Foreign Trade, Finances, and Economic Growth

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Summary: The article is an empirical study on the impact of foreign trade on the relationship between financial development and economic growth in Bulgaria. The study verifies the hypothesis whether foreign trade is a factor of economic growth and whether it acts as one of the major transmission mechanisms transferring effects on economic growth, which are generated by the dynamic development of banking financial intermediation. To this end, a descriptive analysis of various aspects of the functioning of the real economy and banking system is made at the beginning, and a comment is offered on the dependencies existing between them. Subsequently, econometric methods are used to test the availability of a Granger's causality for each of the real/financial variable pairs in the periods before and after the implementation of the currency board mechanism in Bulgaria. At the next stage, by applying Johansen's test, the study reveals the most significant long-term dependencies of economic growth on its fundamental real economy factors, and goes on to do so by adding financial development factors. A follow-up is made of the effect produced by the inclusion of each of the financial variables on the contribution of foreign trade, as well as of the impact of foreign trade on the economic growth contribution of each of the financial variables. By successive inclusion and exclusion of the openness of the economy from the economic growth models, the last stage of the study assesses to what an extent foreign trade impacts the fundamental sources of economic growth in the real economy. It has been proved that in the period extending to the middle of 1997, foreign trade is the only statistically significant real growth factor, and that, at the same time, it is the major transmission mechanism of effects on the part of financial development, whereas in the conditions of the currency board mechanism implemented in the country from the middle of 1997 onwards, it is mainly investments that take over both functions mentioned above.

Key words: foreign trade, financial development, economic growth, investments, employment, transmission mechanisms, factor effect.

JEL: C3, C32, E1, E17, G2, G21, O1, O11, O16.

1. Introduction

The openness of the Bulgarian economy is one of its major characteristic features, which affects the manifestation of all macroeconomic processes taking place in the country. This openness precisely is the conduit of all external economic shocks impacting the Bulgarian economy, such as energy shocks, raw-material, input, and resource shocks, exports shock, financial shocks, etc. The objective of this study is to verify to what an extent Bulgaria's foreign trade affects the interaction between financial development and the real economy and how eventually the effect of foreign trade impacts the country's economic growth. The hypothesis is that foreign trade in its capacity

of an economic growth factor is one of the major channels and transmission mechanisms conducive to the transfer of impacts between financial development and economic growth.

2. Indicators and Descriptive Analysis

The selected indicators subject to analysis are as follows:

Concerning the real economy, economic growth is represented by the growth rate of the real GDP; employment – by the rate of changing employment; investments – by the changes in the share of gross fixed capital formation in terms of the GDP; and the openness of the economy – by the dynamic development of the share of foreign trade commodity exchange in terms of the GDP.

Concerning the interaction between financial development and economic growth, three groups of indicators have been employed. The first one contains three liquidity indicators: the shares of liquid liabilities, of the M2 monetary aggregate, and of quasi-money in terms of the GDP. The second one contains two lending indicators: the shares of domestic and non-government lending in terms of the GDP. The third one contains two bank assets indicators: the shares of the domestic and total assets of the banking system respectively in terms of the GDP again.

Two opposite trends have been observed in *the economic growth of Bulgaria* after the onset of its economic transformation, measured *in terms of the GDP growth rate*, which characterize each of the two distinct periods – the first one encompassing 1991 to 1996 or the so-called pre-currency board period, and the second one encompassing 1997 – 2006 or the so-

called post-currency board period (see the left-hand scale of Figure 1). Up to 1997 including, the trend is mainly of a recessionary nature, whereby the most profound depth of the crisis was reached in 1996 and 1997. In 1996, the economy registered its largest negative rate of economic growth amounting to 9.4 % in absolute terms, whereas in 1997 the level of the country's aggregate output reached its highest level, amounting to two thirds of that registered in the "pre-democratic" 1989[1].

What was observed during the second period since the middle of 1997 is a robust and sustainable trend of the real economy stabilization with economic growth rates of about 5 % per annum, which rose to around 6 % per annum over the last three years of the same period. As a result, in 2006 the physical GDP volume "restored" its 1989 level, whereby the restoration of the 1989 GDP value in US dollar terms (because of the depreciating US$ exchange rate) was reached as late as the first half of 2004[2]. It is only logical that the length of this process for the duration of ten unbroken years would create certain recessionary expectations, or at least expectations for subsiding rates of economic growth in the sense of the normal market cycle and within the limits of a possible larger economic cycle.

The *employment growth rate* (see the right-hand scale of Figure 1) marked its maximum decline of a quarter of the total labor force in 1992, when the GDP plunged in one of its most substantial declines by 7.3 %. In 1991, 1997, and 1996, however, similar and even stronger negative economic growth rates in terms of their absolute value were registered, but at the same time employment marked smaller declines, retention, and even a certain level of employment rate growth. To some extent and in a certain aspect, the discrepancies described above continue

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[1] In the text that follows, please refer to Figure 1.
[2] See 2005 Main Macroeconomic Indicators, National Statistical Institute (NSI), Sofia, 2006, p. 31.
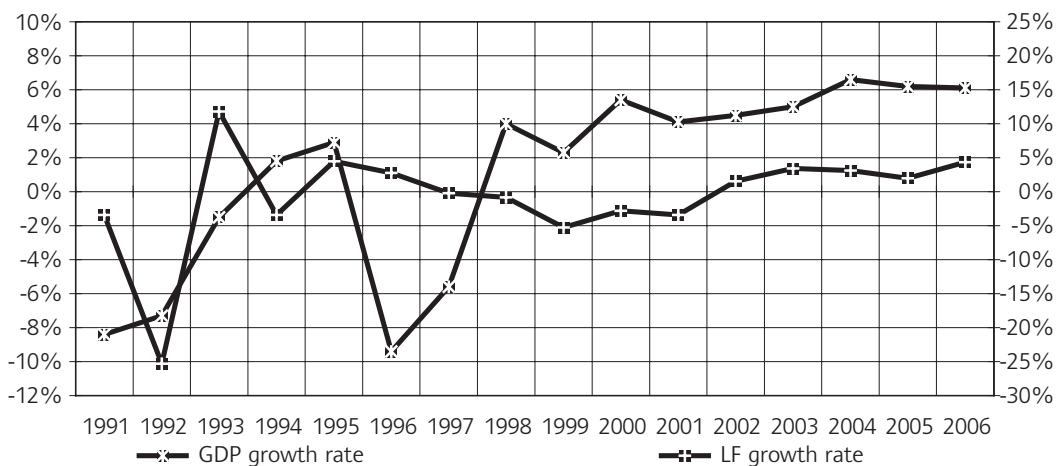
Figure 1. Annual Growth Rates of the GDP and the Number of Labor Force Employed
Sources: 1994-2006 Main Macroeconomic Indicators, National Statistical Institute, Sofia, Bulgaria, (www.nsi.bg)
and computations made by the author.

during the period after the implementation of the currency board mechanism in the country as well, in which – from the point of view of the dynamic development of employment – two sub-periods can be distinguished. In the first such sub-period, which encompasses the first four years of the second period, the labor force employment rate marked a decline, whereas during the second sub-period, which began in 2002, the employment rate was constantly rising. At the same time, over these two sub-periods, the real GDP marked a steady growth by values within a relatively narrow range, which means that its growth trajectory has not been pre-conditioned by the processes taking place on the labor market at that time.

Capital accumulation is measured by means of *the share of the gross fixed capital formation in terms of the GDP* (see the left-hand scale of Figure 2). The empirical rule for most of the market economies is for this relative share to range between one sixth (1/6) and one fifth (1/5) of the GDP[3]. In Bulgaria, at the beginning of the 1990s, it started from such positions precisely, and in 1991 it amounted to 18.2 %. During the first half of the 1990s, it indicated a downward trend, reaching 11 % in 1997, which was mainly at the expense of the growing relative share of personal consumption. What is characteristic here is that the variations of this relative share are mono-directional and are accompanied by GDP fluctuations, but in quantitative terms there is no close interrelationship between the specific changes observed.

Since 1998, the share of gross fixed capital formation in terms of the GDP has been constantly growing, and gradually it reached the figures mentioned above, which are considered to be the normal and commonly accepted values.

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[3] See a more detailed analysis of the dynamic development of the GDP components in: Stattev, St., Aggregate Costs, Macroeconomic Foundations, "Economy" University Publishing House, Sofia, 2005, pp. 216-253; Stattev, St., Aggregate Costs, in Stattev, St. et al, Economic and the Public Sector, "Economy" University Publishing House, Sofia, 2007, pp. 291-319; Stattev, St., Macroeconomic Stabilization, Economic Growth, and Disbalances, - in Stattev, St. et al, Economic Growth and Stabilization, "Economy" University Publishing House, Sofia, 2003, pp. 5-25.

Furthermore, since 2004, this share started to exceed the 20 % mark of the GDP to reach its maximum of 31.9 % in 2006. In this way, for the 1998 – 2006 period of time, the relative share of gross fixed capital formation in terms of the GDP marked a nearly two and a half fold increase, which, however, took place at the expense of the aggravating balance of the foreign trade commodity exchange. Parallel to this, the rates of economic growth remained relatively stable, which is a certain indication that the average productivity of capital accumulation was declining with time. In the longer-term period of time, it is logical to expect that investments and their relative share in terms of the GDP will prove incapable of retaining their high level of dynamic development, to which their comparatively high starting point will also be a contributing factor. It is very likely that such a situation will have an adverse impact on economic growth in the capacity of a counterbalancing effect, to the purpose of retaining or even increasing its rates, which could occur, given that a rise of capital productivity would eventually take place.

