of library use and economic growth.

The next model added the idea that there could be an indirect effect through economic development. The indicators of economic development considered in this study were: education, health, employment, social capital, and savings.

This list originated from the Solow-Swan neoclassical growth model which gives human capital and financial capital as the two inputs into economic production. Savings was used as an indicator of financial capital. Human capital can be discussed in terms of the human development indicators: health, education and employment. Finally, the literature showed the strong theoretical link to social capital, which was the final development indicator considered.

When considering both the library and economic development indicators, direct and indirect effects were revealed. This was shown in the simultaneous equation of Equation 5.2 and Equation 5.3, reproduced here as Equation 7.2.

$$\text{gdp\_us\_09}' = (e2 + 0.4894 * e1) + \mathbf{0.1823}(\text{ref\_us\_09}) + \mathbf{-0.4448}(\text{pc\_us\_09}) + 0.3428(\text{vis\_us\_09}) \quad \text{Equation 7.2}$$

Again a positive relationship was expected throughout. The negative relationship observed for pc\_us\_09 is not expected. It could be that the relationships between the library variables are obscuring the results somewhat.

All these variables were taken from the same year. Thus the dynamics of the interactions between the variables could be obscured. For example, if citizens are richer, they could better afford a home computer, reducing the reliance on the libraries' computers. Richer citizens would also be associated with an increase in GDP. This is one possible scenario that could explain the negative relationship between computer use in the library and GDP. This is discussed in more detail later in this chapter.

The circulation variable did not come up as statistically significant in this model either. It could be that the other variables conceal the effect that it has on GDP. In order to explore this, each library variable was taken in turn and examined independently of the others. The results of this were shown in Table 45 and are reproduced in Table 86.

*Table 86: Summary of the results regressions using all development indicators as independent variables*

Library variable	Direct effect	Indirect effect through health_us_09	Indirect effect through save_us_09
vis_us_09		-0.2582	0.4985
ref_us_09			
circ_us_09		-0.197	0.2512
prog_us_09		-0.1498	0.312
child_us_09		-0.1246	0.2304
pc_us_09	-0.205	-0.0929	

Although all the development variables were included in the stepwise regressions, only two came up as significant: health\_us\_09 and save\_us\_09. When the library variables were considered in this way, the relationship between circ\_us\_09 and gdp\_us\_09 becomes clearer. There is a negative direct relationship, and a positive indirect relationship. They cancel each other out, in a way. Without the perspective of a path analysis, one might conclude that circ\_us\_09 does not contribute to gdp\_us\_09. A closer look reveals a much more complex relationship.

Similarly to how each library variable was examined in isolation of the other library variables, an isolation of the development variables was done. The results of that isolation were first shown in Table 54 and are reproduced in Table 87.

Table 87: Summary of effects of library variables through specific development variables

	vis_us_09		ref_us_09		circ_us_09		prog_us_09		child_us_09		pc_us_09	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
Library variables → unem_us_09 → gdp_us_09	0.7463		0.2042	-0.51						0.0364	-0.406	
Library variables → educ_us_09 → gdp_us_09	0.5539		0.2220	-0.06		0.0682				0.0638	-0.3777	-0.0415
Library variables → health_us_09 → gdp_us_09	0.5028		0.1647								-0.4388	
Library variables → save_us_09 → gdp_us_09		0.3479	0.2385	-0.0562							-0.37	-0.0748
Library variables → sc_us_09 → gdp_us_09	0.5028		0.1647								-0.4388	

Table 87 shows how complex the relationships between library usage, economic development and economic growth really are. For example, if one were to focus only on the direct effects of ref\_us\_09, one would conclude that the relationship between ref\_us\_09 and gdp\_us\_09 is a positive one. However, indirectly it has a negative relationship. This table shows clearly that not all library use is equally good for the economy all the time.

These results restrict the analysis to a single year. While this simplifies the models, there is no plausible reason that the effects of library use should be bound by a calendar year in reality. If vis\_us\_09, for example, contributes to gdp\_us\_09, it could well be contributing to subsequent years as well. In order to explore this lagged relationship, variables from different years were used. Equation 7.3 (first introduced as Equation 6.4) was created from the lagged analysis.

$$\begin{aligned} \text{gdp\_us\_09}' = & (e1 + -0.9263*e2 + 0.646*e3) + \mathbf{-0.4314}(\text{vis\_us\_08}) + 0.6403(\text{vis\_us\_07}) \\ & + \mathbf{0.2043}(\text{ref\_us\_05}) + -0.1358(\text{circ\_us\_08}) + 0.0571(\text{circ\_us\_04}) + \\ & \mathbf{0.3971}(\text{prog\_us\_04}) + \mathbf{-0.369}(\text{pc\_us\_09}) + 0.0743(\text{pc\_us\_06}) \end{aligned}$$

Equation 7.3

Equation 7.3 shows that the effects of library usage are not isolated to a single year. In the model one can see that vis\_us\_08 has a negative effect on gdp\_us\_09, a delay of a year, and indirect effects from 2007 and 2004.

The relationship between the economy and the library is not a simple one. Different uses of the library contribute to different parts of economic growth and development in different ways. These relationships are not independent, nor are they restricted to a single year. The library use of one year has effects into the future. While this fact might be intuitive, it had not yet been quantitatively and empirically explored in the known literature.

The effect of library use is not always positive either. If one were to only look at the international results, one would conclude that it is. The simple models created for the international data obscure many subtleties that were explored with the USA data. The use of the Solow-Swan framework and the method of path analysis for the examination of the link between public library use and economic growth and development revealed unique results.

### **7.2.3 Linking results to the literature**

The systematic literature review done in Chapter 2 revealed that the literature linking public library use and economic growth and development is not evenly covered. Certain topics were more popular than others. Table 88 shows the spread of literature. This table is based on Table 3 shown in Section 2.7.

Table 88: Number of articles covered by the literature review

	<b>Social capital</b>	<b>Health</b>	<b>Education</b>	<b>Employment</b>	<b>Finances</b>	<b>GDP</b>
<b>Library as a place</b>	12	Not covered in literature	Not covered in literature	Not covered in literature	Not covered in literature	Not covered in literature
<b>Interaction with librarian</b>	7	3	Not covered in literature	1	Not covered in literature	Not covered in literature
<b>Programmes</b>	3	8	11	3	Not covered in literature	Not covered in literature
<b>Internet</b>	4	2	2	4	1	Not covered in literature
<b>Books</b>	1	1	Not covered in literature	Not covered in literature	Not covered in literature	Not covered in literature

The results from the analysis have shown statistically significant links that were not previously covered by the literature. Table 89 shows where in this thesis empirical links between the themes were shown. Those that were covered by the analysis section of this thesis are shown in blue, black text refers to sections from the literature review.

Table 89: Themes covered in this thesis

	<b>Social capital</b>	<b>Health</b>	<b>Education</b>	<b>Employment</b>	<b>Finances</b>	<b>GDP</b>
<b>Library as a place</b>	Section 2.2.1	<a href="#">Section 5.2</a>			<a href="#">Sections 5.1, 5.2, 5.3, 6.3</a>	<a href="#">Sections 5.1, 5.3, 6.1</a>
<b>Interaction with librarian</b>	Section 2.2.2	Section 2.3.1	<a href="#">Section 5.3</a>	<a href="#">Sections 2.5.3, 5.3</a>	<a href="#">Sections 5.3, 5.1</a>	<a href="#">Sections 5.1, 5.3, 6.1</a>
<b>Programmes</b>	Section 2.2.3	<a href="#">Sections 2.3.3, 5.2</a>	<a href="#">Sections 2.4.1, 5.3</a>	<a href="#">Sections 2.5.2, 5.3</a>	<a href="#">Section 5.2</a>	<a href="#">Section 6.1</a>
<b>Internet</b>	Section 2.2.4	<a href="#">Sections 2.3.2, 5.2</a>	<a href="#">Sections 2.4.2, 5.3</a>	Section 2.5.1	<a href="#">Sections 2.6.1, 5.1, 5.3, 6.3</a>	<a href="#">Section 6.1</a>
<b>Books</b>	Section 2.2.5; <a href="#">Chapter 4</a>	<a href="#">Sections 2.3.4, 5.2, 6.3</a> <a href="#">Chapter 4</a>	Section 5.3		<a href="#">Sections 5.2, 6.3</a>	<a href="#">Chapter 4</a>

This thesis has taken the first steps in empirically linking certain themes that were not previously linked empirically in the literature, such as the library as a place and health, and interaction with the librarian and education. For other themes it has contributed to the existing literature, for example book circulation and health. These first steps make



this thesis unique.

It should also be noted that some themes could not be empirically linked either in the literature review or by statistical analysis that followed, such as book circulation and employment. These are points which could be taken up in further studies.

### ***7.3 Interrogating some results***

In the three results chapters, namely Chapter 4, 5 and 6, there were several results that were unexpected. As those chapters were devoted to showing the results of the statistical tests, a further discussion was delayed. That further discussion takes place in this section.

The order of this section will follow the order of the questions that arose out of the results chapters. Not all results can be fully explored: this discussion covers those which are particularly anomalous.

#### **7.3.1 Why is the relationship between GDP and computer usage generally negative?**

Both Chapters 5 and 6 showed that there exists a negative relationship between GDP and computer usage in public libraries. One possible reason for this could be a substitution effect. An increase in GDP is often correlated with an increase in income. It would stand to reason that with a higher income, Internet consumption would move away from the free facilities at a public library to home subscriptions. To test this theory, the percentage of individuals above the age of three with access to household Internet (sourced from United States Census Bureau 2009b), expressed as `net@home` was regressed against GDP as the dependent variable. Table 90 gives the result of that regression:

Table 90: Regression result from *net@home* -> *gdp\_us\_09*

	Coefficient	p-value
Intercept	2.1198	0.00451 **
<i>net@home</i>	1.3343	0.00101 **
Signif. codes: <0.001 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘+’ 0.1 ‘.’ 1		
Residual standard error: 0.1032 on 49 degrees of freedom		
Multiple R-squared: 0.1998, Adjusted R-squared: 0.1835		
F-statistic: 12.23 on 1 and 49 DF, p-value: 0.001008		

Table 90 shows a statistically sound regression. The F-statistic and p-values are at acceptable levels, while the adjusted R-squared shows that *net@home* could explain 18 percent of the variation in *gdp\_us\_09*.

The positive coefficient associated with *net@home* shows that there is a positive relationship with GDP and having Internet at home. This result supports the argument that there is a substitution effect between accessing the Internet at a public library and accessing it at home. When incomes increase, it would appear that Internet consumption shifts from public libraries to personal subscriptions. This shift has been noted in the literature too. For example, Sigler and others said: “With public libraries serving as the trusted social outlet for free public Internet access and assistance, people with no access, insufficient access, or insufficient digital literacy primarily turn to the library to apply for and access vital social services” (2011: 22). DeMaagd, Chew and Huang (2012: 114) found that those in a lower income group were statistically significantly more likely to use the computers in public libraries than those in a higher income group.

### 7.3.2 Why does the reference questions variable have a positive relationship with the unemployment variable?

Section 5.3.1 took all the library variables and regressed them against the unemployment variable, *unem\_us\_09*. The reference questions variable came up as

statistically significant and showed a positive relationship with the unemployment variable. This relationship could be read as: an increase in the number of reference questions being asked is correlated with an increase in unemployment rate. This relationship is counter to the one that is expected.

It has been shown that mental depression can follow unemployment, as unemployment reduces social contact in a person's life (Bolton and Oatley 1987). It could be that the unemployed interact with librarians more in an effort to create social contact and stave off depression. To test this, the reference questions variable was regressed as the independent variable against the suicide rates. Suicide rates were sourced from United States Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System (2011: 86). The results are shown in Table 91.

*Table 91: Regression result from ref\_us\_09 -> suicide\_us\_09*

	Coefficient	p-value
Intercept	1.7291	4.54E-10 ***
ref_us_09	-0.3209	0.0076 **
Signif. codes: <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		
Residual standard error: 0.1211 on 49 degrees of freedom		
Multiple R-squared: 0.1368, Adjusted R-squared: 0.1192		
F-statistic: 7.764 on 1 and 49 DF, p-value: 0.00756		

The results depicted in Table 91 show that there is a statistically significant and negative relationship between asking reference questions and suicide rates. This supports the argument that an interaction with the librarian is likely to be a social interaction that would contribute to a better state of mind in the unemployed.

### **7.3.3 Why does the reference questions variable have a negative relationship with the education variable?**

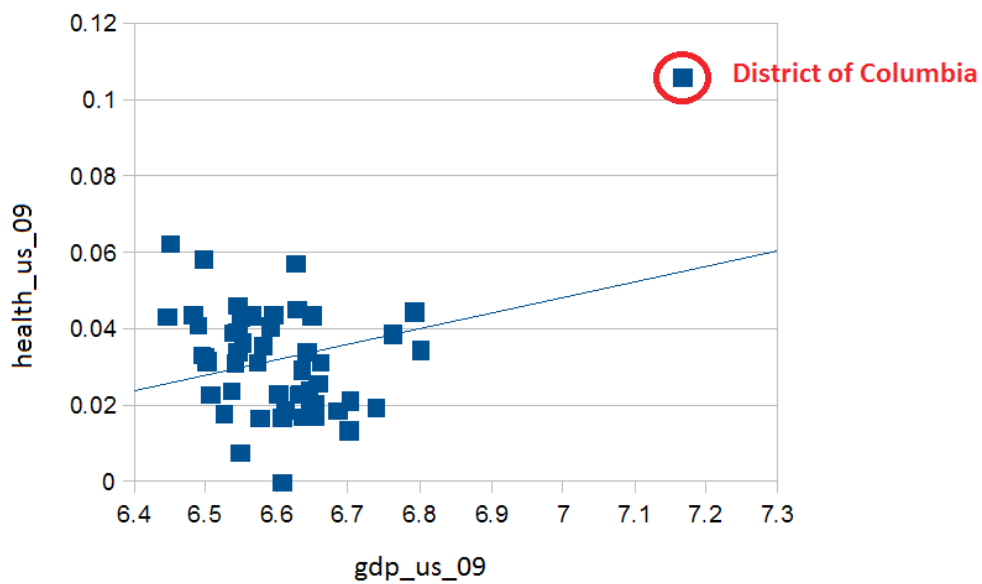
In Section 5.3.2 it appeared that the reference questions variable, `ref_us_09`, had a statistically significant and negative relationship with the education variable, `educ_us_09`. This relationship was unexpected, and warranted a deeper investigation.

When `ref_us_09` was regressed as the only independent variable against `educ_us_09` as the dependent variable, the relationship was found to be insignificant. It is probably because the other variables included in the model shown in Section 5.3.2 obscured the true relationship that the reference questions variable had with the education variable.

### **7.3.4 Why do child mortality rates have a positive relationship with GDP?**

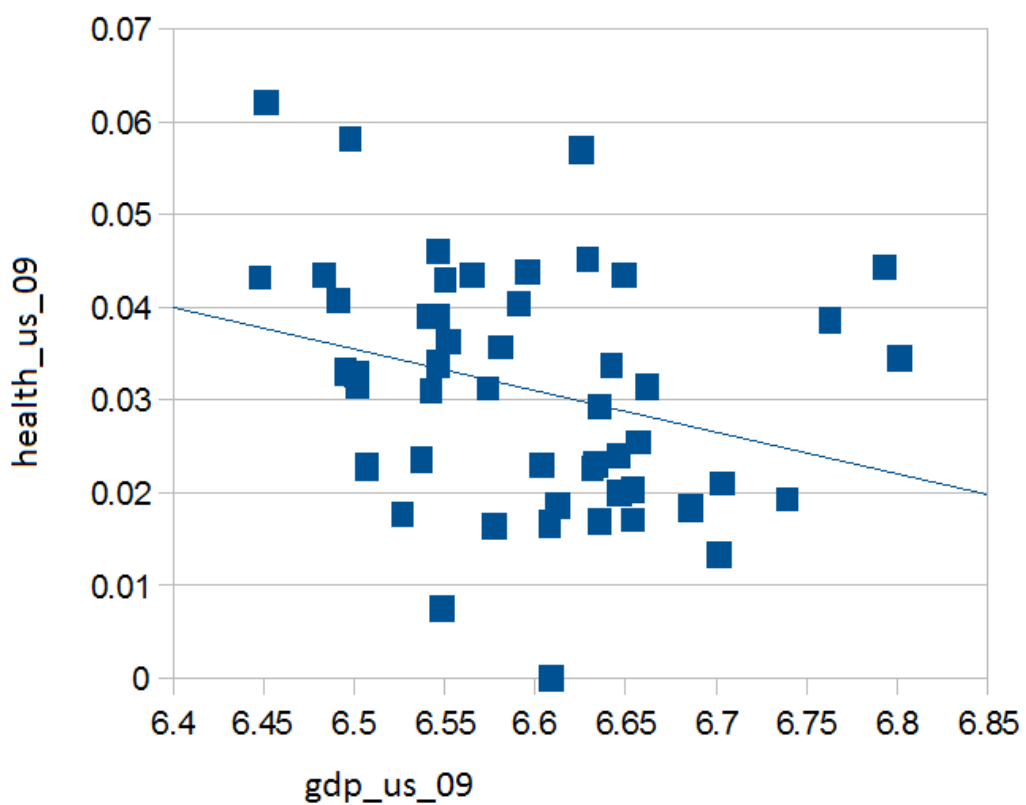
It was found in Section 6.1.9 that there is a delayed relationship between GDP and child mortality rates that is statistically significant and positive. An increased child mortality rate is indicative of poor health. Health is expected to be positively related to GDP. Thus the positive relationship between child mortality and GDP is unexpected.

When the values for these two variables were plotted on a scatter plot, an outlier was apparent. Illustration 24 shows this:



*Illustration 24: Scatter plot depicting `health_us_09` and `gdp_us_09`*

When the values associated with the District of Columbia were removed, the values were plotted again. Illustration 25 shows this.



*Illustration 25: Scatter plot depicting `health_us_09` and `gdp_us_09` without the outlier of the District of Columbia*

Looking at the trend lines of these two graphs, it is clear that the slope changes when the outlier is removed. The inclusion of the District of Columbia could explain why the anomalous relationship between health\_us\_08 and gdp\_us\_09 was observed.

One might think that this outlier should be removed from the study. Gujarati, citing Draper and Smith, explains why this should not always be done:

Automatic rejection of outliers is not always a wise procedure. Sometimes the outlier is providing information that other data points cannot due to the fact that it arises from an unusual combination of circumstances which may be of vital interest and requires further investigation rather than rejection. As a general rule, outliers should be rejected out of hand only if they can be traced to causes such as errors of recording the observations or setting up the apparatus [in a physical experiment]. Otherwise, careful investigation is in order (2003: 541).

For this reason the outlier was not removed. It could however explain the unexpected findings.

This subsection explored some of the questions that arose out of the results, attempting to provide a possible explanation for the anomalous results that were observed. In all cases a possible cause was found. The following subsection gives some implications arising out of this thesis.

## ***7.4 Implications for policy and practice***

There are several implications from these results. This section outlines them.

### **7.4.1 A complex relationship**

This thesis showed that the relationship between public library use and economic growth and development is a complex one. Those who work with public libraries should not assume that the relationship is simple. Different parts of the public library service contribute differently to economic growth and development, and they do so at a differing rate. This result implies that it would be too hasty to assume that there is a simple relationship between economic growth and development.

A uni-directional relationship was assumed for this thesis. There is evidence that the relationship is bi-directional: that economic factors impact public library use (see James [1985], Rooney-Browne [2009] and Skelly [2011] for examples). This further complicates the relationship.

### **7.4.2 Funding implications**

There is evidence of a positive relationship between public library use and economic growth and development. In particular interactions with the librarian and use of the library as a place seems to have a mostly positive relationship. Librarians can use this evidence to motivate for a continuation or an improvement of spaces. The quantitative evidence shown here can be used to supplement the existing evidence in order to effect policy changes.

When evaluating the effectiveness of funding projects, librarians and others should bear in mind that there could be a considerable time delay between the use of the public library and the economic impact, as it was shown in Chapter 6. This thesis only considered a five-year period; it is plausible that the impact of public library use could extend beyond that.

### **7.4.3 Data collection**

This study and its conclusions are limited by the availability of data. It is hoped that the results will inspire other bodies to undertake a more thorough and robust collection of data from public libraries, in all countries.

Individual librarians could use the framework that this thesis offered to collect local statistics on public library use and the economic environment. These could be used to show the impact of the library in the micro-environment that a single library serves.

### **7.4.4 Planning library services**

If a contribution to economic growth and development is a desirable end for public libraries, librarians could take the relationships revealed in this thesis into account when planning library services. For example, offering programmes on health care resources could supplement other services that the government is offering to improve the health of a particular state.

The results discussed in Section 7.3.1, that computers in public libraries are more often used by the poorer in the community, can be used to appropriate funds more effectively. Librarians could focus the provision of public computer access on libraries that serve poorer communities, rather than distributing them equally to all libraries.

