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Financial Development and Economic Growth in Romania

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1. Introduction

The fundamental question in economic growth that has preoccupied researchers is why do countries grow at different rates. The empirical growth literature has come up with numerous explanations of cross-country differences in growth, including factor accumulation, resources endowments, the degree of macroeconomic stability, educational attainment, institutional development, legal system effectiveness, international trade or ethnic and religious diversity.

One critical factor that has begun to receive considerable attention more recently is the role of financial markets in the growth process. The pozitive link between financial depth, defined broadly as the development level of financial markets, and economic growth is in one sense fairly obvious. That is why more developed countries, without exception, have more developed financial markets. Therefore, it would seem that policies to develop the financial sector would be expected to raise economic growth.

This paper examines whether the exogenous component of financial intermediary development influences economic growth. In the second chapter, I tried to mirror the main links between this two concepts, reminding the most important view points expressed by acknowledged economists and researchers. The third part presents a simplified dynamic model used in the next chapter for econometric estimations. I chose to express the endogenous rate of economic growth as an ARDL(1,1) model (Auto-Regressive Distributed Lag), after that I applied an error correction model, in order to obtain the long-run relationship between financial intermediation and the endogenous variable. The econometric modelling for this mathematical issues was realised using VAR and VEC estimation methods, over a period of 117 months (1992:01-2001:09). The last chapter offer a personal interpretation of results obtained in the econometric analysis of Romania case, together with the conclusions infered by my studies.

My view is that in a well-functioning financial system, there are numerous interactions among all components (public finance, banking system, securities market). In my study, by using few variables, I emphasise the importance of the first and the second elements (romanian securities market being extremely fable); hence, I think that the unit of observation for studying finance’s role in economic modernization should be the financial system as a whole, and not just one or two of its components.

2. Economic growth-financial development nexus

Nobel Prize winners sharply disagree about the role of the financial sector in economic growth. In a collection of essays by the “pioneers of development economics” – including three winners of the Nobel Prize in Economics, finance is not even discussed (Meier and Seers, 1984). Similarly, Nobel Laureate Robert Lucas (1988) dismisses finance as a major determinant of economic growth. Building on prescient insights by authors like Gurley and Shaw (1955), Goldsmith (1969) or McKinnon (1974), however, a new wave of research indicates that financial systems play a critical role in stimulating economic growth (Levine, 1997). Moreover, recent work suggests that both stock markets and banks independently influence growth (Levine and Zervos, 1998). Thus, unlike more dismissive views of the finance-growth nexus, Nobel Laureate Merton Miller remarked in 1998 “... that financial markets contribute to economic growth is a proposition almost too obvious for serious discussion.”

Indeed, the role of financial development is considered by many to be the key to economical progress. For instance, Hamilton (1781) argued that “banks were the happiest engines that ever were invented” for spurring economic growth. Others, however, question whether finance boosts growth. Adams (1819) asserted that banks harm the “morality, tranquility, and even wealth” of nations.

Economic theories mirror these divisions. Some models show that economic agents create debt contracts and financial intermediaries to ameliorate the economic consequences of informational asymmetries, with beneficial implications for resource allocation and economic activity. However, other models note that higher returns from better resource allocation may depress saving rates enough such that overall growth rates actually slow with enhanced financial development. Furthermore, opinions like financial development primarily follows economic growth implies that the engines of growth must be sought elsewhere. In terms of policy, 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.

There are shortcomings, however, with recent empirical investigations of the impact of financial system on economic growth. Research either uses pure cross-country analyses that do not account for possible biases induced by endogeneity and omitted variables; or, researchers use complex, hard to interpret panel estimates without focusing on the potential influence of outliers.

Theory provides conflicting predictions about the impact of overall financial development on growth and about the separate effects of stock markets and banks. Many models emphasize that well-functioning financial intermediaries and markets ameliorate information and transactions costs and thereby foster efficient resource allocation and hence faster long-run growth (Levine, 2001). Similarly, financial market development may accelerate economic growth by enhancing risk diversification and thereby encouraging risk-averse investors to shift toward higher-return, projects. Theory, however, also shows that financial development can hurt growth. Specifically, by enhancing resource allocation and the returns to saving, financial sector development could lower saving rates through well-known income and substitution effects. Also, greater risk diversification in some models lowers precautionary savings and therefore may lower aggregate saving rates. If there are externalities associated with capital accumulation, this drop in savings could slow growth and reduce welfare. Thus, theory provides ambiguous predictions about the growth effects of financial development. Theory also offers conflicting predictions about whether stock markets and banks are substitutes, compliments, or whether one is more conducive to growth than the other. For instance, some authors criticize the role that banks play in easing information frictions and therefore in improving resource allocation, while researchers like Stiglitz stress that stock markets will not produce the same benefits as banks. On the other hand, some models emphasize that markets mitigate the inefficient monopoly power exercised by banks and stress that the competitive nature of markets encourages innovative, growth-enhancing activities as opposed to the excessively conservative approach taken by banks. Finally, some theories remind us that it is not banks or markets, it is banks and markets; these different components of the financial system ameliorate different information and transaction costs.

History appears to indicate that a good financial system is one that has five key components: sound public finances and public debt management, stable monetary arrangements, a variety of banks (some with domestic and others with international orientations, and perhaps some with both orientations), a central bank to stabilize domestic finances and manage international financial relations, and, at last, a well-functioning securities market. Insurance might well be added to this list, as a sixth component, but I leave it out here, in part, because it involves a function – risk management – similar to that in which another component, banking, engages, and in part because, in a global historical context, it could be and often was supplied by insurers in other countries. Nonetheless, I recognize that the leading economies did develop the insurance component of their financial systems early in their financial and economic modernizations. Such an articulated financial system, once it is in place and functioning, can mobilize capital domestically and thereby promote a country's economic development and growth. In a financial globalization context, it can also serve, either directly by the facilities it offers or indirectly by enhancing growth prospects, to attract the interest of foreign investors.

In our case, what makes a good financial system possible? What are its prerequisites? Without going into detail, I would say that the prerequisites would likely include a combination of good government, including representative political institutions, an independent judiciary or court system, clearly defined and secure property rights, and financial savvy on the part of leaders – finance ministers, central bankers, and so on – among the components of a good system.

We place sound *public finance* first in our list of financial-system components largely for historical reasons. In modern history, good financial systems emerged out of the needs of the nation-state for financing, often to fight its wars with other nation-states. Sound public finance includes setting and controlling public expenditure priorities, raising revenues adequate to fund them efficiently, and if – as is often the case – that involves issuing public debt, then provision must be made for servicing the debt to gain and keep the confidence of the investors who purchase it. The historical primacy of public finance in the development of financial systems, to be documented below, serves another purpose. It reminds us that much of finance, historically and now, and especially when finance has global dimensions, is inextricably bound up with politics. It is both naive and a misreading of history to assume that capital moved throughout the world solely, or even mostly, in search of the highest available return commensurate with the risks taken. It is equally naive to assume that capital usually moved in response to the demands of users who want to make productive economic investments. In a world without governments and foreign policies, that might have been the case. But ours is not such a world. This is a reality that needs to be kept in mind in any discussion of economic globalization. Nonetheless, it should also be kept in mind that the needs of governments to raise and deploy funds internationally for reasons of state (typically, wars) resulted in the creation of financial systems that could mobilize capital and deploy it for productive economic purposes.

Stable money is desirable for the usual textbook reasons. Money is useful as a medium of exchange, a store of value, and a standard of deferred payments. All three uses, but especially the latter two, are harmed if money fluctuates and depreciates in value in unpredictable ways.

Banks and banking have played large roles in modern economies. Once a monetary base is specified, banks of deposit, discount, and note issue amplify it into a money stock that consists largely of bank money convertible into the monetary base. They do this by granting credit to entrepreneurs and other users of funds. The credit-granting function turns banks into risk managers, the essence of their role as financial intermediaries. A lot of the risk that banks manage arises from borrowing short and lending long. Individual banks and banking systems become troubled, even fail, when recipients of bank credit are unwilling or unable to repay on schedule (illiquidity and default problems) or at all (insolvency and repudiation problems). If depositors, the holders of bank money from whom the banks borrow short, learn of such problems, they may compound them by attempting *en masse* to convert their bank money to base money.

*Central bank*s, the fourth of our key components of a modern financial system, can prevent such problems from arising, or at least alleviate them when they do arise. They do this by monitoring and regulating the operations of individual banks in a banking system with the goal of preventing problems. And they do it to alleviate problems when they do arise by acting as lenders of last resort. Central banks also act in the areas of other financial-system components. For example, they often serve as the government's bank, that is, as an adjunct of public finance. And they act to stabilize the value of a country's money, both domestically and internationally.

Securities markets, the last component, facilitate the issuance of public and private debt securities and private equity securities. Specialized banks – investment or merchant banks – serve here as financial intermediaries between the borrowers/issuers (governments and business enterprises) of bonds, stocks, and other forms of securities, and the lenders/investors who purchase securities. Once securities are issued, trading markets provide them with transferability and liquidity that enhance their appeal to investors, be they domestic or foreign.

One could arrive at the above list of key financial-system components as an inference from observing the financial systems of highly-developed national economies today. Such financial systems are one of the characteristics of these countries that distinguish them from the far larger number of less developed economies. We turn now to the historical origins of such systems.

