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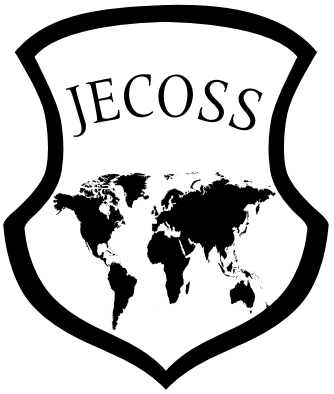

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Journal of Economic and Social Studies (JECOSS) aims to develop scientific knowledge in the areas that include, and are related to Economics, Business Administration, Public Administration, Political Studies, International Relations, Labor Economics and Industrial Relations, Econometry, Sociology and Psychology. As an international social sciences journal with interdisciplinary feature, it will set a ground to bring social science communities across disciplines identified above with a view for sharing information and debate. The journal publishes refereed articles and technical research notes that build on theory and contemporary scientific knowledge. Articles submitted to JECOSS will be peer-reviewed and expected to report previously unpublished scientific work. Submitted manuscripts should follow journal guidelines and should not be under consideration elsewhere.

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Refereed Articles

Channels of Monetary Transmission in the CIS: a Review[1]

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ABSTRACT

Twenty years have passed since the breakdown of the Soviet Union, and it is time to draw a concluding line for monetary policy efficiency in the Commonwealth of Independent States (CIS). We propose a comprehensive treatment of the subject for nine members of the CIS for the period of 2000-2009. Four transmission channels are investigated: interest rate channel, exchange rate channel, bank lending channel, and monetary channel. First, we design a Vector Auto Regression framework for each CIS member-state and investigate the short-run dynamics of the impact of each of the four transmission channels on domestic output and inflation. Second, we construct Auto Regressive Distributed Lag Models (ARDL) in order to study the country-wise efficiency of transmission channels in the long run. Finally, we employ a panel data fixed effects method to show how the CIS behaves as a region. Our short-run individual country analysis yields highly heterogeneous results. In the long run, however, it's apparent that broad monetary base (M2) is the most influential determinant of aggregate output. Inflation is affected the most by the refinancing rate and the flow of remittances. For both output and inflation, exchange rate plays a role of a supporting channel.

KEYWORDS
CIS; Monetary Transmission; VAR; ARDL Cointegration; Panel Data Analysis

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Introduction

The Channels of Monetary Transmission: an Overview

The proposition that policy interventions can affect macroeconomic behavior has become a leading line of thought among both researchers and practitioners. It is said that policy-makers are able to influence the flow of events in the real economy by targeting specific economic aggregates of interest. They achieve this by calibrating certain policy variables – those over which they have direct power and control. An intervention into the policy variable then, in theory, transmits its innovation into the real economy via a certain channel. While policy interventions and end-of-the-day effects on the real economy are largely known and measurable, the dynamic that occurs in the transmission channel is quite challenging to assess and to measure. The channels of monetary transmission are often called a "black box", suggesting that we know that monetary policy does influence real economic aggregates, but we don't always know how exactly (Bernanke and Gertler, 1995).

Policy makers typically have two major tools for economic control at their disposal: fiscal and monetary policy. Fiscal policy has never been consistenly viewed as a reliable variable for macroeconomic stabilization (Mishra, Montiel, and Spilimbergo, 2010). The fiscal channel often operates slowly, inefficiently, and usually aggrevates situations by acting as a pro-cyclical catalyst of any exogenous shock. It's not to say that the fiscal arm is completely useless, but fiscal policy must be almost universally accompanied by a credible and congruent stance from the national central bank. In short, much due to the imperfections associated with the fiscal dimension of policy making, monetary policy often takes on the lead role in economic stabilization and control.

It has become conventional to believe that monetary policy indeed affects lives of economic agents, although sometimes in an undirect way (Mishkin, 1996). The transmission channels through which monetary policy is conducted are often subtle and complex. While the aim has always been to target a real variable such as aggregate output or employment, the selection of the correct channel of monetary transmission in order to execute the desired plan is often impeded by the structural issues of a given economy's internal context. The story of the channels of monetary transmission, although without doubt built upon certain fundamental theoretical blocs, is an empirical issue. The workings of each monetary transmission channel

(and there are several of them) depend on a plethora of factors, ranging from the overall stage of macroeconomic development to the nuances of micro-structures of domestic financial markets (Checetti, 1999). Those factors differ tremendously in different regions and regimes of the world, thus necessisating differentiated and/or regional approaches to the study of monetary transmission channels.