Table 87 shows that the strongest relationship exists between visits to the library and economic growth. This could be used to plan library services to make public libraries more attractive to visit, if a contribution to economic growth is a desirable goal for librarians. This result would need to be explored in more detail, however, before a targeted service is implemented.



Another implication of this study is that it raised many questions that fell outside the scope of this thesis. This realisation gives rise to recommendations for further study, which are discussed in the next section.

## **7.5 Implications for theory**

This thesis opened with a quote from the *IFLA public library service guidelines*: “[Libraries] have an important role in the development and maintenance of a democratic society by giving the individual access to a wide and varied range of knowledge, ideas and opinions” (Koontz and Gubbin 2010: 2). The *Guidelines* also state the purpose of the public library: “The primary purpose of the public library is to provide resources and services in a variety of media to meet the needs of individuals and groups for education, information and personal development including recreation and leisure” (Koontz and Gubbin 2010: 2). Education is the primary focus; the other areas of economic development are mentioned under the headings of ‘information’ or ‘personal development’. This thesis showed that the link between public library use and other areas of economic development could be as strong as the link between public library use and education. This implies that the current thinking that libraries have a role to play in education is incomplete: they have a role to play in the other areas too.

The *Guidelines* specify resources and buildings as two specific services provided by the library. The provision of library programmes is mentioned only in passing (Koontz and Gubbin 2010: 38). Given that library programmes were shown to have statistically significant links to economic growth and development, and the popularity of library programmes in the literature, the services of the library should include the offering of library programmes as a standard feature. Libraries have moved beyond the simple provision of books. This is evident in the *Guidelines*, but they fail to explicitly state what additional services libraries should be providing in the modern age.

This thesis does not propose a new theory of the role of public libraries in society. Rather it adds to a general movement in this theory that the role of public libraries has changed.

## ***7.6 Recommendations for further study***

No thesis can explore every angle of a particular topic, and this thesis is no exception. From the results found in this study, there are several questions that could be taken as subsequent studies. This section discusses some of those recommendations.

### **7.6.1 The two-way relationship between public library use and economic growth and development**

This thesis focused on a one-way relationship between public library use and economic growth and development. In reality, it is quite probable that a two-way relationship exists. Literature on public library use during times of economic recession bears testimony to the fact that economic conditions affect public library use (see Beck 2009, James 1985, Rooney-Brown 2009 for examples). The bi-directionality of the relationship is something a future paper could explore.

### **7.6.2 Better data**

Although this thesis contributes to the understanding of the relationship between public library use and economic growth and development, there are recognisable limitations in the data. Particularly at the international level, a more reliable data set might have yielded better and more statistically stable results. A further study could undertake a more robust collection of data.

### **7.6.3 Different methods**

The data used in this thesis was non-stationary. That is, there was an underlying trend in the data which prevented a time-series analysis. With a better dataset, a time-series analysis might be viable. This analysis could tell how the relationship between public library use and economic growth and development has changed over time.

### **7.6.4 Social capital**

Unlike the other indicators of economic development, social capital is not represented by a single indicator. In the seminal work on social capital, *Bowling alone*, Putnam (2000) explores a multitude of possible indicators of social capital. Due to the availability of data, this thesis only used one indicator for the international study and one indicator for the USA study. A more thorough study of the relationship between social capital and public library use that employs different indicators would be of interest.

### **7.6.5 Why does library circulation feature so little in the literature?**

The surprising result of the literature review is that circulation is one of the library services that is least discussed. This study postulated that it might be because books for loan are a fundamental part of the library service, and so do not require defending in the literature. A deeper exploration of why library circulation features so little in the literature on library use and economic growth and development is another topic of interest.

### **7.6.6 Is there a difference in impact between different countries?**

This study did not explore if the relationship between public library use and economic growth and development differs between countries. It would be interesting to explore whether cultural differences make an impact on the relationship. Would the relationship be stronger for a country that has a reading culture, for example?

### **7.6.7 Why does public computer use contribute negatively?**

One of the findings of this thesis is that usage of computer terminals in public libraries has a negative relationship with economic growth and development. While this thesis suggested one reason for this, a more thorough exploration of why this might be is beyond the scope of this thesis, and could be the topic of another study.

In a relationship that is as complex as the one between public library use and economic growth and development, there are many angles that could be explored.

### **7.6.8 Linking themes that were not empirically linked**

Section 7.2.3 showed that uses of public libraries have not been empirically linked with themes of economic growth and development, either in the literature or in the statistical analysis that followed. These are:

- Library as a place and Education;
- Library as a place and Employment;
- Books and Employment.

The possible empirical link between these points could be a topic of a research project.

## **7.7 Issues and limitations**

No thesis is without limitations. This section discusses the limitations of this thesis.

These are grouped under time, data, budget and scope limitations.

Given the time limits set by the institution where this thesis is registered, the collection of original data by one researcher, rather than a whole team, on a desirable scale was not feasible. If original data collection was a necessary requirement of this thesis, the study would have had to be restricted to a much smaller geographical area which would have limited the findings and conclusions. Thus it was decided to forgo original data collecting in favour of keeping the study as geographically broad as possible. This approach did allow for some useful and original insights.

Given the time limitations discussed above, it was decided to use existing data. This brought data limitations into the thesis. If the data was collected as original data, a data set could have been created which would have aligned perfectly with the research question. As it was decided to use existing data, it was a challenge to find suitable datasets.

At an international level, a perfect dataset does not exist. The set that covers the greatest number of countries is that from UNESCO (UNESCO Institute for Statistics 2012). This dataset has questionable reliability. Not only is it incomplete with many gaps in the data, covering few countries, but the data itself looks inaccurate. For example, the number of public library service points in the United Kingdom jumped from 4630 in 1999 to 21849 in 2000. This might be as a result of a change in definition of ‘service point’ in the United Kingdom but it makes the dataset questionable under statistical scrutiny. However, this dataset has been used by others (see Liu 2004 for example), which gave credence to its use in this thesis.

This thesis restricted itself to only examining quantitative data. By design this excludes the rich nuances that qualitative data could have brought to the conclusions. For example, one topic of interest revealed by the literature review was how libraries are used as a place. Simply looking at the numbers of library users, or the number of persons entering a library, does not explain what the users make use of the library for, or why these persons could be entering the library. Another example, simply looking at how library programmes influence the education of the nation, does not reveal how attending a library programme helped an individual escape poverty and feed his/her family. The author has observed that the library science discipline is primarily qualitative; the richness that a qualitative study brings can be found already existing in the literature, as shown in Chapter 2. This thesis was intended to complement the qualitative studies already offered by others.

No external funding was provided for this thesis. If time were not a factor in original data collecting, the lack of a suitable budget would still have prevented data collecting from taking place.

This thesis has restricted itself to answering the research questions posed. In answering these, several other interesting findings arose. The scope of the thesis excludes a thorough discussion of these. For example, this thesis has limited itself to examining the one-way relationship from libraries to the economy. In reality a two-way relationship exists where the economy influences libraries too, as suggested by James (1985) and Rooney-Browne (2009). However, this relationship, from economies to libraries, was not explored in great detail due to the scope limitations set by the research question. This limitation is not unique to this thesis, all studies need to restrict themselves to focus on a particular topic.

Due to the language abilities of the author, the language of research and articles included in this thesis was limited to English. This excludes possible research which might have contributed positively to the research that was written in another language.

This thesis is written for a library and information science audience. As such, it has kept the economic explanations to the simplest form possible. This brings its own limitations. The economic discipline has a rich statistical basis, while the discipline of library and information science tends to lean towards other methods. Due to the intended audience, the richness of economics cannot be included to its fullest extent. This limitation was weighed against the benefit of adding to the small body of studies in library and information science which use economics to explore the public library's contribution.

No research is without limitations; this thesis is no exception. Provided that the limitations are recognised and taken into account, they should not prevent the researcher from exploring a research question. The study lays the base and points the way for further explorations of this topic, and recommendations to overcome these limitations are included in Section 7.6.

## **7.8 Conclusion**

The aim of this thesis was to address the research question: how do public libraries contribute to economic growth and development? It sought to answer the following sub-questions:

- What can be learnt from the literature on the relationship between public library use and economic growth and development?
- What kind of relationship exists between different parts of public library use and economic growth and development?

The first question was answered through a systematic review of the literature. It was found that there is evidence for a positive relationship between public library use and economic growth and development. Certain topics, such as library programmes, were more prevalent in the literature.

The second question was answered with regression and path analysis. This method was chosen due to the availability of data. It was found that in some cases there is a positive relationship between economic growth and development and public library use, but not in all cases.

This thesis considered a number of services that public libraries offer and showed their relationship with five development factors together with economic growth. This is the originality of the study: no other has brought together these variables into a single framework.

The relationship, like so many others, is a complicated one. This study has contributed to the understanding of this relationship by employing an unusual method which complements the existing research. It also provides direction for future studies.



## Works cited

*A note on citations: when referring to an unpaginated website, this thesis has adopted the provisions of the Chicago Manual of Style, 16th ed., paragraph 15.8, which allows the addition of a paragraph or section heading as a locator.*

*This section details the works that were cited in the thesis. Where a reference appears in the list of excluded articles shown in Appendix as well as on this list, it was used elsewhere in the thesis while still being excluded from the systematic review shown in Chapter 2.*

- Aabø, S. 2005. Valuing the benefits of public libraries. *Information Economics and Policy* 17(2): 175–198. <http://dx.doi.org/10.1016/j.infoecopol.2004.05.003> Accessed 14 May 2013.
- Aabø, S. 2009. Libraries and return on investment (ROI): a meta-analysis. *New Library World* 110 (7): 311–324. <http://dx.doi.org/10.1108/03074800910975142> Accessed 14 May 2013.
- Aabø, S. and R. Audunson. 2012. Use of library space and the library as place. *Library & Information Science Research* 34(2): 138–149. <http://dx.doi.org/10.1016/j.lisr.2011.06.002> Accessed 28 Apr. 2013.
- Aabø, S., R. Audunson and A. Vårheim. 2010. How do public libraries function as meeting places? *Library & Information Science Research* 32(1): 16–57. <http://dx.doi.org/10.1016/j.lisr.2009.07.008> Accessed 28 Apr. 2013.
- Abaidoo, R. 2012. Economic growth, regional savings and FDI in sub-Saharan Africa: trivariate causality and error correction modeling approach. *International Journal of Economics and Finance* 4(11): 40-50. <http://ccsenet.org/journal/index.php/ijef/article/view/20894> Accessed 7 Jun. 2013.
- Abbas, Q. and J. Foreman-Peck. 2008. Human capital and economic growth: Pakistan, 1960-2003. *Lahore Journal of Economics* 13(1): 1-27. <http://goo.gl/TUh3n6> Accessed 24 Feb. 2014.

- Abdelhafidh, S. 2013. Potential financing sources of investment and economic growth in North African countries: a causality analysis. *Journal of Policy Modeling* 35(1): 150-169. <http://dx.doi.org/10.1016/j.jpolmod.2012.01.001> Accessed 7 Jun. 2013.
- Akçomak, I. and B. ter Weel. 2009. Social capital, innovation and growth: evidence from Europe. *European Economic Review* 53(5): 544-567. <http://dx.doi.org/10.1016/j.euroecorev.2008.10.001> Accessed 8 Jun. 2013.
- Akerlof, G. and J. Stiglitz. 1969. Capital, wages and structural unemployment. *The Economic Journal* 79(314): 269-281. <http://www.jstor.org/stable/2230168> Accessed 6 Jun. 2013.
- Akparobore, D. 2011. The role of public libraries in promoting adult education in Nigeria. *Library Philosophy & Practice* 453: 48-52. <http://goo.gl/KMTNkA> Accessed 6 Jun. 2013.
- American Library Association. 2013. *Information literacy competency standards for higher education*. <http://goo.gl/tQF2ou> Accessed 10 May 2013.
- Ape, R., S. Uganneya and M. Ode. 2012. Methods employed by public libraries in providing services to people living with HIV and AIDS in Benue State, Nigeria. *Information Technologist* 9(2): 28-34. <http://www.ajol.info/index.php/ict/article/view/87077> Accessed 8 Feb. 2014.
- Audunson, R., S. Essmat and S. Aabø. 2011. Public libraries: a meeting place for immigrant women? *Library & Information Science Research* 33(3): 1-20. <http://dx.doi.org/10.1016/j.lisr.2011.01.003> Accessed 28 Apr. 2013.
- Audunson, R., A. Vårheim, S. Aabø and E. Holm. 2007. Public libraries, social capital, and low intensive meeting places. *Information Research* 12: 1-13. <http://informationr.net/ir/12-4/colis20.html> Accessed 28 Apr. 2013.
- Barro, R. and X. Sala-i-Martin. 1995. *Economic growth*. New York: McGraw-Hill.
- Beck, S.J. 2009. This is our time to shine. *Reference & User Services Quarterly* 49(1): 8-12. <http://rusa.metapress.com/content/m171433233646619/> Accessed 21 Feb. 2014.
- Becker, S., M. Crandall, K. Fisher, B. Kinney, C. Landry and A. Rocha. 2010. *Opportunity for all: how the American public benefits from Internet access at U.S.*

- libraries*. Washington, DC: Institute of Museum and Library.  
<http://tascha.washington.edu/usimpact> Accessed 28 Apr. 2013.
- Bertot, J., C. McClure and P. Jaeger. 2008. The impacts of free public internet access on public library patrons and communities. *The Library Quarterly* 78(3): 285-301.  
<http://www.jstor.org/stable/10.1086/588445> Accessed 28 Apr. 2013.
- Birkenhead, G. and M. Grant. 2012. Informing the public health. *Health Information & Libraries Journal* 29(3): 177-179. <http://dx.doi.org/10.1111/j.1471-1842.2012.00998.x> Accessed 17 May 2013.
- Bjerk, D. 2010. Thieves, thugs, and neighborhood poverty. *Journal of Urban Economics* 68(3): 231-246. <http://dx.doi.org/10.1016/j.jue.2010.06.002> Accessed 4 Apr. 2014.
- Blaug, M. 1966. Literacy and economic development. *The School Review* 74(4): 393-418. <http://www.jstor.org/stable/1084482> Accessed 8 Jun. 2013.
- Bolton, W. and K. Oatley. 1987. A longitudinal study of social support and depression in unemployed men. *Psychological Medicine* 17(2): 453-460.  
<http://dx.doi.org/10.1017/S0033291700025010> Accessed 3 Mar. 2014.
- Broering, N., G. Chauncey and J. Miller. 2012. HIV/AIDS health information outreach service in San Diego. *Journal of Consumer Health on the Internet* 16(1): 1-17.  
<http://www.tandfonline.com/doi/abs/10.1080/15398285.2012.646227> Accessed 30 Apr. 2013.
- Caidi, N. and D. Allard. 2005. Social inclusion of newcomers to Canada: an information problem? *Library & Information Science Research* 27(3): 302-324.  
<http://dx.doi.org/10.1016/j.lisr.2005.04.003> Accessed 8 Jun. 2013.
- Celano, D. and S. Neuman. 2001. *The role of public libraries in children's literacy development: an evaluation report*.  
[http://www.bclibraries.ca/ptplc/files/Role\\_Libraries\\_Literacy.pdf](http://www.bclibraries.ca/ptplc/files/Role_Libraries_Literacy.pdf) Accessed 20 Oct. 2012.
- Chen, M. 2013. The effect of language on economic behavior: evidence from savings rates, health behaviors, and retirement assets. *American Economic Review* 103(2): 690-731. <http://dx.doi.org/10.1257/aer.103.2.690> Accessed 7 Jun. 2013.

- Child, R. and A. Goulding. 2012. Public libraries in the recession: the librarian's axiom. *Library Review* 61(8/9): 641–663. <http://dx.doi.org/10.1108/00242531211292123> Accessed 4 May 2013.
- Chou, Y. 2005. Three simple models of social capital and economic growth. *The Journal of Socio-Economics* 35: 889-912. <http://dx.doi.org/10.1016/j.socec.2005.11.053> Accessed 8 Jun. 2013.
- Coleman, J. 1988. Social capital in the creation of human capital. *The American Journal of Sociology* 94(supplement): S95-120. <http://www.jstor.org/stable/10.2307/2780243> Accessed 8 Jun. 2013.
- Collins, B. 2012. How public libraries are a boon to small business. *American Libraries* 43(7/8): 28. <http://goo.gl/ka7Hv1> Accessed 8 Jun. 2013.
- Crawford, J. and C. Irving. 2012. Information literacy in employability training: the experience of Inverclyde Libraries. *Journal of Librarianship and Information Science* 44(2): 79–89. <http://lis.sagepub.com/content/44/2/79.abstract> Accessed 1 May 2013.
- Dearlorff, A. 2010. *Dearlorff's glossary of international economics*. <http://www-personal.umich.edu/~alandear/glossary/> Accessed 8 Jun. 2013.
- DeMaagd, K., H. Chew and G. Huang, G. 2012. The use of public computing facilities by library patrons: demography, motivations, and barriers. *Government Information Quarterly* 30(1): 111-118 <http://www.sciencedirect.com/science/article/pii/S0740624X12001402> Accessed 8 Feb. 2014.
- Dempster, M. 2003. Systematic review. In R. Miller & J. Brewer, eds. *The A-Z of social research*. London: Sage. <http://dx.doi.org/10.4135/9780857020024.n110> Accessed 14 Mar. 2013.
- Dent, D. 2007. Local economic development in Uganda and the connection to rural community libraries and literacy. *New Library World* 108(5): 203-217. <http://dx.doi.org/10.1108/03074800710748777> Accessed 27 Oct. 2012.
- The Economist*. 2013. *Economics A-Z*. <http://www.economist.com/economics-a-to-z> Accessed 2 Jun. 2013.

- Elbert, M., D. Fuegi and U. Lipeikaite, 2012. Public libraries in Africa – agents for development and innovation?: Current perceptions of local stakeholders. *IFLA Journal* 38(2): 148–165. <http://dx.doi.org/10.1177/0340035212444512> Accessed 7 Mar. 2014.
- Fehrenbach, L. and D. Hurford. 1998. Developing the emergent literacy of preschool children through a library outreach program. *Journal of Youth Services in Libraries* 12(1): 40–45. <http://goo.gl/rQ7dsi> Accessed 7 Mar. 2014.
- Flaherty, M. 2013. Consumer health information provision in rural public libraries: a comparison of two library systems. *Library Quarterly* 83 (2): 155–165. <http://www.jstor.org/stable/10.1086/669548> Accessed 30 Apr. 2013.
- Freedman, M. and A. Nickell. 2010. Impact of after-school nutrition workshops in a public library setting. *Journal of Nutrition Education and Behavior* 42(3): 192–196. <http://dx.doi.org/10.1016/j.jneb.2009.07.003> Accessed 30 Apr. 2013.
- Gong, L., H. Li and D. Wang. 2012. Health investment, physical capital accumulation, and economic growth. *China Economic Review* 23(4): 1104–1119. <http://dx.doi.org/10.1016/j.chieco.2012.07.002> Accessed 6 Jun. 2013.
- Gould, E. and R. Gomez. 2010. The “cool factor” of public access to ICT: users’ perceptions of trust in libraries, telecentres and cybercafés in developing countries. *Information Technology & People* 23(3): 247–264. <http://dx.doi.org/10.1108/09593841011069158> Accessed 29 Apr. 2013.
- Grossman, M. 2000. The human capital model. In A. Culyer and J. Newhouse, eds. *Handbook of health economics, 1A*. Amsterdam: Elsevier, pp. 347–408.
- Gujarati, D. 2003. *Basic econometrics*. 4th ed. Boston: McGraw Hill.
- Haldar, S. and G. Mallik. 2010. Does human capital cause economic growth? A case study of India. *International Journal of Economic Sciences and Applied Research* 3(1): 7–25. <http://www.econstor.eu/bitstream/10419/66597/1/659374412.pdf> Accessed 24 Feb. 2014.
- Hammersley, M. 2006. Causality. In V. Jupp, ed. *The SAGE dictionary of social research methods*. Beverly Hills, CA: SAGE, pp. 24–26. <http://srmo.sagepub.com/view/the-sage-dictionary-of-social-research-methods/SAGE.xml> Accessed 10 Jul. 2013.