The changes in the openness of the economy, presented by means of the dynamic development of *the relative share of foreign trade commodity exchange in terms of the GDP*, as a whole fail to illustrate the manifestation of any distinct regularity (see the right-hand scale of Figure 2). It is generally accepted that when this indicator exceeds 80 % (i.e. when more than 80 % of the GDP goes through the channels of foreign trade) a country's economy is wide open. This country reached this limit as early as the beginning of the 1990s and subsequently this figure was surpassed to a significant extent. Over the greater part of the last decade of the 20th century, the foreign trade commodity exchange did not exceed the GDP, the only exceptions being the years 1992, 1996, and 1997. The fact that it is during these three years that the largest declines of the real GDP were recorded is an indication that the serious growth of openness of the economy registered at that time was not transformed into a stimulating factor or at least – into a factor conducive to the stabilization of the economy. Similar discrepancies are characteristic for the
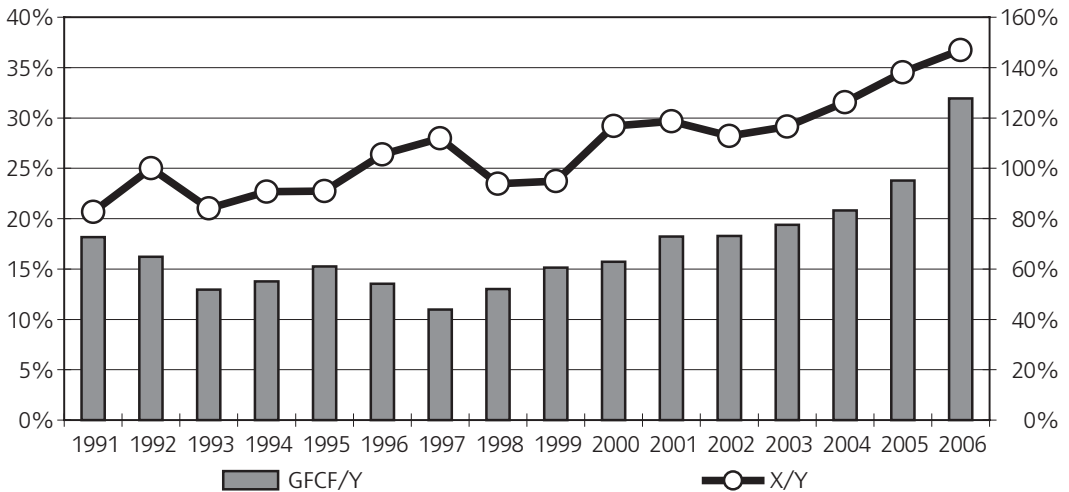

Figure 2. Annual Growth Rates of the Relative Share of Gross Fixed Capital Formation and the Foreign Trade Commodity Exchange in Terms of the GDP
Sources: 1994-2006 Main Macroeconomic Indicators, National Statistical Institute, Sofia, Bulgaria, (www.nsi. bg) and computations made by the author.

rest of the period leading to 1997, when the relatively more moderate but sufficiently high values of openness of the economy on their own were accompanied by positive or comparatively low negative growth rates of the aggregate production in absolute terms.

In 1998, the openness of the economy restored its level from before the crisis years of 1996 and 1997, and subsequently started to increase. This trend was enhanced in 2000 and in the 2003 – 2006 period of time, by the end of which the volume of foreign trade commodity exchange exceeded one and a half time the size of the GDP and the economy turned out to be twice as more open as it was at the beginning of the country's transition to a market economy. At the same time, the real GDP growth rates throughout the period after the implementation of the currency board mechanism vary within a narrow range only and manifest no close correspondence with the enhanced openness of the economy.

And yet, years marked by a sharp increase of the relative share of foreign trade commodity exchange, such as 2000 and 2004, stand apart with the acceleration of growth as well, and when the changes in the openness of the economy are smoother and more gradual, the growth of aggregate production is either minimal or declining. This rule was broken over the last two years of the period under observation, when the enhanced openness takes place in the conditions of stable and even steadily subsiding real GDP growth rates.

The dependence of economic growth on the relative share of foreign trade commodity exchange in terms of the GDP is conditioned by the structural characteristics of the indicator subject to analysis. The maximum increases in the openness of the economy up to 1997 stem from the simultaneous rise of both exports and

imports, whereby imports predominate in 1992, and exports predominate in 1996 and 1997. For their part, the variations of exports and imports mainly reflect the fluctuations of the exchange rate of the local Bulgarian currency and the fluctuations of the world prices of imports at large. The novel increase of openness, which began in the year 2000, can be seen as being provoked mostly by the increase of imports coupled with the relatively more conservative behavior of exports, although exports were also marking a rising trend. In this case the underlying reasons can be found mainly in the growth of aggregate production, the appreciating prices of energy sources, and the intensive lending activity in the part of the banking sector. What is peculiar here is that given the dominant role of imports, the short-term effect on the dynamic development of the real GDP can be qualified rather as a negative one, whereas the long-term consequences are affected by the commodity composition of imports at large. Taking into consideration the constantly growing share of imported investment goods, which exceeds one third of the overall volume of imports, its impact on economic growth in the long-run is expected to be positive or neutral, to say the least[4].

Upon following up the behavior of the traditional indicator, which has most frequently been used to measure banking intermediation, namely the indicator of *the total liquid liabilities in terms of the GDP*, we can arrive at the conclusion about the existence of a clearly outlined specificity in the periods before and after the implementation of the currency board mechanism, as well as in the periods of transition between them (see Figure 3). The indicator reaches its extreme values between 170 % and 180 % in the temporal interval between 1992 and 1994, whereas over the following three years it marks a sharp and lasting decline. The peak levels of decline have been registered in 1996 and 1997, and it is in

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4 See Bulgarian National Bank, Annual Report, 2007, p. 17.

1997 that the liquid liabilities of the banking system barely amount to 27 % of the GDP. What is observed after 1997 is a constant rise of this indicator measuring the depth of banking intermediation, whereby this rise has been taking place at relatively steady growth rates. In this way, in 2006, the total liquid liabilities of the banking system amounted to two thirds of the GDP, but this value was nonetheless lower than the value registered in the period up to 1996 included.

The dynamic development of the M2 indicator in terms of the GDP for the entire period after the onset of the economic transformation in the early 1990s is indicative of the manifestation of a clearly defined cycle, the trough of which occurred in 1997, when the M2 monetary aggregate dropped lower than one quarter of the GDP and came to stand at as little as 23.4 %. In 1991 this ratio stood at 53.3 % and over the following three years it varied at levels between 60 % and 51 %, but subsequently marked an abrupt drop. Since 1998, the indicator has been steadily growing by an average annual rate of

about 3.6 percentage points. In 2006, it reached 56.2 %, thus even exceeding its base 1991 level, and it is expected to continue rising over the coming years as well, though at gradually subsiding growth rates.

During the first (pre-currency board) period, the quasi-money indicator in terms of the GDP manifested steeper and more dynamic fluctuations in comparison with the ratio between quasi-money to the M2 monetary aggregate, whereas in the period between 1998 and 2006 (the post-currency board period) its behavior was substantially less volatile and manifested greater stability. Up to 1997, the changes of the indicator demonstrate a certain analogy with the changes taking place with the M2 monetary aggregate in terms of the GDP, although the discrete values of the indicator remain at a much lower level. Since 1998, the ratio of quasi-money to the GDP marks a persistent increase, which has been taking place at relatively even growth rates and without any direct relation to the changes observed in the values of the real GDP.
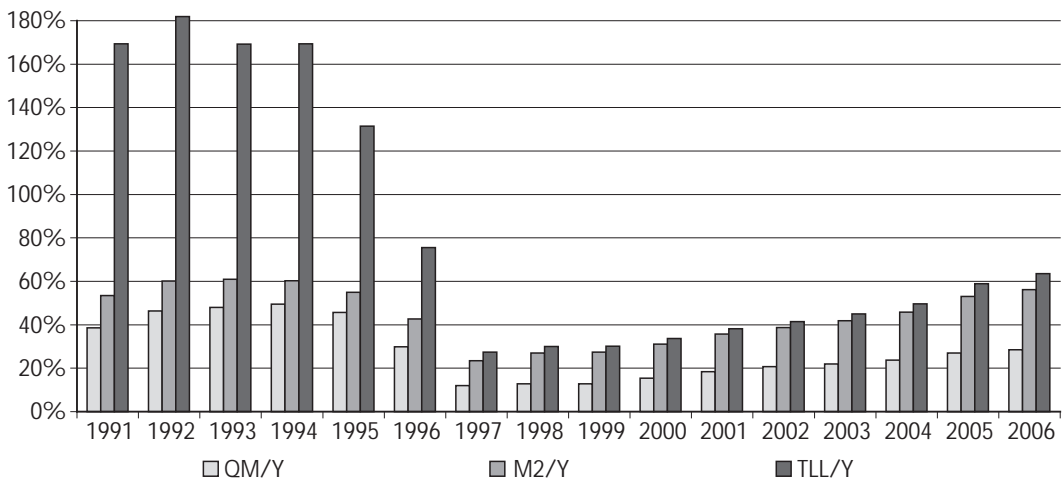

Figure 3. Banking System Liquidity Indicators
Sources: 1990-2006 Annual Reports, Bulgarian National Bank, Sofia (www.bnb.bg, www.nsi.bg, www.minfin.government.bg) and computations made by the author.

The first bank lending indicator is the ratio between domestic lending and the GDP. At the beginning of 1990s, this indicator is marked by rising and increasingly higher values, which in 1993 and 1994 amount to 104.7 % and 106.7 % respectively (see Figure 4). What is subsequently observed, however, is a sharp drop, which takes longer in comparison with the majority of the indicator discussed thus far, and in 1999 it marks as low a level as 15 %. Since 2001, the indicator comes to grow in connection with the surge of the banks' lending activity, which – on the one hand – was affected to some extent by the positive development of the real economy, and – on the other – was generating positive impulses of its own, thus benefiting the same real economy. After 2001, the upward trend began to slow down and the registered levels hovered around the 40 % mark, which was mainly due to the measures launched by the Bulgarian National Bank aimed at curbing the credit expansion. This is an indicator in connection with which Bulgaria is still lagging behind the developed economies, where the levels of domestic lending gravitate around the 50 % mark. In this sense,

the conservative policy pursued by the Bulgarian National Bank is not intended to repress lending, but is rather meant to calm down its growth rates over time to the purpose of facilitating the more gradual attainment of the optimum ratio between domestic lending and the overall size of the economy.

