

# The Historical Relation between Banking, Insurance, and Economic Growth in Sweden: 1830 to 1998

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## Abstract

We examine empirically the dynamic historical relation between banking, insurance and economic (income) growth in Sweden using time-series data from 1830 to 1998. We examine long-run historical trends in the data using econometric tests for cointegration and Granger causality. Our results indicate that the development of domestic bank lending, but not insurance, preceded economic growth in Sweden during the nineteenth century, while Granger causality was reversed in the twentieth century. We also find that the development of bank lending in the nineteenth century increased the demand for insurance as well as promoting economic growth. In later periods, the development of insurance fosters demand for banking services but only in times of economic prosperity. For the entire period of our analysis, we find that banking is the predominant influence on both economic growth and the demand for insurance. In contrast, the insurance market appears to be driven more by the pace of growth in the economy rather than leading economic development. Therefore, we conclude that financial intermediation (particularly banking) is an important prerequisite for stimulating economic growth and argue that our results could have important policy implications for contemporary emerging economies that are developing their financial and legal infrastructure.

## INTRODUCTION

In this paper we examine the dynamic historical relation between banking, insurance and economic (income) growth in Sweden using time-series data from 1830 to 1998<sup>1</sup>. We believe that this is a particularly apt topic for research given that banks and insurance companies have historically played an important role in economic development as a result of their financial intermediary activities<sup>2</sup>. For example, economic historians with an interest in both commercial (i.e., savings and credit) banking (e.g., Nygren, 1983; Jonung, 1992; Hansson and Jonung, 1997; Crothers, 1999) and

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<sup>2</sup> Financial intermediation is essentially concerned with the transfer of resources from savers (surplus units) to users of funds (deficit units) in the economy (Boot and Thakor, 1997a, pp. 693-694). Skogh (1991, p. 66) contends that the differences between banks and insurance companies as financial intermediaries lie in their respective specializations in risks and customers. For example, banks have traditionally specialized in personal and commercial financial (e.g., credit) risks and insurance companies have specialized in personal and commercial accident (e.g., liability) risks.

insurance markets (e.g., Pearson, 1992, 1993; Smith and Stutzer, 1995; Crothers, 2004) have consistently reported that financial intermediation assisted economic development in the early years of mass industrialization in the eighteenth and nineteenth centuries by, amongst other things, mobilizing savings, mitigating risk and uncertainty, encouraging entrepreneurship, accumulating productive capital, and fostering the development of the national financial and legal infrastructure. Outreville (1990, 1996), Arestis and Demetriades (1997), Adams and Zou (2004) amongst others, argue that, for similar reasons, there is likely to be a strong linkage between banking, insurance and economic growth in today's emerging economies. However, not many previous empirical studies have focused on the role played by financial intermediation (especially insurance) in the historical development of modern economies (e.g., see Sylla, 2002, 2003). Additionally, researchers (e.g., Pagano, 1983; Rousseau and Sylla, 2005; Sylla 2002, 2003) suggest that the conjoint effects of banking and other financial systems (like insurance) in relation to historical patterns of economic growth is not clear from the literature. Indeed, Luintel and Khan (1999, p. 382) report that the issue of causality between financial intermediation and economic growth is theoretically controversial. Therefore, we believe that econometric work on the historical development of the financial services sector and its implications for the wider economy could usefully inform economic historians as well as industry regulators, legislators, and others with a contemporary policy interest in financial services, and its role in international economic development. For example, empirical studies, such as ours, can help to promote a better understanding of how financial services facilitate risk-taking and entrepreneurship in developing economies. Indeed, Levine, Loayza and Beck (2000, p. 32) state that “. . . if financial intermediaries exert an economically large impact on growth, then this raises the degree of urgency attached to legal, regulatory, and policy reforms designed to promote financial development.” It is also now recognized in the economics literature “. . . that cointegration tests require a long time span of data rather than merely a large number of observations” (Luintel and Kahn, 1999, p. 387). Furthermore, a country-specific approach (such as that adopted in the present study) helps to avoid the potentially confounding effects, such as differences in culture and regulatory environments that can arise in prior cross-country financial services-economic growth-based studies (e.g., see Ward and Zurbruegg, 2000)<sup>3</sup>.

Hansson and Jonung (1997), Wachtel and Rousseau (1995), Rousseau and Wachtel (1998), Levine (1999), Levine et al. (2000), Ward and Zurbruegg (2000), amongst others, have pointed out that economic growth can be either supply-led as a result of development in financial intermediaries like banks and insurance companies, or alternatively, economic growth can promote the public demand for financial services. In fact, the question of whether the financial services sector preceded or followed economic growth has for a long time been debated in the economic history literature on Scandinavia (e.g., see Sandberg, 1978, 1979; Nygren, 1983; Hansson and Jonung, 1997; Schön, 1988, 1995) and other parts of the world such as the United Kingdom (UK) (e.g., see Pearson, 1992, 1993, 2004) and the United States (US) (e.g. see Rousseau and Sylla, 2005; Crothers, 1999, 2004). Indeed, Pearson (2004) reports that the contribution of the insurance industry to economic growth (and vice versa) during the industrial revolution and afterwards is unclear from the economic history literature due to a lack of empirical data and analysis. However, in the financial economics literature, where studies have tended to be conducted on a cross-sectional country basis often using reasonably short time-series data (typically less than 40 years), there is no conclusive empirical evidence on the direction of the causal relation between the development of banking and insurance markets and economic growth (e.g., see Outreville, 1990, p. 491 and Ward and Zurbruegg, 2000, p. 490). This study thus contributes to the literature by shedding light on the empirical linkage between banking and insurance separately and conjointly on Swedish economic growth over the 169 years from 1830-1998 – a period covering the early years of mass industrialization to the present day<sup>4</sup>.

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<sup>3</sup> This attribute does not necessarily mean that our results do not have wider appeal. For example, our results could be generalized to the financial services sector of countries that have experienced a similar economic history and institutional legal-regulatory framework to Sweden – for example, other Scandinavian countries.

<sup>4</sup> Gårdlund (1947) suggests that the early 1830s mark the approximate beginning of Sweden's modern industrialization period. The 1830s also witnessed greater monetary stability (e.g., through the re-establishment of a silver standard in 1834 that had been abandoned in 1809) and the formation of the first commercial banks.

We contend that Sweden is a potentially interesting domain in which to focus our study not only because of the country's rich economic archives<sup>5</sup>, but for other reasons too. For example, take the insurance industry: unlike UK and US-based insurance companies, which have invested heavily in equity markets since the 1920s (Scott, 2002), Swedish insurers have (due primarily to regulatory constraints) only been active purchasers of equities since the late 1970s/early 1980s (Lindmark, Andersson and Adams, 2006). Indeed, Waldenström (2002) reports that high taxes on equity transactions during the first half of the twentieth century effectively 'crowded out' trading on the Stockholm Stock Exchange<sup>6</sup>. In the post-1945 period, Swedish insurance companies were required by the Insurance Act 1948 to adopt a precautionary asset management strategy and work in partnership with government in the public management of the economy and the pursuance of state welfare objectives (e.g., social insurance) (Larsson, 1991; Lindmark et al., 2006)<sup>7</sup>. This situation could have affected the financial intermediation function of insurance in Sweden during much of the twentieth century - for example, in terms of reducing the efficient allocation of capital in the economy, and thus restricting economic growth. Therefore, the historical relation between insurance and economic growth in Sweden could take on a different profile from that of other relatively less regulated insurance markets such as the UK and US where (according to Scott (2002) for example) insurance companies have been more active investors in the domestic stock markets and less integrated with State economic planning. This could potentially provide important insights as to the nature of the empirical relation between financial intermediation and economic growth in environments subject to different levels of regulation and financial market investment, particularly over time. Furthermore, Allen and Gale (1995) suggest that bank-dominated financial systems (such as Sweden and Germany) provide improved inter-temporal risk sharing, while financial market-dominated systems (such as the UK and US) provide better cross-sectional risk sharing in the economy. Bank-dominated financial systems also reduce information asymmetry problems in lending decisions and could help to foster greater certainty in corporate investment and economic development (Morck, Wolfenzon and Yeung, 2005). As a result, the historical relation between financial intermediation and economic growth could differ across countries.

Our results suggest that bank lending (but not insurance) was an important prerequisite for stimulating economic growth in Sweden during the nineteenth century. Subsequently, improvements in economic growth increased the public demand for financial services (including insurance) as the economy matured over time. We also find that the development of bank lending in the nineteenth century increased the demand for insurance as well as promoting economic growth. In later periods, we find that the development of insurance fosters demand for banking services but only in times of economic growth. For the entire period of our analysis, we find that banking is the predominant influence on both economic growth and the demand for insurance. In contrast, the insurance market appears to be driven more by the pace of growth in the economy rather than leading economic development. These results have potentially important policymaking implications for State planners, legislators and regulators seeking to develop local financial systems as a prelude to implementing and supporting future strategies for economic development. Clearly, this issue is also important for policymakers in contemporary emerging economies as well as analysts at international trade organizations such as the Organization for Economic Cooperation and Development (OECD).

The remainder of this paper is organized as follows. Section 2 provides background information on the historical development of the Swedish banking and insurance markets, while

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In line with international developments at the time, Sweden changed from a silver standard to a gold standard in 1874 (Ögren, 2006).

<sup>5</sup> Levine (1999, p. 22) reports that institutional information (e.g., accounting) systems can also be important prerequisites for the development of financial intermediation in an economy. The fact that Sweden has, by international standards, good economic data archives could to some degree contribute to the development of the domestic financial infrastructure and promote national economic growth.

<sup>6</sup> Historically, the lack of an active domestic stock market in Sweden compared to the UK and US underscores the potential importance of financial intermediaries to national economic development – the key focus of the present study.