- Hancks, J. 2011. Keepin' it rural: the role of rural public library educational programming and outreach in community economic sustainability efforts. D.Edu. diss. Illinois: Northern Illinois University.  
<http://search.proquest.com/docview/874246054?accountid=14975> Accessed 1 May 2013.
- Heuertz, L. 2009. Rural libraries building communities. PhD diss. Washington: University of Washington. <http://search.proquest.com/docview/305016178?accountid=14975> Accessed 29 Apr. 2013.
- Hoffman-Goetz, L., D. Friedman and A. Celestine. 2006. Evaluation of a public library workshop: teaching older adults how to search the Internet for reliable cancer information. *Journal of Consumer Health on the Internet* 10(3): 29–43.  
[http://dx.doi.org/10.1300/J381v10n03\\_03](http://dx.doi.org/10.1300/J381v10n03_03) Accessed 13 Feb. 2014.
- Holt, G., D. Elliott and A. Moore. 1999. Placing a value on public library services. *Public Libraries* 38(2): 98. <http://goo.gl/tz77kH> Accessed 14 May 2013.
- Howitt, P. 2008. Endogenous growth theory. In S. Durlaf and L. Blume, eds. *The new Palgrave dictionary of economics*. 2nd ed. Hampshire: Palgrave Macmillan.  
<http://dx.doi.org/0.1057/9780230226203.0472> Accessed 23 Feb. 2014.
- Huang, R, L. Fulginiti and E. Peterson, E. 2010. Health and growth: causality through education. *China Agricultural Economic Review* 2(3): 321-344.  
<http://dx.doi.org/10.1108/17561371011078444> Accessed 24 Feb. 2014.
- International Economic Development Council. 2013. *Economic development reference guide*.  
[http://www.iedconline.org/clientuploads/Downloads/IEDC\\_ED\\_Reference\\_Guide.pdf](http://www.iedconline.org/clientuploads/Downloads/IEDC_ED_Reference_Guide.pdf) Accessed 10 May 2013.
- J. L. Management Services. 2008. *Enriching communities: the value of public libraries in New South Wales*. Sydney: Library Council of New South Wales.  
[http://www.sl.nsw.gov.au/services/public\\_libraries/publications/docs/enriching\\_communities.pdf](http://www.sl.nsw.gov.au/services/public_libraries/publications/docs/enriching_communities.pdf) Accessed 29 Apr. 2013.
- James, S. 1985. The relationship between local economic conditions and the use of public libraries. *The Library Quarterly* 55(3): 255-272.  
<http://www.jstor.org/stable/10.2307/4307857> Accessed 10 Jul. 2013.

- Johnson, C. 2007. Social capital and the search for information: examining the role of social capital in information seeking behaviour in Mongolia. *Journal of the American Society for Information Science & Technology* 58(6): 883-94.  
<http://dx.doi.org/10.1002/asi.20561> Accessed 8 Jun. 2013.
- Johnson, C. 2012. How do public libraries create social capital? An analysis of interactions between library staff and patrons. *Library & Information Science Research* 34(1): 52–62. <http://dx.doi.org/10.1016/j.lisr.2011.07.009> Accessed 29 Apr. 2013.
- Johnson, C. and M. Griffis. 2009. A place where everybody knows your name? investigating the relationship between public libraries and social capital. *Canadian Journal of Information and Library Science* 33(3/4): 159–191.  
<http://goo.gl/vKvQXo> Accessed 29 Apr. 2013.
- Kalyoncu, K. 2009. Causality test between investment in physical and human capital ratio and economic growth. *Empirical Economics Letters* 8(7): 709-714.  
<http://goo.gl/FeAF4J> Accessed 6 Jun. 2013.
- Keller, G. and B. Warrack. 2003. *Statistics for management and economics*. Pacific Grove: Thomson.
- Kelly, K. 2012. Lack of training and a self-service environment leaves staff and users uncertain about health information in a public library setting. *Evidence Based Library & Information Practice* 7(1): 122–124.  
<https://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/12350/13265> Accessed 29 Apr. 2013.
- Kim, D., S. Lin and Y. Suen. 2013. Investment, trade openness and foreign direct investment: social capability matters. *International Review of Economics and Finance* 26(1): 56-69. <http://goo.gl/wrVE2Y> Accessed 7 Jun. 2013.
- Kim, G. 2011. A critical review of valuation studies to identify frameworks in library services. *Library & Information Science Research* 33(2): 112-119.  
<http://dx.doi.org/10.1016/j.lisr.2010.09.006> Accessed 17 May 2013.
- Klopfer, L. and H. Nagata. 2011. Contextual approach to understanding the socio-cultural function of a public library in Japan. *Performance Measurement & Metrics* 12(1): 66–77. <http://dx.doi.org/10.1108/14678041111124306> Accessed 29 April 2013.



- Koontz, C. and B. Gubbin, eds. 2010. *IFLA public library service guidelines*. 2nd rev. ed. Berlin: De Gruyter Saur. <http://www.doabooks.org/doab?func=fulltext&rid=15128> Accessed 17 May 2013.
- Koufogiannakis, D. 2012. The state of systematic reviews in library and information studies. *Evidence Based Library and Information Practice* 7(2): 91-95. <http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/17089/14045> Accessed 13 March 2013.
- Kronus, C. 1973. Patterns of adult library use: a regression and path analysis. *Adult Education Quarterly* 23(2): 115-131. <http://aeq.sagepub.com/content/23/2/115.short> Accessed 22 Mar. 2013.
- Kumar, A. and B. Kober, B 2012. Urbanization, human capital, and cross-country productivity differences. *Economics Letters* 117(1): 14-17. <http://www.sciencedirect.com/science/article/pii/S0165176512002133> Accessed 1 Apr. 2014.
- Kwon, N. and K. Kim. 2009. Who goes to a library for cancer information in the e-health era? A secondary data analysis of the Health Information National Trends Survey (HINTS). *Library & Information Science Research* 31(3): 192–200. <http://www.sciencedirect.com/science/article/pii/S0740818809000504> Accessed 6 Mar. 2014.
- Library Research Services. 2013. *Library research services*. <http://www.lrs.org/> Accessed 11 Jul. 2013.
- Linnan, L., B. Wildemuth, C. Gollop, P. Hull, C. Silbajoris and R. Monnig. 2004. Public librarians as a resource for promoting health: results from the Health for Everyone in Libraries Project (HELP) librarian survey. *Health Promotion Practice* 5(2): 182–190. <http://hpp.sagepub.com/cgi/pmidlookup?view=long&pmid=15090172> Accessed 30 May 2013.
- Liu, L. 2004. The contribution of public libraries to countries' economic productivity: a path analysis. *Library Review* 53(9): 435-441. <http://dx.doi.org/10.1108/00242530410565210> Accessed 27 Oct. 2012.
- Lopez-Bazo, E. and R. Moreno. 2008. Does human capital stimulate investment in physical capital? *Economic Modelling* 25(6): 1295-1305. <http://goo.gl/Fmkfe0> Accessed 6 Jun. 2013.



- Ludosean, B. 2012. A VAR analysis of the connection between FDI and economic growth in Romania. *Theoretical And Applied Economics* 19(10): 115-130.  
<http://goo.gl/KFjBWu> Accessed 7 Jun. 2013.
- Malachowski, M. 2011. Patient activation: public libraries and health literacy. *Computers in Libraries* 31(10): 5-9. <http://goo.gl/KWBxnt> Accessed 17 May 2013.
- May, F. 2007. Libraries as public space: patterns of use in Nova Scotia public libraries. MLIS thesis. Halifax, Nova Scotia: Dalhousie University.  
<http://search.proquest.com/docview/304789392?accountid=14975> Accessed 29 Apr. 2013.
- McClure, C., B. Fraser, T. Nelson and J. Robbins. 2000. *Economic benefits and impacts from public libraries in the State of Florida*.  
<http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED449805> Accessed 20 Oct. 2012.
- McClure, C., B. Fraser, T. Nelson and J. Robbins. 2001. *Economic benefits and impacts from public libraries in the State of Florida: final report*. Tallahassee, FL: Information Use Management and Policy Institute, School of Information Studies, Florida State University.  
[http://www.ii.fsu.edu/content/download/15672/102056/St\\_Lib\\_FL\\_1.Final.Report.Dec1.2000.pdf](http://www.ii.fsu.edu/content/download/15672/102056/St_Lib_FL_1.Final.Report.Dec1.2000.pdf) Accessed 1 May 2013.
- McConnell, C. and S. Brue. 2005. *Economics: principles, problems, and policies*. 16th ed. New York: McGraw-Hill.
- McKenzie, P., E. Prigoda, K. Moffatt and L. McKechnie. 2007. Behind the program room door: the creation of parochial and private women's realms in a Canadian public Library. In J. Buschman and G. Leckie, eds. *The library as place: history, community, and culture*. Westport, Conn.: Libraries Unlimited. 117-134.  
[http://publish.uwo.ca/~pmckenzi/McKenzie\\_et\\_al\\_2007\\_Behind\\_the\\_program-room\\_door\\_proof.pdf](http://publish.uwo.ca/~pmckenzi/McKenzie_et_al_2007_Behind_the_program-room_door_proof.pdf) Accessed 29 Apr. 2013.
- Mehrara, M. and M. Musai. 2011. Health expenditure and economic growth: an ARDL approach for the case of Iran. *Journal of Economics and Behavioral Studies* 3(4): 249-256. <http://goo.gl/NGbsrz> Accessed 10 Mar. 2014.
- Molyneux, R. 2013. *Library data archive*. <http://drdata.lrs.org/> Accessed 11 Jul. 2013.

- Mulligan, C. 2008. Becker, Gary S. (born 1930) In In S. Durlauf and L. Blume, eds. *The new Palgrave dictionary of economics*. Basingstoke, Hampshire: Palgrave Macmillan. <http://dx.doi.org/10.1057/9780230226203.0114> Accessed 23 Feb. 2014.
- Ngepah, N. 2012. Long life and productivity in South Africa: long burdensome or long healthy? *African Development Review/Revue Africaine de Developpement* 24(4): 371-387. <http://goo.gl/Z34O1n> 6 Jun. 2013.
- Odubunmi, A., J. Saka and D. Oke. 2012. Testing the cointegrating relationship between health care expenditure and economic growth in Nigeria. *International Journal of Economics and Finance* 4(11): 99-107. <http://goo.gl/NQVgo0> Accessed 6 Jun. 2013.
- OECD. 2003. *Glossary of statistical terms*. <http://stats.oecd.org/glossary/index.htm> Accessed 10 May 2013.
- Oermann, M. 2005. Using web sites on quality health care for teaching consumers in public libraries. *Quality Management in Health Care* 14(3): 188-195. [http://journals.lww.com/qmhcjournal/Abstract/2005/07000/Using\\_Web\\_Sites\\_on\\_Quality\\_Health\\_Care\\_for.8.aspx](http://journals.lww.com/qmhcjournal/Abstract/2005/07000/Using_Web_Sites_on_Quality_Health_Care_for.8.aspx) Accessed 8. Feb. 2014
- Oliva-Moreno, J. 2012. Loss of labour productivity caused by disease and health problems: what is the magnitude of its effect on Spain's economy? *European Journal of Health Economics* 13(5): 605-614. <http://goo.gl/LR6Amg> Accessed 6 Jun. 2013.
- Organisation for Economic Co-operation and Development. *see OECD*
- Osborne, J. 2008. 13 Best practices in data transformation: the overlooked effect of minimum values. In J. Osborne, ed. *Best practices in quantitative methods*. Thousand Oaks, CA: SAGE, pp. 197-205. <http://dx.doi.org/10.4135/9781412995627.d17> 24 Feb. 2014.
- Owusu-Ansah, E. 2005. Debating definitions of information literacy: enough is enough! *Library Review* 54(5/6):366-374. <http://search.proquest.com/docview/218295696?accountid=11921> Accessed 10 May 2014
- Paberza, K. and U. Rutkauskiene. 2010. Outcomes-based measurement of public access computing in public libraries: a comparative analysis of studies in Latvia and

- Lithuania. *Performance Measurement and Metrics* 11(1): 75-82.  
<http://dx.doi.org/10.1108/14678041011026883> Accessed 20 Oct. 2012.
- Pifalo, V., S. Hollander, C. Henderson, P. DeSalvo, and G. Gill. 1997. The impact of consumer health information provided by libraries: the Delaware experience. *Bulletin of the Medical Library Association* 85(1): 16–22.  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC226218/> Accessed 30 Apr. 2013.
- Putnam, R. 2000. *Bowling alone: the collapse and revival of American community*. New York: Simon & Schuster.
- Rahman, M. 2011. Causal relationship among education expenditure, health expenditure and GDP: a case study for Bangladesh. *International Journal of Economics and Finance* 3(3): 149-159. <http://goo.gl/t3tVf5> Accessed 6 Jun. 2013.
- Ranganathan, S. 1931. *The five laws of library science*. Madras: The Madras Library Association. <http://hdl.handle.net/2027/uc1.b99721> Accessed 29 Apr. 2013.
- Rao, B., R. Gounder and J. Loening. 2010. The level and growth effects in the empirics of economic growth: some results with data from Guatemala. *Applied Economics* 42(16-18): 2099-2109. <http://goo.gl/6HztRb> Accessed 6 Jun. 2013.
- Reder, M. 2008. Chicago School. In S. Durlauf and L. Blume, eds. *The new Palgrave dictionary of economics*. Basingstoke, Hampshire: Palgrave Macmillan. <http://dx.doi.org/10.1057/9780230226203.0226> Accessed 23 Feb. 2014.
- Retherford, R. and M. Choe. 1993. *Statistical models for causal analysis*. New York: Wiley.
- Revercomb, P. 2005. Internet information literacy: a study of older adults. PhD diss. New York: Syracuse University. <http://search.proquest.com/docview/305382478?accountid=11921> Accessed 1 May 2013.
- Roman, S. and C. Fiore. 2010. Do public library summer reading programs close the achievement gap? *Children & Libraries: The Journal of the Association for Library Service to Children* 8(3): 27–31.  
[http://www.tandfonline.com/doi/pdf/10.1207/s15327671espr0902\\_5](http://www.tandfonline.com/doi/pdf/10.1207/s15327671espr0902_5) Accessed 1 May 2013.

- Rooney-Browne, C. 2009. Rising to the challenge: a look at the role of public libraries in times of recession. *Library Review* 58(5): 341-352.  
<http://dx.doi.org/10.1108/00242530910961765> Accessed 20 Oct. 2012.
- Rosen, S. 2008. Human capital. In S. Durlauf and L. Blume, eds. *The new Palgrave dictionary of economics*. Basingstoke, Hampshire: Palgrave Macmillan.  
<http://dx.doi.org/10.1057/9780230226203.0754> Accessed 23 Feb. 2014.
- Rosenfeldt, D. 2006. Libraries building communities: the vital contribution of Victoria's public libraries. *Performance Measurement and Metrics* 7(3): 185–192.  
<http://dx.doi.org/10.1108/14678040610713147> Accessed 29 Apr. 2013.
- Sayers, A. 2007. Tips and tricks in performing a systematic review. *Journal of General Practise* 57(538): 425. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2047040/>  
Accessed 30 Jun. 2013.
- Sequeira, T. 2011. A note on the causality between health and education. *Economics and Sociology* 4(1): 9-25. <http://goo.gl/SCK8zQ> Accessed 6 Jun. 2013.
- Shoji, M., K. Aoyagi, R. Kasahara, Y. Sawada and M. Ueyama. 2012. Social capital formation and credit access: evidence from Sri Lanka. *World Development* 40(12): 2522-2536. <http://goo.gl/z5yo72> Accessed 7 Jun. 2013.
- Sigler, K., P.T. Jaeger, J.C. Bertot, A.J. McDermott, E.J. DeCoster and L.A. Langa. 2011. The role of public libraries, the Internet, and economic uncertainty. In A. Woodsworth, ed. *Librarianship in times of crisis*. Bingley: Emerald, Advances in Librarianship 34: 19–35. [http://dx.doi.org/10.1108/S0065-2830\(2011\)0000034005](http://dx.doi.org/10.1108/S0065-2830(2011)0000034005)  
Accessed 22 March 2013.
- Skelly, L. 2011. The librarians' axiom: a flat earth theory? The case of the Saldanha Bay Municipality libraries during the Great Recession. MBibl thesis. Cape Town: University of Cape Town. <http://hdl.handle.net/11180/2260> Accessed 17 May 2013.
- Smith, A. 1776. *An inquiry into the nature and causes of the wealth of nations: book II: of the nature, accumulation, and employment of stock*.  
<http://www.econlib.org/library/Smith/smWN6.html#II.1.17> Accessed 23 Feb. 2014.
- Smith, C., K. Logsden and M. Clark. 2005. Consumer health information services at Iowa City Public Library. *Library Trends* 53(3): 496–511.  
<http://www.thefreelibrary.com/Consumer%20health%20information%20services>

- [%20at%20Iowa%20City%20Public%20Library.-a0131499692](#) Accessed 30 Apr. 2013.
- Špiranec, S., M. B. Zorica and G. S. Simončić. 2012. Libraries and financial literacy: perspectives from emerging markets. *Journal of Business & Finance Librarianship* 17(3): 262–278.  
<http://www.tandfonline.com/doi/abs/10.1080/08963568.2012.686438> Accessed 8 Feb. 2014.
- Sumsion, J., M. Hawkins and A. Morris. 2002. The economic value of book borrowing from public libraries: an optimisation model. *Journal of Documentation* 58(6): 662–682. <http://dx.doi.org/10.1108/00220410210448200> Accessed 24 Jun. 2013.
- Swinbourne, K. 2000. *A safe place to go: libraries and social capital*. Sydney: University of Technology, Sydney; State Library of New South Wales.  
[http://www.sl.nsw.gov.au/services/public\\_libraries/docs/safe\\_place.pdf](http://www.sl.nsw.gov.au/services/public_libraries/docs/safe_place.pdf) Accessed 22 Feb. 2014.
- Talavera, O., L. Xiong and C. Xiong. 2012. Social capital and access to bank financing: the case of Chinese entrepreneurs. *Emerging Markets Finance and Trade* 48(1): 55–69. <http://goo.gl/aoFlmq> Accessed 7 Jun. 2013.
- Tampubolon, G., S. Subramanian and I. Kawachi. 2013. Neighbourhood social capital and individual self-rated health in Wales. *Health Economics* 22(1): 14–21.  
<http://goo.gl/bCCHNr> Accessed 7 Jun. 2013.
- Testing for causality. 1994. In J. Cromwell, M. Hannan, W. Labys and M. Terraza, eds. *Multivariate tests for time series models*. Beverly Hills, CA: SAGE, pp. 33–56.  
<http://dx.doi.org/10.4135/9781412985239.n4/> Accessed 10 Jul. 2013.
- Todaro, M. and S. Smith. 2011. *Economic development*. 11th ed. Harlow: Pearson Education.
- Torssander, J. 2013. From child to parent? The significance of children's education for their parents' longevity. *Demography* 50(2): 637–659. <http://goo.gl/W7Uw67> Accessed 6 Jun. 2013.
- Totterdell, B. and J. Bird. 1976. *The effective library*. London: The Library Association.
- UNdata. 2013. *Explorer*. <http://data.un.org/Explorer.aspx?d=31> Accessed 31 Aug. 2013.

- UNESCO. 2006. *Education for all global monitoring report: literacy for life*.  
[http://www.unesco.org/education/GMR2006/full/chapt6\\_eng.pdf](http://www.unesco.org/education/GMR2006/full/chapt6_eng.pdf) Accessed 10 May 2013.
- UNESCO Institute for Statistics. 2012. *Data centre*.  
<http://www.uis.unesco.org/Pages/DataCentre.aspx> Accessed 31 Aug. 2013.
- United Nations. 2012. *Human development index: indices and data*.  
<http://hdr.undp.org/en/statistics/hdi/> Accessed 18 Dec. 2012.
- United Nations Development Programme. 2013. *Human development report*.  
<http://hdr.undp.org> Accessed 28 Jun. 2013.
- United Nations Educational, Scientific and Cultural Organization. *see UNESCO*
- United States. Centers for Disease Control and Prevention. 2013a. *Multiple causes of death data*. <http://wonder.cdc.gov/mcd.html> Accessed 14 Dec. 2013.
- United States. Centers for Disease Control and Prevention. 2013b. *National vital statistics reports: United States life tables*.  
<http://www.cdc.gov/nchs/products/nvsr.htm> Accessed 4 Jul. 2013.
- United States. Centers for Disease Control and Prevention. National Center for Health Statistics. 2011. *National vital statistics system. 2011. National vital statistics reports: deaths: final data for 2009*. 60(3).  
[http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60\\_03.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_03.pdf) Accessed 14 Feb. 2014.
- United States Census Bureau. 1994. *Geographical areas reference manual*.  
<http://www.census.gov/geo/reference/pdfs/GARM/GARMcont.pdf> Accessed 9 Aug. 2013.
- United States Census Bureau. 2009a. *American fact finder: educational attainment, 2009 ACS 1-year estimates*. <http://factfinder2.census.gov/> Accessed 14 Sep. 2013.
- United States Census Bureau. 2009b. *Computer and Internet use in the United States: October 2009*. <http://www.census.gov/hhes/computer/publications/2009.html>  
Accessed 3 Feb. 2014.
- United States Census Bureau. 2013. *Population estimates: vintage 2009: national tables*. [http://www.census.gov/popest/data/historical/2000s/vintage\\_2009/index.html](http://www.census.gov/popest/data/historical/2000s/vintage_2009/index.html)  
Accessed 9 Sep. 2013.