The dynamic development of the indicator measuring the non-government sector lending reveals two clearly distinct periods: a period of decline from 1991 to 1998, and a subsequent period of rise from 1998 to 2006 (see Figure 4). The slump in the levels of this indicator started from relative high values at the beginning of the 1990s. Then the indicator plunged very steeply in order to reach its "bottom" after the crisis of merely 8.8 % in 1998. Its revival gained momentum at a rapid pace, which slowed down over the subsequent years, but eventually it reached a value of 41.3 % in 2006. The expectations are for a continued growth of this indicator, though at a much steadier pace, over the coming years. The stable regularity of a growing ratio of the non-government sector
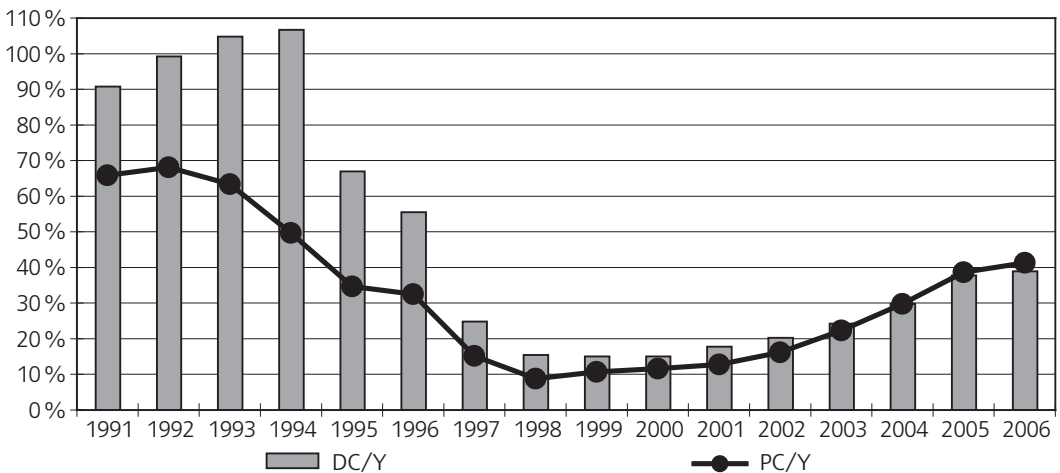

Figure 4. Bank Lending Indicators
Sources: 1990-2006 Annual Reports, Bulgarian National Bank, Sofia (www.bnb.bg, www.nsi.bg, www.minfin.government.bg) and computations made by the author.

receivables to the GDP is a reliable indicator that banking services have deepened their scope of activity with respect to both the non-government or private sector and the economy at large.

The dynamic development of the indicators characterizing bank assets – those of *the total bank assets in terms of the GDP and the domestic bank assets in terms of the GDP* – is displayed on Figure 5. As far as the first period subject to analysis is concerned, the difference between the two indicators lies in the size of foreign assets, the relative share of which in the total bank assets hovers around the interval between 12 % and 15 %, whereas in the crisis years of 1996 and 1997 it grows up to about 25 %. During the second period subject to analysis, it is the amount of net foreign assets, fixed assets, and the other net items, that underlie the difference between the total and domestic bank assets. Between 1998 and the year 2000, the relative share of this summarized item rose. It marked a peak in 1998, when it reached 50 %, and it subsequently increased at a much more moderate pace to reach about 60 % in 2000. Since 2003, the ratio between the other components of the assets and the domestic assets changed and started to stabilize in the reverse direction, now the domestic assets making up around 60 % of the total assets of the banking system. Or – to put it in a different way – despite the different methodologies for their computation in the period up to the middle of 1997, the domestic assets were the dominant structural component of the total bank assets, whereas in the subsequent period they successively declined and increased again, in order to get stabilized over the recent years at around the 60 % mark.

The results from the descriptive analysis carried out yield sufficient grounds for a more detailed study of the interrelationships analyzed thus far by means of econometric methods and the employment of the production function.

3. Econometric Simulation, Results, and Analysis

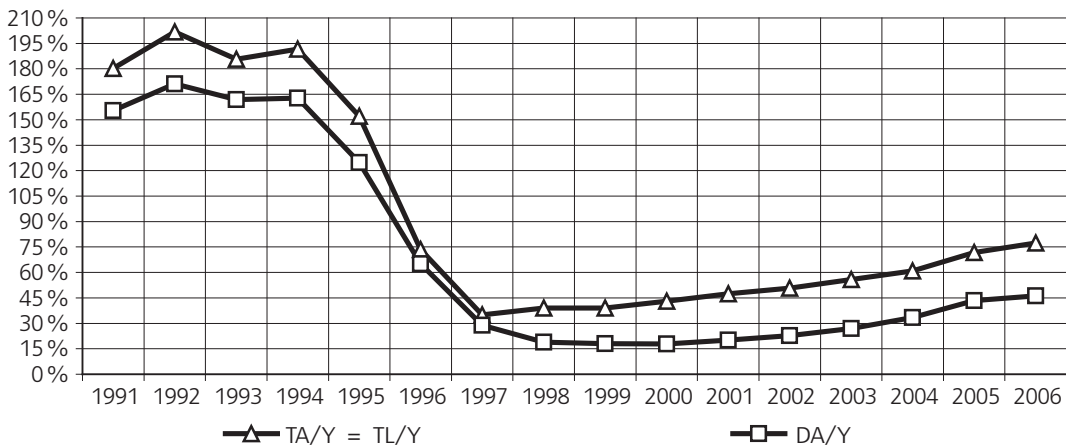The above formulated four indicators measuring the real economy and the seven

Figure 5. Bank Assets Indicators
Sources: 1990-2006 Annual Reports, Bulgarian National Bank, Sofia (www.bnb.bg, www.nsi.bg, www.minfin.government.bg) and computations made by the author.

indicators measuring the financial sector have been arrived at on the basis of logarithmic computation of the quarterly data for the sector performance over the 1991 – 2006 period of time, and subsequently they were subjected to econometric simulation by means of the EVIEWS software package. Upon applying the stationarity testing of the data performed mainly by means of the Dicky – Fuller test, and additionally by means of the Phillips – Peron test, it turned out that all variables are stationary with respect to their first differences, that is, researchers can work with their respective growth rates (see Appendix 1). In this way, the variables employed in the econometric model are as follows:

DLGY is the rate of change of the real GDP;

DLGIY is the rate of change of the share of the gross fixed capital formation in terms of the GDP;

DLGLF is the rate of change in the number of the labor force;

DLGXY is the rate of change of the share of the foreign trade commodity exchange in terms of the GDP;

DLGQMY is the rate of change of the share of quasi-money in terms of the GDP;

DLGM2Y is the rate of change of the share of the M2 monetary aggregate in terms of the GDP;

DLGLLY is the rate of change of the share of liquid liabilities of the banking system in terms of the GDP;

DLGDCY is the rate of change of the share of domestic lending (or credit) in terms of the GDP;

DLGPCY is the rate of change of the share non-government lending (or private credit) in terms of the GDP;

DLGDFAY is the rate of change of the share of the domestic financial assets of the banking system in terms of the GDP;

DLGTFAY is the rate of change of the share of the total financial assets of the banking system in terms of the GDP.

The indicators enumerated above have been subjected to the Granger test for short-term causality (or dependency), whereby the test was carried out for every one of the pairs consisting of each of the real economy indicators and each of the financial system indicators. The results for the first (pre-currency board) period show that financial development, represented by the indicators for the quasi-money growth rate in terms of the GDP and the M2 monetary aggregate growth rate in terms of the GDP, is a cause generating economic growth. The reverse relation is relatively weaker and sporadic but it nonetheless exists and cannot be overlooked. The result obtained can also be interpreted in the following way: The high liquidity rate of the banking system during this period of time (i.e. before the 1996/97 crisis) is a logical reason creating conditions conducive to the positive economic growth, which occurred in 1994/95. At the same time, such causality is non-existent concerning the growth rate of non-government lending, which means that the banking system affects the real GDP growth by means of its sheer size rather than through its active behavior on the market of financial services.

What is also observed throughout the same period is Granger causality in the reverse direction – from economic growth to the financial sector with respect to the indicator share of domestic non-government lending in terms of the GDP. This is considered to be a natural process, under which the development of the real economy and

the real GDP growth in particular (given that all the rest of the conditions are equal) bring about development and an increase of lending as well, and this results in a rising growth rate of the shares of both domestic and non-government lending in terms of the GDP. The specific type of this causality (or dependency) is seen as a confirmation of the theoretical rule that the dynamic development of the real aggregate output is a substantial factor underlying the demand for money, which is presented here through its major components. To a certain extent, the result obtained also contains an element, which is negative for the macroeconomic environment as a whole and is expressed in terms of the increasing amount of non-performing or bad debts. It is these bad debts precisely that have significantly contributed to the occurrence of the economic and financial crisis at the end of the first period subject to analysis.

During the second (1998-2006) period, when the currency board mechanism was already put in place and the money supply was automatically adjusted to the changes in monetary demand, the Granger causality is predominantly in the opposite direction. Causality in the direction to economic growth is demonstrated on quite a slight scale and only with respect to two indicators: share of non-government lending in terms of the GDP and share of quasi-money in terms of the GDP, but it is manifested only after four lags of time have elapsed, which in calendar terms means as late as a year's time. As far as the indicators share of liquid liabilities in terms of the GDP and share of total bank assets in terms of the GDP are concerned, causality has been manifested upon the eighth and ninth lags respectively, i.e. as late as in two years' time, and this result can be considered to be negligible.

In the other direction – from economic growth to financial development – with respect to six of the financial indicators (the only exception being the share of quasi-money in terms of the GDP) – the dependency is very strong and a permanent one. It is manifested on an ongoing basis, without any lags, and it usually subsides by the end of the second year or shortly afterwards. The implication is that economic growth stands out as a significant cause for the development of the financial system and has a strong impact on the dynamic development of the share of the M2 monetary aggregate in terms of the GDP and the liquid liabilities in terms of the GDP on the one hand, an on the other – on the share of domestic lending in terms of the GDP and the share of domestic and total financial assets in terms of the GDP. This means that the financial stability established by the implementation of the currency board mechanism in the country is a prerequisite for the formation of an effective and dynamic macroeconomic environment, which has a positive effect on the development of the financial system.

The econometric analysis of the interrelationship between two of the major factors of economic growth – labor and capital, on the one hand, and financial development, on the other, – observed throughout the first of the two periods subject to analysis, has produced very interesting and seemingly unexpected results. The share of the gross fixed capital formation in terms of the GDP demonstrates the weakest bilateral causal relationship out of all such relationships studied in the course of the study between indicators measuring the real economy and indicators measuring the financial system. Causality has been observed only in the direction from the share of domestic lending in terms of the GDP to the GDP itself, but this happens only as late as the fifth lag, i.e. after a year's time, and thus can be neglected a meaningful impact. What underlies the lack of dependency is the behavior of the financial sector itself, which lacks an orientation to the real economy, and the inherent ineffectiveness of the real economy itself, which is predominantly geared towards the attainment of its own short-term goals.

Another confirmation of this result is the cyclical dynamic development of both the individual growth rate of the gross fixed capital formation and the growth rate of its share in terms of the GDP, which was commented upon in the descriptive analysis of the study. For the period under observation, these rates initially mark a drop (between 1991 and 1993), then increase (in 1994 and 1995), and subsequently sharply slump again (1996 and 1997)[5]. At the same time, none of the indicators measuring financial development demonstrates such or similar dynamic development, which is an indication for the absence of any Granger causality whatsoever.