The foregoing discussion of a good financial system in terms of its key components and their connections to one another raises several questions. When, where, and how did such articulated financial systems appear in modern economic history? And did it matter for the countries concerned in terms of their economic growth and their participation and status in the world economy? Our reading of modern economic history is that countries that developed such good financial systems early in their histories grew rapidly thereafter and often attracted foreign capital inflows that served to enhance their growth. The Netherlands, Great Britain, and the United States are leading examples. In succession, these three countries after their financial emergence went on to become the economic leaders of the past four centuries and also leaders in the export of capital.

The Dutch Republic was the first country to develop such a system early in the 17th century. Despite its small size, the country became a leading political and economic power of the 17th century, and its economic leadership continued into the 18th century. Great Britain developed such a system at the end of the 17th century and in the first decades of the 18th century. It went on to have the first industrial revolution later in the century, to build a worldwide empire, and to succeed the Dutch Republic as the leading world economy during the 18th and much of the 19th century. At the end of the 18th century, the newly independent United States also developed such a system. It was then a small country on the periphery of a world system dominated by Europe, with about half a percent of the world's population. A century later, with about 5 percent of world population, the United States had become the world's largest economy, a position it maintains after the elapse of another century. In each of these three cases, financial innovation led to economic leadership, and then to the Dutch, the British, and the Americans successively becoming world leaders in the export of capital to other countries. During the second half of the 19th century, France and Germany in Europe, and Japan in Asia also became financial innovators, with beneficial results for their economic growth and their ability to become major exporters of capital. In 1914, at the end of the first era of globalization, the four European countries and the United States accounted for about 90 percent of the world's capital exports. Together with Japan, now the world's second largest economy, their share in the second era of globalization at the end of the 20th century has not changed much from what it was nine decades earlier. Even peculiarities of the earlier era remain, with the United States again – as in 1914 – being a net importer of capital even as it exports a great deal of it. I will now examine these countries' early financial development in more detail. There are many similarities among them, but also some differences. The United States and Japan are of special interest because their financial revolutions were far separated in time and space from the European home-ground of modern finance and because they have become the two largest national economies.

*The Dutch Republic (*The Republic or United Provinces) was born late in the 16th century when the northern provinces of the Spanish Netherlands revolted against Spanish

Habsburg rule and, over several decades of protracted warfare extending well into the 17th century, established independence from Spain. Even before Dutch independence, provincial governments in the Spanish Netherlands developed a permanent public debt market, likely the world's first, when annuities were issued as a means of lightening tax burdens in response to the revenue demands of Spanish overlords. This would now be termed tax-smoothing. At roughly the same time, the Spanish Netherlands perfected a continuing market in negotiable international bills of exchange to finance trade without necessitating large movements of hard money across borders. The Dutch revolt maintained the public-debt and money market innovations in the United Provinces. When coupled with the new republic's tolerance of minorities in the southern Netherlands, the revolt also led to an inflow of both capital and financial expertise to Dutch cities, particularly Amsterdam. In 1609 came two additional and major financial innovations. One was the *Wisselban*k, or Bank of Amsterdam, an exchange bank for merchants and the government whose bank money was better than gold, or at least better than the motley collection of gold and silver coins then in circulation. Similar banks were established in other Dutch cities, as were local private banks *(kassier*s) and, somewhat later, merchant banks. The other innovation of 1609 was the common stock, created when the Dutch East India Company decided to make its capital permanent and issued dividend-paying, tradable shares to its owners instead of liquidating each of its trading expeditions at its conclusion and distributing all of the proceeds to the owners. As warfare with Spain wound down in the early decades of the 17th century, and with the aid and example of *Wisselbank* money, the Dutch guilder became stable in value and remained so until the end of the 18th century. Thus, by the early 17th century, the Dutch Republic had established a version of each of the key components of a modern financial system: strong public finances, stable money, banks, a central bank of sorts, and bond and stock markets. There followed an era of great development and prosperity variously described as is the first modern economy. The Republic could not long keep the dominating political power that by the mid-17th century it had derived from its strong economy. It was too small a country and too decentralized a state to accomplish such a feat in a world increasingly dominated by larger, more centralized states. But Dutch wealth continued to accumulate, Dutch capital sought returns all over the world, and Dutch financial expertise was exported to other countries.

Great Britain: Dutch expertise in finance was introduced directly to England after the Glorious Revolution of 1688, when the Dutch stadhouder, Willem of Orange, was invited to become King William III of England. After generations of erratic financial behavior of previous monarchs, the British, envious of Dutch economic and financial power and hoping to surpass it, passed control of their country's finances and monetary system from king to Parliament. Adopting Dutch finance, the British also improved upon it. The Bank of England was formed in 1694 as a bank of discount, deposit and note issue capitalized by public debt, and was thus closer to the modern concept of a central bank than the Amsterdam *Wisselban*k. The metallic currency was recoined and paper issues such as Bank notes were made convertible into the metallic base. England thus achieved a stable money. In subsequent decades the public finances were also stabilized, in part by the introduction of standardized perpetual annuities that became the basis for a liquid public debt market. A domestic money market in bills of exchange appeared. Even earlier, the British East India Company followed its Dutch counterpart by making its capital permanent and issuing tradable shares against it, and an active equity market in company shares was present by the 1690s. These developments have been described as an English in financial revolution, and as "the sinews of power" that enabled the British state to win wars and build an empire. After the mid-18th century, note-issuing country banks began to dot the English and Welsh countryside, joining the long-existing private bankers of London and the Bank. The banking system was knit together via the London money market, through which capital surpluses of English agriculture could be recycled to finance the capital deficits of areas industrializing in the first industrial revolution. In Scotland, large banking co-partnerships with branches and freedom of note issue joined several corporations chartered with banking privileges earlier in the century. Larry Neal's (1990) study of the 18th-century London and Amsterdam capital markets documents the manner in which these developments promoted a flow of capital to England, mainly from the Dutch Republic but also from other continental financial centers. Foreign holdings of shares in leading British companies (East India, South Sea, and the Bank of England) reached nearly 20 percent of the total by mid-century, and foreigners also held about 14 percent of the English national debt. Neal also demonstrates that the two markets across the North Sea from each other were remarkably integrated, with nearly equivalent prices and price changes for the same securities. Even the famous French and English bubbles of 1720 were synchronized in ways that were probably orchestrated by Dutch investors. At the end of the century, during the French Revolution and the Napoleonic Wars, Neal argues that the ability of these markets and institutions to transfer flight capital from the continent to England enabled the industrial revolution there to proceed. Because of international capital market integration, heavy British government borrowing to finance war efforts did not crowd out private investment. If one is willing to consider northwestern Europe as the world, the 18th century surely was the first era of financial globalization. It was the result of two modern financial systems, most likely the only two such systems existing then, linking up with each other across the North Sea, to the advantage of borrowers and investors in both the Dutch Republic and Great Britain. These systems had a version of each of the five key components of a good financial system.

The United States: If one thinks that true financial globalization must link continents separated perhaps by an ocean, and not merely two countries separated by the North Sea, history does not stand in the way with much of a delay. That is because the United States in the early 1790s engineered a financial revolution quite like the earlier ones of the Dutch Republic and Britain. The engineer was Alexander Hamilton, first Secretary of the Treasury (1789-1795) of the new federal government that assembled in 1789 under the Constitution. Hamilton's earlier writings indicate that he had absorbed many of the key lessons of Dutch, English, and French financial history. In office, with the backing of the president, the Congress, and the private sector, he applied them. First, Hamilton set up a federal revenue collection system based on import tariffs and domestic excise taxes authorized by Congress, as well as hoped-for revenues from land sales that were slow to materialize. While proceeding with that, Hamilton in 1790 proposed and Congress adopted a plan for restructuring the par value of the national debt from the American Revolution. The debt included state debts assumed by the new federal government and arrears of interest on it that the previous government had been unable to pay. The restructuring took the form of three new issues of new federal securities with varying interest-rate terms. The new securities were payable, principle and interest, in hard-money dollars to be collected by the revenue system. These provisions applied to the domestic debt of some $65 million; an additional $12 million owed to foreigners, mainly the French government and Dutch investors, was rolled over with fresh loans from Dutch bankers (Perkins 1994). Also in 1790, Hamilton proposed a Bank of the United States modeled on the Bank of England, but with several innovative features including a large capital ($10 million), the possibility of branches and partial (20 percent) government ownership. Like the Bank of England, it was to be the government™s bank and it could also engage in private-sector banking. There were only three other banks, small state institutions, in the country at the time. Congress enacted the Bank proposal early in 1791. The Bank had its initial public offering in July of that year; it was quickly oversubscribed. The Bank opened in Philadelphia at the end of 1791, and branches were established in other cities starting in 1792. Fearing that the federal bank with its branches would dominate U.S. banking, the states moved quickly in the 1790s to charter more banks of their own. A country with no banks prior to1782 became one a decade later with a rapidly expanding banking system, and one that by 1802 had 35 chartered banks. With the Bank proposal enacted, Hamilton next produced a report on a mint, which defined a new U.S. dollar in terms of both gold and silver (i.e., a bimetallic monetary base), and proposed establishing a mint to make a variety of coins based on the decimal system, also an innovation, albeit one earlier proposed by Hamilton's cabinet colleague, Thomas Jefferson. Banknotes convertible into a specie base gradually replaced the early fiat paper issues of state governments. The new federal debt securities appeared late in 1790, followed by the stock of the Bank in mid-1791. So many new and putatively high-quality securities energized the informal trading markets of Philadelphia, New York, and Boston. Trading was vigorous, speculative spirits were unleashed, and new private issues joined those of the government. Government debt that had sold at 15 cents on the dollar in 1789 reached par in 1791, and 120 percent of par in early 1792, just before Wall Street's first crash knocked 20 percent off their value in two months. New York State enacted a law to end speculation in the streets, causing brokers to meet under a buttonwood tree in Wall Street in May 1792, and draw up an agreement to trade indoors. This was the origin of the New York Stock Exchange. In roughly three years, from 1789 to 1792, the United States was transformed from a bankrupt country with a primitive financial system to a country servicing its debts and equipped with a modern financial system like the ones that the Dutch and the British had developed earlier over many decades. What were the effects of that system? In keeping with the general approach of our paper, we discuss them under growth and globalization.