Description of the Channels of Monetary Transmission

There are at least seven channels of monetary transmission that we can distinguish: interest rate channel, exchange rate channel, bank lending channel, balance sheet channel, asset price channel, monetary channel, and expectation channel. Empirically, it has been proven that the interest rate channel is the most dominant one for the case of developed economies with high-quality financial markets. In general, the interest channel is built on a Keynesian view that monetary policy can affect real costs of borrowing by changing nominal interest rates. Because prices are sticky and require time to adjust, nominal interest rate differentials transform into a corresponding adjustment in the real interest rate, which in turn affects spending and investment decisions in the economy.

Contrary to the interest rate channel, the exchange rate channel is usually viewed as the most important monetary transmission channel in developing countries (Coricelli, Egert, and MacDonald, 2005). By performing direct interventions into the foreign exchange market, monetary policy makers can achieve a desirable level of the exchange rate. The exchange rate will in turn affect aggregate production via the current account channel, by influencing the costs of imported and exported goods and their relative price-based trade competitiveness. In addition, in countries where domestic agents tend to hold debt denominated in foreign currency (as is the case with most developing nations), exchange rate fluctuations can have a substantial effect on the agents' debt portoflios and thus their overall balance sheets. Finally, particularly in developing and transmission economies, remittances (finances flowing from abroad) are usually the forgotten factor in the analysis of monetary transmission. In light of the inclusion of remittances into the picture, we believe that the exchange rate can carry an additional significant "wealth effect" on domestic aggregate demand via the flow of the typically dollar-denominated remitance.

The bank lending channel functions on the premise that there exists a pool of bank-dependent loan seekers, who wish to obtain funds for various investment

and consumption purposes. Monetary intervention can alter the the amount of bank reserves, thus changing the total amount of money that is available for banks to lend out. The restriction on the total amount of loanable funds in turn affects the potential of aggregate domestic investment and consumption. Of course, this channel operates with a strict assumption that borrowers do not have other sources of funding such as government bonds for bank credit (Walsh, 1998).

The balance sheet channel is an extension of the bank lending channel, in which we assume that borrowers, in order to obtain credit funds from the bank, are forced to pay an interest-rate premium over the risk-free rate. That risk premium is based on the borrowers' own balance sheet composition, such as a portfolio of securities on hand and real estate in possession (Mishkin, 2001). Monetary policy is able to affect the prices on the real estate market and/or the prices of stocks via open-market interventions targeting the interest rate. This way a monetary policy move can affect the borrower's collateral potential, and thus the overall quantity of credit that banks will be willing to lend out against that collateral. Also, from the point of view of Modigliani's life cycle hypothesis, monetary policy can affect aggregate domestic consumption through the prism of financial wealth of domestic constituents, which is in turn governed by the interest rate dynamics and arbitrage.

The asset price channel, similar in its logical foundations to the balance sheet channel, allows monetary policy makers to affect the total wealth of domestic economic agents. Agents, in turn, are able to adjust their purchasing and saving decisions according to their changing wealth holdings. This idea can be applied to firm-level investment and to the real estate market. The asset price channel matters only if the non-bank financial sector is considerably developed, and if market financing is reasonably important on the macro-scale (Dabla-Norris and Floerkemeier, 2006).

The monetary channel is not a traditional inclusion into the discussion on channels of monetary transmission. We found that there was a gap in the classifications of the channels since neither the monetary base nor the domestic wage level are consistently included into the analysis. The former aggregate is usually viewed as an indirect measure of monetary policy. National banks rarely target monetary base as an end goal, but rather tweak money supply in order to achieve the desired break-even interest rate via open-market operations. Still, broad money should be perceived as an indirect predictor of real economy variables, or at least theoretically. Whether this is the case empirically for the CIS region we will discover later in the paper.

Wages, or more concretely – the growth rate of wages – represents the cost, or the supply side of the nominal economy. We acknowledge the fact that neither the minimum wage nor the nation-wise growth rate of the wages is typically in the hands of monetary policy makers. However, it's important to keep wages in the list of potential determinants of inflation and aggregate output more as a representative measure of the supply side of the economy, something which will make our analysis more complete.