At the same time, financial development as a whole turns out to be a significantly strong Granger cause for the dynamic development of the employment rate. Such causality has been observed for six of the financial development indicators, the only exception being the share of the M2 monetary aggregate in terms of the GDP. In the opposite direction, the dynamic development of the employment rate is a very weak and sporadic cause affecting financial development. Such weak dependency has been registered in the direction of the share of quasi-money in terms of the GDP as well, but only as late as the sixth lag of the study (which means that it occurs after a year and a half), and in the direction to private lending after the seventh lag (which occurs after a year and a half or two years), and this occurrence is negligible and can be taken to be just a random result.

As far as the second – post-currency board – period is concerned, what is observed is a very strong and clearly manifested Granger causality in the direction from financial development to the share of the gross fixed capital formation in terms of the GDP with respect to all financial indicators, on the one hand, and, on the other, to the dynamic development of the employment rate or the number of the employed in the economy, again with respect to all of the financial indicators, the only exception being the share of the M2 monetary aggregate in terms of the GDP. This is considered to be an extremely strong result, which confirms the hypothesis about the transfer of stability from the financial system to all the major factors of economic growth in the real economy, alongside the hypothesis about the transformation of the nominal stability, based on the principles underlying the functioning of the currency board mechanism, into genuine stability. A confirmation of this result can also be discovered in the clearly demonstrated compliance within the whole complex of indicators subject to the study itself, which has also been proven on the basis of the available annual data, the descriptive analysis of which was carried out in the preceding paragraph[6].

It is natural to expect that the causality direction of the connection between financial development and the dynamic development of the relative share of government procurement (i.e. the purchases ordered by the government) in terms of the GDP should initiate from the former to the latter rather, which has been confirmed to different extents for the two periods subject to analysis with respect to the various financial indicators, the confirmation concerning respectively the differing scopes and strengths of such causality.

During the first period, this dependency is expressed very weakly and is observed only with respect to the share of quasi-money in terms of the GDP and the share of the M2 monetary aggregate in terms of the GDP. In practice, the dependency is statistically insignificant (the

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[5] See Figures 1 and 2 and the comments accompanying them.
[6] See Figures 3, 4, and 5 as well as the analysis of the indicators displayed therein.

probability level slightly exceeds the 10 % mark) and has been manifested for a single lag only – i.e. the fifth lag – which means that it occurs more than a year later. For the 1997 – 2006 period of time, the dependency in question abruptly gains strength both in terms of its depth and width. Financial development turns out to be a significant Granger cause for the dynamic development of the share of government procurement in terms of the GDP with respect to six of the financial indicators subject to analysis (the only exclusion being the share of quasi-money in terms of the GDP), whereby the statistical significance is high and usually varies between 1 % and 5 %. What is notable is the fact that this causality occurs a year later and is of a year's duration, which is a naturally expected result in view of the economic essence of this economic growth indicator.

The Granger dependency between the share of foreign trade commodity exchange in terms of the GDP and financial development is a reverse one with respect to all the dependencies reviewed thus far, with the only exception of the causality of the two indicators measuring economic growth. This is an interesting result, which needs a deeper further study on the background of the permanently strong openness of the Bulgarian economy. During the first pre-currency board period, there is a mutual dependency between the foreign trade commodity exchange indicator and two of the indicators for the depth of banking intermediation, namely: the share of quasi-money in terms of the GDP and the share of the M2 monetary aggregate in terms of the GDP. Moreover, the share of foreign trade commodity exchange in terms of the GDP manifests Granger causality with respect to the dynamic development of the share of total financial assets in terms of the GDP, but this dependency occurs on a one-off basis only – after the seventh lag, or a year and a half later.

Causality in the direction to financial development is extremely strongly manifested during the

second post-currency board period. With respect to all financial indicators, without any exception whatsoever, the dependency is permanent and is of a long duration (in the most common case – up to the sixth lag or a year and a half altogether). What is also impressive here is that, as a whole, the level of statistical significance is very high – below 1 %. The reverse causality – from financial development to the share of foreign trade commodity exchange in terms of the GDP – does exist, but it is of a much weaker nature.

The Granger dependency observed in the first pre-currency board period has been confirmed again during the second post-currency board period in the direction from the size of financial intermediation, represented by three indicators, namely: the shares of quasi-money in terms of the GDP, the M2 monetary aggregate in terms of the GDP, and the liquid liabilities in terms of the GDP, to the share of foreign trade commodity exchange in terms of the GDP. This dependency, however, is somewhat sporadic and has relatively worse levels of statistical significance. In this case, the existence of Granger causality on the part of financial development is also demonstrated by both private (or non-government) lending in terms of the GDP and the share of total financial assets in terms of the GDP. This is indicative for the fact that the openness of the economy by itself leads to the demand for more services provided by the banking sector. At the same time, financial development, though to a lesser extent, also makes a contribution of its own to this higher degree of openness of the economy.

The co-integration Johansen's test held for the first pre-currency board period indicates the presence of long-term dependencies in the authentic production function (containing only the labor, capital, and foreign trade factors of production) upon the inclusion of the financial variable for the share of domestic lending in terms of the GDP at the 5 % standard level

of statistical significance (see Appendix 2). Upon lowering the statistical significance to the permissible 10 % mark, the presence of co-integration dependencies is also manifested when another three of the financial indicators are included in the production function, namely: the share of liquid liabilities in terms of the GDP, the share of non-government lending in terms of the GDP, and the share of domestic financial assets in terms of the GDP. In this way, for five out of the eight possible combinations we obtain confirmation for the presence of a long-term dependency of the production function in relation to the real GDP growth rate (see the shaded equations in Table 1, where the underlined variables and the coefficients preceding them are statistically significant).

What is notable about these equations is that the following regularity occurs as a rule without a single exception, namely: the rates of change in employment and in the share of the gross fixed capital formation in terms of the GDP are statistically insignificant, with the respective negative and positive signs of the coefficients preceding them, whereas the changes in the share of the foreign trade commodity exchange in terms of the GDP are statistically significant and have an adverse impact on economic growth. Therefore, the openness of the Bulgarian economy is revealed as the only determinant of economic growth among all the real economy variables, whereby each percent by which the openness of the economy grows accounts for a decrease of economic growth amounting to between 0.33 % and 0.52 %, and for the authentic production function this decline reaches up to 0.59 %.

Upon the successive inclusion of one of the financial variables by following the logic of their structuring in the groups of liquidity / lending / assets, one can see that the coefficients of all financial variables are preceded by negative signs, and that – with the only exception of

the dynamic development of non-government lending in terms of the GDP – they are all statistically significant. This means that the growing size of bank intermediation throughout the 1991 – 1996 period of time not only does not stimulate economic growth, but has a distinct constraining impact on it as well. Out of the statistically significant financial variables, the share of domestic bank assets in terms of the GDP has the strongest impact. Thus for instance, its 1 % increase brings about an economic growth decline by 0.51 %. Upon a change in the share of the liquid liabilities in terms of the GDP by 1 %, there is an opposite change of economic growth by 0.47 %. The share of domestic lending in terms of the GDP exerts the weakest impact, whereby its 1 % rise brings about an economic growth decline by 0.43 %.

The statistical insignificance of the coefficient preceding the non-government lending variable indicates that economic growth remains relatively unaffected by the fluctuations of the banking system activity. What is notable about the equations subject to analysis thus far is that regardless of the fact which of the two indicators employed in the study is used to explicate economic growth, the results are absolutely identical, both with respect to their statistical significance and the signs preceding their independent variables, whereby even the values of their coefficients are identical up to the third decimal sign.

In all dependencies subject to analysis, which pertain to the first pre-currency board period, the financial variables as a rule are always negative and smaller than the numerical expression of the digit one, irrespective of the type of combination with economic growth factors they enter with. In other words, this means that each 1 % change in any of the financial variables corresponds to a change of the economic growth rate smaller than 1 % in just the opposite direction.

In three of the equations, the financial indicators are statistically insignificant. These are the cases with the participation of the share of quasi-money in terms of the GDP, the share of the M2 monetary aggregate in terms of the GDP, and the share of total financial assets in terms of the GDP. In the remaining four cases, the financial variables are statistically significant (see the last row of each section of column (1) in Apendix 2). The results from comparing the coefficients upon the exclusion of the financial variable, displayed in column (1 – 2), indicate that the inclusion of any of the seven financial variables in all cases leads to the decline in absolute terms of the impact exerted by foreign trade. In fact, in the specific situation this means either a smaller or bigger reduction of the pronounced strong negative impact of the share of foreign trade commodity exchange in terms of the GDP on economic growth to the tune of -0.6 % (or to be more exact, 0.5952 %), and in all cases this reduction represents a significant decrease.

The contribution of the various financial indicators to curbing the negative impact of foreign trade over the first pre-currency board period differs for the statistically significant and the statistically insignificant variables, whereby the contribution of the former is bigger and that of the latter is comparatively smaller.

With respect to the statistically significant financial indicators the situation is as follows: The dynamic development of the share of

Table 1. Production Functions of the GDP, Investments, Employment, Foreign Trade and Financial Development (1991-1996)

(dependent variable DLGY)
(constant independent variables: DLGIY, DLGLF, and DLGXY)

Dependent variable	Independent variable	Co-integration equation
DLGY		DLGY = -0.027519 - 0.161655DLGLF + 0.068786DLGIY - 0.59516DLGXY
DLGY	DLGQMY	DLGY = -0.030997 - 0.180124DLGLF + 0.052173DLGIY - 0.534859DLGXY - 0.200054DLGQMY
DLGY	DLGM2Y	DLGY = -0.033853 - 0.16874DLGLF + 0.054572DLGIY - 0.526337DLGXY - 0.244989DLGM2Y
DLGY	DLGLLY	DLGY = -0.040619 - 0.118585DLGLF + 0.06094DLGIY - 0.360568DLGXY - 0.469323DLGLLY
DLGY	DLGDCY	DLGY = -0.039514 - 0.213713DLGLF + 0.037904DLGIY - 0.436532DLGXY - 0.430225DLGDCY
DLGY	DLGPCY	DLGY = -0.035662 - 0.062227DLGLF + 0.077256DLGIY - 0.521156DLGXY - 0.248458DLGPCY
DLGY	DLGDFAY	DLGY = -0.039362 - 0.15626DLGLF + 0.06712DLGIY - 0.333634DLGXY - 0.512599DLGDFAY
DLGY	DLGTFAY	DLGY = -0.039878 - 0.152185DLGLF + 0.061653DLGIY - 0.401066DLGXY - 0.408439DLGTFAY

Remarks: 1. The underlined dependent variables as well as their coefficients are statistically significant.
2. The marked equations express long run interrelations at 5 % and 10 % level of statistical significance and the unmarked – at a 1 % level of statistical significance.

liquid liabilities in terms of the GDP results in the largest reductions of the negative effect of foreign trade by as much as 0.24 %, thus decreasing its negative impact to -0.36 %. As far as the indicator measuring the share of domestic lending in terms of the GDP is concerned, the impact in question here declines from -0.60 % to -0.44 %, or by 0.16 % altogether. For its part, the effect of the dynamic development of private lending in terms of the GDP brings about a decline of the negative impact exerted by foreign trade from -0.60 % to -0.52 %, or by 0.08 % altogether. The influence brought about by the changes in the share of domestic financial assets in terms of the GDP results in the largest cut back of the negative impact of the dynamic development of the share of foreign trade commodity exchange in terms of the GDP – by more than 0.26 % (that is, from -0.595 % to -0.334 %).