<sup>7</sup> Aspects of Sweden's welfare state (e.g., the public pensions system and work-place accident compensation) date back to the early twentieth century but it became particularly omnipresent in the domestic economy after World War II (e.g., see Magnusson, 1997).

section 3 examines the theoretical linkages between banking, insurance and economic growth, and derives six hypotheses to guide empirical testing. Section 4 describes research methodology, including the sources of data, econometric specifications employed and measurement of our variables. Section 5 discusses our empirical results, while section 6 concludes the paper.

## **THE DEVELOPMENT OF THE SWEDISH BANKING AND INSURANCE MARKETS**

In 2004 there were 22 (mainly commercial) banks operating in Sweden employing nearly 40,000 people. Total assets at December 2004 were valued at roughly SKr 2,390 billion (US\$ 360 billion) with approximately 86% of new loans being issued by joint-stock companies, 10% by foreign-owned banks and 3% by mutual forms of organization (SCB Statistiska Centralbyrån, 2005)<sup>8</sup>. In comparison, the Swedish insurance industry comprises about 440 (life and property-liability) companies<sup>9</sup>. In 2003 these companies generated total annual premiums of approximately SKr144billion (US\$21 billion) (split roughly between life and non-life on a 2:1 ratio) and held assets valued at roughly SKr 1,607 billion (US\$ 235 billion) (split roughly between life and non-life on a 9:1 ratio). The insurance industry also directly employs nearly 20,000 people in Sweden (Swedish Insurance Federation, 2004).

According to Larsson (1991) the national insurance market emerged in Sweden in the second-half of the nineteenth century with the formation of Skandia (a joint-stock composite insurance company established in 1855)<sup>10</sup>. Indeed, the growth of the Swedish insurance market in the second half of the nineteenth century is contemporaneous with the development of a national network of private (sometimes mutual) savings banks and commercial joint-stock banks that also performed an important financial intermediation role in promoting rapid industrialization and economic development alongside the Swedish Central Bank (Sveriges Riksbank) (Sandberg, 1978). The second-half of the nineteenth century witnessed other financial developments, such as an increase in the domestic rate of savings, growth of credit facilities by Swedish commercial banks (that included note issuing unlimited liability (Enskilda) banks<sup>11</sup> as well as joint-stock corporate forms), the emergence and development of financial markets (like the Swedish bond market), and increased levels of foreign trade (Nygren, 1983; Ögren, 2006). Such developments helped to increase the supply of liquidity in the domestic economy and fostered Swedish economic growth in the second half of the nineteenth century (Ögren, 2006, p. 88). The Riksbank also played a direct role in the management of the national financial system during the nineteenth century to ensure, amongst other things, regulate the monetary system, monitor bank solvency, and control the national debt. The Riksbank's central supervisory function was supported through standardized banking rules and regulatory inspections of banking operations (Jonung, 1992). In fact, by the second half of the nineteenth century, Sweden's legal infrastructure and systems of contractual enforcement – both important prerequisites for the development of financial intermediation and financial markets (e.g., see Levine, 1999, p. 9) – was (by international standards of the time) well developed (Hägg, 1994, 1997, 1998). Insurance company

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<sup>8</sup> Boot and Thakor (1997b) contend that commercial banks primarily specialize in deposit taking and post-lending monitoring, whereas investment banks' main role is to underwrite firms' debt offerings in capital markets. Universal banking (i.e., the consolidation of commercial and investment banking activities) is not a predominant feature of the present financial system in Sweden (as it is, for example, in Germany).

<sup>9</sup> Some of these companies are separately reporting subsidiaries of conglomerate financial institutions such as the Skandia group; nonetheless, most (at least 75%) of the total number of insurance companies (about 340 or so) that are licensed to operate in Sweden are domestically owned non-group entities (AM Best, 1999).

<sup>10</sup> However, some local fire and marine insurance companies in Sweden can trace their origins back to the eighteenth century. For example, the present day Stockholm Fire Insurance Office (Brandförsäkringskontor) was founded in 1746 (see Lindmark et al. 2006).

<sup>11</sup> Ögren (2006, pp. 88-89) reports that the right of Enskilda banks to issue notes was a key factor in Sweden's economic development in the nineteenth century as it “. . . solved the problem of creating the necessary conditions for a financial system in a poor, under-monetized, and geographically dispersed country.” This helped to enhance liquidity and financial deepening in the economy. Ögren (2006, p. 89) also observes that the Enskilda banks were important in the development of deposit banking in Sweden.

regulations were also introduced in Sweden from the 1880s with the passing of national (solvency-based) insurance laws in 1886 and 1903 (Lindmark et al. 2006). However, in contrast to some other emerging insurance markets of the nineteenth century, for example, Australia and New Zealand, the Swedish government did not directly participate in the domestic insurance market by providing insurance services through a State-owned insurance corporation. Instead, like in the UK, the Swedish government monitored and protected the public interest in the domestic insurance market through a system of insurance legislation and regulations that were primarily designed to protect consumers against corporate insolvency (Larsson, 1991; Lindmark et al., 2006). Therefore, what is according to Browne and Kim (1993) an important determinant of early industrialization and economic growth – a State-owned insurance company – did not exist in Sweden.

Throughout the second half of the nineteenth century the Swedish banking and insurance markets expanded rapidly. For example, the banks increased the volume of credit, particularly with regard to increasing the provision of personal and commercial savings and credit facilities, issuance of mortgages and the financing of equity stakes in new ventures (Nygren, 1983). At the same time, Swedish insurance companies entered new markets in private lines of insurance, such as life insurance, and expanded their business with the wider commercial sector particularly in property insurance lines, like fire and storm damage protection (Bergander, 1967). Additionally, some insurance services in Sweden at the time were (and still are) provided by customer (policyholder)-owned mutual organizations, particularly in fire and life insurance (Hägg, 1998)<sup>12,13</sup>. Like in the Swedish private savings bank sector, mutual insurance companies were often established in the nineteenth century (and before) to serve the financial protection needs of local (particularly rural) communities, and in absolute terms, the number of mutual insurers in Sweden soon exceeded that of the national insurers. This industry feature exists today where (mainly small and localized) mutual insurers comprise roughly 70 percent of the total number of insurance companies in the Swedish market (n = 225 companies), but in terms of the size of their operations they generate less than 20 percent of annual premiums (Swedish Insurance Federation, 2004). However, in the second-half of the nineteenth century it was the large (city-based) national joint-stock financial services companies, like the Stockholm-based Handelsbank and Skandia companies that came to dominate the Swedish financial services sector and its associated regulatory system, particularly in ways that blunted domestic and foreign competition (see Kimball, 1965; Skogh, 1982)<sup>14,15</sup>. The growth of an oligopoly market in the Swedish financial services sector at this time also emerged in other European states such as France (e.g., see Hautcoeur, 2004).

World War I created an export-led economic boom for (neutral) Sweden which stimulated development of the financial services sector, including credit, risk management services and insurance, particularly in relation to property investment, commercial and private mortgages and transportation (Hansson and Jonung, 1997). Nevertheless, the post-World War I economic recession

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<sup>12</sup> Several reasons are given in the literature to explain the preponderance of customer-owned mutual organizations in parts of the financial services sector especially insurance. For example, Pottier and Sommer (1997) suggest that mutual insurers are likely to emerge where underwriting risks are more predictable (e.g., as a result of advances in actuarial technology) thus obviating the need for them to incur potentially high costs of raising new capital. Pottier and Sommer (1997) also report that by merging the customer-owner functions mutual organizations can economize on the agency costs incurred in joint-stock companies in maintaining and monitoring the different economic interests of policyholders and shareholders. The ability of insurers to use actuarial technology to control and accurately price assumed risks could help to explain why to date the process of demutualization has not been as common in Sweden's insurance industry compared with its banking sector (see Lindmark et al., 2006).

<sup>13</sup> Mutual forms of organization in Sweden date back to the eighteenth century when community risk-sharing pools were established in cities and rural areas to cover (in the main) fire damage losses and widows and orphans pensions (e.g., see Hägg, 1998).

<sup>14</sup> For example, even today only 28 foreign insurers are licensed to operate in Sweden generating only about 2-3 percent of total annual premiums (Swedish Insurance Federation, 2004).

<sup>15</sup> For example, both Kimball (1965, p. 199) and Skogh (1982, p. 218) report that in the late 1940s/1950s Swedish insurance industry regulation (notably the 1948 Insurance Act) actively encouraged corporate consolidation in order to reduce excessive competition, realize economies of scale and enhance regulatory control of the market.

led to industry rationalization with some corporate amalgamations and exits from the Swedish market (particularly by foreign financial companies) (e.g., see Larsson, 1991; Jonung, 1992). However, an important feature that characterized the post-World War I financial services sector in Sweden was that compared with financial companies in the UK and US that invested heavily in stock markets (Scott, 2002), Swedish banks and insurance companies held most of their assets in non-liquid assets such as property and low risk securities like government bonds (e.g., see Larsson, 1991). Waldenström (2002) also reports that high investment taxes during this time provided disincentives for Swedish institutional investors (like banks and insurance companies) to invest in equities. Scott (2002), for example, suggests that a primary motivation for Anglo-American insurance companies shifting to a more equity-centred investment strategy was to stabilize cash flows through portfolio diversification. Additionally, the relative absence of (bonus-related) participatory rights (especially life) insurance policies in Sweden did not provide the same stimulus for domestic financial institutions to actively engage in portfolio management as it did for their counterparts in the UK and US. The upside was that this precautionary investment strategy enabled Swedish banks and insurance companies to survive the extremes of the 1920s stock market crash and the subsequent economic depression of the 1930s (Pettersson, 1987; Larsson, 1991; Magnusson, 1997). On the other hand, the lack of equity-based institutional investment in Sweden during the inter-war years could have stifled the pace of development in the economy as a whole (Waldenström, 2002). Hautcoeur's (2004) analysis suggests that for similar institutional and regulatory reasons, France also experienced a precautionary institutional investment strategy during the inter-war years with adverse consequences for new business development and the pace of economic growth.