- United States. Department of Commerce. Bureau of Economic Analysis. 2012. *Interactive data*. <http://www.bea.gov/> Accessed 15 Jun. 2013.
- United States. Department of Labor. Bureau of Labor Statistics. 2012. *Bureau of Labor Statistics*. <http://www.bls.gov/> Accessed 16 Jun. 2013.
- United States. Federal Bureau of Investigation. 2013. *Uniform crime reports*. <http://www.fbi.gov/about-us/cjis/ucr/ucr-publications#Crime> Accessed 22 Oct. 2013.
- United States. Internal Revenue Service. 2013. *SOI tax stats: historic table 2*. <http://www.irs.gov/uac/SOI-Tax-Stats---Historic-Table-2> Accessed 4 Jul. 2013.
- Van Leeuwen, B. and P. Foldvari 2008. Human capital and economic growth in Asia 1890-2000: a time-series analysis. *Asian Economic Journal* 22(3): 225-240. <http://goo.gl/DdK4cQ> Accessed 6 Jun. 2013.
- Williams, J. 2012. Geographic variations in health care utilization: effects of social capital and self-interest, and implications for US Medicare Policy. *Socio-Economic Review* 10(2): 317-342. <http://goo.gl/6CDbh9> Accessed 7 Jun. 2013.
- Williams, K. 2012. Informatics moments: digital literacy and social capital in civil society and people's everyday lives. *Library Quarterly*. 82(1): 47-73. [http://echicago.illinois.edu/2011backgddocs/informatics\\_moments\\_full\\_paper\\_preprint\\_2011.pdf](http://echicago.illinois.edu/2011backgddocs/informatics_moments_full_paper_preprint_2011.pdf) Accessed 29 Apr. 2013.
- World Bank. 2013a. *Databank*. <http://databank.worldbank.org> Accessed 31 Aug. 2013.
- World Bank. 2013b. *Social capital*. <http://go.worldbank.org/VEN7OUW280> Accessed 24 Feb. 2014.
- World Bank. 2013c. *World Bank website*. <http://worldbank.org> Accessed 11 May 2013.
- World Health Organization. 2006. *Constitution of the World Health Organization*. [http://www.who.int/governance/eb/who\\_constitution\\_en.pdf](http://www.who.int/governance/eb/who_constitution_en.pdf) Accessed 10 May 2013.
- World Health Organization. 2013. *World Health Organization website*. <http://www.who.int/> Accessed 10 May 2013.
- Xie, B. 2011a. Effects of an ehealth literacy intervention for older adults. *Journal of Medical Internet Research* 13(4). <http://www.jmir.org/2011/4/e90/> Accessed 30 Apr. 2013.

- Xie, B. 2011b. Older adults, e-health literacy, and collaborative learning: an experimental study. *Journal of the American Society for Information Science and Technology* 62(5): 933–946.  
<http://onlinelibrary.wiley.com/doi/10.1002/asi.21507/abstract> Accessed 30 Apr. 2013.
- Xie, B. 2012. Improving older adults' e-health literacy through computer training using NIH online resources. *Library and Information Science Research* 34(1): 63–71.  
<http://dx.doi.org/10.1016/j.lisr.2011.07.006> Accessed 30 Apr. 2013.



## Appendix A: Excluded articles

*This appendix details the articles that were discovered in the systematic review of the literature, but not included in the discussion. Reasons for their exclusion were given in Chapter 2. If references here also appear in the 'Works cited' list, it is because those works were used elsewhere in the thesis, while still being excluded from the systematic review.*

- Aabø, S. 2005a. The role and value of public libraries in the age of digital technologies. *Journal of Librarianship and Information Science* 37(4): 205-211. <http://lis.sagepub.com/content/37/4/205.short> Accessed 22 Mar. 2013.
- Aabø, S. 2005b. Are public libraries worth their price? A contingent valuation study of Norwegian public libraries. *New Library World* 106(11): 487-495. <http://dx.doi.org/10.1108/03074800510634973> Accessed 8 Mar. 2014.
- Aabø, S. 2005c. Valuing the benefits of public libraries. *Information Economics and Policy* 17(2): 175-198. <http://www.sciencedirect.com/science/article/pii/S0167624504000502> Accessed 8 Mar. 2014.
- Aabø, S. 2009. Libraries and return on investment (ROI): a meta-analysis. *New Library World* 110(7): 311-324. <http://dx.doi.org/10.1108/03074800910975142> Accessed 8 Mar. 2014.
- Aabø, S. and J. Strand. 2004. Public library valuation, nonuse values, and altruistic motivations. *Library & Information Science Research* 26(3): 351-372. <http://www.sciencedirect.com/science/article/pii/S0740818804000179> Accessed 8 Mar. 2014.
- Abdul Kargbo, J. 2005. Managing indigenous knowledge: what role for public librarians in Sierra Leone? *The International Information & Library Review* 37(3): 199-207. <http://www.sciencedirect.com/science/article/pii/S1057231705000457> Accessed 8 Mar. 2014.

- Abram, S. 2012. Workplace information literacy: it's different. *Information Outlook* 16(4): 32-33. <http://search.proquest.com/docview/1027612268?accountid=11921> Accessed 8 Mar. 2014.
- Abu, R., M. Grace and M. Carroll. 2011. The role of the rural public library in community development and empowerment. *International Journal of the Book* 8(2): 63-74. <http://goo.gl/7dXZrK> Accessed 8 Mar. 2014.
- Allcock, J. 2000. Helping public library patrons find medical information-the reference interview. *Public Library Quarterly* 18(3-4): 21-27. [http://www.tandfonline.com/doi/abs/10.1300/J118v18n03\\_04](http://www.tandfonline.com/doi/abs/10.1300/J118v18n03_04) Accessed 22 Feb. 2014.
- Anderson, D. 1972. The public library and its readers: a comparison of the aims and objectives of the public library in developed and developing countries. *International Library Review* 4(4): 433-442. <http://www.sciencedirect.com/science/article/pii/0020783772900234> Accessed 8 Mar. 2014.
- Anderton, H. 2012. STEM, teens, and public libraries it's easier than you think! *Young Adult Library Services* 10(2): 44-46. <http://goo.gl/vwqrl1> Accessed 8 Mar. 2014.
- Anton, S. 2010. Contributing to health and well-being: the public library in partnership. *Library & Information Update* 9(7): 42-43. <http://goo.gl/BZbSJh> Accessed 8 Mar. 2014.
- Archer, R. 2004. Measuring for results: the dimensions of public library effectiveness. *Performance Measurement and Metrics* 5(3). <http://goo.gl/u1uvSY> Accessed 22 Mar. 2013.
- Arko-Cobbah, A. 2006. Civil society and good governance: challenges for public libraries in South Africa. *Library Review* 55(6): 349-362. <http://search.proquest.com/docview/218316774?accountid=11921> Accessed 22 Mar. 2013.
- Ashcroft, L., J. Farrow and C. Watts. 2007. Public libraries and adult learners. *Library Management* 28(3): 125-138. <http://search.proquest.com/docview/198835755?accountid=11921> Accessed 8 Mar. 2014.

- Astbury, R. 1994. The public library of the twenty first century: the key information and learning centre in the community? *Libri* 44(2): 130-144. <http://goo.gl/mrhjbF> Accessed 8 Mar. 2014.
- Auld, H. 2005. Library services in low-income urban communities. *Public Libraries* 44(6): 320-328. <http://search.proquest.com/docview/217454291?accountid=11921> Accessed 8 Mar. 2014.
- Baba, C., A. Brînzaniuc, E. Şirlincan and R. Cherecheş . 2010. Access to health information in rural settings-the implementation of the library's Law No. 334/2002 in Transylvania, Romania. *Transylvanian Review of Administrative Sciences* 29E: 30-38. <http://goo.gl/XmHRQf> Accessed 8 Mar. 2014.
- Barber, E., S. Pisano, S. D'Alessandro, S. Romagnoli, V. Parsiale, G. De Pedro and C. Gregui. 2006. Information society and information technology: the situation of the public libraries in Buenos Aires City and surrounding areas, Argentina. *The International Information & Library Review* 38(1): 1-14. <http://www.sciencedirect.com/science/article/pii/S1057231705000792> Accessed 8 Mar. 2014.
- Barber, P. and L. Wallace. 2008. Libraries connect communities. *American Libraries* 39(9): 52-55. <http://www.jstor.org/stable/25650095> Accessed 22 Feb. 2014.
- Barker, D. 2011. On the outside looking in: public libraries serving young people with disabilities. *Australasian Public Libraries and Information Services* 24(1): 9-16. <http://search.proquest.com/docview/857924161?accountid=11921> Accessed 8 Mar. 2014.
- Barron, D. 2005. *The economic impact of public libraries on South Carolina*. <http://www.libsci.sc.edu/sceis/final%20report%2026%20january.pdf> Accessed 8 Mar. 2014.
- Barugh, J. 1984. Community information and the public library. *Journal of Librarianship and Information Science* 16(2): 77-93. <http://lis.sagepub.com/content/16/2/77.short> Accessed 22 Mar. 2013.
- Becker, K. 2012. 24 hours in the children's section: an observational study at the public library. *Early Childhood Education Journal* 40(2): 107-114. <http://goo.gl/xU63jg> Accessed 8 Mar. 2014.

- Begg, R. 2009. Death or diversification? The use of space in public library buildings. *Aslib Proceedings* 61(6): 619-635. <http://dx.doi.org/10.1108/00012530911005553> Accessed 8 Mar. 2014.
- Berger, Å. 2002. Recent trends in library services for ethnic minorities: the Danish experience. *Library Management* 23(1): 79-87. <http://dx.doi.org/10.1108/01435120210413878> Accessed 8 Mar. 2014.
- Bertot, J., P. Jaeger, L. Langa and C. McClure. 2006. Public access computing and Internet access in public libraries: the role of public libraries in e-government and emergency situations. *First Monday* 11(9). <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/1392> Accessed 8 Mar. 2014.
- Bevis, D. 1969. Book review. *User Survey of the New York Public Library Research Libraries* by Nelson Associates Inc. *The Library Quarterly* 40(1): 216-218. <http://www.jstor.org/stable/4309914> Accessed 10 Mar. 2014.
- Birdi, B., K. Wilson and J. Cocker. 2008. The public library, exclusion and empathy: a literature review. *Library Review* 57(8): 576-592. <http://search.proquest.com/docview/218320928?accountid=11921> Accessed 8 Mar. 2014.
- Birdsong, L. and J. Freitas. 2012. Helping the non-scholar scholar: information literacy for lifelong learners. *Library Trends* 60(3): 588-610. <http://search.proquest.com/docview/1009906031?accountid=11921> Accessed 8 Mar. 2014.
- Birkenhead, G. and M. J. Grant. 2012. Informing the public health. *Health Information & Libraries Journal* 29(3): 177-179. <http://dx.doi.org/10.1111/j.1471-1842.2012.00998.x> Accessed 8 Mar. 2014.
- Black, A. 1991. Libraries for the many: the philosophical roots of the early public library movement. *Library History* 9(1-2): 1-2. <http://www.maneyonline.com/doi/abs/10.1179/lib.1991.9.1-2.27> Accessed 22 Mar. 2013.
- Blackburn, F. 2010. Something for everyone: learning and learning technologies in a public library. *Australian Library Journal* 59(3): 118-126. <http://goo.gl/cIbST5> Accessed 8 Mar. 2014.

- Boaden, S. 2005. Building public library community connections through cultural planning. *Australasian Public Libraries and Information Services* 18(1): 29-36. <http://goo.gl/2JJV6G> Accessed 22 Mar. 2013.
- Boatman, W. 2003. Public libraries as a bridge for college-bound young adults. *Reference & User Services Quarterly* 42(3): 229-234. <http://search.proquest.com/docview/217876978?accountid=11921> Accessed 8 Mar. 2014.
- Bogel, G. 2012. Public library summer reading programs contribute to reading progress and proficiency. *Evidence Based Library & Information Practice* 7(1): 102-104. <http://goo.gl/DH0VkJ> Accessed 8 Mar. 2014.
- Bonnici, L. J., S. L. Maatta and M. K. Wells. 2009. US national accessibility survey: librarians serving patrons with disabilities. *New Library World* 110(11): 512-528. <http://dx.doi.org/10.1108/03074800911007532> Accessed 8 Mar. 2014.
- Bouri, E. N. 1994. Public libraries development reconsidered: the case of Egypt. *International Information and Library Review* 26(3): 151-168. <http://www.sciencedirect.com/science/article/pii/S1057231784710113> Accessed 8 Mar. 2014.
- Bourke, C. 2005. Public libraries: building social capital through networking. *Australasian Public Libraries and Information Services* 18(2): 71-75. <http://goo.gl/hgibwv> Accessed 22 Mar. 2013.
- Bourke, C. 2007. Public libraries: partnerships, funding and relevance. *Australasian Public Libraries and Information Services* 20(3): 135-139. <http://goo.gl/Rbp2KH> Accessed 22 Mar. 2013.
- Boyden, L. and J. Weiner. 2000. Sustainable libraries: teaching environmental responsibility to communities. *Bottom Line: Managing Library Finances* 13(2): 74-83 <http://dx.doi.org/10.1108/08880450010327699> Accessed 8 Mar. 2014.
- Broadly-Preston, J. and A. Cox. 2000. The public library as street corner university: back to the future? *New Library World* 101(4): 149-161. <http://dx.doi.org/10.1108/03074800010332801> Accessed 22 Mar. 2013.
- Brook, T. 2007. Public libraries and their communities: South Australia reads. 73rd IFLA World Library and Information Congress: General Conference and Council,

- Durban, South Africa. 19-23 August 2007.  
<http://archive.ifla.org/IV/ifla73/papers/128-Brook-en.pdf> Accessed 10 Mar. 2014.
- Bryson, J., B. Usherwood and R. Proctor. 2003. *Libraries must also be buildings? New library impact study*. [http://www.shef.ac.uk/polopoly\\_fs/1.128117!/file/CPLIS---New-Library-Impact-Study.pdf](http://www.shef.ac.uk/polopoly_fs/1.128117!/file/CPLIS---New-Library-Impact-Study.pdf) Accessed 8 Mar. 2014.
- Bundy, A. 2003a. Vision, mission, trumpets: public libraries as social capital. Paper presented at the NSW Country Public Libraries Association Conference “Public libraries light up lives”, Tweed Heads, NSW. 3 Jul. 2003. <http://goo.gl/Nnr83K> Accessed 10 Mar. 2014.
- Bundy, A. 2003b. Best investment: the modern public library as social capital. Paper presented at the AGM of Friends of Libraries Australia (FOLA), Altona, Victoria. 27 Aug. 2003. <http://goo.gl/852c3f> Accessed 10 Mar. 2014.
- Bundy, A. 2003c. Capitalising on social capital. *Australasian Public Libraries and Information Services* 16(2): 55.  
<http://search.informit.com.au/documentSummary;dn=972012671592899;res=IELHSS> Accessed 8 Mar. 2014.
- Bundy, A. 2007. For public libraries, the angels are in the detail. *Australasian Public Libraries and Information Services* 20(1): 3-4. <http://goo.gl/8nuXNR> Accessed 8 Mar 2014.
- Bundy, A. 2012. Better, more accessible, libraries for all in Australia: progress and potential. *Australasian Public Libraries and Information Services* 25(3): 138.  
<http://goo.gl/1NACK9> Accessed 8 Mar. 2014.
- Bundy, A. and L. L. Amey. 2006. Libraries like no others: evaluating the performance and progress of joint use libraries. *Library Trends* 54(4): 501-518.  
<http://search.proquest.com/docview/220444823?accountid=11921> Accessed 22 Mar. 2013.
- Bunic, S. 2013. Libraries and the homeless: experiences, challenges and opportunities- socio-economic background of homelessness in Croatia. *Library Review* 62(1/2): 34-42. <http://www.emeraldinsight.com/journals.htm?articleid=17087419&show=abstract> Accessed 10 Feb. 2014.

- Burke, J. E. and S. Hughes-Hassell. 2007. Public library websites for teenagers: how are they addressing the consumer health information needs of today's teens? *Proceedings of the American Society for Information Science and Technology* 44(1): 1-4. <http://dx.doi.org/10.1002/meet.1450440345> Accessed 10 Mar. 2014.
- Burke, S. K. 2008a. Use of public libraries by immigrants. *Reference & User Services Quarterly* 48(2): 164-174. <http://goo.gl/tEw8e2> Accessed 8 Mar. 2014.
- Burke, S. K. 2008b. Public library resources used by immigrant households. *Public Libraries* 47(4): 32-41. <http://search.proquest.com/docview/217459426?accountid=11921> Accessed 8 Mar. 2014.
- Caidi, N. and D. Allard. 2005. Social inclusion of newcomers to Canada: an information problem? *Library & Information Science Research* 27(3): 302-324 <http://www.sciencedirect.com/science/article/pii/S0740818805000332> Accessed 22 Mar. 2013.
- Cart, M. 2002. America's front porch-the public library. *Public Library Quarterly* 21(1): 3-21. [http://www.tandfonline.com/doi/abs/10.1300/J118v21n01\\_02](http://www.tandfonline.com/doi/abs/10.1300/J118v21n01_02) Accessed 8 Mar. 2014.
- Carter, N. J. and R. L. Wallace. 2007. Collaborating with public libraries, public health departments, and rural hospitals to provide consumer health information services. *Journal of Consumer Health on the Internet* 11(4): 1-14. <http://goo.gl/bXqJZY> Accessed 9 Feb. 2014.
- Cathcart, R. 2008. Librarian or social worker: time to look at the blurring line? *The Reference Librarian* 49(1): 87-91. <http://www.tandfonline.com/doi/pdf/10.1080/02763870802103845> Accessed 8 Mar. 2014.
- Cavanagh, M. F. and W. Robbins. 2012. Baby boomers, their elders and the public library. *Library Review* 61(8): 622-640. <http://dx.doi.org/10.1108/00242531211292114> Accessed 8 Mar. 2014.
- Chandler, G. 1974. Public libraries in development. *International Library Review* 6(2): 231-235 <http://www.sciencedirect.com/science/article/pii/0020783774900326> Accessed 8 Mar. 2014.



- Chester, L. 1971. The library and the community: North York Public Library (3) library service to industry. *International Library Review* 3(3): 323-331.  
<http://www.sciencedirect.com/science/article/pii/S0020783771800092> Accessed 10 Mar. 2014.
- Childers, T. and N. van House. 1989. Dimensions of public library effectiveness. *Library and Information Science Research* 11: 273-301.
- Chu, J. 1994. Self-development of public libraries in China: the current situation and some problems. *Library Review* 43(8): 40-43.  
<http://dx.doi.org/10.1108/00242539410072182> Accessed 8 Mar. 2014.
- Clay, E. S. and P. C. Bangs. 2000. Entrepreneurs in the public library: reinventing an institution. *Library Trends* 48(3): 606-618. <http://goo.gl/DHNzye> Accessed 8 Mar. 2014.
- Clyde, L. A. 2005. Librarians and breaking barriers to information literacy: implications for continuing professional development and workplace learning. *Library Review* 54(7): 425-434. <http://search.proquest.com/docview/218315830?accountid=11921> Accessed 8 Mar. 2014.
- Cohen, R. J. 2008. Sex education and the American public library. *Young Adult Library Services* 6(3): 40-45. <http://search.proquest.com/docview/217689238?accountid=11921> Accessed 8 Mar. 2014.
- Coleman, B. W. 2008. Keeping the faith: the public library's commitment to adult education, 1950-2006. PhD Diss. Mississippi: University of Southern Mississippi. <http://search.proquest.com/docview/304465662?accountid=1192> Accessed 10. Mar. 2014.
- Coleman, P. 1993a. Public libraries can and do make a difference: a case to be proved. *European Journal of Marketing* 18(2): 56-64.  
<http://dx.doi.org/10.1108/EUM00000000004769> Accessed 8 Mar. 2014.
- Coleman, P. 1993b. Community information policy and provision. *Aslib Proceedings* 38(9): 305-316. <http://dx.doi.org/10.1108/eb060051> Accessed 8 Mar. 2014.
- Collins, B. 2012. How public libraries are a boon to small business. *American Libraries* 43(7/8): 28. <http://goo.gl/E2v9t3> Accessed 8 Mar. 2014.