With respect to the statistically insignificant financial indicators the situation is quite similar. Upon the inclusion of the indicators measuring the share of quasi-money in terms of the GDP and the share of the M2 monetary aggregate in terms of the GDP, the reduction of the negative impact of foreign trade is of the minutest size – by 0.06 % and 0.07 % respectively, and the reduction goes down to -0.54 % and -0.53 % accordingly. The last from the list of financial indicators – the dynamic development of the total financial assets in terms of the GDP – also leads to the reduction of the negative impact generated by foreign trade by 0.20 %, the size of the actual reduction here being by one third – from -0.60 % to -0.40 %.

Having analyzed the impact exerted by the various financial variables on the dependency of economic growth on the openness of the economy as the only statistically significant factor, the study continues with the analysis of the role played by foreign trade as regards each one of the financial variables from the point of view of their contribution to the economic growth rates.

Upon excluding the foreign trade factor of production, the presence of five long-term dependencies has been proved (without those, in which the share of quasi-money in terms of the GDP and the share of the M2 monetary aggregate in terms of the GDP participate). These five co-integration equations have been shaded in Table 2. On the whole, the exclusion of the foreign trade factor of production (which on its own is the only statistically significant real economy factor, but at the same time exerts a strongly negative impact on economic growth) in principle does not change the predominant statistical insignificance of the rest of the independent real economy variables, derived from the production function, with respect to economic growth.

The only exception here occurs when the relative share of liquid liabilities in terms of the GDP is included in the equation where the dependent variable is the real GDP growth rate. In this case the independent variable becomes statistically significant, but its coefficient is preceded by a negative sign. As far as the financial variables are concerned, two of them turn into statistically significant, namely: the share of the liquid liabilities in terms of the GDP and the share of the non-government lending in terms of the GDP. What is notable about them, however, is that this "transformation" of theirs only enhances the negative effect they have on economic growth.

The inclusion of the factor analyzed here also leads to the reduction of the absolute values of the negative coefficients preceding all seven financial variables, which participate in the long-term dependencies affecting economic growth, subject to this study (see columns (1) and (3) of Apendix 3). In this case, however, because of the strongly negative base impact of the financial

Table 2. Production Functions of the GDP, Investments, Employment, and Financial Development (1991-1996) (constant independent variables: DLGIY and DLGLF)

Dependent variable	Independent variable	Co-integration equation
DLGY	DLGQMY	DLGY = -0.043703 - 0.181493DLGLF - 0.144804DLGIY - 0.361784DLGQMY
DLGY	DLGM2Y	DLGY = -0.047927 - 0.160196DLGLF - 0.136112DLGIY - 0.411978DLGM2Y
DLGY	DLGLLY	DLGY = -0.052182 - 0.089987DLGLF - 0.034211DLGIY - 0.707546DLGLLY
DLGY	DLGDCY	DLGY = -0.052113 - 0.225481DLGLF - 0.114603DLGIY - 0.612603DLGDCY
DLGY	DLGPCY	DLGY = -0.051577 + 0.030196DLGLF - 0.090369DLGIY - 0.447211DLGPCY
DLGY	DLGDFAY	DLGY = -0.049162 - 0.147831DLGLF - 0.014024DLGIY - 0.749245DLGDFAY
DLGY	DLGTFAY	DLGY = -0.053361 - 0.138432DLGLF - 0.047906DLGIY - 0.666892DLGTFAY

Remarks: 1. The underlined dependent variables as well as their coefficients are statistically significant.
2. The marked equations express long run interrelations at 5 % and 10 % level of statistical significance and the unmarked – at a 1 % level of statistical significance.

variables, the positive effect of foreign trade only manages to reduce it by a certain extent, whereby it is again negative, but its size or amount is smaller. The stated reduction is largest for the equation including the total financial assets (by 0.25 %), while the dynamic development of the domestic financial assets and the liquid liabilities yields a 0.24 % reduction each, and the change of domestic lending contributes with a 0.18 % reduction rate. As far as the dynamic development of the share of the M2 monetary aggregate in terms of the GDP and the share of non-government lending in terms of the GDP, the inclusion of foreign trade turns them into statistically insignificant variables, thus reducing their negative impact on economic growth by 0.17 % and 0.20 % respectively. The last financial indicator – the share of quasi-money in terms of the GDP – remains statistically insignificant and the reduction it produces is the smallest – merely 0.16 %.

The inclusion of the foreign trade factor production also leads to an absolute (in all seven cases) enhancement of the contribution of the share of gross fixed capital formation in terms of the GDP to economic growth, amounting to between 0.08 % and 0.20 %. This actually transforms the negative contribution of investments (when the foreign trade factor of production is excluded) into positive (when the openness of the economy is taken into account), but these variables remain statistically insignificant in all the cases of their possible combinations.

When the openness of the economy is taken into consideration, this brings about the enhancement of the negative contribution to economic growth produced by the labor factor of production in five of the cases, whereby the inclusion of the share of non-government lending in terms of the GDP produces the highest negative contribution and

lowers economic growth by 0.1 %, while the share of the M2 monetary aggregate in terms of the GDP and the share of domestic financial assets in terms of the GDP diminish the size of this negative contribution tenfold. The remaining two financial indicators – share of quasi-money in terms of the GDP and share of domestic lending in terms of the GDP – contribute only symbolically to the negative impact of the labor factor of production on economic growth, the numerical expression in the former case being by 0.01 %, and in the latter case – by 0.001 %.

The comprehensive analysis with the inclusion of foreign trade and the simultaneous exclusion of each of the financial variables participating in the dependencies subject to analysis leads to conclusions, which do not contradict the ones already outlined in the study. What is particular about this specific case is that – because the changes in foreign trade and financial development are the only statistically significant independent variables in the production functions subject to this study – the differences in their coefficients coincide with their own coefficients (see the quantitative characteristics of the differences between the coefficients in columns (1 – 2) and (2 – 3) of Apendix 3).

In this way, on the basis of the empirical results displayed above, we can outline the role of the openness of the economy in its capacity of a channel, which materializes effects in the direction from financial development to economic growth. A testimony to this fact is the significant shrinkage of foreign trade's own negative contribution to the changes in the real GDP, which is observed upon the inclusion of any of the financial variables in the production functions constructed for the purposes of this study.

Furthermore, the statistical significance or insignificance of the various financial variables, upon their joint participation in the model

simulating the dynamical development of the share of foreign trade commodity exchange in terms of the GDP, also gives certain indications about the existence of working mechanisms of transmission. Thus for instance, the statistical insignificance of the changes in the share of quasi-money in terms of the GDP, in the share of the M2 monetary aggregate in terms of the GDP, and in the share of non-government lending in terms of the GDP, in the presence of the functioning channel of foreign trade can be interpreted as a testimony to the fact that the impact of financial development on economic growth goes entirely through this channel precisely.

Upon the analysis of the second – post currency board – period in the study, the Johansen tests, which establish the presence of co-integration dependencies, prove the existence of all possible long-term dependencies, and the proof results are far below the 5 % standard level of statistical significance, whereby the highest statistical probabilities are of the order of tenths of the percent, and in the usual case they are hundredths of the percent. The co-integration equations, which reflect the above mentioned long-term dependencies, are displayed in Table 3 for the complete production function, and the co-integration equations with the excluded factor of foreign trade are displayed in Table 4. What is notable about these equations is that the following dependencies are manifested as a rule, without a single exception:

First, the coefficients preceding the factor of investments are always statistically significant (that is the reason why they are underlined), they have a positive sign, and as a rule – they have relatively high values.

Second, the labor factor of production is absolutely (in all possible cases) statistically insignificant, its impact is also positive, and marks relatively high and stable levels.

Third, foreign trade is also totally statistically insignificant, but makes its presence with a variety of values and signs, depending on the nature of the respective financial variable, which participates in the specific combination.

Fourth, the financial variables in slightly over half of the cases are statistically significant, but the coefficients preceding them change their signs and sizes depending on the specific combination, in which they participate in the production function.

The statistically significant coefficients preceding investments vary according to the group, to which a financial variable included in the production function actually belongs. These coefficients have relatively more moderate values – from 0.24 to

0.39 – when a variable from the "liquidity" group participates in the equation, and the values are markedly higher when an indicator from the "lending' or "assets' groups is included in the equation – between 0.51 and 0.58.

The negative signs predominate in connection with the coefficients of the financial variables, the only exception being the share of non-government lending in terms of the GDP, the coefficient of which is positive, but has a relatively low absolute value (see Table 3 and Apendix 5). This positive contribution of the growth of non-government lending confirms the conclusion made in the preceding paragraph about the stimulating impact, which the changes in the activity of the banking sector have on economic growth at large.