The post-World War II period signalled far-reaching changes in the Swedish financial system particularly in terms of the increased demand for consumer credit and risk management services (Hansson and Jonung, 1997). For instance, in 1948 new insurance regulations were introduced in Sweden to ensure the maintenance of adequate reserving and liquidity levels, and also to primarily direct insurance companies' investments into public sector projects and government-sponsored social welfare schemes. Post-World War II, the Swedish government also sought to stabilize the domestic credit market by controlling bank interest rates and levels of bank lending in the domestic economy (Jonung, 1992). Interest rate caps restricted returns on financial services companies' assets; however, when this constraint was ultimately relaxed in the late 1970s/early 1980s there was a much greater degree of investment by banks and insurance companies in the equities of Swedish and foreign companies. Greater deregulation further enabled Swedish insurance companies to play a greater role in the provision of credit services (e.g., commercial mortgages), social insurance (e.g., pensions and private health care) and direct investment in both domestic and overseas-based companies than had hitherto been the case. In recent years Swedish banks have also formed insurance subsidiaries (bancassurers) to offer insurance products and risk management services to the public thus leading to a convergence between the banking and insurance sectors of the economy (Lindmark et al., 2006).

## **HYPOTHESES DEVELOPMENT**

In this section of the paper we examine the theoretical linkages between banking, insurance and economic growth.

### **The Influence of Financial Intermediation on Economic Growth**

#### **1. Banks**

In an early seminal work, Schumpeter (1911) suggested that financial intermediaries (like banks) are important for technical innovation and economic growth and that the industrial revolution pre-dated advances in financial development. Since then several researchers (e.g., Diamond, 1984; Boot and Thakor, 1997a, 1997b; Rousseau and Wachtel, 1998; Levine, 1999; Rousseau and Sylla, 2005; Sylla, 2002, 2003; Crothers, 1999) have emphasized the historical importance of banking market activity in stimulating national economic growth. For example, Sylla (2003) reports that in the US in the nineteenth century banks (both national and foreign) were actively mobilizing savings and providing trade credit and venture capital for new business start-ups. Moreover, Crothers (1999)

argues that banks played an important role in stimulating regional economic growth in the US state of Virginia in the early period of independence, particularly in terms of agriculture (slave-based economy), local industry and infra-structural developments. Sandberg (1978, p. 666) and Nygren (1983, p. 61) also point out that towards the end of the nineteenth century it was common for Swedish banks to issue loans against the shares of both new start-ups and established companies and to be represented on the boards of publicly listed and non-publicly listed companies – thus providing an important corporate governance function. Mork et al.(2005) report that cross-shareholdings held by financial institutions can attain macroeconomic performance as such ‘pyramidal’ control can affect rates of innovation, resource allocation in the economy and economic growth<sup>16</sup>. Furthermore, scholars such as Diamond (1984), Diamond and Dyvbig (1983), Leland and Pyle (1977) and Levine et al. (2000) have emphasized the important role played by financial intermediaries (like banks) in introducing contracts (e.g., loan agreements) and monitoring managers (e.g., by reviewing accounting records) in order to alleviate agency incentive conflicts in firms. This function also has signalling benefits by mitigating information asymmetries in markets and assuring investors thus promoting economic growth.

Sylla (2003) suggests that banks (like insurance companies) have comparative advantages over other forms of organization in assessing and pricing assumed risks (e.g., credit risk) and diversifying such risks by holding balanced portfolios of investments and having (particularly in the case of banks) joint-stock corporate structures protected by limited liability. As noted earlier, researchers like Hägg (1994, 1997, 1998) contend that a supporting system of property rights law and contractual enforcement are also important prerequisites for efficient and effective financial intermediation, and that by the end of the nineteenth century such a legal infrastructure was well developed in Sweden. This institutional feature no doubt helped to contribute to improved resource allocation and growth in the domestic Swedish economy. In addition, Sandberg (1978) reports that during the second-half of the nineteenth century, Swedish banks established a national network of branches that enabled them to expand their business activities especially in new industrial areas. A similar national pattern of distribution channels also characterized the Swedish insurance industry in the second-half of the nineteenth century (Lindmark et al, 2006). Swedish banks also financed corporate investments by cooperating with each other (e.g., on setting interest rates) and providing large loans on a syndicated basis<sup>17</sup>. The raising of equity for the banking sector was also facilitated by the Companies Act 1863 that introduced limited liability that allowed those Swedish banks that chose to become joint-stock companies to expand and spread their risks (e.g., see Sandberg, 1978, p. 663). The stability of the banking system in Sweden was further underpinned in the 1890s when the Riksbank became more of a modern central bank in the sense that it acted as ‘lender of the last resort’ and actively engaged in monitoring the efficiency and effectiveness of domestic financial systems (Nygren, 1983). Sandberg (1978, p. 680) further points out that from the 1870s Sweden’s commercial

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<sup>16</sup> In Sweden the Wallenberg family have for much of the twentieth century played an important role in the banking sector (more recently through their controlling interest in the universal Swedish bank, SEB) and it is primarily through their banking activities that the Wallenberg family have maintained ‘pyramidal’ control of other sectors of the domestic economy. Morck et al. (2005, pp. 688-689) report that in many economies outside of the UK and US such arrangements give such wealthy (oligarchal) families (and other concentrated ownership interests) in banks significant influence on the direction and pace of national economic growth; they also help to bind banks into long-term financing relationships with companies. The membership of the borrowing firm and bank to the same ‘pyramidal’ group does, however, help to mitigate market informational asymmetry problems in the raising of finance and facilitate long-term investment planning.

<sup>17</sup> Indeed, Boot and Thakor (1997a, p. 695) report that a key feature of banking markets is that participants are known and often cooperate and coordinate their activities, whereas in financial markets agents are often anonymous and compete with each other. Boot and Thakor (1997a) contend that banking coalitions are important for effective bank-related investment and sustained economic growth. This view is shared by Diamond (1984) and he adds that banks contribute to economic development by effectively monitoring borrowers’ financial commitments (thus reducing market information asymmetry problems) and efficiently diversifying risk on the deposits/investments that they hold. These attributes of intra-industry collaboration, control of information asymmetries and risk diversification are reported to have existed in Sweden’s banking (e.g., Sandberg, 1978; Nygren, 1983) and insurance (e.g., Lindmark et al., 2006) sectors since the nineteenth century.

banking system was by international standards very sophisticated, particularly with regard to encouraging savings and investment in new technology, product innovation, and risk information management. Sandberg (1978) adds that these attributes had a positive and sustained impact on the annual rate of economic growth in Sweden from the end of the nineteenth century. The importance of banks (and insurance companies) to financial innovation and the development of financial systems and economic growth is also highlighted in several studies such as Boot and Thakor (1997a, 1997b), Rousseau and Wachtel (1998), Crothers (1999), and Sylla (2003). Therefore, we hypothesize that:

**H<sub>1</sub>: Other things being equal, the banking market directly stimulates economic growth.**

## 2. Insurance Companies

Ward and Zurbruegg (2000) and Kugler and Ofoghui (2005) report that in offering risk transfer, indemnification for unexpectedly large losses, financial intermediary services, and real services (e.g., advice), insurance markets have had a significant productive impact within economies. For example, insurance can help to promote strategic investment in productive assets by providing surety to investors and other contractual claimants (e.g., banks) that the value of the investment is protected against unanticipated severe losses (such as those arising from fire and flood damage). In a historical context, Crothers (2004) contends that post-independence insurance (particularly marine insurance) was instrumental in the economic development of the slave-owning states of the US. For example, the development of a domestic marine insurance market enabled the Southern states to provide cost-effective risk protection for their exports of agricultural and associated industrial products without recourse to Lloyds of London. Therefore, insurance helped to stimulate economic growth and sustain the regional slave-based economy up to the end of the Civil War in 1865. John (1956, p. 141) also notes that during the eighteenth century the London insurance market contributed substantially to overseas earnings (invisible exports) as well as helping to develop commodity exports through the provision of commercial credit and investment. Pearson (1997), however, takes a different perspective by suggesting that insurance companies do not tend to drive economic initiatives because of the inherent uncertainties associated with writing new risks. He states (p. 253) that during periods of economic growth “ . . . insurers may face liquidity constraints which hinder their ability (or willingness) to finance the innovations needed to service . . . industrial expansion.”

MacMinn (1987) reports that insurance can further provide an important post-loss financing function and mitigate agency problems such as the underinvestment incentive that can occur in (particularly highly levered) companies that suffer a large asset-loss<sup>18</sup>. This leads to insurance having positive externalities in terms of employment creation, increased economic activity, and business innovation (technology) and risk-taking. In his analysis of the economic contribution of insurance in the development of Britain's industrial revolution in the eighteenth century, John (1953) also points out that insurance companies were active suppliers of debt capital to entrepreneurs alongside the banks. For example, he cites (p. 157) that the Equitable Life Assurance Company provided loans to industrialists to help fund the expansion of Cardiff docks and the development of the South Wales coalfield. Moreover, in efficient insurance markets, the setting of (actuarially fair) insurance prices will compensate for negative externalities such as the moral hazard problems arising from excessive risk-taking as a consequence of insurance (Rothschild and Stiglitz, 1976). Actuarially fair pricing should also help to facilitate the efficient accumulation of productive capital in the economy and provide a spur to economic growth (Ward and Zurbruegg, 2000). In Sweden, however, insurance industry regulation has in the past (for example, after the 1948 insurance regulations came into effect) placed limits on the rates of premiums that insurance companies can charge for the risks that they underwrite in the market. This was instituted to facilitate the achievement of the State's wider public welfare objectives (e.g., social inclusion in insurance). The regulation of premium rates could,

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<sup>18</sup> The underinvestment problem arises because under corporate limited liability rules shareholders have a default option that allows them to choose not to reinvest in fixed assets damaged by severe mishap (e.g., due to fire). This is because the economic benefits of reinvestment could be greater for other claimants – for example, debtholders that hold fixed claims over the assets as collateral for loans granted. Insurance resolves this issue by indemnifying shareholders against the cost of asset reinstatement (e.g., see MacMinn, 1987).

therefore, lead to the mis-pricing of assumed risks and the inefficient allocation of capital within insurance companies. The trade-off between the social welfare benefits of premium controls and the (non-Pareto optimal) efficiency losses generated from State regulation of the Swedish insurance market could have wider macroeconomic ramifications – for example, by reducing funds available for institutional investment and limiting insurance companies’ capacity for underwriting future business risks (Greenwald and Stiglitz, 1990). Additionally, Butler, Gardner and Gardner (1998) have shown that in the US, workers’ compensation insurance and sickness benefits has had significant moral hazard consequences as a result of increased absenteeism and produced reduced levels of productivity in the economy. These findings could equally apply in Sweden as workers’ compensation insurance has been around since 1913 (Larsson, 1991).