- Concannon, M., E. Rafferty and C. Swanson-Farmarco. 2011. Snacks in the stacks: teaching youth nutrition in a public library. *Journal of Extension* 49(5).  
<http://www.joe.org/joe/2011october/iw1.php> Accessed 8 Mar. 2014.
- Copeland, A. and D. Barreau. 2011. Helping people to manage and share their digital information: a role for public libraries. *Library Trends* 59(4): 637-649.  
<https://www.ideals.illinois.edu/handle/2142/26428> Accessed 8 Feb. 2014.
- Dain, P. 1975. Ambivalence and paradox: the social bonds of the public library. *Library Journal* 100(3): 261-266. <http://goo.gl/SHJhRv> Accessed 8 Mar. 2014.
- Daley, M. A. and M. A. Heltshe-Steinhauer. 2009. Consumer health: a collaborative effort. *Journal of Consumer Health on the Internet* 13(4): 347-358.  
<http://goo.gl/T7izD4> Accessed 8 Mar. 2014.
- Dalmer, N. 2013. Health literacy promotion: contemporary conceptualizations and current implementations in Canadian health librarianship. *Journal of the Canadian Health Libraries Association* 34(1): 12-16. <http://pubs.chla-absc.ca/doi/abs/10.5596/c13-004> Accessed 8 Mar. 2014.
- Das, K. 2013. Imbibing public libraries and corporate social responsibility to promote rural development. *DESIDOC Journal of Library & Information Technology* 33(1): 11-16. <http://connection.ebscohost.com/c/articles/86208999/imbibing-public-libraries-corporate-social-responsibility-promote-rural-development> Accessed 8 Feb. 2014.
- Daurio, P. V. 2010. A library and its community: exploring perceptions of collaboration. MA thesis. Oregon: Portland State University.  
<http://search.proquest.com/docview/612689922?accountid=11921> Accessed 10 Mar. 2014.
- Davies, R., T. Brad and A. Király. 1997. The customer is our master: what we know now, how we can serve him better. *Philobiblon: Transylvanian Journal of Multidisciplinary Research in Humanities* 2(1): 95-109 <http://goo.gl/Vvy9An> Accessed 8 Mar. 2014.
- Day, R. 2007. Information connecting people with services: the information and referral role of community service organisations. *Australasian Public Libraries and Information Services* 20(3): 103-

- 117.<http://search.informit.com.au/documentSummary;dn=781708449942768;res=IE>  
LNZC Accessed 22 Mar. 2013.
- Decker, E. N. 2010. Baby boomers and the United States public library system. *Library Hi Tech* 28(4): 605-616. <http://dx.doi.org/10.1108/07378831011096268> Accessed 8 Mar. 2014.
- Deering, M. and J. Harris. 1996. Consumer health information demand and delivery: implications for libraries. *Bulletin of the Medical Library Association* 84(2): 209-216. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC299407/> Accessed 22 Mar. 2013.
- Defoe, D. 1991. Infohealth: community health service at Kingston Public Library. *Canadian Library Journal* 48(5): 340-343. <http://goo.gl/1oQxTn> Accessed 8 Mar. 2014.
- De Groot, J. C. 2009. Building a nation of readers: multiple perspectives on public library summer reading programs. PhD Diss. Alberta: University of Alberta. <http://search.proquest.com/docview/305058671?accountid=11921> Accessed 10 Mar. 2014.
- De Jager, K. and M. Nassimbeni. 2007. Information literacy in practice: engaging public library workers in rural South Africa. *IFLA Journal* 33(4): 313-322. <http://goo.gl/6ySJXI> Accessed 10 Mar. 2014.
- De Jager, K. and M. Nassimbeni. 2012. Giving them what they want and assessing impact: case studies of public library services in, the Western Cape, South Africa. *African Journal of Library, Archives and Information Science* 22(1): 19-30. <http://goo.gl/f4EUcF> Accessed 10 Mar. 2014.
- Demo, W. 1986. *The idea of "information literacy" in the age of high-tech*. <http://goo.gl/wlQHJ9> Accessed 8 Mar. 2014.
- Derr, L. and A. Rhodes. 2010. The public library as urban youth space: redefining public libraries through services and space for young people for an über experience. *Australasian Public Libraries and Information Services* 23(3): 90-97. <http://search.proquest.com/docview/749312182?accountid=11921> Accessed 8 Mar. 2014.

- Dieterle, U. and C. Becker. 2011. Health information for the elderly and their caregivers: a training toolkit for public libraries. *Journal of Consumer Health on the Internet* 15(2): 132-148.  
<http://www.tandfonline.com/doi/abs/10.1080/15398285.2011.573332> Accessed 8 Feb. 2014.
- Donelan, M. and L. Miller. 2010. Public libraries daring to be different. *PM: Public Management* 92(8): 6-9. <http://search.proquest.com/docview/749251212?accountid=11921> Accessed 8 Mar. 2014.
- Dos Santos, V. F. 2004. Public libraries and their contribution towards economic development: real or an impossible dream? Paper presented at 70th IFLA World Library and Information Congress: General Conference and Council, Buenos Aires, Argentina, 22-27 Aug. 2004. [http://archive.ifla.org/IV/ifla70/papers/027e\\_trans-Ferreira-dos-Santos.pdf](http://archive.ifla.org/IV/ifla70/papers/027e_trans-Ferreira-dos-Santos.pdf) Accessed 10 Mar. 2014.
- Dos Santos, V. F. 2009. Public libraries and their contribution towards economic development: a discussion. *LIBRES: Library & Information Science Research Electronic Journal* 19(2): 1-9. <http://goo.gl/DISG5r> Accessed 10 Mar. 2014.
- Dowling, B. 2007. Public libraries and the ex-offender. *Public Libraries* 46(6): 44-48. <http://search.proquest.com/docview/217452885?accountid=11921> Accessed 8 Mar. 2014.
- Durrance, J. C. and K. E. Fisher. 2003. Determining how libraries and librarians help. *Library Trends* 51(4): 541-570, 688-689. <http://search.proquest.com/docview/220442395?accountid=11921> Accessed 8 Mar. 2014.
- Dutch, M. and D. Muddiman. 2001. The public library, social exclusion and the information society in the United Kingdom. *Libri* 51: 183-194. <http://librijournal.org/pdf/2001-4pp183-194.pdf> Accessed 8 Mar. 2014.
- Eakin, D., S. Jackson and G. Hannigan. 1980. Consumer health information: libraries as partners. *Bulletin of the Medical Library Association* 68(2): 220-229. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC226479/> Accessed 8 Mar. 2014.
- Eastwood, E. J. and B. Goldman. 2007. Help your health! Establishing a consumer health program in a small public library. *Journal of Hospital Librarianship* 7(2): 57-

65. [http://www.tandfonline.com/doi/abs/10.1300/J186v07n02\\_05#.Uxq-MvmSxWg](http://www.tandfonline.com/doi/abs/10.1300/J186v07n02_05#.Uxq-MvmSxWg)  
Accessed 8 Mar. 2014.
- Elbert, M., D. Fuegi and U. Lipeikaite. 2012. Public libraries in Africa: agents for development and innovation? Current perceptions of local stakeholders. *IFLA Journal* 38(2): 148-165. <http://dx.doi.org/10.1177/0340035212444512> Accessed 8 Mar. 2014.
- Elbeshausen, H. 2007. Knowledge in dialogue: empowerment and learning in public libraries. *Journal of Information, Communication & Ethics in Society* 5(2/3): 98-115. <http://search.proquest.com/docview/1011919540?accountid=11921> Accessed 8 Mar. 2014.
- Elbeshausen, H. and P. Skov. 2004. Public libraries in a multicultural space: a case study of integration processes in local communities. *New Library World* 105(3/4): 131-141. <http://dx.doi.org/10.1108/03074800410526767> Accessed 22 Mar. 2013.
- Ellis-King, D. 1993. Community libraries. *Library Review* 34(2): 91-101. <http://dx.doi.org/10.1108/eb012789> Accessed 8 Mar. 2014.
- Emojorho, D. 2005. Public library and nation building: the Nigerian experience. *Library Management* 26(3): 123-129. <http://search.proquest.com/docview/198872774?accountid=11921> Accessed 8 Mar. 2014.
- England, S. R. 2007. The consequences of promoting an educational role for today's public libraries. *Public Libraries* 46(2): 55-63. <http://search.proquest.com/docview/217454645?accountid=11921> Accessed 8 Mar. 2014.
- Eve, J., M. de Groot and A.-M. Schmidt. 2007. Supporting lifelong learning in public libraries across Europe. *Library Review* 56(5): 393-406. <http://www.emeraldinsight.com/journals.htm?articleid=1603095&show=abstract> Accessed 9 Feb. 2014.
- Evjen, S. and R. Audunson. 2009. The complex library: do the public's attitudes represent a barrier to institutional change in public libraries? *New Library World* 110(3): 161-174. <http://dx.doi.org/10.1108/03074800910941356> Accessed 8 Mar. 2014.

- Eyre, G. 2003. Back to basics: the role of reading in preparing young people for the information society. *Reference Services Review* 31(3): 219-226.  
<http://dx.doi.org/10.1108/00907320310486818> Accessed 8 Mar. 2014.
- Feldman, S. 2009. Libraries key to economic recovery. *Public Libraries* 48(4): 4-5.  
<http://search.proquest.com/docview/217467289?accountid=11921> Accessed 8 Mar. 2014.
- Ferguson, D. 2006. Developing social capital: Australian and New Zealand friends of libraries. *Australasian Public Libraries and Information Services* 19(1): 26-30.  
<http://goo.gl/nbmaFe> Accessed 22 Mar. 2013.
- Ferguson, S. 2012. Are public libraries developers of social capital? A review of their contribution and attempts to demonstrate it. *Australian Library Journal* 61(1): 22-33. <http://goo.gl/GFVRrc> Accessed 8 Mar. 2014.
- Fisher, K. 2004. Information grounds and the use of need-based services by immigrants in Queens, New York: a context-based, outcome evaluation approach. *Journal of the American Society for Information Science and Technology* 55(8): 754-766.  
<http://onlinelibrary.wiley.com/doi/10.1002/asi.20019/full> Accessed 22 Feb. 2014.
- Fisher, K., M. Saxton, P. Edwards, and J. Mai. 1979. Seattle public library as place: reconceptualizing space, community, and information at the central library. In J. Buschman and G. Leckie. *The library as place: history, community and culture*. Westport, CT.: Libraries Unlimited.  
[http://ibec.ischool.washington.edu/static/pubs/fisher\\_2007\\_libraryasplace.pdf](http://ibec.ischool.washington.edu/static/pubs/fisher_2007_libraryasplace.pdf)  
Accessed 10 Mar. 2014.
- Fitch, L. and J. Warner. 1998. Dividends: the value of public libraries in Canada. *Bottom Line: Managing Library Finances* 11(4): 158-179.  
<http://dx.doi.org/10.1108/08880459810242399> Accessed 22 Mar. 2013.
- Flaherty, M. G. and M. E. Luther. 2011. A pilot study of health information resource use in rural public libraries in upstate New York. *Public Library Quarterly* 30(2): 117-131 <http://dx.doi.org/10.1080/01616846.2011.575702> Accessed 8 Mar. 2014.
- Flaherty, M. G. and L. Roberts. 2009. Rural outreach training efforts to clinicians and public library staff: NLM resource promotion. *Journal of Consumer Health on the Internet* 13(1): 14-30. <http://dx.doi.org/10.1080/15398280802674636> Accessed 8 Mar. 2014.

- Forsyth, E. 2005. Public libraries and the Millennium Development Goals. *IFLA Journal* 31(4): 315-323. <http://dx.doi.org/10.1177/0340035205061389> Accessed 22 Mar. 2013.
- Fraser, B., T. Nelson and C. McClure. 2002. Describing the economic impacts and benefits of Florida public libraries: findings and methodological applications for future work. *Library & Information Science Research* 24(3): 211-233. <http://www.sciencedirect.com/science/article/pii/S0740818802001238> Accessed 22 Mar. 2013.
- Fried, S., M. Kochanowicz and M. Chiranov. 2010. Planning for impact, assessing for sustainability. *Performance Measurement and Metrics* 11(1): 56-74. <http://dx.doi.org/10.1108/14678041011026874> Accessed 8 Mar. 2014.
- Galluzzi, A. 2011. Cities as long tails of the physical world: a challenge for public libraries. *Library Management* 32(4/5): 319-335. <http://search.proquest.com/docview/868253345?accountid=11921> Accessed 8 Mar. 2014.
- Gaudet, F. 2013. What kind of services supply to the poor? A survey directed toward homeless. *Library Review* 62(1/2): 43-46. <http://www.emeraldinsight.com/journals.htm?articleid=17087420&show=abstract> Accessed 10 Feb. 2014.
- Gavin, T. A., W. W. Prince and J. Campbell. 1993. The role of business faculties at eastern European universities and librarians: providing assistance to individuals aspiring to own and operate their own businesses. *Library Management* 14(7): 14-22. <http://dx.doi.org/10.1108/01435129310047992> Accessed 8 Mar. 2014.
- Gerbig, K. M. 2009. The public library: what can we do for your students? *Educators' Spotlight Digest* 3(2): 1-4. <http://goo.gl/e2Mbcb> Accessed 8 Mar. 2014.
- Germano, M. 2011. The library value deficit. *Bottom Line: Managing Library Finances* 24(2): 100-106. <http://dx.doi.org/10.1108/08880451111169124> Accessed 8 Mar. 2014.
- Ghosh, M. 2005. The public library system in India: challenges and opportunities. *Library Review* 54(3): 180-191. <http://www.emeraldinsight.com/journals.htm?articleid=1463508&show=abstract> Accessed 22 Mar. 2013.

- Ghosh, M. 2007. ICT and aids literacy: a challenge for information professionals in India. *Program: Electronic Library and Information Systems* 41(2): 134-147. <http://dx.doi.org/10.1108/00330330710742917> Accessed 8 Mar. 2014.
- Gilton, D. 2008. Information literacy as a department store: applications for public teen librarians. *Young Adult Library Services* 6(2): 39-44. <http://goo.gl/AZ4AEp> Accessed 9 Feb. 2014.
- Gilton, D. 2012. *Lifelong learning in public libraries: principles, programs, and people*. Lanham: Scarecrow Press.
- Glorieux, I., T. Kuppens and D. Vandebroek. 2007. Mind the gap: societal limits to public library effectiveness. *Library & Information Science Research* 29(2): 188-208. <http://www.sciencedirect.com/science/article/pii/S0740818807000436> Accessed 8 Mar. 2014.
- Gollop, C. 1997. Health information-seeking behavior and older African American women. *Bulletin of the Medical Library Association* 85(2): 141-146. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC226241/> Accessed 22 Mar. 2013.
- Gomez, R., S. Pather and B. Dosono. 2012. Public access computing in South Africa: old lessons and new challenges. *Electronic Journal of Information Systems in Developing Countries* 52(1) <https://ejisdc.org/Ojs2/index.php/ejisdc/article/view/915> Accessed 8 Mar. 2014.
- Goodes, P. 2001. Public libraries: the center of community life. *American Libraries* 32(4): 14-15. <http://search.proquest.com/docview/197142621?accountid=11921> Accessed 8 Mar. 2014.
- Goodman, J. 2007. Opening the door: partnership issues in developing a public library learning service for all Australians. *Australasian Public Libraries and Information Services* 20(3): 95. <http://goo.gl/xdUt6H> Accessed 8 Mar. 2014.
- Gosling, W. 2000. To go or not to go? Library as place. *American Libraries* 31(11): 44-45. <http://www.jstor.org/stable/25645717> Accessed 22 Feb. 2014.
- Gould, E. and R. Gomez. 2010. New challenges for libraries in the information age: a comparative study of ICT in public libraries in 25 countries. *Information Development* 26(2): 166-176 <http://dx.doi.org/10.1177/0266666910367739> Accessed 8 Mar. 2014.



- Goulding, A. 2004. Editorial: libraries and social capital. *Journal of Librarianship and Information Science* 36(1): 3-6. <http://lis.sagepub.com/content/36/1/3.short> Accessed 22 Mar. 2013.
- Goulding, A. 2009. Engaging with community engagement: public libraries and citizen involvement. *New Library World* 110(1/2): 37-51.  
<http://search.proquest.com/docview/229632328?accountid=11921> Accessed 8 Mar. 2014.
- Goulding, A. 2013. The Big Society and English public libraries: where are we now? *New Library World* 114(11/12): 478-493.  
<http://www.emeraldinsight.com/journals.htm?articleid=17100243&show=abstract> Accessed 8 Mar. 2014.
- Grace, P. 2000. No place to go (except the public library). *American Libraries* 31(5): 53-55. <http://www.jstor.org/stable/25637627> Accessed 8. Mar. 2014.
- Greenberg, C. and L. Wang. 2012. Building health literacy among an urban teenage population by creating online health videos for public and school health curriculum use. *Journal of Consumer Health on the Internet* 16(2): 135-146.  
<http://www.tandfonline.com/doi/abs/10.1080/15398285.2012.673459> Accessed 8 Mar. 2014.
- Greenberg, R., B. Kirbaway and C. Sievert. 2002. Community health public library branch located in a hospital. *Journal of Hospital Librarianship* 2(3): 51-56.  
<http://goo.gl/mNhZ7T> Accessed 8 Mar. 2014.
- Griffiths, J., D. King and S. Aemi. 2006. *Taxpayer return on investment in Florida public libraries*. <http://dlis.dos.state.fl.us/bld/roi/pdfs/ROISummaryReport.pdf> Accessed 10 Mar. 2014.
- Gross, M. E., Dresang and L. Holt. 2004. Children's in-library use of computers in an urban public library. *Library & Information Science Research* 26(3): 311-337.  
<http://dx.doi.org/10.1016/j.lisr.2004.04.002> Accessed 8 Mar. 2014.
- Guldberg, H. 1991. The economic and social role of public libraries. *Australasian Public Libraries and Information Services* 4(4): 194.  
<http://search.informit.com.au/documentSummary;dn=011831343962122;res=IELNZC> Accessed 9 Feb. 2014.



- Gupta, O. P. 1974. (6) Delhi public library system and its services. *International Library Review* 6(1): 35-41. [http://dx.doi.org/10.1016/0020-7837\(74\)90059-4](http://dx.doi.org/10.1016/0020-7837(74)90059-4) Accessed 8 Mar. 2014.
- Hacker, H. S. 1978. The role of public libraries in networking. *Library Acquisitions: Practice & Theory* 2(3-4): 171-174. [http://dx.doi.org/10.1016/0020-7837\(74\)90059-4](http://dx.doi.org/10.1016/0020-7837(74)90059-4) Accessed 8 Mar. 2014.
- Haider, S. J. 1998. Public libraries and development planning in Pakistan: a review of past efforts and future needs. *Asian Libraries* 7(2): 47-57. <http://dx.doi.org/10.1108/10176749810368937> Accessed 8 Mar. 2014.
- Hall, R. 2010. Public praxis: a vision for critical information literacy in public libraries. *Public Library Quarterly* 29(2): 162-175. <http://dx.doi.org/10.1080/01616841003776383> Accessed 9 Feb. 2014.
- Hamilton-Pennell, C. 2008. Public libraries and community economic development: partnering for success. *Rural Research Report* 18(10). [http://www.iira.org/pubs/publications/iira\\_rrr\\_688.pdf](http://www.iira.org/pubs/publications/iira_rrr_688.pdf) Accessed 8 Mar. 2014.
- Hapel, R. 2012. The library as a place. *Public Library Quarterly* 31(1): 48-55. <http://dx.doi.org/10.1080/01616846.2012.654737> Accessed 8 Mar. 2014.
- Hardarson, H. A. 2013. Iceland one lives longer by visiting the public library. *Scandinavian Library Quarterly* 46(3). <http://slq.nu/?article=iceland-one-lives-longer-by-visiting-the-public-library> Accessed 8 Feb. 2014.
- Harding, J. 2008a. Information literacy and the public library: we've talked the talk, but are we walking the walk? *Australian Library Journal* 57(3): 274-294. [http://alia.asn.au/publishing/alj/57/ALJ\\_Vol57\\_No3\\_2008.pdf#page=72](http://alia.asn.au/publishing/alj/57/ALJ_Vol57_No3_2008.pdf#page=72) Accessed 9 Feb. 2014.
- Harding, J. 2008b. Information literacy and the public library. *Australasian Public Libraries and Information Services* 21(4): 157-167. <http://goo.gl/qi2nhR> Accessed 8 Mar. 2014.
- Harris, C. 2007. Libraries with lattes: the new third place. *Australasian Public Libraries and Information Services* 20(4): 145. <http://www.thefreelibrary.com/Libraries+with+lattes%3A+the+new+third+place.-a0172010485> Accessed 8 Mar. 2014.

- Harris, M. 1975. The role of the public library in American life: a speculative essay. *University of Illinois at Urbana-Champaign, Graduate School of Library Science Occasional Papers* 117. <https://www.ideals.illinois.edu/handle/2142/3863> Accessed 8 Mar. 2014.
- Harris, R., F. Henwood, A. Marshall and S. Burdett. 2010. "I'm not sure if that's what their job is" consumer health information and emerging "healthwork" roles in the public library. *Reference & User Services Quarterly* 49(3): 239-252. <http://goo.gl/4Y7Qwh> Accessed 8 Mar. 2014.
- Harris, R., C. N. Wathen and D. Chan. 2005. Public library responses to a consumer health inquiry in a public health crisis: the SARS experience in Ontario. *Reference & User Services Quarterly* 45(2): 147-154. <http://www.jstor.org/stable/10.2307/20864480> Accessed 8 Feb. 2014.
- Hart, G. 2006a. The information literacy education readiness of public libraries in Mpumalanga Province (South Africa). *Libri: International Journal of Libraries & Information Services* 56(1): 48-62. <http://goo.gl/8iyIKF> Accessed 8 Mar. 2014.
- Hart, G. 2006b. Educators and public librarians: unwitting partners in the information literacy education of South African youth? *Innovation* (32): 74-93. <http://goo.gl/454F1B> Accessed 8 Mar. 2014.
- Hart, G. 2006c. Public librarians and information literacy education: views from Mpumalanga Province. *South African Journal of Libraries & Information Science* 72(3): 172-184. <http://goo.gl/sRNG8M> Accessed 8 Mar. 2014.
- Hart, G. 2007. Social capital: a fresh vision for public libraries in South Africa? *South African Journal of Libraries & Information Science* 73(1): 14-24. [http://www.sabinet.co.za/abstracts/liasa/liasa\\_v73\\_n1\\_a3.html](http://www.sabinet.co.za/abstracts/liasa/liasa_v73_n1_a3.html) Accessed 22 Mar. 2013.
- Head, M., C. R. Marcella and J. M. Smith. 1995. Are you being served? the quality of business information provision in Scottish public libraries. *Library Review* 44(2): 28-37. <http://search.proquest.com/docview/218303713?accountid=11921> Accessed 8 Mar. 2014.
- Heitsch, E. K. and R. P. Holley. 2011. The information and learning commons: some reflections. *New Review of Academic Librarianship* 17(1): 64-77. <http://dx.doi.org/10.1080/13614533.2011.547416> Accessed 8 Mar. 2014.