Table 3. Production Functions of the GDP, Investments, Employment, Foreign Trade and Financial Development (1997-2006)

(dependent variable DLGY)
(constant independent variables: DLGIY, DLGLF, and DLGXY)

Dependent variable	Independent variable	Co-integration equation
DLGY		DLGY = 0.013057 + 0.209072DLGLF + 0.756991DLGIY + 0.006223DLGXY
DLGY	DLGQMY	DLGY = 0.013931 + 0.145971DLGLF + 0.237026DLGIY + 0.036977DLGXY - 0.109748DLGQMY
DLGY	DLGM2Y	DLGY = 0.015116 + 0.202429DLGLF + 0.398028DLGIY - 0.006086DLGXY - 0.135597DLGM2Y
DLGY	DLGLLY	DLGY = 0.015339 + 0.289136DLGLF + 0.38395DLGIY + 0.002317DLGXY - 0.154196DLGLLY
DLGY	DLGDCY	DLGY = 0.013883 + 0.320647DLGLF + 0.510863DLGIY - 0.035282DLGXY - 0.061944DLGDCY
DLGY	DLGPCY	DLGY = 0.010506 + 0.36488DLGLF + 0.574263DLGIY + 0.142895DLGXY + 0.037356DLGPCY
DLGY	DLGDFAY	DLGY = 0.014195 + 0.425542DLGLF + 0.583922DLGIY - 0.017328DLGXY - 0.074007DLGDFAY
DLGY	DLGTFAY	DLGY = 0.018927 + 0.390806DLGLF + 0.526757DLGIY + 0.028962DLGXY - 0.310774DLGTFAY

Remarks: 1. The underlined dependent variables as well as their coefficients are statistically significant. 2. All equations express long run interrelations at 1 % level of statistical significance.

The Wald test for Granger long-term causality gives only a single robust two-way causality, which has been confirmed in all possible cases of the complete production function, namely the dependency between economic growth and investments. For the labor factor of production such a two-way long-term causality exists in six out of the eight variants of complete production functions. Causality between labor and growth in the direction from the dynamic development of the employment rate to the economic growth rate has not been observed only in the "authentic" production function and when the financial variable of the share of non-government lending in terms of the GDP has been included in it.

An interesting result is the absence of any long-term dependency between foreign trade and economic growth in whatever direction. The total causality between investments and growth is fully matched by the absolute absence of any causality between foreign trade and economic growth. This leads to the assumption that the causal long-term impact of the dynamic development of the share of foreign trade commodity exchange in terms of the GDP is transferred to growth through the channels of the other independent variables, with which foreign trade enjoys causal connections.

The long-term direct causality between financial development and economic growth is very weak, too. There is no trace of any two-way causality whatsoever. Only the dynamic development of the share of quasi-money in terms of the GDP is a cause of economic growth in the direction from finances to growth. In the opposite direction, a long-term causality is demonstrated from economic growth to the changes in the share of domestic lending in terms of the GDP and in the share of non-government lending in terms of the GDP, as well as in the direction to the changes in the share of domestic financial assets in terms of the GDP.

There is, however, a strong and constant causality between financial indicators and the factors of production – mainly with investments and labor, and less with foreign trade, which indicates that the mutual impact between finances and growth is actually intermediated by them and goes through them. All financial indicators manifest themselves as a long-term cause for the dynamic development of the share of gross fixed capital formation in terms of the GDP and the rate of change in the number of the employed. The only exception here is that upon the inclusion of the share of non-government lending in terms of the GDP, the long-term Granger causality in the direction to investments is lost. In the direction to foreign trade there is only one long-term causal dependency and it stems from the changes in the share of total financial assets in terms of the GDP.

Proofs concerning the way in which the factors of production act in the capacity of transmission mechanisms are produced by the demonstration of a strong reverse long-term causality stemming from the factors of economic growth themselves in the direction leading to financial development. The dynamic development of investments is a long-term cause for the changes in the share of domestic lending in terms of the GDP, in the share of non-government lending in terms of the GDP, and also for the changes in the share of domestic financial assets in terms of the GDP. On the other hand, the dynamic development of labor and foreign trade cause long-term changes in the share of the M2 monetary aggregate in terms of the GDP, in the share of liquid liabilities in terms of the GDP, as well as in the share of non-government lending in terms of the GDP. For their part, the changes in the share of foreign trade commodity exchange in terms of the GDP are a long-term Granger cause for the changes in the share of total financial assets in terms of the GDP.

The next stage of the analysis is concerned with the task of outlining the quantitative contribution of the individual financial variables to economic growth, which is the basis for a subsequent review, the task of which is to determine the role of each of the independent real economy variables, acting as a transmission mechanism from finances to growth and vice versa.

During the 1997 – 2006 period, the "authentic" production function (without any financial variable included in it) has only one statistically significant independent variable – investments – and this variable has entirely positive coefficients (see the displayed equations and their coefficients in column (2) of Apendix 5). This means that the increase of the share of the gross fixed capital formation in terms of the GDP has a positive contribution to economic growth, whereby the rise of the growth rate of the gross fixed capital formation in terms of the GDP by 1 % brings about an increase of the real GDP growth

rate by nearly 0.8 %. Labor is a statistically insignificant factor with a positive but relatively weak contribution to economic growth. Foreign trade is also statistically insignificant, but it demonstrates a symbolic positive impact on the growth rate of the real GDP.

In all the dependencies subject to analysis during the second post-currency board period, the contribution of the financial variables – as it was observed in the first pre-currency board period as well – is negative, with the only exception of the share of non-government lending in terms of the GDP (see the last row of each segment of column (1) in the commented Apendix 5). The results obtained from the comparison of the coefficients displayed in column (1 – 2) show that the inclusion of any of the seven financial variables leads to a significant reduction of the effect of investments in all possible cases, which quantitatively amounts to a twofold or even

Table 4. Production Functions of the GDP, Investments, Employment, and Financial Development (1997-2006) (constant independent variables: DLGIY and DLGLF)

Dependent variable	Independent variable	Co-integration equation
DLGY	DLGQMY	DLGY = 0.01285 + 0.207738DLGLF + 0.248226DLGIY − 0.04726DLGQMY
DLGY	DLGM2Y	DLGY = 0.012619 + 0.22959DLGLF + 0.353672DLGIY − 0.02699DLGM2Y
DLGY	DLGLLY	DLGY = 0.012983 + 0.268317DLGLF + 0.36203DLGIY − 0.043651DLGLLY
DLGY	DLGDCY	DLGY = 0.013431 + 0.341221DLGLF + 0.556449DLGIY − 0.047033DLGDCY
DLGY	DLGPCY	DLGY = 0.01699 + 0.327876DLGLF + 0.480981DLGIY + 0.021651DLGPCY
DLGY	DLGDFAY	DLGY = 0.013743 + 0.455848DLGLF + 0.553323DLGIY − 0.061938DLGDFAY
DLGY	DLGTFAY	DLGY = 0.011591 + 0.194442DLGLF + 0.447466DLGIY + 0.032393DLGTFAY

Remarks: 1. The underlined dependent variables as well as their coefficients are statistically significant. 2. All equations express long run interrelations at 1 % level of statistical significance.

larger decline in the various combinations. When the dynamic development of the share of quasi-money in terns of the GDP is taken into account, the extent of the reduction is the largest, whereby the contribution of investments drops from 0.76 % to 0.24 % or by 0.52 percentage points. The reduction is smaller with the participation of the various forms of lending in terms of the GDP and the various types of financial assets in terms of the GDP, where the registered decrease of impact drops from 0.17 percentage points to 0.25 percentage points. If the above logic of reasoning is reversed, it may also be claimed that the exclusion of any of the financial variables leads to an increase of the contribution investments make to economic growth within the quantitative limits mentioned above.

The inclusion of the foreign factor of production has an effect on the impact of the rest of the independent variables, which is much similar to the one exerted by the inclusion of investments, although its intensity is lower (see Table 4 and Apendix 5). The effect of the change of the share of gross fixed capital formation in terms of the GDP is positive with respect to both its quantitative expression and the number of indicators. What is observed in five of the cases is a growing impact of investments on the GDP growth rate, which reaches almost 0.1 % when the share of non-government lending in terms of the GDP participates in the equation, whereby the levels of statistical significance are very good indeed. When the share of quasi-money in terms of the GDP participates in the equation, investments turn from a statistically insignificant into a significant factor, but the impact of quasi-money slightly declines. A slight reduction of the impact of the gross fixed capital formation in terms of the GDP is also observed with respect to the participation of the share of domestic lending in terms of the GDP, which is accompanied by a good statistical significance of the respective coefficients as well.

In principle, the labor factor of production is totally statistically insignificant in the complete production function, and it remains insignificant upon the inclusion and exclusion of the openness of the economy. What is particular upon the inclusion of foreign trade is that it turns all the seven financial variables from statistically insignificant into significant. In six of the cases we observe a reduction of the negative impact of the financial variables, whereas with the participation of the share of total financial assets in terms of the GDP the impact now becomes negative instead of positive. It is with the participation of the share of non-government lending in terms of the GDP only that this positive impact is slightly enhanced.

The simultaneous taking into account of the inclusion of foreign trade and the exclusion of the financial variable (see column (2 – 3) in Apendix 5), unequivocally enhances and confirms the conclusions made above about the impact of the dynamic development of the share of foreign trade commodity exchange in terms of the GDP on the factor effect in the direction to economic growth. The impact on the contribution of investments to economic growth in this case is absolutely positive in all the seven possible combinations with each of the growth indicators, whereby the levels of statistical significance are very good need. The only case of statistical insignificance here is observed with respect to the participation of the share of quasi-money in terms of the GDP.

On the contrary, the impact on the contribution of labor in all the possible cases is statistically insignificant and predominantly negative. What also turns out to be statistically insignificant is the inclusion of financial indicators such as the factors of growth to the exclusion of foreign trade, whereby – in quantitative terms – their opposite impacts get mutually neutralized.

4. Conclusion

The conclusion is that the behavior of the factors of production and the financial variables upon their successive and simultaneous inclusion and exclusion from the production functions, constructed to the purpose of this study, gives sufficient grounds for us to assess them as linking elements and transmission mechanisms between the real economy and the financial system. In the period prior to the implementation of the currency board mechanism, the role of the openness of the economy as a channel for the materialization of effects in the direction from financial development to economic growth is the strongest. After the middle of 1997, when the currency board mechanism is firmly put in place, it is investments that manifest themselves as the strongest conduit of impulses from financial development to economic growth.

Unlike the first pre-currency board period, in the second post-currency board period foreign trade surrenders its role of a substantial transmission mechanism between the banking and the real sector. The changes in employment also prove incapable of playing such a mediating function, because even though employment proves to be closely connected with the dynamic development of investments, its performance in terms of impact is statistically insignificant. At the same time, the sound statistical significance of all financial variables included in the complete production function also testifies to the presence of a channel transmitting effects via the factor productivity. And unlike the situation in the first pre-currency board period, the dynamic development of the share of non-government lending in terms of the GDP now exerts a stimulating impact on economic growth precisely through the vehicles of this mechanism.