British economic growth may also have had roots in financial development. In the Dutch case, a modern financial system was in place before the Golden Age and the rise of the Dutch economy to 17th-century preeminence. In the British case, a modern financial system was in place before the first Industrial Revolution and the rise of the English economy to 18th-century preeminence. In the U.S. case, a modern financial system was in place before the U.S. industrial and transportation revolutions and the westward movement of the 19th century, by the end of which the United States was the pre-eminent economy. We see a pattern emerging in this history.

What about globalization? Does having a good financial system mean that foreign capital is more likely to flow to that country? Although residuals from balance of payments data indicate only modest net capital inflows during the period from 1790 to 1812, more detailed data on foreign holdings of U.S. securities tell a different story. Benchmark estimates of such holdings in 1789 and 1803, a period encompassing the financial revolution of the Hamiltonian Federalists, indicate that foreign investors increased their holdings by $48-52 million from a 1789 base of $17-18 million, the majority of which consisted of Revolutionary War debts owed to France and the Dutch. The inflow of portfolio capital implied by Wilkins's data is fairly consistent with U.S. Treasury and other records for 1803 on total U.S. securities issuance and the amounts in domestic and foreign hands. Foreign investors held 53 percent of the U.S. national debt in 1803, and 62 percent of the stock of the Bank of the United States. With shares of state banks, insurance and transportation companies added in, there was a grand total of $122 million in public and private securities issued, almost all after 1789 as state chartering of corporations took off. Foreign investors held nearly half of these securities, or $59 million.

The modern concept of an emerging market involves the generation of confidence among foreign investors. The ingredients of confidence include fiscally responsible governments, stable money, and sound domestic financial institutions, markets, and instruments. Confidence in a country's securities increases, we think, when there are domestic stock and bond markets to enhance their liquidity. Two centuries ago the United States was such an emerging market and, with an occasional slip, it has remained a Mecca for foreign investors ever since. A century earlier, Dutch and other foreign investors saw something similarly attractive in England. A century before that, foreign investors saw it in the Dutch Republic. Emerging markets are not new in history.

France and Germany: After Great Britain, France and Germany were the leading foreign lenders in the era of globalization during the late 19th and early 20th centuries. Even then, however, these two large and relatively prosperous European countries lagged well behind Britain, another large country, in international lending, and, on a per capita basis, even behind the Netherlands. Moreover, the Dutch and the British became foreign lenders and international investors long before the French and the Germans. This raises two questions. What accounts for the French and German lag? And why did the two countries then play major roles in the financial globalization that of the late 19th century? We would answer both questions by saying that until the middle of the 19th century neither France nor Germany had developed all of the components of a good financial system that the Netherlands developed two centuries earlier, Britain a century earlier, and the United States half a century earlier. In the case of France, while England was having its financial revolution in the decades around 1700, the country's public finances were chaotic, and the collapse of John Law's scheme in 1720 made the French public suspicious of paper money and banking for a century or more. Nonetheless, after the end of the Napoleonic Wars in 1815, France's public finances and currency were stabilized and the central Bank of France had been present since 1800. There were also a variety of bankers, but nothing like the extensive banking systems that existed in the United States and Britain. Paris had a stock exchange, but it listed just a few securities, mostly government debt. France's relative financial backwardness during the early 19th century resulted from the state™s strict controls on, and limitations of, banking and securities market development. In the case of Germany, the country was of course not unified in fact until the middle of the 19th century, or in law until 1871. When the United States began its financial revolution in 1790, there were hundreds of separate German states, each with its own ruler. By the early 19th century (if not before), the major German states had stable public finances and stable money, but in other financial-system components respects they lagged even behind France. The Prussian Bank, forerunner of the central Reichsbank that came in 1875, was not founded until 1846. There were a variety of private bankers, including such famous houses as the Rothschilds that began in Germany, and other public and private financial institutions. But as in France, state controls limited banking development. Securities markets were slow to develop, and the ones of the early decades of the 19th century were more adjuncts of the private bankers' businesses than independent sources of finance.

In both France and Germany financial systems began to take on a more modern form around 1850. The capital needs of large enterprises such as railways and the growing perception that the two countries were lagging behind Britain provided reasons for change. Change came in more liberal state approaches to banking development, in particular the innovation (for these countries, although it had existed in the United States for 6-7 decades and in England for 2-3 decades) was joint-stock banking. The French leader Louis Bonaparte, after declaring himself Emperor Napoleon III in 1851, sought to justify his authoritarian regime by fostering rapid economic development. With his backing, the joint-stock Credit Mobilier bank was formed in 1852; it combined commercial and investment banking. Although the Credit Mobilier failed in 1868, it had an impact in and outside of France. With the French Credit Mobilier as an example, the Germans founded similar institutions. During the middle decades of the 19th century, France and Germany thus added missing elements of a good financial system. As their financial systems mobilized capital more effectively, the two economies grew faster and their financiers began to invest large sums of capital in other countries.

Japan until the 1850s was almost totally ioout of the loopll of western economic development. Yet it quickly became a major economic and political power during the era of globalization a century ago, and then within a century became the world™s second largest national economy. That makes Japan perhaps the most interesting of the cases studied here. How did it happen? Among the important reasons is that Japan, like the other cases here but unlike so many of the world's countries, had a financial revolution that resulted in a good financial system. After the Meiji revolution toppled the isolationist shogun regime in 1868, there were in the 1870s both bold initiatives and false starts in building a modern financial system. The bold initiative included commuting feudal dues paid in rice to government bonds paid in money. This created a securities market, and the Tokyo and Osaka stock exchanges formed in 1878 to trade the new issues. The false starts included excessive issues of fiat currency and an attempt to copy the U.S. national banking system with bank notes backed by government bonds. The banks purchased large amounts of government bonds and issued large amounts of bank notes against them, without much attention to the specie reserves they were supposed to maintain. Fiat money and bank-created money led to rampant inflation from 1876 to 1881 (Tamaki 1995). Financially, Japan turned the corner during the 1880s. The Yokohama Specie Bank was founded in 1880 and given the task of accumulating specie through financing the countries exports so that a currency convertible to specie could in time be established. The alternative of gaining specie by means of a foreign loan was rejected on grounds that foreign lenders could not be trusted or given influence in Japanese affairs. The Specie Bank™s operations were clever. It paid Japanese exporters in Japanese currency advanced from the government when goods were exported, then drew bills of exchange collectible in specie on the foreign purchasers and collected them at branches it established in foreign cities, and finally remitted the specie to the government to repay for the government's advance. Financial innovation thus encouraged exports and the government's accumulation of specie. In 1881, Masayoshi Matsukata became Japan's finance minister, an office he held for many years. Matsukata played a role in Japan's financial revolution comparable to that of Hamilton in the United States. In 1882, he established the central Bank of Japan. He also instituted a regime of fiscal austerity and deflation to end the inflationary excesses of the 1870s. By 1885, paper-money circulation was reduced enough, and the government's specie accumulations had increased enough, for the Bank of Japan to introduce silver-convertible bank notes. Private bank note issue rights were taken away in 1883, and the government's fiat issues were gradually retired. Bank of Japan notes were 2 percent of Japan's note circulation when they were introduced in 1885; by 1897 they had increased to 75 percent. Along with these changes, Matsukata instituted reforms of Japan's banking system. With fiscal and currency stability achieved by the mid 1880s, Japan recovered quickly from the deflation of the decade's first years. Company formation tripled between 1885 and 1890. During a credit crisis in 1889, the Bank of Japan found a way to aid these companies and the Japanese securities markets.