- Hendry, J. D. 2000. Social inclusion and the information poor. *Library Review* 49(7): 331-336. <http://dx.doi.org/10.1108/00242530010344192> Accessed 8 Mar. 2014.
- Herdman, M. 1943. The public library in depression. *The Library Quarterly* 13(4): 310-334. <http://www.jstor.org/stable/10.2307/4303148> Accessed 8 Mar. 2014.
- Herrera, L. 2004. Toward a literate nation. *Public Libraries* 43(1): 9. <http://search.proquest.com/docview/217455359?accountid=11921> Accessed 8 Mar. 2014.
- Hibberd, L. 2011. Being of the book: reading aloud, memory and spaces of social engagement. *International Journal of the Book* 8(3): 1-13. <http://ijb.cgpublisher.com/product/pub.27/prod.415> Accessed 8 Mar. 2014.
- Hill, N. M. 2012. Public libraries and services to the unemployed. *Public Libraries* 51(2): 14-21. <http://goo.gl/WKhfAk> Accessed 8 Mar. 2014.
- Hillenbrand, C. 2005a. A place for all: social capital at the Mount Barker Community Library, South Australia. *Australasian Public Libraries and Information Services* 18(2): 41-58. <http://search.informit.com.au/documentSummary;dn=005142107280428;res=IELHSS> Accessed 8 Mar. 2014.
- Hillenbrand, C. 2005b. Public libraries as developers of social capital. *Australasian Public Libraries and Information Services* 18(1): 4-12. <http://search.informit.com.au/documentSummary;dn=005272538079236;res=IELHSS> Accessed 22 Mar. 2013.
- Holt, G. 2001. Changing demand for library business services. *Bottom Line: Managing Library Finances* 14(1). <http://www.emeraldinsight.com/journals.htm?issn=0888-045X&volume=14&issue=1&articleid=1486278&show=html> Accessed 8 Mar. 2014.
- Holt, L. E. and G. E. G. Holt. 2010. Public library services for the poor: doing all we can. *New Library World*. 112(11/12): 575. <http://www.emeraldinsight.com/journals.htm?articleid=17003892&show=html> Accessed 8 Mar. 2014.
- Homann, B. 2003. German libraries at the starting line for the new task of teaching information literacy. *Library Review* 52(7): 310-318. <http://dx.doi.org/10.1108/00242530310487407> Accessed 8 Mar. 2014.

- Horton, S. 2006. Social capital, government policy and public value: implications for archive service delivery. *Aslib Proceedings* 58(6): 502-512.  
<http://search.proquest.com/docview/217757635?accountid=11921> Accessed 8 Mar. 2014.
- Huang, Y. and Y. Yang. 2011. An empirical evaluation study of public libraries based on principal component analysis. In 2011 International Conference on Intelligence Science and Information Engineering. Piscataway, NJ: IEEE, 314-316.  
<http://dx.doi.org/10.1109/ISIE.2011.100> Accessed 10 Mar. 2014.
- Hughes-Hassell, S. D. Hanson-Baldauf and J. E. Burke. 2008. Urban teenagers, health information, and public library web sites. *Young Adult Library Services* 6(4): 35-42.  
<http://goo.gl/250IU5> Accessed 8 Mar. 2014.
- Humphreys, G. 2010. The origins of the city business library: an update. *Business Information Review* 27(4): 225-226. <http://dx.doi.org/10.1177/0266382110384178> Accessed 8 Mar. 2014.
- Huysmans, F. and M. Oomes. 2013. Measuring the public library's societal value: a methodological research program. *IFLA Journal* 39(2): 168-177.  
<http://conference.ifla.org/past-wlic/2012/76-huysmans-en.pdf> Accessed 7 Feb. 2014.
- Ignatow, G., S. M. Webb, M. Poulin, R. Parajuli, P. Fleming, S. Batra and D. Neupane. 2012. Public libraries and democratization in three developing countries: exploring the role of social capital. *Libri: International Journal of Libraries & Information Services* 62(1): 67-80. <http://dx.doi.org/10.1515/libri-2012-0005> Accessed 10 Mar. 2014.
- Imholz, S. and J. Arns. 2008. Worth their weight: an assessment of the evolving field of library evaluation. *Public Library Quarterly* 26(3): 31-48.  
[http://www.tandfonline.com/doi/abs/10.1300/J118v26n03\\_03](http://www.tandfonline.com/doi/abs/10.1300/J118v26n03_03) Accessed 10 Mar. 2014.
- Institute for Learning Innovation and Delaware Division of Libraries. 2009. Motivations for library use: Dover, Delaware, library user identity-motivation pilot study, December 2005. *Public Library Quarterly* 28(4): 312-325.  
<http://dx.doi.org/10.1080/01616840903110057> Accessed 10 Mar. 2014.
- Jackson, S. 1995. Book Review. Information for a new age: redefining the librarian by Library Instruction Round Table of the American Library Association. *The Library*

- Quarterly* 66(2): 220-222. <http://www.jstor.org/stable/4309118> Accessed 10 Mar. 2014.
- Jaeger, P., J. Bertot and C. Kodama. 2011. Describing and measuring the value of public libraries: the growth of the Internet and the evolution of library value. *First Monday* 16(11). <http://uncommonculture.org/ojs/index.php/fm/article/view/3765> Accessed 10 Mar. 2014.
- Jaeger, P., J. Bertot, K. M. Thompson, S. M. Katz and E. J. DeCoster. 2012. The intersection of public policy and public access: digital divides, digital literacy, digital inclusion, and public libraries. *Public Library Quarterly* 31(1): 1-20. <http://dx.doi.org/10.1080/01616846.2012.654728> Accessed 10 Mar. 2014.
- James, S. 1985. The relationship between local economic conditions and the use of public libraries. *The Library Quarterly* 55(3): 255-272. <http://www.jstor.org/stable/10.2307/4307857> Accessed 22 Mar. 2013.
- Janes, J. and B. Ptacek. 2013. The library as catalyst for civic engagement. *Library Journal* 138(14): 30. <http://goo.gl/N0m1x7> Accessed 8 Feb. 2014.
- Jay, M. and S. Webber. 2005. Impact of the Internet on delivery of reference services in English public libraries. *Program: Electronic Library and Information Systems* 39(1): 25-38. <http://dx.doi.org/10.1108/00330330510578787> Accessed 10 Mar. 2014.
- Jehlik, T. 2004. Information literacy in the public library. *Nebraska Library Association Quarterly* 35(4): 7-13. <http://goo.gl/Eana8X> Accessed 10 Mar. 2014.
- Jingxia, L. 2002. The public library and citizens' information literacy education in China: a case study of Wuhan Area, China. Paper presented at 68th IFLA Council and General Conference, Glasgow. 18-24 Aug. 2002. <http://archive.ifla.org/IV/ifla68/papers/039-098e.pdf> Accessed 10 Mar. 2014.
- Johnson, C. A. 2010. Do public libraries contribute to social capital? A preliminary investigation into the relationship. *Library & Information Science Research* 32(2): 147-155 <http://www.sciencedirect.com/science/article/pii/S0740818810000083> Accessed 22 Mar. 2013.

- Jones, A. 1970. Criteria for the evaluation of public library services. *Journal of Librarianship and Information Science* 2(4): 228-245.  
<http://lis.sagepub.com/content/2/4/228.short> Accessed 22 Mar. 2013.
- Jones, D. 2006. People places revisited: guidelines for public library buildings. *Australasian Public Libraries and Information Services* 19(1): 5-12.  
<http://goo.gl/94r1ay> Accessed 22 Mar. 2013.
- Jones, K. H. 1993. Towards a re-interpretation of public library purpose. *New Library World* 73(3): 76-82. <http://dx.doi.org/10.1108/eb038040> Accessed 10 Mar. 2014.
- Jones, R. 2003. Making health information accessible to patients. *Aslib Proceedings* 55(5): 334-338. <http://dx.doi.org/10.1108/00012530310498905> Accessed 22 Mar. 2013.
- Julien, H. and S. Anderson. 2003. The public library in “Connecting Canadians”. *Canadian Journal of Library and Information Science* 27(4): 5-29.  
<http://goo.gl/cil2EU> Accessed 10 Mar. 2014.
- Julien, H. and R. R. D. Breu. 2005. Instructional practices in Canadian public libraries. *Library & Information Science Research* 27(3): 281-301.  
<http://www.sciencedirect.com/science/article/pii/S0740818805000320> Accessed 22 Mar. 2013.
- Julien, H. and S. K. Genuis. 2009. Emotional labour in librarians’ instructional work. *Journal of Documentation* 65(6): 926-937.  
<http://dx.doi.org/10.1108/00220410910998924> Accessed 10 Mar. 2014.
- Jusic, J. 2013. Entrepreneurial leadership in public libraries. *Public Libraries Online* 30 Aug. <http://publiclibrariesonline.org/2013/08/entrepreneurial-leadership-in-public-libraries/> Accessed 10 Mar. 2014.
- Kajberg, L. and E. Gökçek. 2012. Are we experiencing the end of the library as we know it? Speculating on the future of libraries as “space of flows”. *Communications in Computer and Information Science* 317: 33-45. [http://dx.doi.org/10.1007/978-3-642-33299-9\\_7](http://dx.doi.org/10.1007/978-3-642-33299-9_7) Accessed 10 Mar. 2014.
- Kalia, D. R. 1974. (5) A review of public library development in India. *International Library Review* 6(1): 29-33.

- <http://www.sciencedirect.com/science/article/pii/0020783774900582> Accessed 10 Mar. 2014.
- Kapitzke, C. 2003. Information literacy: a review and poststructural critique. *Australian Journal of Language and Literacy* 26(1): 53-66.  
<http://eprints.qut.edu.au/8867> Accessed 22 Mar. 2013.
- Kapitzke, C. and B. Bruce. 2006 Introduction. Rewriting libr@ries: space, knowledge and capital. In C. Kapitzke and B. Bruce, eds. *Libr@ries: changing information space and practice*. Mahwah N.J.: Lawrence Erlbaum Associates, xxv-xlvii.
- Kargbo, J. 2011. Public library services in the knowledge economy: the Sierra Leone experience. *Public Library Quarterly* 30(1): 62-75.  
<http://www.tandfonline.com/doi/abs/10.1080/01616846.2010.525387> Accessed 8 Feb. 2014.
- Kavulya, J. M. 2007. Digital libraries and development in sub-Saharan Africa: a review of challenges and strategies. *Electronic Library* 25(3): 299-315.  
<http://dx.doi.org/10.1108/02640470710754814> Accessed 10 Mar. 2014.
- Kerslake, E. and M. Kinnell. 1998. Public libraries, public interest and the information society theoretical issues in the social impact of public libraries. *Libri: International Journal of Libraries & Information Services* 48(1): 1-12. <http://goo.gl/Pqf0Ra> Accessed 22 Mar. 2013.
- Ko, Y., M. W. Shim, S.-H. Pyo, J. S. Chang and H. K. Chung. 2012. An economic valuation study of public libraries in Korea. *Library & Information Science Research* 34(2): 117-124.  
<http://www.sciencedirect.com/science/article/pii/S0740818812000060> Accessed 10 Mar. 2014.
- Kolakoski, L. F. 2005. Bringing health care information to rural public libraries how one hospital is reaching out to its local community. *Journal of Hospital Librarianship* 5(4): 65-72. [http://dx.doi.org/10.1300/J186v05n04\\_06](http://dx.doi.org/10.1300/J186v05n04_06) Accessed 10 Mar. 2014.
- Koltay, T. 2011. Information literacy for amateurs and professionals: the potential of academic, special and public libraries. *Library Review* 60(3): 246-257.  
<http://dx.doi.org/10.1108/00242531111117290> Accessed 10 Mar. 2014.



- Könyves-Tóth, L. 1972. Youth library services in public libraries: an international survey. *International Library Review* 4(3): 303-311.  
<http://www.sciencedirect.com/science/article/pii/0020783772900052> Accessed 10 Mar. 2014.
- Kostagiolas, P., A. C. Banou and E.-M. Laskari. 2009. Strategic planning and management for the public libraries: the case of Greek central public libraries. *Library Management* 30(4): 253-265.  
<http://dx.doi.org/10.1108/01435120910957913> Accessed 10 Mar. 2014.
- Kostagiolas, P., A. Margiola and A. Avramidou. 2011. A library management response model against the economic crisis: the case of public libraries in Greece. *Library Review* 60(6): 486-500. <http://dx.doi.org/10.1108/00242531111147206> Accessed 10 Mar. 2014.
- Kouame, G., M. Harris and S. Murray. 2005. Consumer health information from both sides of the reference desk. *Library Trends* 53(3): 464-479. <http://goo.gl/3W3zYK> Accessed 10 Mar. 2014.
- Kranich, N. 2005. Civic partnerships. *Resource Sharing & Information Networks* 18(1-2): 89-103. [http://www.tandfonline.com/doi/abs/10.1300/J121v18n01\\_08](http://www.tandfonline.com/doi/abs/10.1300/J121v18n01_08) Accessed 22 Mar. 2013.
- Kronus, C. 1973. Patterns of adult library use: a regression and path analysis. *Adult Education Quarterly* 23(2): 115-131. <http://aeq.sagepub.com/content/23/2/115.short> Accessed 22 Mar. 2013.
- Kurtz-Rossi, S. and P. Duguay. 2010. Health information literacy outreach: improving health literacy and access to reliable health information in rural Oxford County, Maine. *Journal of Consumer Health on the Internet* 14(4): 325-340.  
<http://dx.doi.org/10.1080/15397734.2010.524089> Accessed 10 Mar. 2014.
- Lacey, P. and P. Smith. 2010. Inclusive libraries. *Journal of Assistive Technologies* 4(2): 44-48. <http://dx.doi.org/10.5042/jat.2010.0282> Accessed 10 Mar. 2014.
- LaGuardia, C. 2011. Library instruction in the digital age. *Journal of Library Administration* 51(3): 301-308. <http://dx.doi.org/10.1080/01930826.2011.556948> Accessed 10 Mar. 2014.



- Lai, H.-J. 2011. Information literacy training in public libraries: a case from Canada. *Journal of Educational Technology & Society* 14(2): 81-88. <http://goo.gl/IvaGLM> Accessed 9 Feb. 2014.
- Lai, H.-J. and C.-Y. Wang. 2012. Examining public librarians' information literacy, self-directed learning readiness, and e-learning attitudes: a study from Taiwan. *Malaysian Journal of Library and Information Science* 17(2): 101-115. [http://umrefjournal.um.edu.my/filebank/published\\_article/4646/1234.pdf](http://umrefjournal.um.edu.my/filebank/published_article/4646/1234.pdf) Accessed 10 Mar. 2014.
- Leckie, G. J. and J. Hopkins. 2002. The public place of central libraries: findings from Toronto and Vancouver. *The Library Quarterly* 72(3): 326-372. <http://search.proquest.com/docview/194754740?accountid=11921> Accessed 10 Mar. 2014.
- Lee, S. 2007. Vroom's expectancy theory and the public library customer motivation model. *Library Review* 56(9): 788-796. <http://search.proquest.com/docview/218302795?accountid=11921> Accessed 10 Mar. 2014.
- Lilienthal, S. M. 2013. Prison and public libraries. *Library Journal* 138(2): 26. <http://search.proquest.com/docview/1270656250?accountid=11921> Accessed 10 Mar. 2014.
- Lin, P. 2010. Information literacy barriers: language use and social structure. *Library Hi Tech* 28(4): 548-568. <http://dx.doi.org/10.1108/07378831011096222> Accessed 10 Mar. 2014.
- Listwon, A. and B. Sen. 2009. Public library services and the Polish community in England: case study. *Library Review* 58(4): 290-300. <http://dx.doi.org/10.1108/00242530910952837> Accessed 10 Mar. 2014.
- Liu, L. G. 2000. The emergence of business information resources and services on the Internet and its impact on business librarianship. *Online Information Review* 24(3): 234-255. <http://dx.doi.org/10.1108/14684520010341317> Accessed 10 Mar. 2014.
- Liu, L. G. 2004. The contribution of public libraries to countries' economic productivity: a path analysis. *Library Review* 53(9): 435-441. <http://dx.doi.org/10.1108/00242530410565210> Accessed 10 Mar. 2014.

- Lord, J. M. 2009. Improving the public: cultural and typological change in nineteenth-century libraries. PhD diss. New York: City University of New York.  
<http://search.proquest.com/docview/304861878?accountid=11921> Accessed 10 Mar. 2014.
- Losinski, P. 2012. From books to community: the changing value of public libraries. *National Civic Review* 101(4): 4.  
<http://onlinelibrary.wiley.com/doi/10.1002/ncr.21092/abstract> Accessed 8 Feb. 2014.
- Maatta, S. L. 2003. Adult literacy programs in community information resource centers in Florida: comparative case studies. PhD diss. Florida: The Florida State University.  
<http://search.proquest.com/docview/305326570?accountid=11921> Accessed 10 Mar. 2014.
- Macnaught, B. 2004. Impact and performance measurement in public library services in the UK. *Performance Measurement and Metrics* 5(3): 96-100.  
<http://dx.doi.org/10.1108/14678040410570102> Accessed 10 Mar. 2014.
- Mahmood, K. 2005. Multipurpose community telecenters for rural development in Pakistan. *Electronic Library* 23(2): 204-220.  
<http://dx.doi.org/10.1108/02640470510592906> Accessed 10 Mar. 2014.
- Maitra, S. 1974. (9) The public library and adult education in India. *International Library Review* 6(1): 55-60.  
<http://www.sciencedirect.com/science/article/pii/0020783774900624> Accessed 10 Mar. 2014.
- Malachowski, M. 2011. Patient activation: public libraries and health literacy. *Computers in Libraries* 31(10): 5-9. <http://goo.gl/jj4qaF> Accessed 10 Mar. 2014.
- Manero, E. and M. Clarke. 2007. What can public libraries bring to patient choice? *Library & Information Update* 6(7/8): 35-37. <http://goo.gl/iNX15e> Accessed 10 Mar. 2014.
- Marchant, M. M. P. 1994. *Why adults use the public library: a research perspective*. Englewood, CO: Libraries Unlimited.
- Marcum, D. B. D. 1996. Redefining community through the public library. *Daedalus* 125(4): 191-205. <http://search.proquest.com/docview/210566859?accountid=11921> Accessed 22 Mar. 2013.

- Markless, S. and D. Streatfield. 2001. Developing performance and impact indicators and targets in public and education libraries. *International Journal of Information Management* 21(2): 167-179.  
<http://www.sciencedirect.com/science/article/pii/S0268401201000081> Accessed 10 Mar. 2014.
- Mass. health info network launched by public libraries. 1977. *Library Journal* 102(22): 2464. <http://goo.gl/VUAlgE> Accessed 10 Mar. 2014.
- Massey, S. A., A. C. Weeks and T. Y. Neely. 2005. Providing library services for urban children: challenges and strategies. In D. A. Nitecki and E. Abels, eds. *Advances in Librarianship* 29: 73-97. [http://dx.doi.org/10.1016/S0065-2830\(05\)29002-5](http://dx.doi.org/10.1016/S0065-2830(05)29002-5) Accessed 10 Mar. 2014.
- Massis, B. 2013. Today's business libraries: a vital local resource in a challenging economy. *New Library World* 115(1/2): 61-64. <http://dx.doi.org/10.1108/NLW-09-2013-0070> Accessed 10 Mar. 2014.
- McCabe, R. 2001. *Civic librarianship: renewing the social mission of the public library*. Lanham: Scarecrow Press.
- McColvin, L. R. 1961. *Libraries for children*. London: Phoenix House.
- McCook, K. and P. Barber. 2002. Public policy as a factor influencing adult lifelong learning, adult literacy, and public libraries. *Reference & User Services Quarterly* 42(1): 66-75. <http://www.jstor.org/stable/20863942> Accessed 10 Mar. 2014.
- McKenna, J. 2007. Danish post-secondary students use public libraries for study purposes. *Evidence Based Library & Information Practice* 2(3): 108-110.  
<https://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/434> Accessed 10 Mar. 2014.
- McLaine, S. 2010. Healing for the soul: the book well program. *Australasian Public Libraries and Information Services* 23(4): 141-147. <http://goo.gl/OYCcuJ> Accessed 10 Mar. 2014.
- McLoughlin, C. and A. Morris. 2004. UK public libraries: roles in adult literacy provision. *Journal of Librarianship and Information Science* 36(1): 37-46.  
<http://lis.sagepub.com/content/36/1/37.short> Accessed 10 Mar. 2014.