As with the banking sector, Main (1982) suggests that by collecting and processing information on various corporate risk exposures and underwriting risks on actuarially fair terms, insurance companies (like banks) can play an important role in reducing information asymmetries, assuring investors and providing a positive signal to the financial market as to the quality of companies’ future growth opportunities<sup>19</sup>. Larsson (1991) also notes that in the inter-war years Swedish insurance companies played an important role, in partnership with government in maintaining domestic economic stability through, for example, precautionary investment management and risk assessment, and direct involvement in underwriting public sector projects. Ward and Zurbruegg (2000) add that as major institutional investors, insurance companies not only help the efficient allocation of capital in an economy but (again like banks) also enhance returns on their investments through active monitoring of managerial activities and corporate governance. This reasoning leads us to hypothesize that:

**H<sub>2</sub>: Other things being equal, the insurance market directly stimulates economic growth.**

### **3. The Influence of Economic Growth on Financial Intermediation**

As noted earlier in section 1, the direction of causality between banking, insurance and economic growth can run both ways. That is, financial intermediation might not only facilitate economic growth by providing deposit-taking, credit facilities, risk transfer, loss indemnification, and so on, but conversely, it could be the case that economic growth creates (stimulates) the public demand for banking and insurance – for example, by supplying investment funds and protecting accumulated productive capital against unanticipated losses (Fohlin, 2002). Robinson (1952) is an early advocate of this view when he states (p. 52) that “. . . by and large, it seems to be the case that where enterprise leads finance follows.” As Hansson and Jonung (1997) point out, both lines of reasoning are plausible theoretically and so empirical analysis is needed to resolve the issue. In the Swedish context, Sandberg (1978) contends that in the early/mid-nineteenth century the domestic system of financial intermediation was relatively more advanced economically than the system of industrial production. Consequently, Sandberg (1978) argues that financial intermediaries (like banks and insurance companies) promoted economic growth in the early period of industrialization in Sweden by providing, amongst other things, capital for investment and risk protection services. With regard to insurance, Ward and Zurbruegg (2000) contend that the risk management and financial intermediary benefits of insurance, and their impact on economic growth could persist over time, particularly in relatively long-protected domestic economies such as Sweden. On the other hand, Rousseau and Wachtel (1998) contend that in developed economies, financial intermediation may become a relatively less important influence on economic growth as competition between financial intermediaries increases and financial markets become more attractive to deposit-holders with surplus funds to invest in corporate growth opportunities. Wachtel and Rousseau (1995) and Rousseau and Sylla (2005) provide empirical support for this view from their historical analysis of financial systems and economic development in Anglo-American countries. They find that in these economies there was a stronger relation between financial intermediation and economic growth prior to the Great

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<sup>19</sup> We consider that the assumption of actuarially fair pricing is reasonable as continued mis-pricing will clearly lead in the long-term to insurance company bankruptcies and exits from the market.

Depression of the 1930s compared with the post-World War II period when financial systems and capital markets became more sophisticated due to, amongst other things, increased global trade and cross-border investment.

In the debate concerning the causal linkage between financial intermediation and economic growth, Kindleberger (1982) argues that in the nineteenth century the demand for banking (and indeed, insurance) services in Sweden emerged directly from rapid industrialization and demographic growth in major urban centres such as Stockholm, Gothenburg, and Malmö. King and Levine (1993) also suggest that economic development (that may be prompted by public as well as private sector investment) could stimulate the demand for ancillary financial services such as banking and insurance. The Swedish government has been actively interventionist in the management of the national economy in partnership with the private sector since at least the turn of the twentieth century (Heckscher, 1954; Hansson and Jonung, 1997; Magnusson, 1997). Moreover, Gelderblom and Jonker (2004) observe that to facilitate economic growth, the demand for consumer and commercial credit has to be met by a ready supply of funds (savings). In their capacity as financial intermediaries, insurance companies can play an important role in the accumulation and investment of capital in the economy – a process stimulated by increased levels of economic activity (Ward and Zurbruegg, 2000). Furthermore, in a cross-sectional study of 45 countries for 1981 (including Sweden) Beenstock, Dickinson and Khajura (1988) report that insurance activity is highly dependent on the level of domestic per capita income. They add (p.262) that in periods of economic growth, the supply of insurance often increases as underwriting capital enters the insurance industry in search of increased market returns. Hussels, Ward and Zurbruegg (2005, p. 260) also consider that the demand and supply of insurance (particularly life insurance<sup>20</sup>) “. . . is likely to depend upon economic development, since with a greater rate of economic growth the consumption of insurance products should increase”. Furthermore, the demand for insurance is expected to be increasing in levels of economic activity because there will be more accumulated capital (assets) to insure against unexpected loss. Therefore, it is plausible that the growth of banking and insurance services was prompted by the increasing levels of per capita income generated by national economic growth during the period of our analysis (1830-1998). That is, the public demand for banking and insurance could be income elastic<sup>21</sup>. Using Swedish economic data from 1861 to 1910, Fisher and Thurman (1989) in fact find that that the growth of the banking sector was caused by, not the cause of, economic growth. We thus present two alternative test hypotheses:

**H<sub>3</sub>: Other things being equal, economic growth directly stimulates the banking market.**

**H<sub>4</sub>: Other things being equal, economic growth directly stimulates the insurance market.**

#### **4. The Conjoint Effects of Banking and Insurance and Economic Growth**

Sylla (2003) reports that financial intermediary systems interact closely in modern economies. This suggests that it is the conjoint effects of banking and insurance that stimulate economic growth. For example, Grace and Rebello (1993) argue that insurance encourages greater corporate bank

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<sup>20</sup> Hussels et al. (2005) suggest that as the taking out of life insurance is a long-term consumption decision it should be positively related to anticipated future permanent income.

<sup>21</sup> Some prior studies (e.g., Ward and Zurbruegg, 2000, Hussels et al., 2005) suggest that there may be a limit to the relation between economic income and the demand for financial services in that at higher levels of per capita income some consumers may be less inclined to borrow from banks and self-insure against accident and mortality risks. Indeed, Di Matteo and Emery (2002) find evidence of an inverse relation between accumulated wealth and life insurance in their study of male life insurance holdings in Ontario, Canada, in 1892. However, on balance we contend that increased wealth in the economy can stimulate the demand and supply of financial intermediary services by (as pointed out above) increasing the value of assets in the economy that need to be protected against unexpected losses and providing the funds for investment in banking and insurance operations. In fact, Esho, Kirievsky, Ward and Zurbruegg (2004) provide evidence for this contention in their study of the impact of national income on property-casualty insurance in a cross-section of developed and developing countries over the period 1984-1998.

borrowing by reducing companies' market cost of capital, which in turn influences economic growth by stimulating demand for financial services. Assets-based (property) insurance can also protect the value of collateral underpinning loans granted from acute losses due to fire, storm damage and so on. This attribute helps to reduce banks' credit risk exposures (and enhance shareholders' returns) and so promote higher levels of lending than would otherwise be the case without insurance (e.g., see Zou and Adams, 2006). In addition, banks also use deposit insurance to protect the value of their investments against (systematic) market risks and liquidity crises arising from catastrophes that affect consumer and investor confidence in the economy (Diamond and Dybvig, 1983); in fact, in most developed countries banks have used deposit insurance to protect against the risk of such losses since at least the late nineteenth/early twentieth centuries (Calomiris, 1990; Hooks and Robinson, 2002). This aspect of insurance potentially helps banks to alleviate credit risk, increase corporate and private lending, and invest in potentially high yielding projects thereby stimulating economic development. Banks can also encourage borrowers to take out life insurance, particularly on large and long-term loans, such as commercial and private mortgages, in order to cover the risk of premature death and consequential inability to meet agreed payments<sup>22</sup>. Consequently, insurance (both non-life and life) helps to facilitate the supply of bank credit in the economy. The growth in bank market activity could also help the supply of insurance in the domestic economy – for example, by providing institutional investment funds for the expansion of insurance services (particularly important in Sweden given the lack of a deep stock market). Therefore, we hypothesize that:

**H<sub>5</sub>: Other things being equal, the interaction of the banking and insurance markets directly stimulates economic growth.**

On the other hand, high levels of economic activity can increase the market demand for bank loans to finance corporate growth opportunities and thus drive the demand for assets-based insurance cover. Additionally, the level of economic activity can affect the volume of deposits (investment funds) retained by financial intermediaries and thus the degree of institutional investment in the national economy (Fohlin, 2002). In other words, the combined effects of banking and insurance activity could be (surplus) income dependent (Beenstock et al. 1988). Increases in the value of invested assets due to buoyant economic activity can also lead to an increase in the amount of deposit insurance purchased by banks (Calomiris, 1990; Hooks and Robinson, 2002). This reasoning implies that:

**H<sub>6</sub>: Other things being equal, economic growth directly stimulates the interaction of banking and insurance markets.**

## **5. Other Considerations**

To sum up, the direction of the causal (predicted) relation between banking, insurance and economic growth remains an unresolved empirical issue (Levine, 1999; Levine et al. 2000). For example, using 1961-1996 data for nine OECD countries Ward and Zurbruegg (2000) found mixed results concerning the insurance-economic growth relation. Their causality tests revealed that for some countries (e.g., Canada and Japan) there was evidence that insurance market growth led to growth in the economy at large; for others (e.g., France) the results showed a causal effect from economic growth to insurance market development; and for four countries, including the UK and US, no significant results were produced in either direction. Ward and Zurbruegg (2000) attribute their findings to country-specific factors such as the relative state of regulatory development, the degree of insurance penetration<sup>23</sup> and the cultural propensity to insure versus self-insurance (e.g., through personal savings). Kugler and Ofoghi (2005) also provide mixed results using disaggregate (line of

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<sup>22</sup> As Main (1982) makes clear, it is invariably costly for creditors (banks) to instigate bankruptcy and eviction procedures against debtors. Insurance can therefore mitigate costly legal proceedings in the event of unanticipated loan default by borrowers. The transaction cost benefit of insurance is also examined in Skogh (1989).