The bylaws of the Bank forbade lending on securities, but it could increase market liquidity by special discounting of bills covered by high-quality public and private securities. The innovation allowed companies to repay the banks during the credit crunch, and it thus cemented ties between companies, banks, and the Bank of Japan by encouraging the banks to hold company shares (Morikawa 1992). Although this might seem to indicate the origins of modern Japan's strong bank-firm relationships, we now know that securities markets and equity finance were important independent sources of firm financing from the 1880s to the 1920s. In 1897, aided by an indemnity in gold paid by China after the Sino-Japanese War of 1894-1995, Japan adopted the gold standard and started the system of long-term credit banks. These banks were joint stock companies, although under the supervision of the Ministry of Finance. Issuing debentures, most of which were purchased by the Ministry with surplus government funds and postal savings deposits, the new banks invested the proceeds in infrastructure and other investments. Once on the gold standard maintained by the world's leading economies, Japan lost its earlier aversion to borrowing abroad and quickly became an emerging market. Loans were raised in London in 1897 and 1899. Foreign loans totaled 140 million British pounds from 1899 to 1907, enough to cover 70 percent of the costs of the Russo-Japanese War of 1904-1905.

It is often wondered why, of all the possible candidates, Japan was the one non-western country to modernize its economy and join the ranks of the wealthy western countries. We think an important part of the answer, and one supported by Rousseau (1999) with time series evidence, is that early in its history, during the Meiji era, Japan developed a sophisticated financial system like that of the western leaders. As in the other cases essayed here, that financial system included stable public finances, sound money, banks, a central bank, and securities markets. It enabled Japan, a poor and relatively isolated country in 1870, to become an emerging market and a rapidly growing economic and political power by the early 20th century. As Herbert Feis long ago put it, Japan, of all the countries of the Orient, proved itself capable of using to good advantage the capital of Europe. Its government succeeded in the threefold task of promoting internal industrial development, extending and reinforcing Japanese economic interests in Korea and China, and adjusting its plans to the political rivalries of the European continent –. The growing strength obtained from the use of that capital made Japan a better credit risk for investors and a more important ally. By 1914 the small island empire had become a great power in its own right and might. Japan had learned an important lesson of history, namely that financial development can be the basis of economic growth and participation as a major player in the global economy. With all the elements of a good financial system in place before the 20th century, Japan’s economic success seems less an exception to the rule of West-dominated economic modernization and more a confirmation the key role of financial development in promoting economic modernization.

3. Theoretical Model of Analysis

Over the last decade or so, a booming cointegration literature has focused on the estimation of long-run relationships among I(1) variables (Johanssen 1995, Phillips and Hansen 1990). From this literature, two common misconceptions have been derived. The first one is that long-run relationships exist *only* in the context of cointegration of integrated variables. The second one is that standard methods of estimation and inference are incorrect. Shin, Pesaran, Lee and Garratt (1998) have argued against both misconceptions, showing how small modifications to standard methods can render consistent and efficient estimates of the parameters in a long-run relationship between both integrated and stationary variables. Furthermore, the methods proposed by Shin and co-authors avoid the need for pre-testing and order-of-integration conformability given that they are valid whether or not the variables of interest are I(0) or I(1). The main requirements for the validity of this methodology are that, first, there exist a long-run relationship among the variables of interest and, second, the dynamic specification of the model be augmented such that the regressors are strictly exogenous and the resulting residual is not serially correlated. For reasons that will become apparent shortly, Shin, Pesaran and co-authors call their method "an autoregressive distributed lag (ARDL) approach" to long-run modelling. My analysis consider, in a simplified version, the following bivariate model:

$$y_t = a + b \cdot y_{t-1} + c \cdot X_{t-1} + \nu_t \qquad (1)$$

$$X_t = \gamma + \rho \cdot X_{t-1} + \varepsilon_t \qquad (2)$$

where y_t, the decision variable, is the industrial production growth rate in year t and **X**, the forcing variable, represents a set of growth determinants including financial depth (expressed as a ratio between credit to non-governments and industrial production) and control variables (respectively monetary aggregate M2 weighted by the same industrial production).

Furthermore, assume that the residuals (or shocks) have the following distributional properties:

$$\begin{pmatrix} \nu_t \\ \varepsilon_t \end{pmatrix} \sim (0, \Sigma) \qquad \Sigma = \begin{pmatrix} \sigma_{\nu\nu} & \sigma_{\nu\varepsilon} \\ \sigma_{\nu\varepsilon} & \sigma_{\varepsilon\varepsilon} \end{pmatrix} \qquad (3)$$

The first point to note is that X does not depend on past values of y (beyond its dependence on previous values of X*).* If a more general process for X were allowed, the long-run relationship between the two variables would not be unique. That is, both variables would be endogenous and additional identification assumptions would be needed to discern between various long-run relationships. Since multiple long-run relationships are beyond the scope of this paper, we restrict the dynamic process for *X* to be purely autoregressive.

The second point to note is that the existence of a long-run relationship requires the process for *y* to be stable, which in this simple example entails that $|b|<1$. Notice that once we have restricted the process of *X* to be purely autoregressive, the existence of a long-run relationship does not rely on whether *X* is I (0) or I(1); that is, there is no restriction on whether $\rho=1$.

In order to be able to derive the long-run relationship between *y* and X, we must obtain a dynamic regression equation in which, first, the regression residual is serially uncorrelated and, second, the regressors, X, are *strictly* exogenous (that is, independent of the residuals at all leads and lags.) Given the assumptions on the distributional properties of the residuals *n* and *e* (equation 3), the requisite that the residuals be serially uncorrelated is met in our simple example. If this were not the case, we would need to augment the lag order in (1) and (2) until the residuals become serially independent. The second pre-requisite to derive a long-run relationship is, however, not met in my example – *X* is not *strictly* exogenous given that the non-zero correlation between the shocks entails a contemporaneous feedback between *y* and X. As explained by Shin and Pesaran (1998), the way to control for this contemporaneous feedback is also to augment the dynamic specification in (6). The purpose of augmenting the regression equation is to replace the (correlated) residual ν with a linear predictor based on leads and lags of X and a new residual that by construction is independent of X. In our example, we model the contemporaneous correlation between ν_t and ε_t by a linear regression of ν_t on ε_t as follows,

$$\nu_t = \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}} \cdot \varepsilon_t + \eta_t \tag{4}$$

where $(\sigma_{\nu\varepsilon}/\sigma_{\varepsilon\varepsilon})$ represents the coeficient of regression and η_t is distributed independently from ε_t.

Substitute the above expression for ν_t into equation (1). Then, using the AR model for X, express ε_t in terms of X_t and X_{t-1}. The ensuing regression equation is an auto-regressive distributed lag model (ARDL) for *y* from which a long-run relationship can be derived. The resulting ARDL(1,1) for y is given by,

$$y_t = \left(a - \gamma \cdot \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}} \right) + \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}} \cdot X_t + \left(c - \rho \cdot \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}} \right) \cdot X_{t-1} + \eta_t \tag{5}$$

Note that the original process for *y* (equation 1) is now augmented by the inclusion of the additional regressor X_t. The error-correction model (ECM) implied by the ARDL(1,1) given above can be expressed as,

$$\Delta y_t = -(1-b) \cdot \left[y_{t-1} - \frac{a - \gamma \cdot \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}}}{1-b} - \left(\frac{c + \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}} \cdot (1-\rho)}{1-b} \right) \cdot X_{t-1} \right] + \left(\frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}} \right) \cdot \Delta X_t + \eta_t \tag{6}$$

where the expression in brackets is the error-correction term and (1-b) is the speed of adjustment. Therefore, the long-run (steady-state) relationship implied by the dynamic system in equations (1)-(4) is given by,

$$y^* = \left(\frac{a - \gamma \cdot \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}}}{1-b} \right) + \left(\frac{c + \frac{\sigma_{\nu\varepsilon}}{\sigma_{\varepsilon\varepsilon}} \cdot (1-\rho)}{1-b} \right) \cdot X^* + \eta^* \tag{7}$$

or

$$y^* = \alpha + \beta \cdot X^* + \eta^* \tag{8}$$

The main assumption is that there exist a single long-run relationship between the endogenous and forcing variables. The pre-requisites for consistent and efficient estimation are that the shocks in the dynamic specification be serially uncorrelated and that the forcing variables be strictly exogenous. As we illustrated, the pre-requisites can be met by augmenting sufficiently the lag order of the dynamic regression equation. The resulting equation will generally be an ARDL(p, q) model of sufficiently large lag order.

4. Data used and econometric estimations

In order to reveal the influence of financial intermediation over economic growth in Romania, I modelled the monthly data offered by National Bank of Romania and National Commission for Statistics (from January 1992 to September 2001). The time series used are:

qind = monthly value of industrial production in ROL;

rtcrqind = ($\Delta qind_t/qind_{t-1}$) = industrial production monthly value rate of growth (chain), as a proxy for GDP monthly rate of growth;

fd = monthly credit to non-governments in ROL;

fdinq = (fd/q) = financial depth (credit to non-governments weight in monthly industrial production);

rtcrfd = ($\Delta fdinq_t/fdinq_{t-1}$) = financial depth monthly rate of growth (chain);

m2 = monthly value in ROL of monetary aggregate M2;

m2inq = (m2/q) = monetary aggregate M2 weight in monthly industrial production;

rtcrm2inq = ($\Delta m2inq_t/m2inq_{t-1}$) = monthly growth rate of M2 weight in industrial production (chain).

The dynamic of these variables is illustrated in the Figure 1 (page 17).