Wages, broad monetary base, and remittances are the variables not always considered in empirical investigations of the monetary transmission channels. We believe that these three variables will add some originality in the perspective on the traditional approach to monetary transmission literature. Overall, we will analyze 4 channels of monetary transmission in this study: exchange rate channel, interest rate channel, bank lending channel, and the monetary channel. Detailed description of the variables used in each channel is available in Section 3.1.

The Case of CIS

After the Soviet Union collapsed in the early 1990s, hundreds of millions of people were left very much in chaos and disorder on all levels of governance. In order to preserve the unity that existed in the Soviet times, the Commonwealth of Independent States was established by Russia, Ukraine, and Belarus, and the supranational organization now includes 10 official and 1 unofficial member. It is still unclear whether the CIS plays any effective role as a governing body on a daily basis and carries any significant impact on legislation and/or polit-economical directions of its constituents. However, member-states of this group do resemble each other in their dynamic of development and nation-building in the past 20 or so years, and thus it has become common to view CIS as a distinct economic unit.

One of the traits that is shared by most if not all of the CIS countries is the fragility of legislation and the rule of law, the decease that has plagued the region for much of its independent existence. Our interest lies in the economic and financial aspects of legal governance, and on that front, although much has indeed been accomplished (like the de juro sovereignty of the national banks), incomplete and outdated legal codes coupled with inefficient execution on the low and medium administrative levels contribute to an economic and financial environment without a solid, complete legal foundation.

Furthermore, with the imperfections in legal governance of the financial sectors of CIS states naturally comes the problem of the large informal sectors of the economy. Corruption and the shadow economy are a problem for the CIS, but to be fair that is an ongoing issue for all developing economies and countries in transition of this world. With the presense of a large nformal economy, formal sources of funding like the ones which will be discussed in this paper lose their marginal superiority over the informal routes. As a result, channels of monetary transmission can not possible measure (at least not fully) the impact that the informal economy has on real macroeconomic aggreagates. This implies that some if not most of transmission channels are not operational in the CIS due to the presence of alternative and unregistered sources of funding. We can also not discard the importance of remittances that for some of the CIS member states are in the highest ranks in the world, such as Tajikistan and Armenia. Remittances are not necessarily illegal, but they do represent a somewhat informal channel of financing, and they are typically denominated in foreign currencies.

On the monetary front, CIS member-states almost uniformally confronted years of very high inflation (and some countries exhibited textbook examples of hyperinflation) following the Soviet Union breakdown. Inflation came as a result of two dominant factors. First, national governments in the CIS region were deeply in debt, with the obligations spiralling out of control. In order to finance the debt, national banks were required to effectively print more money and buy out those government debt obligations. This eventually debased national currencies, forcing some states to adobt fixed-exchange or semi-fixed currency regimes; either with respect to the American Dollar or to the Russian Ruble. The second factor which caused hyperinflation in the CIS was backward wage indexation which was unchanged since the Soviet era (Botric and Cota, 2006). Extremely rapid wage elevation and a poor system of managing that growth led to exploding incomes and opulence of money, which at the end of the day carried less and less marginal value. Hyperinflation, by and large, is an issue of the past for members of the CIS. However, certain countries like Belarus still have dangerously high inflation rates, ranging from 20 to 30% annualized.

Consequently, following the collapse of trust in national currencies due to hyperinflation and relative debasement, populations in the CIS began using foreign currencies such as the Dollar in their everyday operations. The famous notion of "dollarization" paralyzed monetary policy makers in the region, who were not able to effectively perform their duties due to the enormously large amount of foreign currency in domestic circulation. Dollarization is still a relevant problem for some

of the CIS members, however due to managed exchange rate regimes, monetary governing bodies have been considerably successful with stabilizing the system and enforcing monetary policy at least on some of the available channels.

Perhaps the most urgent of all problems for today that CIS countries are facing is the development of financial markets and the financial sector in general. On many layers, financial sector in the CIS is defficient and lagging behind not just the industrialzed states but also the developing countries in Eastern-Europe and Asia. First, the overall infrastructure of financial intermediation is in need of reform and strengthening. The overall levels of monetization and financial intermediation are low, which causes aggregate demand in CIS states to respond little to credit or deposit rates. Second, the region is very high in terms of quantities of foreign currency-denominated loans to the private sector. Thus, financing decisions are not affected to large extent by the interventions into domestic interest rate markets. Third, the banking sectors in almost all CIS states suffer from low levels of competion (consolidation of leading national commercial banks into groups of "Top-5" or alike).