<sup>23</sup> Insurance penetration is defined as the ratio of total annual insurance industry premiums over gross domestic product (GDP) per capita (e.g., see Swiss Re, 2004).

insurance) data for the UK's property-liability insurance industry over the period 1971-2003. Arestis and Demetriades (1997) further report that the strength and direction of the relation between economic growth and financial intermediation could vary over time as a result of cyclical changes in the pace of human and physical capital development, technological advances, and economic growth, as well as competition between national and international financial services companies. Furthermore, it is possible that for certain periods within a long historical time series (as is the case in this study) the relation between banking, insurance and economic growth may be difficult to disentangle (Rousseau and Wachtel, 1998). Indeed, Hautcoeur's (2002) historical analysis of the French life insurance industry (1870-1939) points to stagnation in the insurance-economic growth relation due to such factors as precautionary insurance company investment strategies, managerial inertia, and oligopoly market-induced regulation that promoted the status quo and stifled the pace of product-market innovation and wider economic development. On the other hand, Rousseau and Wachtel (1998) report that for the same period covered by Hautcoeur (2002) Scandinavian insurance markets (like Sweden) commonly used the latest (actuarial) technology, and that this helped them to realize operational efficiencies and increased profitability, which in turn fostered growth in the domestic insurance market and the financial services sector in general<sup>24</sup>. These issues will therefore be examined empirically in the remainder of this paper.

## DATA AND METHODOLOGY

This section describes the research methodology that we employed including the description of the data, econometric specifications and definition of the variables.

### 1. Data

Our data covers the 169 years 1830-1998 and represents the earliest and latest years for which complete archival data were available at the time the study was carried out. Economic data are annual GDP volumes and yearly per capita income estimates derived from Krantz (2001), which are based on the Swedish Historical National Accounts series published in Krantz (1986, 1987a, 1987b, 1991), Pettersson (1987), and Schön (1988, 1995)<sup>25</sup>. Aggregate data on bank loans and mortgages (private and commercial) granted up to 1860 were collected from the Sveriges Riksbank (1931) archive, after which time data were collected from the Swedish Official Statistics (SOS Statistisk Årsbok). Swedish savings banks were first established in the 1830s, but the period up to 1856 is covered by five-yearly benchmarks derived from other Swedish archives (i.e., Finanskomitén, 1863, Table 22). These benchmarks were linearly interpolated using commercial bank loans as a variation index. Thereafter, loans data were collected from the financial services periodical Statistisk Tidskrift until 1913, after which time data were obtained from the Swedish Official Statistics Office (SOS Statistisk Årsbok). Swedish mortgage banks were established in the 1840s and the periodical Sveriges Statistik i sammandrag provided annual data on bank-issued mortgages from 1870 onwards. As the outstanding mortgage value, date of issue, duration (usually 40 years), and interest rates are included in the 1870 records we were able to estimate the annual value of bank mortgages issued by Swedish banks from for the 40 years prior to 1870. Data on annual aggregate (non-life and life) gross insurance premium income written in the Swedish insurance market for the period 1830 to 1913 were collected from Bergander (1967) supplemented with data derived from Wrede (1882), Grip (1992), the Stockholm Stads Brandkontor (Almquist 1921) and the Allmänna Änke- och Pupillkassans archives<sup>26</sup>. From

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<sup>24</sup> Sweden has had a professional actuarial body since 1904. The role and responsibilities of Swedish actuaries (e.g., in terms of solvency management and financial reporting) have been enshrined in various insurance statutes since the passing of the Insurance Act 1903 (Hägg, 1998).

<sup>25</sup> The Swedish National Statistics Office derives annual population estimates from published census data (carried out every 10 years or so).

<sup>26</sup> We aggregate non-life and life annual insurance premiums as risk transfer, indemnification and financial intermediation are functions common to both life and non-life insurance (see also Ward and Zurbrugg, 2000, p. 490). We also assume that in the long-term the public demand for life and non-life insurance will exhibit similar income elasticity and that both sectors of the insurance market emerged more or less concomitantly in Sweden.

1913 onwards all insurance premiums data were collected from the official Swedish insurance industry statistics (SOS Enskilda Försäkringsanstalter), supplemented from 1996 by the Financial Inspectorate (Finansinspektionen) online Swedish business reports<sup>27</sup>.

## 2. Specification

As in prior studies (e.g., Arestis and Demetriades, 1997; Hansson and Jonung, 1997; Ward and Zurbruegg, 2000; Luintel and Khan, 1999; Arestis, Demetriades and Luintel, 2001) we examine the long-term causality between financial intermediaries and economic growth by constructing a multivariate vector autoregressive (VAR) model to test for dynamic interactions (Granger causality) in a p-dimensional system, defined by:

$$X_t = \Pi_1 X_{t-1} + \Pi_2 X_{t-2} + \dots + \Pi_k X_{t-k} + \Phi D_t + \varepsilon_t \quad [1]$$

where  $X_t$  is a p-dimensional vector of the time series under study, the  $\Pi$ 's are  $p \times p$  matrices defining the relation between a variable and lags of another (see Johansen, 1988). The variable  $D_t$  is a vector of exogenous variables, in our case enabling estimation of intercept and trend. The Granger (1969) test for causality between the variables involves a joint F- or  $\chi^2$  - test to examine whether present and past values of a variable, say  $X_i$ , can explain future values of another, say  $X_j$ . In this

example, the null hypothesis ( $H_0$ ) of no Granger causality from  $X_{it}$  to  $X_{jt}$  is represented by stating that the (j,i)'th coefficients of the matrices  $\Pi_1, \Pi_2, \dots, \Pi_k$  are all zero. The concept can also be extended to allow for testing if a group of variables Granger causes another group of variables (Granger, 1969). The most general use of the Granger causality test in this paper involves three variables – banking (BANK), insurance (INS) and economic growth (ECON).

If our time series are stationary, this would be a sufficient methodology and the equation [1] could be used for testing our hypotheses on Granger causality. We can then state our VAR-model in levels and thereby, use our observations directly without any transformation. However, like many statistical procedures, tests of Granger causality become more complicated when the series are non-stationary in a particular sense, namely that they are so called integrated of order d or I(d). In general terms, this means that they can be made stationary by differencing them d times. The reason for these difficulties is that quantities which otherwise follow the well-known t-, F- or  $\chi^2$  distributions take on other distributions which are more complicated to deal with. Sims, Stock and Watson (1990) and subsequently, Toda and Phillips (1993) investigated this problem. The latter authors concluded that the distribution of the test statistic for Granger causality in level VAR's relies on information that is difficult to obtain from the data. There are three main ways of performing the test: first, we can specify a VAR-model in differences and test for Granger causality in changes of the variables. In doing this, we ignore any possible long-run relation that might exist between variables. A second alternative is to use the levels in the way suggested by Toda and Yamamoto (1995). They show that, with a modification of the model selection procedure, a VAR-model in levels can be used to test for Granger causality and the test-statistics will behave as in the stationary case. The modification consists of first choosing the lag-length using some information criterion (in our case we use both the Akaike information criterion (AIC) and the Schwarz Bayesian criterion (SBC)), and then add the maximal possible order of integration,  $d_{\max}$ , to this lag length. This is then a modified version of the Granger causality test where the last  $d_{\max}$  lags are not exploited directly in the test but are there for

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Some support for these maintained assumptions can be found in Hägg (1998) who emphasizes the enthusiasm of the growing (and increasingly affluent) Swedish middle class of the late eighteenth/early nineteenth centuries for life and pensions (widows and orphans funds) as well as property insurance protection. Furthermore, aggregating non-life and life insurance activity can be justified as both non-life and life insurers perform an important intermediary in the domestic economy as institutional investors.

<sup>27</sup> In 1905 the union between Sweden and Norway was dissolved; prior to this date, however, Norway and Sweden had separate governments and parliamentary systems, with their own laws and regulatory structures. Therefore, our data set excludes entirely Norwegian data prior to 1905.

the test statistic to converge to a known probability distribution. This is a robust test in that it does not assume a priori knowledge of the order of integration and cointegration of the process. The third approach, which is applicable when the variables are cointegrated, is to base the Granger causality test on the error correction (ECM) form of [1]. However, Toda and Phillips (1993) study this procedure and conclude that the distribution of the test statistic depends on nuisance parameters that have to be estimated from the data. We therefore choose to work with the robust method proposed by Toda and Yamamoto (1995) even though we lose test power compared with the case when the order of integration and cointegration are assumed known.