In order to releave the causality links between these variables, I performed Granger tests for both absolute and relative values of them, as you can see in the Tables 1 and 2 (pages 18-19). After conducting this tests with one month, two months, one quarter, one semester and one year lags, the following conclusions proved to be relevant:

- Industrial production is the endogenous variable in any relationship (at least under an one year lag) involving credit to non-governments and monetary aggregate M2, as it do not Granger cause any of the last two indicators.
- On the other hand, Granger tests reveal an extremely stable causality link between industrial production (as predicted variable) and credit to non-governments or monetary aggregate M2 (as predicting variables) in any lag of at most one year.
- Credit to non-governments is, in his turn, Granger caused by the monetary aggregate M2, all over one year period (thus having another time stable causality relationship).
- Financial depth rate of growth has a strong capacity of prediction over the industrial production rate of growth, for periods from one month to six months; the same relationship occur between monthly growth rate of M2 weight in industrial production and the industrial production rate of growth, but only for one quarter or one semester lags.

To assess the importance and the explanatory value of each variable, several regressions were realized, and two of them are presented in the Tables 3 and 4 (page 20). I must specify that economic shocks (like currency market liberalization from March 1997 or the distribution of the 13th wage which affect especially January each year) were considered in our regressions as pulse dummy variables, named after the month and year of disruption (dummar97, dumjan98, dumjan2000). In order to segregate the meaningful variables from the others a regression with all the variables was performed in the Table 3, after that it was followed in the Table 4 by a regression with the selected exogenous variables, which emphasises the short-term influence of financial depth and the medium-term influence of rtcrm2inq (monthly growth rate of M2 weight in industrial production) above the growth rate of industrial production. Note that these regressions offer high R's (reason to believe in the presence of really explanatory variables of the industrial production's growth rate) and the Durbin-Watson coefficient (which is 1,857 in the selected regression from Table 4) is in its normal interval (1,8 – 2,2), indicating a very weak autocorrelation between errors. The last regression still provide other superior features comparatively to the one presented in Table 3; thus, the coefficients' stability is more obvious in the selected regression (the second one), as you can see below:

Stability Tests for the Regressions presented in:

Table 3

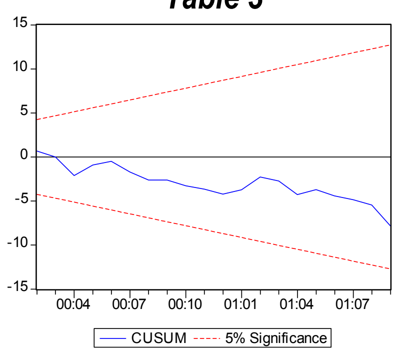
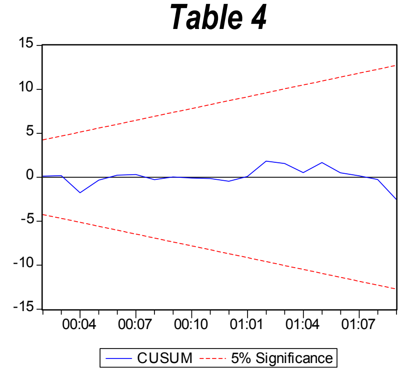


Table 4



It can be also remarqed that the growth rates of financial depth and M2 weight in industrial production (which explain in the selected regression over 65% of growth rate from industrial production) proved themselfes earlier to be relevant regarding Granger causality tests.

All these estimations indicate us that the power of non-government credit increase and monetary expansion explain more than a half of industrial production's evolution. Starting from this supposition, these three variables were included in an Unrestricted Vector AutoRegression (UVAR), in order to reveal the reaction of endogenous industrial production's growth rate at a variation (S.D.±2·S.E.) of growth rates belonging to financial depth and M2 weight in qind. As it is illustrated in Figure 2, the growth rate of industrial production (rtcrqind) has a response function enough sensible at the oscilation of *rtcrfd* and *rtcrm2inq*. The influence structure of these functions (revealed in Figure 3) show us that approximately 8% from variation of industrial production's growth rate is generated by modifications in the growth rate of financial depth, while almost 12% from the same variations are caused, after 4 lags, by movements in *rtcrm2inq* (growth rate of M2 weight in industrial production). Contemplating the reaction functions we observe intuitive responses of rtcrm2inq to innovations in rtcrqind (a monetary expansion is pursued to sustain a short-run increase in real activity).

In order to assess the nature of the long-run relationships between variables we carried cointegration tests Augmented Dickie-Fuller (ADF) and Phillips-Perron (PP) with the following results:

Variable	***Integration Order Obtained With Test:***		Significance Level
	ADF	**PP**	
qind	I(1)	I(1)	1%
fd	I(1)	I(1)	1%
m2	I(2)	I(1)	1%
rtcrqind	I(0)	I(0)	1%
fdinq	I(1)	I(1)	1%
rtcrfd	I(0)	I(0)	1%
m2inq	I(1)	I(1)	1%
Rtcrm2inq	I(0)	I(0)	1%

After the choice of three I(1) integrated variables, I proceed to a Johansen cointegration test, presented in the Table 5 (page 23). This cointegrated equation support the initializing of a VEC model. The results show that industrial production (qind), fdinq and m2inq do not respond to deviations from long-run equilibrium (are weakly exogenous), thus short-run adjustment is established extremely fast. Moreover, even in this set-up, m2inq fails to be Granger-caused by the other two variables, supporting the previous effectiveness proposition. If we analyse the convergence speed of the system to the long-run equilibrium the persistence profile on the cointegrating relation of one system-wide shock indicating that convergence is achieved reasonably fast, respectevly after 5 months in Romania case.

5. Conclusions

The main result of my study regard the long-run stability of the dynamic relationship between economic growth (industrial production in Romania case) and financial deepening (observed like weighted non-governmental credit and monetary aggregate M2 by the industrial production value). This situation has numerous reasons, the most obvious regarding romanian companies' dependency on banking credit (most of these firms being uncapitalzed). In spite of a meaningful progress achieved so far, a large part of the financial system remains week and much needs to be done to enable Romania's banking system as a whole to carry out its intermediation function more effectively. The weakness in much of the financial system is reflected in the poor quality of assets, even after significant cleaning up. The limited effectiveness of the banking system is revealed by the extremely low level of banking sector credit in the economy, as banks are unable or unwilling to lend (the last possibility is best mirrored by the crowding-out effect that had a peak in 1999). Ten years into transition, the overall level of monetization of the economy remains low and the credit to GDP ratio in Romania ranks the lowest among the E.U. accession economies in the region.

Although the monetary aggregate M2 weight in industrial production seems to Granger cause the other variables and to be exogenous (indicating policy effectiveness), the responses of economic growth (and even financial depth) to shocks in its level are counterintuitive.

Another question that implies doubts regarding validity of data analysis refers to the proxy "capacity" of variables used (industrial production instead of G.D.P., non-governmental credit instead of financial intermediation a.s.o.).

Omission of other relevant variables (e.g. fiscal variables, bank supervision, asset prices, inflation, exchange rate) may be another source of inaccuracies, but the marginalisation we adopted is the effect of, either data constraints, either model simplification.

A last uncertain aspect target at the use of VAR models for policy purposes apply to this case. The most important methodological problem seems to be the Lucas Critique. If the conditional probability distribution of the chosen instrument changes, the policy exercise may not be valid. The interpretation may be rescued if we suppose that the frequent structural changes in NBR's policy may be regarded as changes in the realisations and not the probabilistic distributions of the stochastic processes for the instruments.

Although we tried not to ignore the long-run relationship among variables by performing the VEC, a careful analysis should take into account the possibility of structural breaks, either in the rank of the CI space or in the coefficients of the cointegrating vector (variables may not have a simultaneous break, which makes the problem extremely complicated. The changes in the approach that seem to be needed (a careful modelling of expectations and structural breaks and of institutional underpinnings of policy) may seem to question the appropriateness of VARs for this analysis.

References

1. Altăr, M. (2002), "Monetary Macroeconomics", MSc Course
2. Andres, J., I. Hernando and J. D. Lopez-Salido (1999), "The Role of the Financial System in the Growth-Inflation Link: The O.E.C.D. Experience", Bank of Spain Working Papers, 9920
3. Barro, R. J. (2001a), "Economic Growth in East Asia Before and After the Financial Crisis", National Bureau of Economic Research Working Papers, 8330
4. (2001b), "Quantity and Quality of Economic Growth", Harvard University Press
5. Bîlbîie, F. O. (2000), "An Attempt to Identify Monetary Policy Shocks in Romania: Some Time Series Stylised Facts – Evidence from VAR and VEC Models", The University of Warwick Press
6. Burke, S. P. (2002), "Lectures on Econometrics – Some Aspects of Time Series Econometrics", MSc Course
7. Chan, L. K. C., J. Karceski and J. Lakonishok (2001), "The Level and Persistence of Growth Rates", National Bureau of Economic Research Working Papers, 8282
8. Cozmâncă, B. O. (2000), "Transmission Mechanisms of Monetary Policy", Dissertation Paper
9. Dekle, R. and K. M. Kletzer (2001), "Domestic Bank Regulation and Financial Crises: Theory and Empirical Evidence from East Asia", National Bureau of Economic Research Working Papers, 8322
10. Easterly, W. and R. Levine (2001), "It's Not Factor Accumulation: Stylized Facts and Growth Models", World Bank Working Papers
11. Fischer, S. and R. Sahay (2000), "The Transition Economies After Ten Years" , International Monetary Fund Working Papers, 30
12. International Monetary Fund (2001), "Romania: Selected Issues and Statistical Appendix", International Monetary Fund Country Report, 16
13. Khan, M. S. and S. A. Senhadji (2000), "Financial Development and Economic Growth: An Overview", International Monetary Fund Working Papers, 209
14. Kolodko, G. W. (2000) "Globalization and Catching-Up: From Recession to Growth in Transition Economies", International Monetary Fund Working Papers, 100
15. Kraay, A. and G. Monokroussos (1999), "Growth Forecasts Using Time Series and Growth Models", World Bank Working Papers
16. Levine, R. and M. Carkovic (2001), "Finance and Growth: New Evidence and Policy Analyses for Chile", Carlson School of Management, University of Minnesota Press
17. Levine, R., N. Loayza and T. Beck (2000), "Financial Intermediation and Growth: Causality and Causes", Journal of Monetary Economics, 46, 31-77
18. Loayza, N. and R. Ranciere (2002), "Financial Development, Financial Fragility and Growth", Central Bank of Chile Working Papers, 145
19. National Bank of Romania (1990-2001), Annual Reports and Monthly Bulletins