- McMenemy, D. 2007. What is the true value of a public library? *Library Review* 56(4): 273-277. <http://search.proquest.com/docview/218298552?accountid=11921> Accessed 10 Mar. 2014.
- McMenemy, D. 2009. *The public library*. London: Facet Publishing.
- McShane, I. 2011. Public libraries, digital literacy and participatory culture. *Discourse: Studies in the Cultural Politics of Education* 32(3): 383-397. <http://www.tandfonline.com/doi/abs/10.1080/01596306.2011.573254> Accessed 10 Mar. 2014.
- Medical Library Association. 1996. The librarian's role in the provision of consumer health information and patient education. *Bulletin of the Medical Library Association* 84(2): 238-239. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC299415/> Accessed 22 Feb. 2014.
- Mehra, B. and K. Albright. 2006. Health information services available for people living with HIV/AIDS: perspectives of library and information professionals. *Proceedings of the American Society for Information Science and Technology* 43(1): 1-7. <http://onlinelibrary.wiley.com/doi/10.1002/meet.14504301150/full> Accessed 10 Mar. 2014.
- Mercado, M. I. 1997. Multicultural realities in the information age: questions of relevance for public library resource allocation and adequacy. *Bottom Line: Managing Library Finances* 10(3): 119-122. <http://dx.doi.org/10.1108/08880459710175728> Accessed 10 Mar. 2014.
- Merkley, C. 2012. Public library training program for older adults addresses their computer and health literacy needs. *Evidence Based Library & Information Practice* 7(4): 105-107. <http://goo.gl/syj0d5> Accessed 10 Mar. 2014.
- Milam, D. 2001. Access for all: public library contributions to civic connectivity. *National Civic Review* 90(3): 213-220. <http://onlinelibrary.wiley.com/doi/10.1002/ncr.90302/abstract> Accessed 10 Mar. 2014.
- Milam, D. 2008. Public library strategies for building stronger economies and communities. *National Civic Review* 97(3): 11-16. <http://dx.doi.org/10.1002/ncr.219> Accessed 10 Mar. 2014.

- Miller, L. N. 2012. Canadian public libraries are aware of their role as information literacy training providers, but face several challenges. *Evidence Based Library & Information Practice* 7(1): 120-121.  
<http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/12326> Accessed 10 Mar. 2014.
- Missingham, R. 2005. Libraries and economic value: a review of recent studies. *Performance Measurement and Metrics* 6(3): 142-158.  
<http://search.proquest.com/docview/223655916?accountid=11921> Accessed 22 Mar. 2013.
- Moody, K. 2004. Censorship by Queensland public librarians: philosophy and practice. *Australasian Public Libraries and Information Services* 17(4): 168-185.  
<http://goo.gl/kmtFZx> Accessed 22 Mar. 2013.
- Morris, J. 2013. Free to learn: helping ex-offenders with reentry. *Public Library Quarterly* 32(2): 119-123.  
<http://www.tandfonline.com/doi/abs/10.1080/01616846.2013.788936> Accessed 8 Feb. 2014.
- Most, L. 2009. The rural public library as place in north Florida: a case study. PhD diss. Florida: The Florida State University.  
<http://search.proquest.com/docview/193270017?accountid=11921> Accessed 10 Mar. 2014.
- Most, L. 2011. The rural public library as place: a theoretical analysis. In D. E. Williams and J. Golden, eds. *Advances in Library Administration and Organization*, 30:51-149. [http://dx.doi.org/10.1108/S0732-0671\(2011\)0000030005](http://dx.doi.org/10.1108/S0732-0671(2011)0000030005) Accessed 10 Mar. 2014.
- Muggleton, T. 2013. Public libraries and difficulties with targeting the homeless. *Library Review* 62(1/2): 7-18. <http://www.emeraldinsight.com/journals.htm?articleid=17087417&show=abstract> Accessed 10 Mar. 2014.
- Murray, L. 1971. The library and the community: North York Public Library (1) re-examination of objectives. *International Library Review* 3(3): 309-314.  
<http://www.sciencedirect.com/science/article/pii/S0020783771800079> Accessed 10 Mar. 2014.

- Nassimbeni, M. and B. May. 2006. Adult education in South African public libraries: a profile of activities. *South African Journal of Library and Information Science* 72(1): 12-26. [http://www.sabinet.co.za/abstracts/liasa/liasa\\_v72\\_n1\\_a2.html](http://www.sabinet.co.za/abstracts/liasa/liasa_v72_n1_a2.html) Accessed 10 Mar. 2014.
- Nassimbeni, M. and N. Tandwa. 2008. Adult education in two public libraries in Cape Town: a case study. *South African Journal of Libraries & Information Science* 74(1): 83-92. [http://reference.sabinet.co.za/sa\\_epublication\\_article/liasa\\_v74\\_n1\\_a8](http://reference.sabinet.co.za/sa_epublication_article/liasa_v74_n1_a8) Accessed 10 Mar. 2014.
- Newman, J. and B. McKee. 2005. Beyond the new public management? Public services and the social investment state. *Policy & Politics* 33(4): 657-673. <http://www.ingentaconnect.com/content/tpp/pap/2005/00000033/00000004/art00007> Accessed 22 Mar. 2013.
- Newton, R., A. Sutton and M. McConnell. 1998. Information skills for open learning: a public library initiative. *Library Review* 47(2): 125-134. <http://dx.doi.org/10.1108/00242539810205522> Accessed 10 Mar. 2014.
- Nielsen, B. G. and P. Borlund. 2011. Information literacy, learning, and the public library: a study of Danish high school students. *Journal of Librarianship and Information Science* 43(2): 106-119 <http://goo.gl/XOIL9> Accessed 9 Feb. 2014.
- Noe, G. 2012. Libraries and civic engagement: finding hope after tragedy. *National Civic Review* 101(4): 11-12. <http://dx.doi.org/10.1002/ncr.21096> Accessed 10 Mar. 2014.
- Norman, M. 2012. Frail, fatal, fundamental: the future of public libraries. *Public Library Quarterly* 31(4): 339. <http://dx.doi.org/10.1080/01616846.2012.732491> Accessed 10 Mar. 2014.
- North, S. 2000. A place for children: public libraries as a major force in children's reading. *Library Management* 21(5): 271-278. <http://links.emeraldinsight.com/journals.htm?articleid=1499953> Accessed 10 Mar. 2014.
- Novotny, E. 2011. "Bricks without straw": economic hardship and innovation in the Chicago Public Library during the Great Depression. *Libraries & the Cultural Record* 46(3): 258-275. <http://goo.gl/ogX2tL> Accessed 10 Mar. 2014.

- Nutefall, J. E. 2001. Information literacy: developing partnerships across library types. *Research Strategies* 18(4): 311-318.  
<http://www.sciencedirect.com/science/article/pii/S0734331003000077> Accessed 10 Mar. 2014.
- Nyren, K. 1985. Public library health info for central Massachusetts. *Library Journal* 110(14): 122-123. <http://goo.gl/q6uAMe> Accessed 10 Mar. 2014.
- Nzivo, C. N. 2012. User perception on library services and information resources in Kenyan public libraries. *Library Review* 61(2): 110-127.  
<http://search.proquest.com/docview/927125701?accountid=11921> Accessed 10 Mar. 2014.
- O’Beirne, R. 2010. *From lending to learning: the development and extension of public libraries*. Oxford: Chandos.
- Obiagwu, M. C. 1993. Library acquisitions and economic recovery in West Africa. *Collection Building* 12(1): 60-67. <http://dx.doi.org/10.1108/eb023329> Accessed 10 Mar. 2014.
- Oh, S. and Y. Noh. 2013. Online health information in South Korean public libraries: developing evaluation criteria. *Library & Information Science Research* 35(1): 78-84. <http://dx.doi.org/10.1016/j.lisr.2012.09.001> Accessed 10 Mar. 2014.
- Okiy, R. B. 2003. Information for rural development: challenge for Nigerian rural public libraries. *Library Review* 52(3/4): 126-131.  
<http://search.proquest.com/docview/218317535?accountid=11921> Accessed 10 Mar. 2014.
- Olden, A. 2005. “For poor nations a library service is vital”: establishing a national public library service in Tanzania in the 1960s. *Library Quarterly* 75(4): 421-445.  
<http://goo.gl/NsZCx0> Accessed 9 Feb. 2014.
- Omotosho, A. M. and O. C. Okiki. 2012. Challenges of public libraries patrons in the use of information services for attainment of health millennium development goals. *Library Philosophy and Practice* 758.  
<http://digitalcommons.unl.edu/libphilprac/758/> Accessed 10 Mar. 2014.

- Opara, U. 2008. The public library in contemporary Nigeria: challenges and the way forward. *IFLA Journal* 34(4): 349-358. <http://ifl.sagepub.com/content/34/4/349.short> Accessed 10 Mar. 2014.
- Owusu-Ansah, E. K. 2005. Debating definitions of information literacy: enough is enough! *Library Review* 54(5/6): 366-374.  
<http://search.proquest.com/docview/218295696?accountid=11921> Accessed 10 Mar. 2014.
- Oxborrow, K. 2012. Public libraries in Norway help non-Western immigrant women to integrate into society. *Evidence Based Library & Information Practice* 7(1): 114-115. <http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/12340> Accessed 10 Mar. 2014.
- Paberza, K. and U. Rutkauskiene. 2010. Outcomes-based measurement of public access computing in public libraries: a comparative analysis of studies in Latvia and Lithuania. *Performance Measurement and Metrics* 11(1): 75-82.  
<http://dx.doi.org/10.1108/14678041011026883> Accessed 10 Mar. 2014.
- Pankl, R. R. 2010. Marketing the public library's business resources to small businesses. *Journal of Business & Finance Librarianship* 15(2): 94-103.  
<http://dx.doi.org/10.1080/08963560903554641> Accessed 10 Mar. 2014.
- Parker, R. and G. Kreps. 2005. Library outreach: overcoming health literacy challenges. *Journal of the Medical Library Association* 93(4 Sup.): S81-S85. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1255757/> Accessed 10 Mar. 2014.
- Parker, S. 2006. The performance measurement of public libraries in Japan and the UK. *Performance Measurement and Metrics* 7(1): 29-36.  
<http://search.proquest.com/docview/223655737?accountid=11921> Accessed 22 Mar. 2013.
- Pateman, J. 1999. Social exclusion: an international perspective on the role of the state, communities and public libraries in tackling social exclusion. *Journal of Information Science* 25(6): 445-463. <http://jis.sagepub.com/content/25/6/445.short> Accessed 22 Mar. 2013.



- Pateman, J. and K. Williment. 2013. *Developing community-led public libraries: evidence from the UK and Canada*. Farnham, Surrey, UK: Ashgate Publishing Limited.
- Paulaitis, G., E. Vardell and J. Shipley. 2011. Collaborating with public librarians to promote emergency preparedness and safety awareness. *Journal of Consumer Health on the Internet* 15(4): 313-321.  
<http://dx.doi.org/10.1080/15398285.2011.623556> Accessed 10 Mar. 2014.
- Pettigrew, K. 2002. Facilitating community information seeking using the Internet: findings from three public library-community network systems. *Journal of the American Society for Information Science and Technology* 53(11): 894-903.  
<http://onlinelibrary.wiley.com/doi/10.1002/asi.10120/full> Accessed 10 Mar. 2014.
- Pettigrew, K., J. Durrance and P. Vakkari. 1999. Approaches to studying public library networked community information initiatives: a review of the literature and overview of a current study. *Library & Information Science Research* 21(3): 327-360. <http://www.sciencedirect.com/science/article/pii/S074081889900016X> Accessed 10 Mar. 2014.
- Phillips, A. 2012. Framing the public library: the public perception of the public library in the media. MLS thesis. Illinois: Dominican University.  
<http://search.proquest.com/docview/1240572830?accountid=11921> Accessed 10 Mar. 2014.
- Phinney, E. 1956. *Library adult education in action: five case studies*. Chicago: American Library Association.
- Picerno, P. V. 2005. Health and medical information on and off the Internet: what part can and do public libraries play? *Journal of Consumer Health on the Internet* 9(4): 11-25. [http://www.tandfonline.com/doi/abs/10.1300/J381v09n04\\_02](http://www.tandfonline.com/doi/abs/10.1300/J381v09n04_02) Accessed 8 Feb. 2014.
- Pifalo, V., S. Hollander, C. L. Henderson, P. DeSalvo and G. P. Gill. 1997. The impact of consumer health information provided by libraries: the Delaware experience. *Bulletin of the Medical Library Association* 85(1): 16-22.  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC226218/> Accessed 22 Mar. 2013.

- Pilerot, O. 2012. LIS research on information sharing activities: people, places, or information. *Journal of Documentation* 68(4): 559-581.  
<http://dx.doi.org/10.1108/00220411211239110> Accessed 10 Mar. 2014.
- Poll, R. 2003. Measuring impact and outcome of libraries. *Performance Measurement and Metrics* 4(1): 5-12. <http://dx.doi.org/10.1108/14678040310471202> Accessed 10 Mar. 2014.
- Poll, R. and P. Payne. 2006. Impact measures for libraries and information services. *Library Hi Tech* 24(4): 547-562. <http://dx.doi.org/10.1108/07378830610715419> Accessed 10 Mar. 2014.
- Pors, N. O. 2006. The public library and students' information needs. *New Library World* 107(7): 275-285. <http://dx.doi.org/10.1108/03074800610677263> Accessed 10 Mar. 2014.
- Pors, N. O. 2008. Trust and organisational effectiveness. *Performance Measurement & Metrics* 9(1): 59-68. <http://goo.gl/00Vaz7> Accessed 10 Mar. 2014.
- Pors, N. O. 2010. Burning platforms and melting icebergs: an exploratory analysis of present strategic challenges and cross-pressures in the public libraries. *Performance Measurement & Metrics* 11(1): 9-24. <http://dx.doi.org/10.1108/14678041011026838> Accessed 10 Mar. 2014.
- Preer, J. 2001. Where are libraries in bowling alone? *American Libraries* 32(8): 60-62. <http://search.proquest.com/docview/197149078?accountid=11921> Accessed 10 Mar. 2014.
- Prigoda, E. and P. J. McKenzie. 2007. Purls of wisdom: a collectivist study of human information behaviour in a public library knitting group. *Journal of Documentation* 63(1): 90-114. <http://dx.doi.org/10.1108/00220410710723902> Accessed 8 Mar. 2014.
- Public Library Association. Standards Committee. 1968. *Minimum standards for public library systems, 1966*. Chicago: American Library Association.
- Rader, H. B. 2000. A silver anniversary: 25 years of reviewing the literature related to user instruction. *Reference Services Review* 28(3): 290-297.  
<http://dx.doi.org/10.1108/00907320010345213> Accessed 10 Mar. 2014.

- Rader, H. B. 2002. Information literacy 1973-2002: a selected literature review. *Library Trends* 51(2): 242-259. <http://search.proquest.com/docview/220447512?accountid=11921> Accessed 22 Mar. 2013.
- Rahman, Z. 2013. Library, democracy and sustainable development: the role of public libraries in India. *Golden Research Thoughts* 3(2).  
<http://www.aygrt.isrj.net/ArticleDetails.aspx?id=2691> Accessed 10 Mar. 2014.
- Raju, R. and J. Raju. 2010. The public library as a critical institution in South Africa's democracy: a reflection. *LIBRES: Library & Information Science Research Electronic Journal* 20(1): 1-13. <http://goo.gl/z87zsP> Accessed 10 Mar. 2014.
- Rankin, C. 2012. The potential of generic social outcomes in promoting the positive impact of the public library: evidence from the national year of reading in Yorkshire. *Evidence Based Library & Information Practice* 7(1): 7-21.  
<http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/11727> Accessed 10 Mar. 2014.
- Ravi, B. and G. Vivek. 2013. Importance of partnerships for development of public libraries in India. *DESIDOC Journal of Library & Information Technology* 33(1): 17-20. <http://goo.gl/IWOCYX> Accessed 10 Feb. 2014.
- Ren, X. 2013. New York State Public Library Systems and their services. *Public Library Quarterly* 32(1): 46. <http://dx.doi.org/10.1080/01616846.2013.760397> Accessed 10 Mar. 2014.
- Rockman, I. F. 2003. Information literacy, a worldwide priority for the twenty-first century. *Reference Services Review* 31(3): 209-210.  
<http://dx.doi.org/10.1108/00907320310486791> Accessed 10 Mar. 2014.
- Romero, N. L. 2011. Libraries' response to the crisis: measures to mitigate its impact. *Bottom Line: Managing Library Finances* 24(4): 236-240.  
<http://dx.doi.org/10.1108/08880451111193352> Accessed Mar. 2014.
- Rooney-Browne, C. 2009. Rising to the challenge: a look at the role of public libraries in times of recession. *Library Review* 58(5): 341-352.  
<http://search.proquest.com/docview/218297408?accountid=11921> Accessed Mar. 2014.

- Rooney-Browne, C. and D. McMenemy. 2010. Public libraries as impartial spaces in a consumer society: possible, plausible, desirable? *New Library World* 111(11/12): 455-467. <http://search.proquest.com/docview/807493656?accountid=11921> Accessed 10 Mar. 2014.
- Ross, S. V. T. 2011. Non-resident use of public libraries in Appalachia. *Library Management* 32(8/9): 540-552. <http://search.proquest.com/docview/900910690?accountid=11921> Accessed 10 Mar. 2014.
- Roy, L., T. Bolfiging and B. Brzozowski. 2010. Computer classes for job seekers: LIS students team with public librarians to extend public services. *Public Library Quarterly* 29(3): 193-209. <http://dx.doi.org/10.1080/01616846.2010.502028> Accessed 10 Mar. 2014.
- Roy, L., B. Brzozowski, S. Arnold-Garza and K. Beauchemin. 2001. "Are you searching for a new job?" *Texas Library Journal* 87(1): 30-33. <http://goo.gl/fvsRk9> Accessed 10 Mar. 2014.
- Ruffin, A. B., K. Cogdill, L. Kutty and M. Hudson-Ochillo. 2005. Access to electronic health information for the public: analysis of fifty-three funded projects. *Library Trends* 53(3): 434-452. <http://search.proquest.com/docview/220444092?accountid=11921> Accessed 10 Mar. 2014.
- Rusk, M. D. and E. Cummings. 2011. Libraries and the local economy: partnerships for economic growth (a presentation to the Oklahoma Library Association, March 30, 2011). *Community and Junior College Libraries* 17(2): 53-61. <http://dx.doi.org/10.1080/02763915.2011.591708> Accessed 10 Mar. 2014.
- Ruthven, J. 2010. Training needs and preferences of adult public library clients in the use of online resources. *Australian Library Journal* 59(3): 108-117. <http://goo.gl/2L3Vvs> Accessed 10 Mar. 2014.
- Ryan, J. and C. R. C. McClure. 2003. Economic impact of the Hawaii State Public Library System (HSPLS) on the business and tourism industries study: final report. *Online Submission*. <http://goo.gl/dDB2ZP> Accessed 10 Mar. 2014.
- Salmer, G. 2008. Time to read and Estevan area literacy group: results from two collaborative approaches to literacy. Paper presented at the 74th IFLA World Library and Information Congress: General Conference and Council, Québec, Canada. 10-14

- August 2008. <http://archive.ifla.org/IV/ifla74/papers/085-Salmers-en.pdf> Accessed 10 Mar. 2014.
- Sathe, N., A. P. Lee and N. B. Giuse. 2004. A power information user (PIU) model to promote information integration in Tennessee's public health community. *Journal of the Medical Library Association* 92(4): 459-464. <http://goo.gl/ljgZxE> Accessed 10 Mar. 2014.
- Sawyer, R. 1996. The economic and job creation benefits of Ontario Public Libraries. *Bottom Line: Managing Library Finances* 9(4): 14-26. <http://dx.doi.org/10.1108/08880459610131781> Accessed 22 Mar. 2013.
- Schwartz, D. G., E. Mosher, S. Wilson, C. Lipkus and R. Collins. 2002. Seniors connect: a partnership for training between health care and public libraries. *Medical Reference Services Quarterly* 21(3): 1-19. <http://goo.gl/EKcNLJ> Accessed 10 Mar. 2014.
- Scott, R. 2011a. The role of public libraries in community building. *Public Library Quarterly* 30(3): 191-227. <http://dx.doi.org/10.1080/01616846.2011.599283> Accessed 8 Feb. 2014.
- Scott, R. 2011b. Strategies that public libraries use to build communities. *Public Library Quarterly* 30(4): 307-346. <http://dx.doi.org/10.1080/01616846.2011.625604> Accessed 10 Mar. 2014.
- Shabi, I. I. N. 2012. Knowledge and attitude of women to HIV/AIDS in a farming community in southwestern Nigeria: challenges for public libraries. *Public Library Quarterly* 31(3): 246. <http://www.tandfonline.com/doi/abs/10.1080/01616846.2012.684631> Accessed 8 Feb. 2014.
- Shenton, A. K. 2009. Search images, information seeking and information literacy. *Library Review* 58(2): 109-115. <http://dx.doi.org/10.1108/00242530910936925> Accessed 10 Mar. 2014.
- Shoham, S. and R. Rabinovich. 2008. Public library services to new immigrants in Israel: the case of immigrants from the former Soviet Union and Ethiopia. *The International Information & Library Review* 40(1): 21-42. <http://www.sciencedirect.com/science/article/pii/S1057231707000574> Accessed 10 Mar. 2014.