Cointegration analysis, however, can yield interesting results in other respects. The special case of cointegration that we are using here means that there exist linear combinations of  $I(1)$ -variables that are  $I(0)$ . In the case when  $r$  such linear combinations exist, the ECM of [1] can be written as:

$$\Delta X_t = \Pi X_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \Phi D_t + \varepsilon_t \quad [2]$$

where  $\Pi = \sum_{i=1}^k \Pi_i - I$  and  $\Gamma_i = -\sum_{j=i+1}^k \Pi_j$ . Cointegration is present in the system when the matrix  $\Pi$  can be decomposed into the product of two  $p \times r$  matrices  $\alpha$  and  $\beta$  (determining the stationary linear combinations) such that  $\Pi = \alpha\beta'$  (see e.g. Engle and Granger, 1987). Our model now becomes:

$$\Delta X_t = \alpha\beta' X_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \Phi D_t + \varepsilon_t \quad [3]$$

Johansen (1991, 1995) provides a unified approach to analyze cointegration within VAR models. Amongst other things, the procedures for the determination of  $r$  and estimation of the parameters in the model are given, while the elements of the vector  $\beta'X_t$  are the stationary linear combinations, which can be interpreted as in equilibrium. However, in order for cointegration to be revealing, the original variables in the system must be integrated. The stationarity of the variables is therefore investigated by means of the augmented Dickey-Fuller (ADF) test, which uses an autoregressive model, including intercept and trend to accommodate for these features in the data. The regression used in this test is:

$$\Delta x_t = \alpha x_{t-1} + \delta_0 + \delta_1 t + \sum_{k=1}^{p-1} \beta \Delta x_{t-k} + v_t \quad [4]$$

where  $v_t$  is a ‘white noise’ process and the  $H_0$  of non-stationarity, a so called unit root, is  $\alpha = 0$ . Rejection of the  $H_0$  means that there is statistical evidence that the time series is stationary.

Whether we are using VAR models in levels or differences, we need to pre-determine the lag-length before commencing with the analysis (Luintel and Kahn, 1999; Arestis et al., 2001). Since no particular prior reasoning, in the sense of economic theory guides us here we let the AIC and SBC determine the lag length. Roughly, these methods use the likelihood function (where a large value implies a good model) and penalize it with a function that increases with the number of parameters. This means that we are weighting the two conflicting goals of having a good fit to the data and having few parameters (the so-called principle of parsimony). The way we are using these information criteria is that we let them give us ideas of the lag length, after which we test for autocorrelation in the residual series. The latter is done using a multivariate Lagrange multiplier (LM) test (e.g., see Arestis et al., 2001).

### 3. Variables

First, our key variables are defined as follows:

Economic Growth ( $x_t$ ) (ECON): We use the natural log of the ratio of Gross Domestic Product (GDP) per capita to measure national economic growth.

Bank Credit (BANK): We use data for the total (central, commercial and savings) annualised amount of real bank lending to the non-bank public on a per capita basis to represent this variable. The implicit GDP deflator was also used to convert prices to real terms.

Insurance Penetration (INS): This variable is measured as the real annualized value of total premiums (life and non-life insurance) per capita. In deriving real values, current premiums are again deflated with the implicit GDP deflator<sup>28</sup>.

Furthermore, due to the long period covered by our study (169 years) we sub-divided the time series into three exogenously determined sub-periods for separate analysis. Our choice of structural breaks was governed by a combination of historical institutional changes (e.g., regulatory), the need for sufficient period length for analysis and the results derived from the Granger causality tests. The sub-periods selected on this basis were: the early development period 1830-1888 (59 years); 1889-1948 (60 years), including the inter-war/war years; and the post-World War II period 1949-1998 (40 years)<sup>29</sup>.

## EMPIRICAL RESULTS

In this section of the paper we outline and discuss the empirical results of our study.

### 1. Preliminary Tests

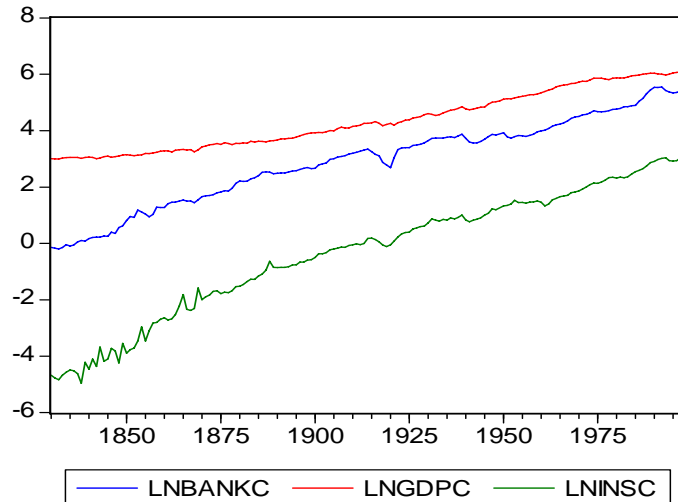
As can be seen from Figure 1, there are clearly upward trends in the logarithms of the three variables (ECON, BANK and INS) during the observed historical period, and these have to be accounted for in the analysis in order to get correct inference on the matters that interest us. We thus choose to approximate them by linear trends, which suggest that the three variables are, in some sense, moving together over time. However, whether this is due to a deterministic trend or to cointegration is a question that is formally analyzed below. Furthermore, the question of Granger causality, that is whether events in a variable are systematically preceding events in another, is not easy to get an idea of visually. The issue of Granger causality is therefore examined later in this section of the paper.

**Figure 1: Time plots of the logarithms of the variables BANK, ECON and INS.**

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<sup>28</sup> Insurance penetration is sometimes viewed in the literature as reflecting domestic demand, but in equilibrium it could equally reflect the supply of insurance in an economy. Therefore, insurance penetration can be viewed as a measure of insurance activity reflecting both the demand and supply in an economy.

<sup>29</sup> Compared with prior cointegration studies (e.g., Luintel and Kahn, 1999 used an average time span of 38 years) the length of our sub-periods is more than sufficient to capture the long-run relation between financial intermediation and economic growth.



As in prior research (e.g., Ward and Zurbrugg, 2000), we conducted preliminary tests on our historical time series data set to determine the order of integration and lag length. First, we carried out unit root tests on the data to examine for non-stationarity in the historical time series using the augmented Dickey-Fuller test for the full sample (see Table 1). On the basis of the graph above, both the intercept and trend were included in the tests. The SBC was used to determine the lag length. There is no evidence for stationarity of the time series. In the sequel, we assume that all three variables are I(1).

**Table 1: Augmented Dickey-Fuller Test Statistics 1830-1998**

This table presents the Augmented Dicker-Fuller test (tau) statistics for stationarity in the historical time series (1830-1998).

Variable	Tau	p-value	Lags used
ECON	-2.552	0.303	0
INS	-2.002	0.595	2
BANK	-2.718	0.231	1

Notes:

1. ECON is the log of annual per capita growth in the rate of real GDP to measure economic growth; INS is the real annual value of total annual premiums (life and non-life insurance) per capita; BANK is the total (central, commercial and savings) real bank lending to the non-bank public on a per capita basis.
2. the p-values are not significant at conventional levels ( $p \leq 0.10$  or less) indicating non-stationarity in the historical time series.

The next step is the lag length determination of ECM VAR-models in levels for the full period. Table 2, which presents the AIC and SBC for lag length determination in VAR models, shows that the criteria give one and three lags respectively. To be on the safe side in terms of model misspecification, we work with the larger of those.

**Table 2: Lag length determination of VAR-model in levels 1830-1998**

This table presents the Akaike and Schwarz Bayesian criteria for lag length determination in VAR-models for the historical time series (1830-1998). The numbers in bold fonts shows the lag lengths chosen by the particular information criteria.

<b>p</b>	<b>AIC</b>	<b>SBC</b>
1	-7.160	-6.937
2	-7.352	<b>-6.959</b>
3	-7.395	-6.832
4	<b>-7.424</b>	-6.690
5	-7.361	-6.454

The  $H_0$  is that all autocorrelations and cross autocorrelations of order *lag* (which is the header in the table) or less are zero. Accordingly, to the test statistics and p-values of the multivariate LM test of autocorrelation there is no evidence of autocorrelation in VAR(4) model of first differences. The choice was then based on the results of the autocorrelation tests of residuals, reported in table 3, showing the test statistics and p-values of the multivariate LM test of autocorrelation. Accordingly, the VAR (4) in levels is an appropriate point of departure for carrying out further Granger causality tests.

**Table 3: Joint test of autocorrelation in the VAR (4)-model in levels**

The table presents the test statistics and p-values of the multivariate LM test of autocorrelation. The null hypothesis is that all autocorrelations and cross autocorrelations of order lag or less are zero.

<b>No. of Lags</b>	<b>Test statistic</b>	<b>p-value</b>
1	8.024	0.532
2	15.845	0.070
3	10.460	0.315
4	11.751	0.228
5	16.858	0.051
6	17.044	0.048
12	6.936	0.644
24	4.158	0.901
36	3.586	0.937

## 2. Granger Causality over the Full Period: 1830-1998

As causality in the historical time series could be modelled as a VAR (4) in levels, we investigated causality between our key variables using the Granger causality Wald test described in Toda and Yamamoto (1995). Although it is unlikely that the same causality has prevailed throughout the entire time series, we nevertheless started with a test for the whole historical time period (169 years). Table 4 gives the Granger Causality Wald Test Statistics for the entire historical time series (1830-1998). The tests also include pairwise Granger causality tests among the variables.

**Table 4: Granger Causality Wald Test Statistics 1830-1998**

This table shows the Granger Causality Wald Test Statistics for the entire historical time series (1830-1998). The tests also include pair-wise Granger causality tests among the variables.