20. Rousseau, P. L. and R. Sylla (2001), "Financial Systems, Economic Growth and Globalization", National Bureau of Economic Research Working Papers, 8323
21. Shin, Y., M. H. Pesaran, K. Lee and A. Garratt (1998), "A Structural Cointegrating VAR Approach to Macroeconometric Modelling", Cambridge University Press, Cambridge
22. Wachtel, P. (2002), "Financial Sector, Monetary Policy and Central Banks: Selected Topics", MSc Course
23. Wagner, N. and D. Iakova (2001), "Financial Sector Evolution in the Central European Economies: Challenges in Supporting Macroeconomic Stability and Sustainable Growth", International Monetary Fund Working Papers, 141

Figures and Tables

Figure 1 : Time Series Used

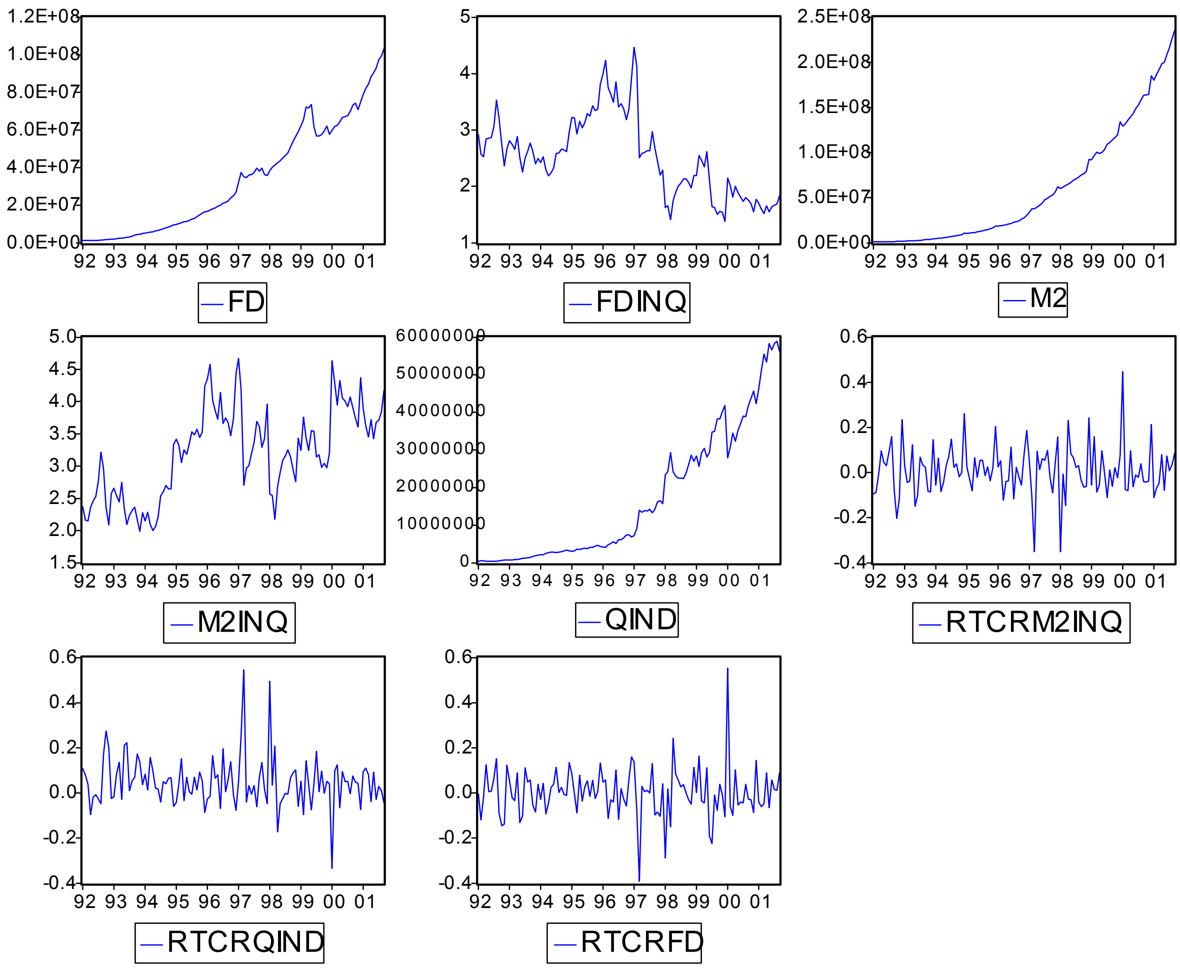


Table 1 : Granger Causality Tests for qind, fd & M2

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:14
Sample: 1992:01 2001:09
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability
QIND does not Granger Cause M2	116	5.37589	0.02222
M2 does not Granger Cause QIND		16.3931	9.5E-05
FD does not Granger Cause M2	116	1.53008	0.21867
M2 does not Granger Cause FD		4.01497	0.04749
FD does not Granger Cause QIND	116	13.2743	0.00041
QIND does not Granger Cause FD		2.18165	0.14245

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:16
Sample: 1992:01 2001:09
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
QIND does not Granger Cause M2	115	2.44575	0.09136
M2 does not Granger Cause QIND		7.62283	0.00079
FD does not Granger Cause M2	115	1.91555	0.15214
M2 does not Granger Cause FD		3.78421	0.02574
FD does not Granger Cause QIND	115	7.33498	0.00102
QIND does not Granger Cause FD		2.57265	0.08092

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:16
Sample: 1992:01 2001:09
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability
QIND does not Granger Cause M2	114	1.27873	0.28546
M2 does not Granger Cause QIND		5.48526	0.00152
FD does not Granger Cause M2	114	1.56687	0.20170
M2 does not Granger Cause FD		4.26036	0.00695
FD does not Granger Cause QIND	114	6.58017	0.00040
QIND does not Granger Cause FD		1.97869	0.12154

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:18
Sample: 1992:01 2001:09
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Probability
QIND does not Granger Cause M2	111	0.91558	0.48717
M2 does not Granger Cause QIND		3.40215	0.00431
FD does not Granger Cause M2	111	1.69005	0.13141
M2 does not Granger Cause FD		3.04580	0.00895
FD does not Granger Cause QIND	111	4.92559	0.00019
QIND does not Granger Cause FD		1.36450	0.23655

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:19
Sample: 1992:01 2001:09
Lags: 12

Null Hypothesis:	Obs	F-Statistic	Probability
QIND does not Granger Cause M2	105	2.45116	0.00896
M2 does not Granger Cause QIND		3.20380	0.00088
FD does not Granger Cause M2	105	4.88695	5.5E-06
M2 does not Granger Cause FD		2.49667	0.00779
FD does not Granger Cause QIND	105	3.53068	0.00032
QIND does not Granger Cause FD		1.84831	0.05403

Table 2 : Granger Causality Tests for rtcrqind, rtcrfd & rtcrm2inq

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:41
Sample: 1992:01 2001:09
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability
RTCRM2INQ does not Granger Cause RTCRFD	116	5.36506	0.02235
RTCRFD does not Granger Cause RTCRM2INQ		6.19526	0.01427
RTCRQIND does not Granger Cause RTCRFD	116	2.56370	0.11213
RTCRFD does not Granger Cause RTCRQIND		9.44382	0.00266
RTCRQIND does not Granger Cause RTCRM2INQ	116	0.14692	0.70221
RTCRM2INQ does not Granger Cause RTCRQIND		1.20521	0.27462

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:43
Sample: 1992:01 2001:09
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
RTCRM2INQ does not Granger Cause RTCRFD	115	1.80916	0.16863
RTCRFD does not Granger Cause RTCRM2INQ		2.00054	0.14015
RTCRQIND does not Granger Cause RTCRFD	115	0.97951	0.37875
RTCRFD does not Granger Cause RTCRQIND		5.70265	0.00440
RTCRQIND does not Granger Cause RTCRM2INQ	115	0.61167	0.54428
RTCRM2INQ does not Granger Cause RTCRQIND		2.40527	0.09497