We consider that the major results displayed above, which were obtained in the course of the study, are relevant to the dynamic development and structure of the economy and its openness during the period after the implementation of the currency board mechanism. There are sufficient grounds to claim that the last two factors of economic growth, subject to this study, namely – investments and foreign trade – to various extents and levels of strength also play the role of transmission mechanisms of the effect of the changes taking place in the financial system, and transfer these effects on to economic growth. **ᴎA**

Results from the extended dicky-fuller test and the phillips-peron test for the presence of a single root in the first differences with a long-term constant median

1991-1996

Variable	As per Akaike's information criterion					As per Schwartz's information criterion				
	ADF	S%L	L*	PP	S%L	ADF	S%L	L*	PP	S%L
LGQMY	-6.610229	1	0	-6.607924	1	-6.610229	1	0	-6.454301	1
LGM2Y	-6.884149	1	0	-6.883979	1	-6.884149	1	0	-6.833722	1
LGLLY	-7.376067	1	0	-7.374357	1	-7.376067	1	0	-7.373756	1
LGDCY	-5.700540	1	0	-5.698709	1	-5.700540	1	0	-5.599162	1
LGPCY	-6.306318	1	0	-6.303530	1	-6.306318	1	0	-6.105781	1
LGDFAY	-7.312826	1	0	-7.311085	1	-7.312826	1	0	-7.312826	1
LGTFAY	-7.129386	1	0	-7.129338	1	-7.129386	1	0	-7.129386	1
LGY	-4.758545	1	0	-4.758599	1	-4.758545	1	0	-4.762987	1
LGIY	-5.406641	1	1	-8.338365	1	-5.406641	1	1	-6.006909	1
LGLF	-2.811956	10	2	-5.709494	1	-2.4358440		0	-2.559051	
LGXY	-4.990551	1	0	-4.990544	1	-4.990551	1	0	-4.990551	1

1997-2006

Variable	As per Akaike's information criterion					As per Schwartz's information criterion				
	ADF	S%L	L*	PP	S%L	ADF	S%L	L*	PP	S%L
LGQMY	-5.590656	1	0	-5.590862	1	-5.590656	1	0	-5.607900	1
LGM2Y	-4.923623	1	0	-18.04363	1	-4.464030	1	3	-4.846051	1
LGLLY	-5.207708	1	0	-14.23452	1	-3.542936	1	3	-5.184084	1
LGDCY	-5.251563	1	2	-3.910668	1	-3.987936	1	3	-3.910668	1
LGPCY	-5.717747	1	0	-5.952908	1	-5.717747	1	0	-5.718200	1
LGDFAY	-4.175706	1	2	-3.130799	5	-3.885720	1	3	-3.279975	5
LGTFAY	-4.382701	1	0	-126.5484	1	-4.382701	1	0	-4.307904	1
LGY	-14.226110	1	0	-13.927110	1	-14.226110	1	0	-16.266380	1
LGIY	-6.014902	1	1	-6.736371	1	-6.014902	1	1	-11.174460	1
LGLF	-4.141746	1	1	-4.569605	1	-4.327469	1	0	-4.233508	1
LGXY	-3.653505	1	2	-6.254898	1	-7.663980	1	0	-7.435486	1

Remark: LGQMY, LGM2Y, LGLLY, LGDCY, LGPCY, LGDFAY, LGTFAY, LGY, LGYC, LFIY, LGLF, LGGY, LGXY, and LGCPI are the designations for the natural logarithms
of the share of quasi-money in terms of the GDP, the share of M2 monetary aggregate in terms of the GDP, the share of liquid liabilities in terms of the GDP, the share of domestic credit or lending in terms of the GDP, the share of private lending in terms of the GDP, the share of domestic financial assets in terms of the GDP, the share of total financial assets in terms of the GDP, of the real GDP itself on the basis of 1995 data, the per capital real GDP, the share of gross fixed capital formation in terms of the GDP, the employment rate (the number of the employed), the share of government purchases in terms of the GDP, the share of the foreign trade turnover in terms of the GDP, and the index of consumer prices (1995 = 100%).

L is the optimum length of lag, which according to Aikake's criterion is of a 5 lags maximum value, and according to Schwartz's criterion is of a 9 lags maximum value.*
S%L displays the statistical significance at levels 1%, 5%, and 10%, or the absence of a statistical significance altogether.

Johansen's co-integration test between the GDP, investments, employment, foreign trade, and financial development (1991–1996)

Independent variables	Ho H$_1$	Trace statistics	Critical value at 5 %	Prob-ability**	Max-Eigen statistics	Critical value at 5 %	Prob-ability**
DLGY,	r = 0*	83.63434	47.856130	0.0000	35.964270	27.584340	0.0033
DLGLF,	r < = 1*	47.670080	29.797070	0.0002	25.867220	21.131620	0.0100
DLGIY,	r < = 2*	21.802860	15.494710	0.0049	16.498480	14.264600	0.0218
DLGXY	r < = 3*	5.304380	3.841470	0.0213	5.304380	3.841466	0.0213
DLGY,	r = 0*	116.276600	69.818890	0.0000	49.078430	33.876870	0.0004
DLGLF,	r < = 1*	67.198190	47.856130	0.0003	29.322410	27.584340	0.0296
DLGIY,	r < = 2*	37.875770	29.797070	0.0047	26.979310	21.131620	0.0067
DLGXY,	r < = 3	10.896460	15.494710	0.2179	6.007799	14.264600	0.6122
DLGQMY	r < = 4*	4.888661	3.841466	0.0270	4.888661	3.841466	0.0270
DLGY,	r = 0*	117.088400	69.818890	0.0000	48.213780	33.876870	0.0005
DLGLF,	r < = 1*	68.874640	47.856130	0.0002	31.077280	27.584340	0.0170
DLGIY,	r < = 2*	37.797360	29.797070	0.0049	27.538180	21.131620	0.0055
DLGXY,	r < = 3	10.259180	15.494710	0.2613	5.804944	14.264600	0.6384
DLGM2Y	r < = 4*	4.454234	3.841466	0.0348	4.454234	3.841466	0.0348
DLGY,	r = 0*	125.158600	69.818890	0.0000	54.830750	33.876870	0.0001
DLGLF,	r < = 1*	70.327810	47.856130	0.0001	32.232610	27.584340	0.0117
DLGIY,	r < = 2*	38.095210	29.797070	0.0044	24.683560	21.131620	0.0151
DLGXY,	r < = 3	13.411650	15.494710	0.1006	7.067925	14.264600	0.4811
DLGLLY	r < = 4*	6.343723	3.841466	0.0118	6.343723	3.841466	0.0118
DLGY,	r = 0*	125.461800	69.818890	0.0000	54.072130	33.876870	0.0001
DLGLF,	r < = 1*	71.389680	47.856130	0.0001	31.503620	27.584340	0.0149
DLGIY,	r < = 2*	39.886060	29.797070	0.0025	23.267810	21.131620	0.0246
DLGXY,	r < = 3	16.618250	15.494710	0.0337	10.338360	14.264600	0.1907
DLGDCY	r < = 4*	6.279891	3.841466	0.0122	6.279891	3.841466	0.0122
DLGY,	r = 0*	114.167900	69.818890	0.0000	43.109330	33.876870	0.0030
DLGLF,	r < = 1*	71.058600	47.856130	0.0001	29.553900	27.584340	0.0276
DLGIY,	r < = 2*	41.504700	29.797070	0.0015	27.040100	21.131620	0.0065
DLGXY	r < = 3	14.464600	15.494710	0.0710	8.765609	14.264600	0.3062
DLGPCY	r < = 4*	5.698991	3.841466	0.0170	5.698991	3.841466	0.0170
DLGY,	r = 0*	125.794200	69.818890	0.0000	54.723190	33.876870	0.0001
DLGLF,	r < = 1*	71.071030	47.856130	0.0001	30.789200	27.584340	0.0187
DLGIY,	r < = 2*	40.281830	29.797070	0.0022	26.011080	21.131620	0.0095
DLGXY	r < = 3	14.270750	15.494710	0.0758	7.890295	14.264600	0.3899
DLGDFAY	r < = 4*	6.380455	3.841466	0.0115	6.380455	3.841466	0.0115
DLGY,	r = 0*	120.442000	69.818890	0.0000	50.768310	33.876870	0.0002
DLGLF,	r < = 1*	69.673730	47.856130	0.0001	32.048610	27.584340	0.0124
DLGIY,	r < = 2	37.625120	29.797070	0.0051	25.467910	21.131620	0.0115
DLGXY	r < = 3*	12.157210	15.494710	0.1495	7.250217	14.264600	0.4600
DLGTFAY	r < = 4*	4.906992	3.841466	0.0267	4.906992	3.841466	0.0267

H0 – zero hypothesis for the absence of a long-term causality.
H1 – single hypothesis for the presence of a long-term causality.
* marks the rejection of the hypothesis for the absence of long-term causality at a probability level of 0.05.
** p-values of McKinnon, Hoge, and Mischellis (1999).

Transmission mechanisms between financial development and the GDP growth rate (1991 − 1996)
(the dependent variable − DLGY)
(the constant independent variables − DLGIY and DLGLF)
(the variate independent financial variable − Fi)