- Sigler, K. P., P. T. P. Jaeger, J. J. C. Bertot, A. J. McDermott, E. J. DeCoster and L. A. Langa. 2011. The role of public libraries, the Internet, and economic uncertainty. *Advances in Librarianship*, 34: 19-35. [http://dx.doi.org/10.1108/S0065-2830\(2011\)0000034005](http://dx.doi.org/10.1108/S0065-2830(2011)0000034005) Accessed 22 Mar. 2013.
- Sigurgeirsdottir, M. and H. A. Hardarson. 2011. One lives longer by visiting the public library. *Scandinavian Public Library Quarterly* 44(1): 10-13. <http://goo.gl/eDwCQr> Accessed 10 Mar. 2014.
- Skot-Hansen, D., C. H. Rasmussen and H. Jochumsen. The role of public libraries in culture-led urban regeneration. *New Library World* 114(1): 7-19. <http://dx.doi.org/10.1108/03074801311291929> Accessed 10 Mar. 2014.
- Skov, A. 2004. Information literacy and the role of public libraries. *Scandinavian Public Library Quarterly* 3: 4-7. <http://goo.gl/wqkTXK> Accessed 22 Mar. 2013.
- Skrzeszewski, S. and M. Cubberley. 1997. Community-based economic development and the library: a concept paper. *Library Management* 18(7): 323-327. <http://dx.doi.org/10.1108/01435129710170379> Accessed 10 Mar. 2014.
- Smith, C. 2011. "The easier-to-use version": public librarian awareness of consumer health resources from the National Library of Medicine. *Journal of Consumer Health on the Internet* 15(2): 149-163. <http://dx.doi.org/10.1080/15398285.2011.573339> Accessed 10 Mar. 2014.
- Smith, C. and K. Eschenfelder. 2011. *Public libraries as financial literacy supporters: a report of the Wisconsin Center for Financial Security, 2011*. <http://minds.wisconsin.edu/handle/1793/55445> Accessed 10 Mar. 2014.
- Smith, C. and K. Eschenfelder. 2013. Public libraries in an age of financial complexity: toward enhancing community financial literacy. *Library Quarterly: Information, Community, Policy* 83(4): 299-329. <http://www.jstor.org/stable/10.1086/671912> Accessed 8 Feb. 2014.
- Smyth, A. L. 1993. The information services provided by public libraries to industry and commerce. *Aslib Proceedings* 25(12): 468-476. <http://dx.doi.org/10.1108/eb050437> Accessed 10 Mar. 2014.
- Spacey, R. and L. Cooke. 2013. Regulating use of the Internet in public libraries: a review. *Journal of Documentation* 70(3).

- <http://www.emeraldinsight.com/journals.htm?articleid=17101492&show=abstract>  
Accessed 10 Mar. 2014.
- Spang, L. and L. M. Baker. 2000. Healthcare information delivery in public libraries: implications for academic reference librarians. *Reference Services Review* 28(1): 81-94. <http://dx.doi.org/10.1108/00907320010313867> Accessed 10 Mar. 2014.
- Sparanese, A. C. 2002. Service to the labor community: a public library perspective. *Library Trends* 51(1): 19-35. <http://search.proquest.com/docview/220453412?accountid=11921> Accessed 10 Mar. 2014.
- Špiranec, S., M. B. Zorica and G. S. Simončič. 2012. Libraries and financial literacy: perspectives from emerging markets. *Journal of Business & Finance Librarianship* 17(3): 262-278.  
<http://www.tandfonline.com/doi/abs/10.1080/08963568.2012.686438> Accessed 8 Feb. 2014.
- Steffen, N., Z. Lietzau, K. C. Lance, A. Rybin and C. Molliconi. 2009. Public libraries - a wise investment: a return on investment study of Colorado Public Libraries. *Library Research Service*. <http://goo.gl/BIF9F4> Accessed 10 Mar. 2014.
- Stern, C. and T. Kaur. 2010. Developing theory-based, practical information literacy training for adults. *The International Information & Library Review* 42(2): 69-74.  
<http://www.sciencedirect.com/science/article/pii/S105723171000024X> Accessed 10 Mar. 2014.
- Stevens, C. and P. Campbell. 2006. Collaborating to connect global citizenship, information literacy, and lifelong learning in the global studies classroom. *Reference Services Review* 34(4): 536-556. <http://www.emeraldinsight.com/journals.htm?articleid=1583910&show=abstract> Accessed 22 Mar. 2013.
- Stilwell, C. 2006. "Boundless opportunities?": towards an assessment of the usefulness of the concept of social exclusion for the South African public library situation. *Innovation* 32(1): 1-28. <http://www.innovation.ukzn.ac.za/InnovationPdfs/No32pp1-28Stilwell.pdf> Accessed 22 Mar. 2013.
- Susic, J. 2009. NIH senior health classes for senior citizens at a public library in Louisiana. *Journal of Consumer Health on the Internet* 13(4): 417-419.  
<http://dx.doi.org/10.1080/15398280903341226> Accessed 10 Mar. 2014.



- Svendsen, G. L. H. 2010. Socio-spatial planning in the creation of bridging social capital: the importance of multifunctional centers for intergroup networks and integration. *International Journal of Social Inquiry* 3(2): 45-73.  
<http://goo.gl/aODGir> Accessed 10 Mar. 2014.
- Svendsen, G. L. H. 2013. Public libraries as breeding grounds for bonding, bridging and institutional social capital: the case of branch libraries in rural Denmark. *Sociologia Ruralis* 53(1): 52-73.  
<http://onlinelibrary.wiley.com/doi/10.1111/soru.12002/full> Accessed 9 Feb. 2014.
- Talvé, A. 2011. Libraries as places of invention. *Library Management* 32(8): 493-504.  
<http://dx.doi.org/10.1108/01435121111187860> Accessed 10 Mar. 2014.
- Taylor, N., P. Jaeger, A. McDermott, C. Kodama and J. Bertot. 2012. Public libraries in the new economy: twenty-first-century skills, the Internet, and community needs. *Public Library Quarterly* 31(3): 191-219.  
<http://dx.doi.org/10.1080/01616846.2012.707106> Accessed 10 Mar. 2014.
- Thebridge, S. and B. Train. 2002. Promoting reading through partnerships: a ten-year literature overview. *New Library World* 103(4): 131-140.  
<http://dx.doi.org/10.1108/03074800210428542> Accessed 10 Mar. 2014.
- Train, B. 2003. Building up or breaking down barriers? The role of the public library in adult basic skills education. *Library Review* 52(8): 394-402.  
<http://dx.doi.org/10.1108/00242530310493806> Accessed 10 Mar. 2014.
- Train, B. and J. Elkin. 2001a. Effecting change: reader development projects in public libraries. *Library Management* 22(8/9): 395-403.  
<http://search.proquest.com/docview/198827690?accountid=11921> Accessed 10 Mar. 2014.
- Train, B. and J. Elkin. 2001b. "Measuring the unmeasurable": reader development and its impact on performance measurement in the public library sector. *Library Review* 50(6): 295-304. <http://dx.doi.org/10.1108/EUM0000000005598> Accessed 10 Mar. 2014.
- Uddin, M., N. M. Quaddus and M. S. Islam. 2006. Socio-economic-cultural aspects and mass information need: the case of public library uses in Bangladesh. *Library Management* 27(9): 636-652. <http://dx.doi.org/10.1108/01435120610715536> Accessed 10 Mar. 2014.



- Ulvik, S. 2010. "Why should the library collect immigrants' memories?": a study of a multicultural memory group at a public library in Oslo. *New Library World* 111(3): 154-160. <http://search.proquest.com/docview/229579320?accountid=11921> Accessed 22 Mar. 2013.
- Underwood, P. 2009. Supporting the information needs of entrepreneurs in South Africa. *Library Review* 58(8): 569-580. <http://dx.doi.org/10.1108/00242530910987064> Accessed 10 Mar. 2014.
- Usherwood, B. 2002. Demonstrating impact through qualitative research. *Performance Measurement and Metrics* 3(3): 117-122. <http://www.emeraldinsight.com/journals.htm?articleid=862306&show=abstract> Accessed 22 Feb. 2014.
- Usherwood, B. 2007. *Equity and excellence in the public library: why ignorance is not our heritage*. Hampshire: Ashgate.
- Usherwood, B. and R. Linley. 1999. New library-new measures: a social audit of public libraries. *IFLA Journal* 25(2): 90-96. <http://ifl.sagepub.com/content/25/2/90.short> Accessed 10 Mar. 2014.
- Vakkari, P. 2014. Models explaining the perceived outcomes of public libraries. *Journal of Documentation* 70(4). <http://www.emeraldinsight.com/journals.htm?articleid=17103118&show=abstract> Accessed 7 Feb. 2014.
- Vakkari, P. and S. Serola. 2012. Perceived outcomes of public libraries. *Library & Information Science Research* 34(1): 37-44. <http://www.sciencedirect.com/science/article/pii/S0740818811000934> Accessed 10 Mar. 2014.
- Vallet, N. 2013. Becoming partners in urban development a case-study research on the strategic roles of Flemish and Dutch public libraries in the future development of cities. *Library Management* 34(8/9): 650-663. <http://dx.doi.org/10.1108/LM-03-2013-0024> Accessed 10 Mar. 2014.
- Vårheim, A. 2007. Social capital and public libraries: the need for research. *Library & Information Science Research* 29(3): 416-428. <http://www.sciencedirect.com/science/article/pii/S0740818807000631> Accessed 22 Mar. 2013.

- Vårheim, A. 2008. Theoretical approaches on public libraries as places creating social capital. Paper presented at 74th IFLA World Library and Information Congress: General Conference and Council, Québec, Canada. 10-14 Aug. 2008.  
<http://archive.ifla.org/IV/ifla74/papers/091-Varheim-en.pdf> Accessed 10 Mar. 2014.
- Vårheim, A. 2009. Public libraries: places creating social capital? *Library Hi Tech* 27(3): 372-381. <http://goo.gl/ElnCPz> Accessed 22 Mar. 2013.
- Vårheim, A. 2011. Gracious space: library programming strategies towards immigrants as tools in the creation of social capital. *Library & Information Science Research* 33(1): 12-18. <http://www.sciencedirect.com/science/article/pii/S0740818810001088> Accessed 22 Mar. 2013.
- Vavrek, B. 1995. Rural libraries and community development. *Wilson Library Bulletin* 69(5): 42-44. <http://goo.gl/tjmgkX> Accessed 10 Mar. 2014.
- Vengersammy, O. 2011. Libraries adding value with technology training. *Computers in Libraries* 31(9): 10-15. <http://goo.gl/zrlGca> Accessed 8 Feb. 2014.
- Wadley, A. L., J. E. Broady and T. E. Hayward. 1997. An evaluation of current public library service to the full-time employed. *Library Management* 18(4): 205-215  
<http://search.proquest.com/docview/198793932?accountid=11921> Accessed 10 Mar. 2014.
- Wallis, J. 2003. Information-saturated yet ignorant: information mediation as social empowerment in the knowledge economy. *Library Review* 52(8): 369-372.  
<http://dx.doi.org/10.1108/00242530310493770> Accessed 10 Mar. 2014.
- Van der Walt, F. 2008. The educational role of the public library in teaching information literacy skills to children. *Cape Librarian* 52(1): 14-16.  
<http://goo.gl/Mtr41z> Accessed 10 Mar. 2014.
- Walter, V. A. V. 2003. Public library service to children and teens: a research agenda. *Library Trends* 51(4): 571-589, 690.  
<http://search.proquest.com/docview/220465692?accountid=11921> Accessed 22 Mar. 2013.
- Walwyn, O. and J. Rowley. 2011. The value of therapeutic reading groups organized by public libraries. *Library & Information Science Research* 33(4): 302-312.

- <http://www.sciencedirect.com/science/article/pii/S0740818811000648> Accessed 10 Mar. 2014.
- Walzer, N. and J. Gruidl. 1997. Rural public libraries and community economic development. *Illinois Libraries* 79: 178-181.
- Welch, J. M. 2005. Silent partners: public libraries and their services to small businesses and entrepreneurs. *Public Libraries* 44(5): 282-286.  
<http://search.proquest.com/docview/217450609?accountid=11921> Accessed 10 Mar. 2014.
- Welsh, T. S. and S. E. Higgins. 2009. Public libraries post-Hurricane Katrina: a pilot study. *Library Review* 58(9): 652-659.  
<http://dx.doi.org/10.1108/00242530910997937> Accessed 10 Mar. 2014.
- Westbrook, L. 2008. Understanding crisis information needs in context: the case of intimate partner violence survivors. *Library Quarterly* 78(3): 237-261.  
<http://goo.gl/ftEKUh> Accessed 10 Mar. 2014.
- Wiegand, W. 2003. To reposition a research agenda: what American studies can teach the LIS community about the library in the life of the user. *The Library Quarterly* 73(4): 369-383. <http://www.jstor.org/stable/10.2307/4309683> Accessed 22 Mar. 2013.
- Wiegand, W. 2011. Main street public library. *American Libraries* 42(9/10): 46-48.  
<http://search.proquest.com/docview/901009889?accountid=11921> Accessed 10 Mar. 2014.
- Wijasuriya, D. E. K. 1974. (14) Public library development in Malaysia: a brief statement of existing conditions together with a research proposal. *International Library Review* 6(1): 91-102.  
<http://www.sciencedirect.com/science/article/pii/0020783774900673> Accessed 10 Mar. 2014.
- Wijetunge, P. 2000. The role of public libraries in the expansion of literacy and lifelong learning in Sri Lanka. *New Library World* 101(3): 104-111.  
<http://dx.doi.org/10.1108/03074800010324558> Accessed 10 Mar. 2014.
- Williams, P. and J. Edwards. 2011. Nowhere to go and nothing to do: how public libraries mitigate the impacts of parental work and urban planning on young people.

- Australasian Public Libraries and Information Services* 24(4): 142-152.  
<http://search.proquest.com/docview/912684213?accountid=11921> Accessed 10 Mar. 2014.
- Williamson, K. 2009. Creating the new village green: the impact of the retirement of the baby boomers on the public library. *Australasian Public Libraries and Information Services* 22(2): 83-88. <http://search.proquest.com/docview/214110800?accountid=11921> Accessed 10 Mar. 2014.
- Witte, K. De and B. Geys. 2011. Evaluating efficient public good provision: theory and evidence from a generalised conditional efficiency model for public libraries. *Journal of Urban Economics* 69(3): 319-327.  
<http://www.sciencedirect.com/science/article/pii/S0094119010000902> Accessed 10 Mar. 2014.
- Wood, F. B., B. Lyon, M. B. Schell, P. Kitendaugh, V. H. Cid and E. R. Siegel. 2000. Public library consumer health information pilot project: results of a national library of medicine evaluation. *Bulletin of the Medical Library Association* 88(4): 314-322.  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC35252/> Accessed 22 Mar. 2013.
- Woodson, D. E., D. F. Timm and D. E. E. Jones. 2011. Teaching kids about healthy lifestyles through stories and games: partnering with public libraries to reach local children. *Journal of Hospital Librarianship* 11(1): 59-69.  
<http://dx.doi.org/10.1080/15323269.2011.538619> Accessed 10 Mar. 2014.
- Wray, W. 2009. Library services for the poor: implications for library education. *Public Library Quarterly* 28(1): 40-48.  
<http://www.tandfonline.com/doi/abs/10.1080/01616840802675390> Accessed 8 Feb. 2014.
- Xie, B. and J. M. J. Bugg. 2009. Public library computer training for older adults to access high-quality Internet health information. *Library & Information Science Research* 31(3): 155-162. <http://dx.doi.org/10.1016/j.lisr.2009.03.004> Accessed 22 Mar. 2013.
- Xie, B. and P. T. Jaeger PhD. 2008. Computer training programs for older adults at the public library. *Public Libraries* 47(5): 52-59.  
<http://search.proquest.com/docview/217466377?accountid=11921> Accessed 10 Mar. 2014.

- Yi, Y. J. 2012. Consumer health information behavior in public libraries: a mixed methods study. PhD diss. Florida: The Florida State University.  
<http://search.proquest.com/docview/1034741744?accountid=11921> Accessed 10 Mar. 2014.
- Yi, Y. J. and S. You. 2012. A revised model for course content of consumer health information services. In *ACM International Conference Proceeding Series*. Tallahassee, FL: School of Library and Information Studies, College of Communication and Information, Florida State University, 646-647.  
<http://dx.doi.org/10.1145/2132176.2132323> Accessed 10 Mar. 2014.
- Yilmaz, B. 2002. Social change, industrialisation and public libraries: a theoretical approach. *Aslib Proceedings* 54(5): 326-334.  
<http://dx.doi.org/10.1108/00012530210448271> Accessed 10 Mar. 2014.
- Zabel, D. and E. Novotny. 2010. Hard choices in hard times lessons from the Great Depression. *Reference & User Services Quarterly* 49(3): 222-224.  
<http://goo.gl/QCcyGc> Accessed 10 Mar. 2014.
- Zionts, N., J. Apter, J. Kuchta and P. K. Greenhouse. 2010. Promoting consumer health literacy: creation of a health information librarian fellowship. *Reference & User Services Quarterly* 49(4): 350-359.  
<http://rusa.metapress.com/index/P76H9263H2224H26.pdf> Accessed 10 Mar. 2014.

## Appendix B: Countries included in international regressions

Table 92 gives the details of which countries were included in the various regressions that were discussed in Chapter 4. The key to the column numbers is given below the table. The final column, labelled “Total”, gives the number of regressions that that specific country was included in. The final row shows the number of countries that were included in each regression.

*Table 92: Countries included in international regressions*

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Armenia	•		•	•	•		•	•		•	•	•	9
Bahamas		•	•				•	•		•			5
Bulgaria	•	•	•	•	•	•	•	•	•	•	•	•	12
Burkina Faso		•	•	•	•		•			•	•	•	8
China, Macao Special Administrative Region		•	•	•			•	•		•	•		7
Costa Rica		•	•	•			•	•		•	•		7
Croatia	•	•	•	•	•	•	•	•	•	•	•	•	12
Cuba		•	•				•	•	•	•			6
Cyprus	•	•	•	•	•	•	•	•		•	•	•	11
Czech Republic		•	•		•		•	•		•		•	7
Denmark		•	•	•			•	•		•	•		7
Ecuador		•	•	•			•	•		•	•		7
Estonia	•	•	•	•	•	•	•	•	•	•	•	•	12
Finland		•	•	•	•	•	•	•	•	•	•	•	11
Hungary	•	•	•	•	•	•	•	•	•	•	•	•	12
Iceland		•	•	•			•	•		•	•		7
Japan	•	•	•	•	•	•	•	•	•	•	•	•	12
Latvia	•	•	•	•	•	•	•	•	•	•	•	•	12
Lithuania	•	•	•		•		•	•		•		•	8
Mexico	•	•	•	•	•	•	•	•	•	•	•	•	12
Norway	•	•	•	•	•	•	•	•	•	•	•	•	12
Poland	•	•	•		•		•	•		•		•	8
Portugal	•		•	•	•		•	•		•		•	8
Republic of Moldova	•	•	•		•		•	•		•		•	8
Romania	•	•	•		•		•	•		•		•	8
Russian Federation	•	•	•		•		•	•		•		•	8
Rwanda		•	•				•			•			4
Saint Vincent and the Grenadines			•				•			•			3
Saudi Arabia			•				•	•		•			4
Sierra Leone			•				•			•			3
Slovakia	•	•	•		•		•	•		•		•	8
Slovenia		•	•				•	•		•			5
Sweden	•	•	•		•	•	•	•	•	•	•	•	11
Turkey			•				•	•		•			5
Uganda			•				•			•			3
United Kingdom of Great Britain and Northern Ireland	•		•	•	•		•	•		•	•	•	9
n=	22	28	36	19	22	11	36	31	11	36	19	22	

Column Key:

1. circ\_int\_99; unem\_int\_99 —> gdp\_int\_99
2. circ\_int\_99; educ\_int\_99 —> gdp\_int\_99
3. circ\_int\_99; health\_int\_99 —> gdp\_int\_99
4. circ\_int\_99; sc\_int\_99 —> gdp\_int\_99
5. circ\_int\_99; save\_int\_99 —> gdp\_int\_99
6. circ\_int\_99; development variables —> gdp\_int\_99
7. circ\_int\_99 —> gdp\_int\_99
8. circ\_int\_99 —> unem\_int\_99
9. circ\_int\_99 —> educ\_int\_99
10. circ\_int\_99 —> health\_int\_99
11. circ\_int\_99 —> sc\_int\_99
12. circ\_int\_99 —> save\_int\_99