It has also become common for many CIS commercial banks, and many economic agents in general for that matter, to obtain capital through external financing, thus leaving them indifirrent to the performance of domestic monetary and financial indicators. Further, the nonbank financial sectors are practically non-existant for most CIS states. Absense of serious stock and debt markets, mortgage markets, insurance industries, hampers the the probability of either the asset price channel or the balance sheet channel to work appropriately. In addition, most if not all CIS countries must still address the issue of capital account liberalization, since capital mobility in certain countries of the region is considerably low (Jamilov, 2012). This is partially explained by active policies to prevent currency depreciations in the region (Keller, Richardson, 2003). Finally, qualitatively speaking, poor human capital expertise on the fronts of risk management, credit risk assessment, and accounting further influence the workings of monetary transmission channels in quite a negative way.

All in all, CIS is a region in transmission with its member-states showing signs of great resemblence, both in terms of historical development, and also in the types of problems that they are facing nowadays. Incomplete legislative foundations, informal sectors and shadow economies, dollarization, noncompetitiveness and consolidation in the banking sectors, capital account immobility, underdevelopment of the capital markets, and a growing need for transparent governance are among

the primary challenges for the CIS now and going forward. While analyzing the issue of monetary policy transmission in the CIS, we must look at the issue through the prism of the region's peculiarites which were just mentioned. In light of these factors, we expect that the channels that we will measure (interest rate, exchange rate, bank lending, and monetary) will not always behave in a way that theory or evidence from industrialized states would predict.

Indeed there have been many papers, both theoretical and empirical in nature, in the field of monetary policy transmission. There have been also some studies, both on individual country-basis and on the CIS as a group, on the channels of monetary transmission for the case of CIS. However, the originality of this paper is that nobody, to the best of our knowledge, has performed such a comprehensive country-wise and regional analysis employing 3 distinct econometric methodologies. We will present the behavior of 4 channels of monetary transmission for 9 member states of the CIS over the period of 2000-2009. We will analyze the dynamics of monetary transmission channels in the short run using a VAR framework and in the long run using an ARDL approach to cointegration. And we will also provide evidence on how the CIS performs as a distinct unit via fixed effects panel-data analysis. In the end we will highlight the best and the worst performing channels of monetary transmission, and provide policy-relevant recommendations and conclusions.

The rest of the paper is structured as follows. In Section 2 we provide a review on the channels of monetary transmission literature. Section 3 describes the data and the countries used in our analysis, and lays out the econometric methods which were employed. Section 4 reports the short-run and long-run individual country as well as the CIS panel data results. Section 5 offers a discussion of our findings. Finally, Section 6 concludes.

Literature Review

Boivin, Kiley, and Mishkin (2011) suggest to categorize the monetary transmission channels into neoclassical and non-neoclassical groups. To the former category belongs the path that the interest rate takes to the real economy through investment and consumption. The non-neoclassical channels function through the change in the supply of credit and how the bank balance sheets respond to credit innovations. The relative efficiency of these two channels depends on the degree of development of the domestic financial system.

Mishra, Montiel, and Spilimbergo (2010) provide arguments in favor of the bank lending channel as the prime route for monetary policymaking. They argue that apart from the bank lending channel, the interest rate channel, the asset channel, and the exchange rate channel are limited in their scope and ability by a set of negative factors: absense of well-functioning markets for fixed-income securities and equities, weak real estate markets, heavy central bank intervention in the foreign exchange markets, and by the very imperfect connections with the international capital markets. See (Keller, Richardson, 2003) for the discussion of exchange rate regimes in the CIS economies. In addition to the bank lending channel, the balance sheet channel is predicted to operate as a financial accelerator through the increased external finance premium.