Coefficients variables	Co-integration equation			Coefficient differences		
0	1	2	3	(1-2)	(1-3)	(2-3)
	DLGY =	DLGY =	DLGY =			
C	-0.030997	-0.027519	-0.043703	-0.003478	0.012706	0.016184
DLGLF	-0.180124	-0.161655	-0.181493	-0.018469	0.001369	0.019838
DLGIY	0.052173	0.068786	-0.144804	-0.016613	0.196977	0.213590
DLGXY	-0.534859	-0.595160		0.060301	-0.534859	-0.595160
DLGQMY	-0.200054		-0.361784	-0.200054	0.161730	0.361784
	DLGY =	DLGY =	DLGY =			
C	-0.033853	-0.027519	-0.047927	-0.006334	0.014074	0.020408
DLGLF	-0.168740	-0.161655	-0.160196	-0.007085	-0.008544	-0.001459
DLGIY	0.054572	0.068786	-0.136112	-0.014214	0.190684	0.204898
DLGXY	-0.526337	-0.595160		0.068823	-0.526337	-0.595160
DLGM2Y	-0.244989		-0.411978	-0.244989	0.166989	0.411978
	DLGY =	DLGY =	DLGY =			
C	-0.040619	-0.027519	-0.052182	-0.013100	0.011563	0.024663
DLGLF	-0.118585	-0.161655	-0.089987	0.043070	-0.028598	-0.071668
DLGIY	0.060940	0.068786	-0.034211	-0.007846	0.095151	0.102997
DLGXY	-0.360568	-0.595160		0.234592	-0.360568	-0.595160
DLGLLY	-0.469323		-0.707546	-0.469323	0.238223	0.707546
	DLGY =	DLGY =	DLGY =			
C	-0.039514	-0.027519	-0.052113	-0.011995	0.012599	0.024594
DLGLF	-0.213713	-0.161655	-0.225481	-0.052058	0.011768	0.063826
DLGIY	0.037904	0.068786	-0.114603	-0.030882	0.152507	0.183389
DLGXY	-0.436532	-0.595160		0.158628	-0.436532	-0.595160
DLGDCY	-0.430225		-0.612603	-0.430225	0.182378	0.612603
	DLGY =	DLGY =	DLGY =			
C	-0.035662	-0.027519	-0.051577	-0.008143	0.015915	0.024058
DLGLF	-0.062227	-0.161655	0.030196	0.099428	-0.092423	-0.191851
DLGIY	0.077256	0.068786	-0.090369	0.008470	0.167625	0.159155
DLGXY	-0.521156	-0.595160		0.074004	-0.521156	-0.595160
DLGPCY	-0.248458		-0.447211	-0.248458	0.198753	0.447211
	DLGY =	DLGY =	DLGY =			
C	-0.039362	-0.027519	-0.049162	-0.011843	0.009800	0.021643
DLGLF	-0.156260	-0.161655	-0.147831	0.005395	-0.008429	-0.013824
DLGIY	0.067120	0.068786	-0.014024	-0.001666	0.081144	0.082810
DLGXY	-0.333634	-0.595160		0.261526	-0.333634	-0.595160
DLGDFAY	-0.512599		-0.749245	-0.512599	0.236646	0.749245
	DLGY =	DLGY =	DLGY =			
C	-0.039878	-0.027519	-0.053361	-0.012359	0.013483	0.025842
DLGLF	-0.152185	-0.161655	-0.138432	0.009470	-0.013753	-0.023223
DLGIY	0.061653	0.068786	-0.047906	-0.007133	0.109559	0.116692
DLGXY	-0.401066	-0.595160		0.194094	-0.401066	-0.595160
DLGTFAY	-0.408439		-0.666892	-0.408439	0.258453	0.666892

Johansen's co-integration test between the GDP, investments, employment, foreign trade, and financial development (1997–2006)

Independent variables	Ho H₁	Trace statistics	Critical value at 5 %	Prob-ability**	Max-Eigen statistics	Critical value at 5 %	Prob-ability**
DLGY	r = 0*	17.9430	47.85613	0.0000	84.14922	27.58434	0.0000
DLGLF	r <= 1*	90.74508	29.79707	0.0000	51.69979	21.13162	0.0000
DLGIY	r <= 2*	39.04529	15.49471	0.0000	21.00221	14.26460	0.0037
DLGXY	r <= 3*	18.04308	3.84147	0.0000	18.04308	3.84147	0.0000
DLGY	r = 0*	204.00250	69.81889	0.0000	89.61744	33.87687	0.0000
DLGLF	r <= 1*	114.38500	47.85613	0.0000	56.00776	27.58434	0.0000
DLGIY,	r <= 2*	58.37726	29.79707	0.0000	24.45615	21.13162	0.0164
DLGXY	r <= 3*	33.92111	15.49471	0.0000	21.32228	14.26460	0.0033
DLGQMY,	r <= 4*	12.59882	3.84147	0.0004	12.59882	3.84147	0.0004
DLGY,	r = 0*	216.41930	69.81889	0.0000	84.92593	33.87687	0.0000
DLGLF,	r <= 1*	131.49340	47.85613	0.0000	66.88743	27.58434	0.0000
DLGIY,	r <= 2*	64.60598	29.79707	0.0000	27.88725	21.13162	0.0048
DLGXY	r <= 3*	36.71873	15.49471	0.0000	20.98845	14.26460	0.0037
DLGM2Y,	r <= 4*	15.73028	3.84147	0.0001	15.73028	3.84147	0.0001
DLGY,	r = 0*	216.76320	69.81889	0.0000	85.28663	33.87687	0.0000
DLGLF,	r <= 1*	131.47660	47.85613	0.0000	63.67162	27.58434	0.0000
DLGIY,	r <= 2*	67.80499	29.79707	0.0000	30.63530	21.13162	0.0017
DLGXY	r <= 3*	37.16969	15.49471	0.0000	20.70910	14.26460	0.0042
DLGLLY,	r <= 4*	16.46059	3.84147	0.0000	16.46059	3.84147	0.0000
DLGY,	r = 0*	203.80680	69.81889	0.0000	84.61973	33.87687	0.0000
DLGLF,	r <= 1*	119.18710	47.85613	0.0000	62.88927	27.58434	0.0000
DLGIY,	r <= 2*	56.29782	29.79707	0.0000	25.21744	21.13162	0.0126
DLGXY	r <= 3*	31.08038	15.49471	0.0001	19.90099	14.26460	0.0058
DLGDCY	r <= 4*	11.17939	3.84147	0.0008	11.17939	3.84147	0.0008
DLGY,	r = 0*	203.09870	69.81889	0.0000	84.38339	33.87687	0.0000
DLGLF,	r <= 1*	118.71530	47.85613	0.0000	60.25903	27.58434	0.0000
DLGIY,	r <= 2*	58.45623	29.79707	0.0000	28.13632	21.13162	0.0044
DLGXY	r <= 3*	30.31991	15.49471	0.0002	18.88738	14.26460	0.0086
DLGPCY	r <= 4*	11.43253	3.84147	0.0007	11.43253	3.84147	0.0007
DLGY,	r = 0*	205.64610	69.81889	0.0000	84.60961	33.87687	0.0000
DLGLF,	r <= 1*	121.03650	47.85613	0.0000	64.00457	27.58434	0.0000
DLGIY,	r <= 2*	57.03194	29.79707	0.0000	27.75899	21.13162	0.0050
DLGXY	r <= 3*	29.27295	15.49471	0.0002	19.25175	14.26460	0.0075
DLGDFAY	r <= 4*	10.02119	3.84147	0.0015	10.02119	3.84147	0.0015
DLGY,	r = 0*	205.76680	69.81889	0.0000	84.58053	33.87687	0.0000
DLGLF,	r <= 1*	121.18620	47.85613	0.0000	58.29429	27.58434	0.0000
DLGIY,	r <= 2*	62.89195	29.79707	0.0000	25.45438	21.13162	0.0116
DLGXY	r <= 3*	37.43757	15.49471	0.0000	20.06881	14.26460	0.0054
DLGTFAY	r <= 4*	17.36875	3.84147	0.0000	17.36875	3.84147	0.0000

H0 – zero hypothesis for the absence of a long-term causality.
H1 – single hypothesis for the presence of a long-term causality.
* marks the rejection of the hypothesis for the absence of long-term causality at a probability level of 0.05.
** p-values of McKinnon, Hoge, and Mischellis (1999).

Apendix 5

Transmission mechanisms between financial development and the GDP growth rate (1997 – 2006)
(the dependent variable – DLGY)
(the constant independent variables – DLGIY and DLGLF)
(the variate independent financial variable – Fi)

Coefficients variables	Co-integration equation			Coefficient differences		
0	1	2	3	(1-2)	(1-3)	(2-3)
C	DLGY = 0.013931	DLGY = 0.013057	DLGY = 0.012850	0.000874	0.001081	0.000207
DLGLF	0.145971	0.209072	0.207738	-0.063101	-0.061767	0.001334
DLGIY	0.237026	0.756991	0.248226	-0.519965	-0.011200	0.508765
DLGXY	0.036977	0.006223		0.030754	0.036977	0.006223
DLGQMY	-0.109748		-0.047260	-0.109748	-0.062488	0.047260
C	DLGY = 0.015116	DLGY = 0.013057	DLGY = 0.012619	0.002059	0.002497	0.000438
DLGLF	0.202429	0.209072	0.229590	-0.006643	-0.027161	-0.020518
DLGIY	0.398028	0.756991	0.353672	-0.358963	0.044356	0.403319
DLGXY	-0.006086	0.006223		-0.012309	-0.006086	0.006223
DLGM2Y	-0.135597		-0.026990	-0.135597	-0.108607	0.026990
C	DLGY = 0.015339	DLGY = 0.013057	DLGY = 0.012983	0.002282	0.002356	0.000074
DLGLF	0.289136	0.209072	0.268317	0.080064	0.020819	-0.059245
DLGIY	0.383950	0.756991	0.362030	-0.373041	0.021920	0.394961
DLGXY	0.002317	0.006223		-0.003906	0.002317	0.006223
DLGLLY	-0.154196		-0.043651	-0.154196	-0.110545	0.043651
C	DLGY = 0.013883	DLGY = 0.013057	DLGY = 0.013431	0.000826	0.000452	-0.000374
DLGLF	0.320647	0.209072	0.341221	0.111575	-0.020574	-0.132149
DLGIY	0.510863	0.756991	0.556449	-0.246128	-0.045586	0.200542
DLGXY	-0.035282	0.006223		-0.041505	-0.035282	0.006223
DLGDCY	-0.061944		-0.047033	-0.061944	-0.014911	0.047033
C	DLGY = 0.010506	DLGY = 0.013057	DLGY = 0.016990	-0.002551	-0.006484	-0.003933
DLGLF	0.364880	0.209072	0.327876	0.155808	0.037004	-0.118804
DLGIY	0.574263	0.756991	0.480981	-0.182728	0.093282	0.276010
DLGXY	0.142895	0.006223		0.136672	0.142895	0.006223
DLGPCY	0.037356		0.021651	0.037356	0.015705	-0.021651
C	DLGY = 0.014195	DLGY = 0.013057	DLGY = 0.013743	0.001138	0.000452	-0.000686
DLGLF	0.425542	0.209072	0.455848	0.216470	-0.030306	-0.246776
DLGIY	0.583922	0.756991	0.553323	-0.173069	0.030599	0.203668
DLGXY	-0.017328	0.006223		-0.023551	-0.017328	0.006223
DLGDFAY	-0.074007		-0.061938	-0.074007	-0.012069	0.061938
C	DLGY = 0.018927	DLGY = 0.013057	DLGY = 0.011591	0.005870	0.007336	0.001466
DLGLF	0.390806	0.209072	0.194442	0.181734	0.196364	0.014630
DLGIY	0.526757	0.756991	0.447466	-0.230234	0.079291	0.309525
DLGXY	0.028962	0.006223		0.022739	0.028962	0.006223
DLGTFAY	-0.310774		0.032393	-0.310774	-0.343167	-0.032393