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:43
Sample: 1992:01 2001:09
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability
RTCRM2INQ does not Granger Cause RTCRFD	114	3.41570	0.02006
RTCRFD does not Granger Cause RTCRM2INQ		2.44631	0.06784
RTCRQIND does not Granger Cause RTCRFD	114	1.81327	0.14913
RTCRFD does not Granger Cause RTCRQIND		4.40341	0.00582
RTCRQIND does not Granger Cause RTCRM2INQ	114	1.02532	0.38449
RTCRM2INQ does not Granger Cause RTCRQIND		4.87109	0.00325

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:44
Sample: 1992:01 2001:09
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Probability
RTCRM2INQ does not Granger Cause RTCRFD	111	2.12720	0.05685
RTCRFD does not Granger Cause RTCRM2INQ		1.95278	0.07982
RTCRQIND does not Granger Cause RTCRFD	111	1.26902	0.27868
RTCRFD does not Granger Cause RTCRQIND		2.80433	0.01465
RTCRQIND does not Granger Cause RTCRM2INQ	111	0.73003	0.62651
RTCRM2INQ does not Granger Cause RTCRQIND		2.64573	0.02020

Pairwise Granger Causality Tests
Date: 06/24/02 Time: 14:44
Sample: 1992:01 2001:09
Lags: 12

Null Hypothesis:	Obs	F-Statistic	Probability
RTCRM2INQ does not Granger Cause RTCRFD	105	1.05744	0.40678
RTCRFD does not Granger Cause RTCRM2INQ		1.60155	0.10784
RTCRQIND does not Granger Cause RTCRFD	105	1.12682	0.35090
RTCRFD does not Granger Cause RTCRQIND		1.19988	0.29786
RTCRQIND does not Granger Cause RTCRM2INQ	105	0.81332	0.63604
RTCRM2INQ does not Granger Cause RTCRQIND		0.67473	0.77056

Table 3 : Regression of rtcrqind over the other variables

Dependent Variable: RTCRQIND
Method: Least Squares
Date: 06/26/02 Time: 16:24
Sample(adjusted): 1994:01 2001:09
Included observations: 92
Excluded observations: 1 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.080566	0.022051	3.653630	0.0005
RTCRQIND(-1)	-0.048566	0.224507	-0.216325	0.8294
RTCRQIND(-2)	-0.092404	0.215380	-0.429027	0.6692
RTCRQIND(-3)	-0.162091	0.202592	-0.800084	0.4264
RTCRQIND(-6)	-0.249289	0.187342	-1.330663	0.1876
RTCRQIND(-12)	0.071623	0.250336	0.286107	0.7756
RTCRQIND(-24)	-0.343314	0.216671	-1.584498	0.1176
RTCRFD(-1)	0.192994	0.191970	1.005331	0.3182
RTCRFD(-2)	0.179081	0.197511	0.906688	0.3677
RTCRFD(-3)	-0.541490	0.194518	-2.783755	0.0069
RTCRFD(-6)	0.061263	0.176327	0.347437	0.7293
RTCRFD(-12)	-0.006824	0.199453	-0.034216	0.9728
RTCRFD(-24)	0.209566	0.194734	1.076166	0.2855
RTCRM2INQ(-1)	-0.084234	0.234746	-0.358828	0.7208
RTCRM2INQ(-2)	-0.227710	0.209090	-1.089053	0.2799
RTCRM2INQ(-3)	0.473420	0.219116	2.160590	0.0342
RTCRM2INQ(-6)	-0.246103	0.202751	-1.213822	0.2289
RTCRM2INQ(-12)	0.025325	0.269396	0.094007	0.9254
RTCRM2INQ(-24)	-0.581944	0.240079	-2.423966	0.0179
DUMMAR97	0.485630	0.075810	6.405914	0.0000
DUMJAN98	0.479880	0.077354	6.203666	0.0000
DUMJAN2000	-0.316451	0.089930	-3.518878	0.0008

R-squared	0.719392	Mean dependent var	0.040367
Adjusted R-squared	0.635210	S.D. dependent var	0.109016
S.E. of regression	0.065843	Akaike info criterion	-2.398118
Sum squared resid	0.303471	Schwarz criterion	-1.795082
Log likelihood	132.3134	F-statistic	8.545643
Durbin-Watson stat	1.781621	Prob(F-statistic)	0.000000

Table 4 : Selected Regression of rtcrqind

Dependent Variable: RTCRQIND
Method: Least Squares
Date: 06/26/02 Time: 16:34
Sample(adjusted): 1994:01 2001:09
Included observations: 92
Excluded observations: 1 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.050523	0.011701	4.317840	0.0000
RTCRQIND(-24)	-0.357926	0.159371	-2.245867	0.0274
RTCRFD(-1)	0.135798	0.061531	2.206980	0.0301
RTCRFD(-3)	-0.514537	0.146024	-3.523658	0.0007
RTCRM2INQ(-3)	0.638021	0.150882	4.228618	0.0001
RTCRM2INQ(-24)	-0.415388	0.153725	-2.702148	0.0084
DUMMAR97	0.488365	0.065471	7.459235	0.0000
DUMJAN98	0.455259	0.065044	6.999200	0.0000
DUMJAN2000	-0.331202	0.073907	-4.481318	0.0000

R-squared	0.688115	Mean dependent var	0.040367
Adjusted R-squared	0.658054	S.D. dependent var	0.109016
S.E. of regression	0.063748	Akaike info criterion	-2.575050
Sum squared resid	0.337297	Schwarz criterion	-2.328353
Log likelihood	127.4523	F-statistic	22.89045
Durbin-Watson stat	1.856950	Prob(F-statistic)	0.000000