Moreover, the bank lending channel is often regarded as the key channel of monetary transmission (Cetorelli and Godlberg, 2008). Presumably because banking is always among the largest non-energy sources of growth generation in developing economies, and also because banks are still the prime channel for obtaining funds. The channel tends to work differently for large and for small banks, with the difference typically rationalized by the higher substitutability of deposits as sources of funding for the larger institutions. Small banks, on the other hand, have a smaller chance of obtaining funds through alternative means. Thus, the bank lending channel operates in a discriminative manner with respect to size, balance-sheet wise. (Kashyap and Stein, 1995, 2000). With respect to the case of CIS, the a priori expectation on the working of the bank lending channel is ambivalent: on hand hand, the banking sectors in most CIS countries are considerably consolidated, so this particular channel of transmission should not work because of the presense of larger banks. In the meantime, it's improbable that many banks in the CIS are global in nature, with most institutions holding assets either domestically or outside the country but still relativel close to the home region. The lack of a global nature of CIS banks therefore suggests that the bank lending channel should be operational (Cetorelli and Goldberg, 2008).

Further with regards to the bank lending channel, the path from monetary policy aggregates to the real economy lies through the availability and cost of bank credit. If the link between monetary policy interventions and the availability and the cost of credit is low, then the banking sector is not competitive enough and the real cost of bank lending is actually very high due to a poor institutional environment. If the link between the availability and the cost of credit and the real economy is low then the formal sector of the economy is too small. Note that both bank sector non-competitiveness and the dominance of the informal financial sector are two factors

very much expected in the case of CIS. Therefore, it's possible that the pass-through from monetary policy actions onto the real economy will be weak on both paths.

Kabundi and Nonhlanhla (2011) provide interesting evidence on the importance of the channel of confidence in the case of monetary transmission in South Africa. They built a Factor-Augmented Vector Auto Regression (FAVAR) framework and concluded that confidence in addition to the interest rate channel play the biggest role of explaining the real economy and prices. Also for South Africa, Ncube and Ndou (2011) claim that the wealth effect and the credit channel should be targeted for conducting anti-inflation policies.

Channels of monetary transmission should not be just operational on a technical side. They must also be controled by a credible monetary policy center. Mohanty and Turner (2008) argue that credibility and credible monetary policy frameworks are essential in strengthening the efficiency of the interest rate channel of monetary policy transmission in the emerging market economies (EMEs). Mukherjee and Bhattacharya (2011) conclude that for the case of EMEs, the interest rate channel impacts private consumption and investment. They also decomposed their results for the scenarios of with and without inflation targeting, and proved that presense of the inflation targeting regime does not alter the main conclusion.

Another work for the EMEs highlights the importance of having a developed domestic financial system (Bhattacharya, 2011). Weakness in the system coupled with a large informal sector in the economy leads to weak performance of the traditional channels of monetary transmission. In this paper, the most powerful transmission channel was found to be the exchange rate channel, while the interest rates had no significant impact on aggregate demand.

Dollarization in the context of monetary policy has been addressed in Acosta-Ormaechea and Coble (2011). They argue that in Chile and New Zealand the traditional interest rate channel is more important, while in Peru and Uruguay the most significant channel is the exchange rate channel. Horvath and Maino (2006) believe that dollarization has a negative effect on the efficiency of the independent interest rate channel of monetary transmission.

Dollarization, as discussed in the previous section, is also a serious issue for the countries of the CIS. Korhonen and Wachtel (2005) claim that domestic prices reflect the changes in the exchange rate very quickly; in other words, the speed of adjustment to long-run equilibrium is fairly high. They argue that this signals the

high level of dollarization in most CIS countries. See (Balino, Bennet, Borensztein, 1999) and (Sahay, Vegh, 1995) for the discussion of monetary policy in a highly-dollarized economies.

Mohanty (2012) provide an extensive treatment of the monetary transmission channels for the case of India, but derive conclusions that are applicable to a much general pool of countries. Namely, they argue that deregulation of interest rates, government-led auction-based market borrowing programme, development of the short-term money markets, reduction in statutory reserve requirements, among other reforms have contributed to the development of the interest rate based indicrect instrument for monetary policy management.

Isakova (2008) conducted a VAR analysis for three Central Asian countries (Kazakhstan, Kyrgyz Republic, and Tajikistan). Results of this study show that policy rates passed through to money market interest rates without much trouble. However, inflation and aggregate output are not significantly affected by the innovations in the policy rates. They conclude that the bank lending channel is weak in the case of these three countries.