Test	Test statistic	df	p-value
1. INS=> ECON	4.158	4	0.385
2. BANK=> ECON	13.131	4	0.011***
3. INS, BANK=> ECON	17.480	8	0.026**
4. ECON=>INS	8.180	4	0.085*
5. BANK=>INS	33.118	4	0.000***
6. BANK, ECON=>INS	38.580	8	0.000***
7. ECON=>BANK	3.480	4	0.481
8. INS=>BANK	8.155	4	0.086*
9. INS, ECON=>BANK	11.402	8	0.180

Note:  $X^2$  critical values are at the 0.10 level. Wald test statistics marked \* are statistically significant at  $p \leq 0.10$ , \*\*  $p \leq 0.05$  and \*\*\*  $p \leq 0.01$  or less (2-tail).

From Table 4 (tests 1 and 2) it is evident that for the 169 years as a whole ECON is only singularly Granger-caused by BANK at the 1% confidence level (2-tail), suggesting that, consistent with  $H_1$ , increased levels of bank credit drives economic development. In addition, BANK is Granger-causing INS (Table 4, test 5 at  $p \leq 0.01$ , 2-tail) with ECON in association with BANK also having a significant influence the growth of insurance markets (Table 4, test 6 at  $p \leq 0.01$ , 2-tail). These observations indicate that the development of the banking sector and economic growth together influence the demand for insurance possibly because insurance coverage provides surety for unanticipated asset losses after loans have been granted. Interestingly, this phenomenon has also been reported in contemporary emerging economies such as China (e.g., see Zou and Adams, 2006). In addition, high levels of banking and economic activity could increase the flow of funds to insurance companies thereby enhancing the supply of insurance in the domestic economy. However, as Jonung (1992) reports it is important to determine structural shifts in Granger causation in historical time-series data by examining the relation between the variables of interest in different sub-periods within the time series (see section 4.3). We thus conduct and report the results of these tests in sub-sections 5.3 to 5.5 below.

### 3. Granger Causality over the Sub-Period: 1830-1888

This sub-period covers the early industrialization phase of Sweden's economic development from 1830 to 1888 at which point high levels of claims (particularly in relation to fire damage) led Swedish insurance companies to report substantial losses and increase rates of premiums. It also prompted a wave of restructuring (consolidation) in the Swedish financial services sector and the introduction of new banking and insurance market regulations (Larsson, 1991; Jonung, 1992). The Granger Causality Wald tests covering the sub-period 1830-1888 are exhibited in Table 5.

**Table 5: Granger Causality Wald Test Statistics 1830-1888**

This table shows the Granger Causality Wald Test Statistics for the entire historical time series (1830-1888). The tests also include pair-wise Granger causality tests among the key variables.

Test	Test statistic	df	p-value
1. INS=> ECON	5.411	4	0.248
2. BANK=> ECON	9.184	4	0.057*
3. INS, BANK=> ECON	13.484	8	0.096*
4. ECON=>INS	9.293	4	0.054**
5. BANK=>INS	8.057	4	0.090*
6. BANK, ECON=>INS	14.686	8	0.066*
7. ECON=>BANK	0.519	4	0.972
8. INS=>BANK	5.105	4	0.277
9. INS, ECON=>BANK	6.104	8	0.636

Note:  $X^2$  critical values are at the 0.10 level. Wald test statistics marked \* are statistically significant at  $p \leq 0.10$ , \*\*  $p \leq 0.05$  and \*\*\*  $p \leq 0.01$  or less (2-tail).

Table 5 (test 2) suggests that BANK influenced ECON in Sweden in the early period of industrialization ( $p \leq 0.10$ , 2-tail) as predicted by  $H_1$ , while analyzed separately, INS responded positively to both growth in banking (Table 5, test 5,  $p \leq 0.10$ , 2-tail) and economic growth in association with development of the banking sector (Table 5, test 6,  $p \leq 0.10$ , 2-tail). This finding is consistent with Hansson and Jonung's (1997) historical analysis of the link between banking and financial development in nineteenth century Sweden and suggests that the growth of assets-based insurance coverage followed the expansion of bank credit in the promotion of economic development in the early years of industrialization and urban growth. The phenomenon of insurance lagging behind bank lending has also been witnessed in contemporary developing markets (such as China) (e.g., see Zou and Adams, 2006) and can arise for various reasons. For example, the potential for earning large short-term investment yields from bank lending in periods of rapid economic growth can often take precedence over careful risk underwriting and loss mitigation. As noted earlier, the results of tests 5 and 6 reported in Table 5 reveal that for the years 1830-1888 the growth of banking services and economic activity Granger-causes a corresponding increase in the demand for insurance (at  $p \leq 0.10$ , 2-tail). This observation suggests that eventually the risk protection qualities of insurance becomes increasingly important in both bank-based and corporate decision-making as the economy develops and becomes more complex and uncertain. Therefore, it appears that the insurance market initially lagged behind the banking sector in stimulating economic growth but then became more important as it became an integral part of the lending criteria and asset management strategies of Swedish banks in the early period of rapid industrialization of the nineteenth century.

#### 4. Granger Causality over the Sub-Period: 1889-1948

This sub-period covers the late nineteenth century industrialization consolidation phase of development including the turbulent World War I and II period, and the global economic depression of the inter-war years. The Granger causality statistics are shown in Table 6 and again, the only statistically significant results (both 2-tail) are that BANK is Granger-causing INS (Table 6, test 5,  $p \leq 0.05$ ) and that BANK in association with buoyant economic growth also influences INS (Table 6, test 6,  $p \leq 0.10$ ). These results suggest that the public demand for insurance is dependent on the level of banking activity and the state of the economy during this period. This result is not surprising as in periods of recession (such as the inter-war years) the demand for insurance is likely to be particularly price and income elastic (Ward and Zurbruegg, 2000).

**Table 6: Granger Causality Wald Test Statistics 1889-1948.**

This table shows the Granger Causality Wald Test Statistics for the entire historical time series (1889-1948). The tests also include pair-wise Granger causality tests among the variables.

Test	Test statistic	df	p-value
1. INS=> ECON	0.668	4	0.955
2. BANK=> ECON	3.910	4	0.419
3. INS, BANK=> ECON	6.348	8	0.601
4. ECON=>INS	4.526	4	0.340
5. BANK=>INS	9.958	4	0.041**
6. BANK, ECON=>INS	14.486	8	0.070*
7. ECON=>BANK	4.415	4	0.353
8. INS=>BANK	3.613	4	0.461
9. INS, ECON=>BANK	7.153	8	0.520

Note:  $X^2$  critical values are at the 0.10 level. Wald test statistics marked \* are statistically significant at  $p \leq 0.10$ , \*\*  $p \leq 0.05$  and \*\*\*  $p \leq 0.01$  or less (all 2-tail).

Compared with the first sub-period, this phase of Sweden's economic development (despite the existence of a more mature financial system) appears to indicate important changes in the way the economy works. This is because the causal relations between BANK, INS and ECON revealed in tests 2 and 3 of Table 6 (and previously significant at the 10 % level) are now insignificant (contrary to  $H_1$  and  $H_2$ ). This may simply be a reflection of the global economic turmoil during the inter-war years, which makes the sub-period particularly difficult to analyze with certainty. On the other hand, we cannot rule out the possibility that there are important structural changes in the economy as it matures over time. In fact, the evidence suggests that the Swedish financial services sector at this stage may no longer be a prime mover of national economic growth. There are three plausible (non-mutually exclusive) explanations for this observation. First the insignificant relation between BANK, INS and ECON during this sub-period could be due to regulatory changes affecting the banking and insurance markets. For example, more stringent solvency-based regulations (e.g., the 1903 Insurance Act) could have meant that financial intermediaries had less capital to invest in prospective positive net present value projects and that this had a detrimental effect on economic growth (e.g., see Diamond and Dybvig, 1983). Second, financial intermediaries may also have had to retain high levels of liquid assets (e.g., cash) and strictly ration investment in emerging growth opportunities during the inter-war years because, as noted previously, Sweden did not have a large (deep) and active domestic stock market (like the UK and US) (e.g., see Waldenström, 2002). In other words, the lack of active equity trading in Sweden could have contributed to a lack of liquidity in the economy thus stifling the impact of financial services companies on economic growth. Indeed, prior research (e.g., Arestis and Demetriades, 1997; Boot and Thakor, 1997a, 1997b; Arestis et al., 2001; Rousseau and Sylla, 2005) suggests that well-developed financial markets are vitally important for efficient and effective financial intermediation and economic development. Boot and Thakor (1997a) make the interesting observation that lack of financial market activity in an economy could be the result of collaborative (non-competitive) actions by financial intermediaries. For example, they posit that “. . . a critical factor in the development of the financial market is the fragmentation of the banking industry which in turn may depend on the number of banks in the industry.” (p. 726). Indeed, evidence for non-competitive (cartel) behavior in Sweden's financial services sector for much of the nineteenth and twentieth centuries has been reported previously in the literature (e.g., see Lindmark et al., 2006). Third, during this period the Swedish government took a more active role in the management of the domestic economy (Magnusson, 1997). The increase in State economic planning and control could therefore have reduced the role played by financial intermediaries like banks and insurers in the macro economy.

## 5. Granger Causality over the Sub-Period: 1949-1998

The third sub-period covers the high economic growth years after World War II up to the present day. The Granger causality results are presented in Table 7.

**Table 7: Granger Causality Wald Test Statistics 1949-1998**

This table shows the Granger Causality Wald Test Statistics for the entire historical time series (1889-1948). The tests also include pair-wise Granger causality tests among the variables.