Figure 2 : Impulse Responses Functions of rtcrqind, rtcrfd and rtcrm2inq

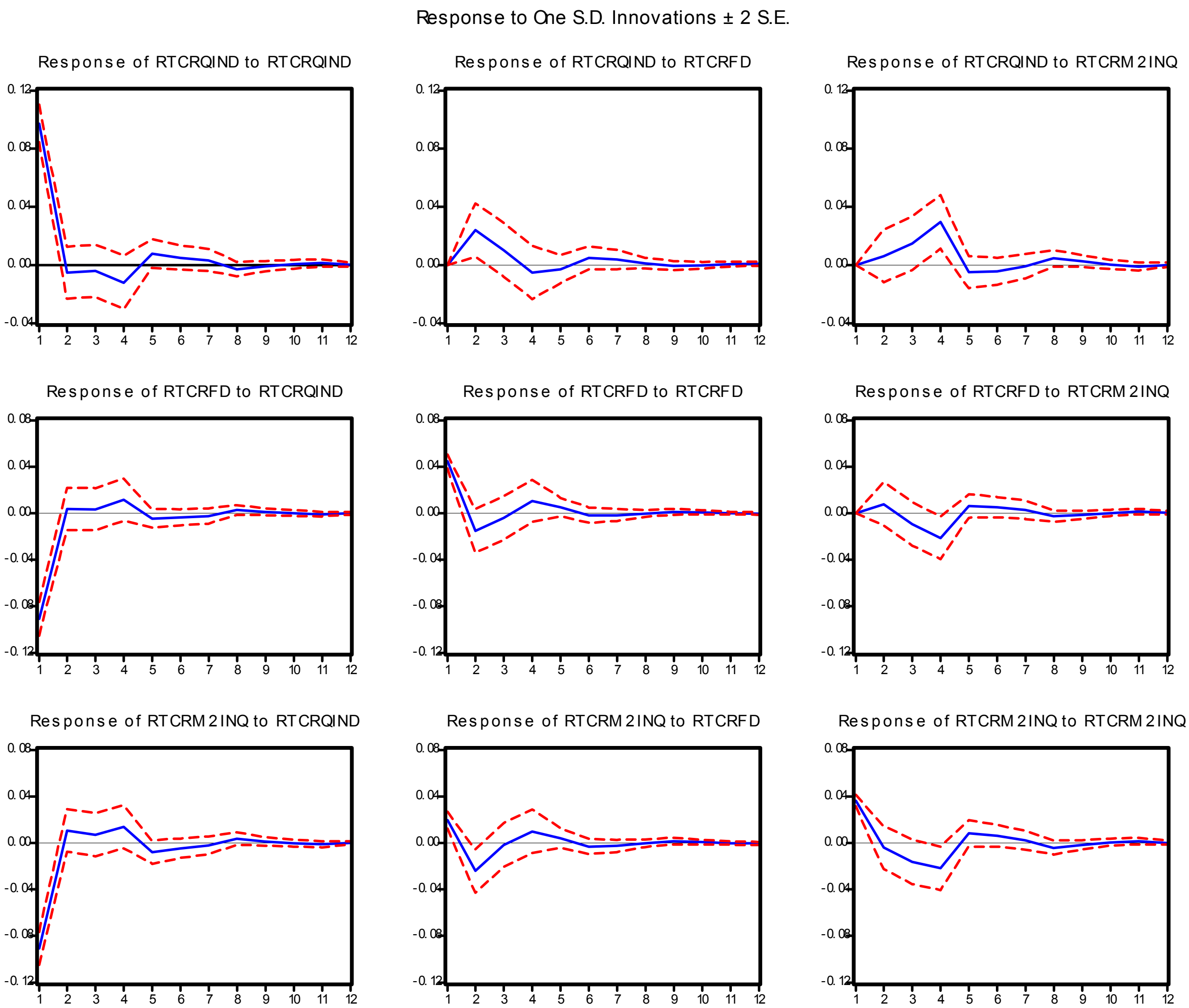


Figure 3 : Variance Decomposition for rtcrqind, rtcrfd and rtcrm2inq

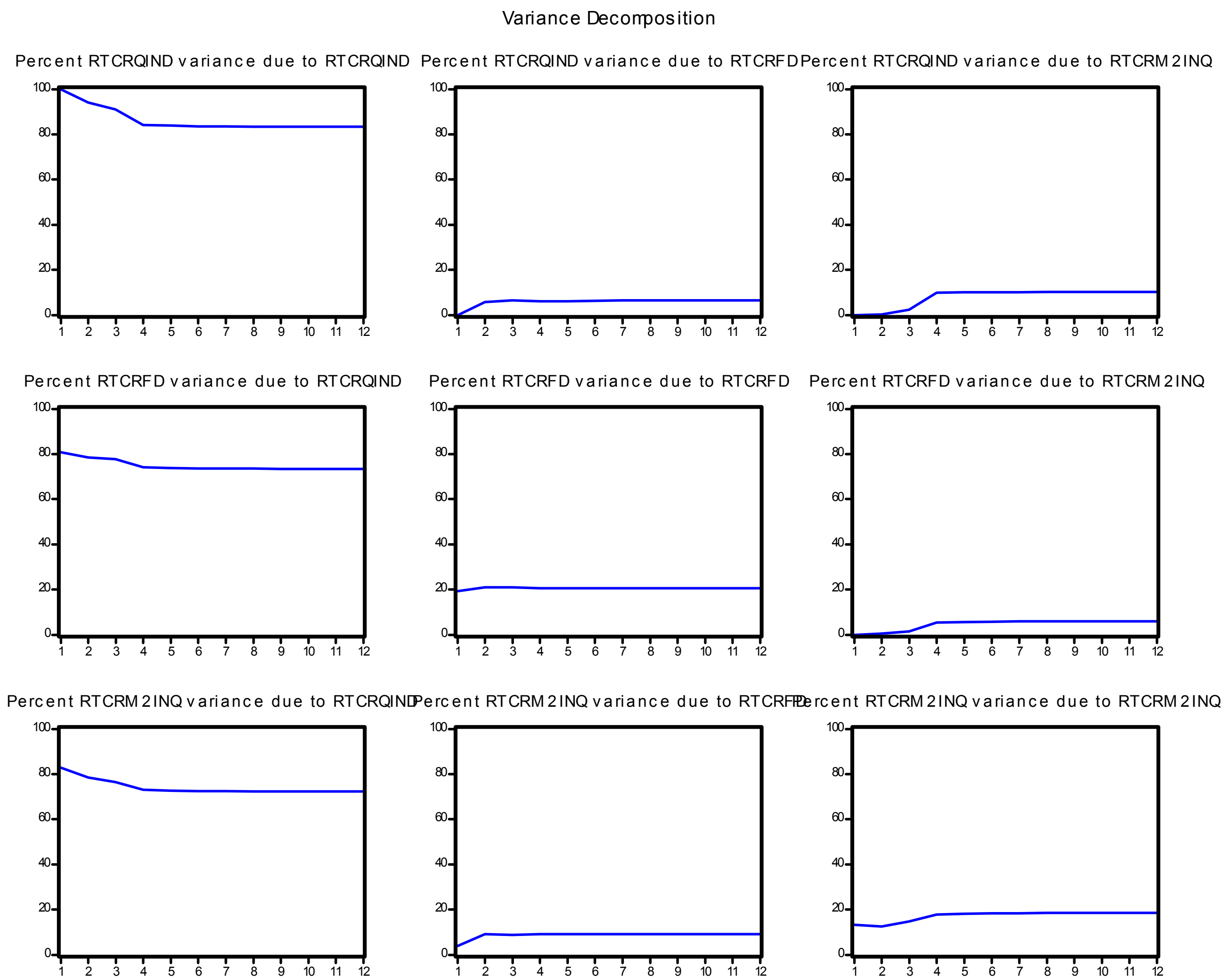


Table 5 : Johansen Cointegration Test

Date: 06/24/02 Time: 05:22
Sample: 1992:01 2001:09
Included observations: 112
Test assumption: No deterministic trend in the data
Series: QIND FDINQ M2INQ
Lags interval: 1 to 4

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.179724	32.83465	24.31	29.75	None **
0.086223	10.64584	12.53	16.31	At most 1
0.004872	0.546965	3.84	6.51	At most 2

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

QIND	FDINQ	M2INQ
5.57E-09	0.024082	-0.001093
-1.77E-08	-0.356699	0.371801
4.99E-09	-0.025981	-0.014435

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

QIND	FDINQ	M2INQ
1.000000	4321437.	-196115.9
	(1.0E+07)	(1.3E+07)
Log likelihood	-1693.622	

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

QIND	FDINQ	M2INQ
1.000000	0.000000	5486851.
		(3524693)
0.000000	1.000000	-1.315064
		(0.19324)
Log likelihood	-1688.573	

Figure 4 : Impulse Responses Functions of qind, fdinq and m2inq

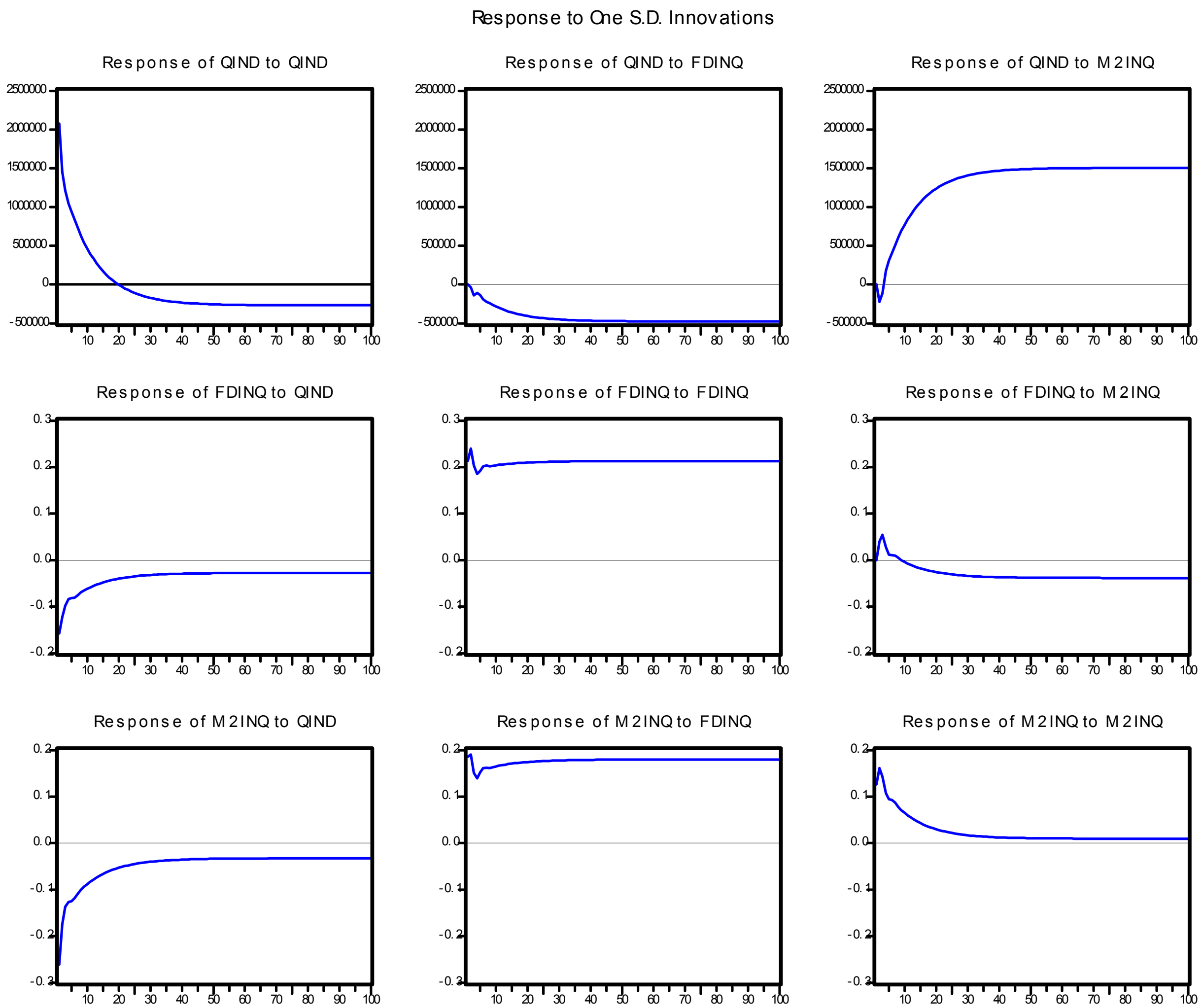


Figure 5 : Variance Decomposition for qind, fdinq and m2inq