Test	Test statistic	df	p-value
1. INS=> ECON	7.347	4	0.119
2. BANK=> ECON	9.440	4	0.510
3. INS, BANK=> ECON	14.623	8	0.067*
4. ECON=>INS	6.561	4	0.161
5. BANK=>INS	9.401	4	0.052**
6. BANK, ECON=>INS	19.319	8	0.013***
7. ECON=>BANK	15.913	4	0.003***
8. INS=>BANK	4.129	4	0.389
9. INS, ECON=>BANK	20.168	8	0.010***

Note:  $\chi^2$  critical values are at the 0.10 level. Wald test statistics marked \* are statistically significant at  $p \leq 0.10$ , \*\*  $p \leq 0.05$  and \*\*\*  $p \leq 0.01$  or less (all 2-tail).

Table 7, test 5 shows that BANK continues to influence INS ( $p \leq 0.05$ , 2-tail), and that the demand for insurance is also influenced by the combined effect of BANK and ECON, as reported in Table 7, test 6 ( $p \leq 0.01$ , 2-tail). Thus, there has been a reversion in the causal relation between banking and economic growth. That is, there is now a distinct difference from the situation in the nineteenth century when banking was causing economic growth, to this more recent period where bank services appear to be demand driven through changes in average levels of per capita income. While INS does not Granger-cause BANK (Table 7, test 8), it does significantly influence BANK together with ECON (Table 7, test 9) at the 1% level of confidence (2-tail). Therefore, because of underwriting and market uncertainties, and the requirement to maintain sufficient liquidity/capital to meet unforeseen claims, insurance per se may not be an important stimulant of economic growth (as proposed by Pearson (1997)). Our Granger causality tests nevertheless suggest that during the turbulent post-World War II period the insurance market played an increasing important role in the Swedish economy in terms of its role in alleviating bank-related credit and asset risks through loan protection and deposit insurance. Table 7, test 5, however, suggests that within the financial sector, it is banking that is in the main driving the growth in insurance ( $p \leq 0.05$ , 2-tail). That is, post-World War II growth in the demand for banking products, such as mortgages (e.g., to finance private home ownership) and other loan-based products has simultaneously increased the demand for assets-based insurance protection products such as property and life insurance, particularly as real disposable incomes in Sweden have risen since the mid-1960s. This view is consistent with that reported in Hussels et al. (2005).

From the early 1970s, many Scandinavian financial services companies began to sell insurance products with significant savings components (e.g., investment-linked life insurance and pensions) (Lindmark et al., 2006). In addition, as a result of recent regulatory changes many Scandinavian banks have begun to offer their customers insurance products either directly through bancassurance subsidiaries or through partnerships with established insurance companies (e.g., see Knutsen, 1999)<sup>30</sup>. Outreville (1996) and Beck and Webb (2003) further show that post-World War II,

<sup>30</sup> Ward and Zurbruegg (2000) report that in some European insurance markets (e.g., France) major changes in the regulatory environment (e.g., due to EU harmonization requirements) and a movement away from State provision in health and life insurance could cause changes in the insurance-economic growth relation. We

banking and economic prosperity are positively correlated with (life) insurance consumption. This could, as Hussels et al. (2005) suggest, be due to the general increase in consumer confidence in well-functioning financial institutions as well as rises in real per capita income in this period. Santomero (1993, p. 19) suggests that the entry of banks into insurance markets (particularly life insurance and pensions<sup>31</sup>) – a move prompted by deregulation and technological change - is motivated primarily by the need for banks to protect/expand market share and improve profitability through the expansion of, and cross-selling within, their customer-base rather than to realize the advantages of improved business diversification per se. Therefore, product-market shifts, and competitive and regulatory changes (deregulation) could also help to explain the conjoint relation between ECON, INS and BANK during this latest period of analysis. Ward and Zurbruegg (2000) also note that short and long run dynamics in the insurance-economic growth relation could be explained by the degree of insurance penetration (i.e., the proportion of premiums written per capita) in a country. Swiss Re (2004) reports that amongst European countries, Sweden is currently ranked twelfth in terms of aggregate insurance penetration and that the rate of change in insurance penetration has remained relatively stable since the end of World War II. This suggests that in Sweden, consumer demand for insurance is potentially buoyant particularly in periods of real economic growth and that structural economic shifts influence the insurance-economic growth relation. In fact, over the period 1961 to 1996 Ward and Zurbruegg (2000) find statistically significant Granger-causation between economic growth and insurance in European countries (such as Italy) that have relatively low levels of insurance penetration, while countries like the UK that have high insurance penetration do not exhibit such a causal relation.

## 6. The Long-Run Relation

The long-run relation in the historical time series 1830-1998 can be further tested using the Johansen (1992) Cointegration Rank Trace Test. In this test, the cointegrating equations are assumed to have an intercept, but not a trend; we find three lagged first differences and so the  $H_0$  that the number of cointegrated equations is larger than  $r$  can be rejected. The results are presented in table 8 below.

**Table 8: Johansen's Cointegration Rank Trace Test Statistics 1830-1998**

This table shows the results of the Johansen Cointegration Rank Trace Test in the entire historical time series (1830-1998). The cointegrating equations are assumed to have an intercept but not a trend and the number of lagged first differences in the ECM was three, implying a VAR(4) model for the level. The alternative hypothesis is that the number of cointegrating equations is larger than  $r$ .

Rank at most	Trace statistic	p-value
$r=0$	30.196	0.045**
$r=1$	9.745	0.301
$r=2$	0.392	0.532

Note: p-values marked \*\* are statistically significant at  $p \leq 0.05$  (2-tail).

In table 8, we find that the three variables are cointegrated over the full period and that one statistically significant long-run relation is reported at the 5% level (2-tail). This indicates that the development of economic growth and financial intermediation through banking and insurance markets cannot deviate too much in the long run. The interdependency between the variables indicates that the

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therefore split our post World War II sample into two further sub-periods covering the years before and after the mid-1960s when changes in consumer preferences for investment insurance products first emerged in Sweden (e.g., Larsson, 1991). However, this procedure did not change the Granger causality and so in the interests of brevity the results are not reported here.

<sup>31</sup> The use of actuarial technology makes underwriting mortality risks relatively cost-effective (predictable) for banks than underwriting non-life risks where they are at a comparative competitive disadvantage compared with insurance companies that have considerable experience of assessing the probability of future losses in lines such as liability and catastrophe risks (e.g., see Santomero, 1993, pp. 28-29).

financial services sector in Sweden is closely related to economic growth and *vice versa*. Turning to the estimated cointegrating equation, based on an ECM-VAR model assuming three lags of the differences, we find further support for the interaction between the variables of interest. Table 9 gives the estimated cointegrating vector equations based on the ECM model (which assumes three lags of differences).

**Table 9: Estimated Cointegrating Vector from the ECM-VAR (4) Model**

This table shows the estimated cointegrating equation, based on a ECM model assuming three lags of the differences.

Variable	Coefficient	p-value
Constant	-3.328	0.000***
BANK	1.000	0.000***
INS	-0.761	-14.937
ECON	0.042	0.391

Note: p-values marked \*\*\* are statistically significant at  $p \leq 0.01$  (2-tail)

The coefficients reported in Table 9 are defining the cointegrating vector, where INS is the normalizing variable. From the results, the stationary relation between the variables can be written as:  $-3.39 + BANK - 0.76INS + 0. + 0.04ECON$  which can be interpreted as reflecting a normalized equilibrium relation between the variables in our model. These coefficients can be interpreted as elasticities, which suggests that a 1% increase in bank lending would approximately give a 25% ( $1/0.04$ ) increase in economic growth. To check the robustness of the model, a joint test of autocorrelation was carried out and the results are reported in Table 10.

**Table 10: Joint Test of Autocorrelation in the ECM-VAR (4) Model**

The table presents the test statistics and p-values of the multivariate LM test of autocorrelation, calculated with small sample correction. The null hypothesis is that all autocorrelations and cross autocorrelations of order lag or less are zero.

Lags	Test statistic	p-value
12	9.572	0.386
24	4.988	0.835
36	3.547	0.939

Table 10 presents the test statistics and p-values of the multivariate LM test of autocorrelation, calculated with a small sample correction. The  $H_0$  is that all autocorrelations and cross autocorrelations of order lag or less are zero such that no significant autocorrelation remains in residuals. On basis of the results reported in Table 10 we therefore conclude that a long-run stationary relation between financial services and economic growth exists in our historical time series.

## CONCLUSIONS

Our study examines empirically the dynamic historical relation between banking, insurance and economic growth in Sweden using a unique time-series data set for the period 1830 to 1998. The period of analysis covers the early years of mass industrialization to the present day and focuses on the overall time-series and three major sub-periods for which sufficient observations were available to conduct our analysis. The present study advances the literature regarding the importance of financial intermediation and economic growth by focusing on a single country – Sweden. This focus enables us to control for potentially confounding effects that can arise in cross-section country studies due to such factors as differences in regulatory history and patterns of economic development.

Our results indicate that the development of bank lending activity preceded economic growth in Sweden during the nineteenth century, while Granger causality was reversed in the twentieth century. We also find that the development of bank lending in the nineteenth century increased the demand for insurance as well as promoting economic growth. In later periods, the development of insurance fosters demand for banking services but only in times of economic prosperity. For the entire period of our analysis, we find that banking is the predominant influence on both economic growth and the demand for insurance. In contrast, the insurance market appears to be driven more economic growth rather than leading economic development over the full 169 years of our period of analysis. Therefore, we conclude that financial intermediation, particularly banking, is an important prerequisite for stimulating economic development and argue that our results could have important policy implications for contemporary emerging economies (such as China) that are developing their financial infrastructure. We recognize that our study does have inherent limitations; for example, our multivariate tests could suffer from omitted variables problems (e.g., the rate of interest can affect the volumes of bank credit in the economy) (e.g., see Luintel and Kahn, 1999, p. 383). However, this potential shortcoming is likely to exist in most historical time series analyses due to the limitations of archival data. Finally, we believe that our study provides a basis for further time-series econometric research of the historical and contemporary role of banking and insurance in economic development in other jurisdictions.

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