Dabla-Norris and Dloerkermeier (2006) analyzed the interest rate pass-through in Armenia and concluded that monetary policy rates transmitted well into the market interest rates. However, the market rates did not affect the real economy or price dynamics. Also for the case of Armenia, but with far-reaching implications for literature in general, Bordon and Weber (2010) decomposed the time series into two regimes, one with a highly dollarized economy and the other with a low degree of dollarization. They have demonstrated that dollarization negatively affects the interest rate channel of monetary policy transmission, since policy rates did a far greater job of affecting inflation and output in a low-dollarization regime. Thus, for the traditional monetary transmission channels to work, it's possible that the countries of the CIS will have to de-deollarize their domestic economies first.

Bakradze and Billmeier (2007) and Samkharadze (2008) show that aggregate output does not respond well to the innovations in the monetary policy variables in the case of Georgia. Similarly, inflation is also not affected by monetary policy shocks. The bank lending channel appears to be functioning in the correct manner, however bank interest rates do not impact aggregate output in a statistically significant way.

Agayev (2011) conducted a panel data analysis for 10 CIS countries in order to determine the factors which explain the region's inflation dynamics. They found that

wages and exchange rate innovations do the best job of explaining inflation in the CIS in the long run. In the short run, however, changes in the bottom-line monetary base is the best explanating factor of price movements. Overall, the exchange rate and the monetary channels seemed to be the best at predicting inflation in the CIS.

With regards to methodologies used in monetary policy transmission studies, most have resolved to the traditional VAR framework (Sims, 1980; Blanchard and Quah, 1989; Bernanke and Blinder, 1992; Cristiano and Eichenbaum, 1992). Others have used SVAR approaches (Aslanidi, 2007), and panel data structures (Agayev, 2011). A relatively novel method of studying the pass-through of monetary policy channels involves an ARDL approach to cointegration (Crespo-Cuaresma et.al., 2004). Some researches devised structural, DSGE-like models explaining macro-dynamics of countries involving numerous policy and market variables (Golinelli and Rovelli, 2002). But all in all, VAR analysis seems to be the most preferred method for short-run analysis, Vector Error Correction – VECM (if the variables are non-stationary) – for long-run investigations, ARDL for the case of variable stationarity (which is common for small samples), and panel fixed and random effects for a look at a group of several countries.

Mishkin (1996) presented an exhaustive explanation of all existing channels of monetary transmission. Egert and MacDonald (2006) provided an excellent literature review on many empirical studies on monetary transmission in developing economies.

Data Description and Econometric Methodology

Data Description

Annual data for the period of 2000-2009 was used for 9 countries of the CIS. Our data selection has been driven by the availability of reliable information for some members of the region. The data set for Armenia, Azerbaijan, Belarus, Moldova, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Ukraine was compiled. Turkmenistan and Uzbekistan have been omitted due to data non-existence. For interpretation purposes, most series have been transformed using a natural

logarithm. Overall, data was obtained from such sources as CIS Stats, Organization for Economic Cooperation and Development (OECD), The World Bank, St. Louis Federal Reserve Bank, Statistical Offices and National Banks of the member states of the CIS. The variables were chosen with respect to their theoretical belonging to a particular channel of monetary transmission. For example, the refinance rate is part of the interest rate channel analysis, while remittances are included into the exchange rate channel discussion. Consult Table 1 below for a thorough description of the series used in this paper.

Table 1. Data Sources and Description

Indicator	Source and Description	Transmission Channel
Consumer Price Index (CPI)	Source: OECD, National Bureaus of Statistics; Format: Nominal, Annual Average; in %	Macro Variable
Gross Domestic Product (GDP)	Source: CIS Stats; Format: Nominal, Domestic Currency; LN Transformation	Macro Variable
Refinancing Rate (RR)	Source: OECD, National Central Banks; Format: 6-month Rates, End-Year; in %	Interest Rate Channel
Federal Funds Rate (FFR)	Source: St. Louis Federal Reserve Bank Online Database; Format: Effective Federal Funds Rate, nominal, End-Year; in %	Interest Rate Channel (Exogenous)
Lending Rate (LR)	Source: OECD, National Central Banks; Format: End-Year, Average Lending Rate; in %	Bank Lending Channel
Deposit Rate (DR)	Source: OECD, National Central Banks; Format: End-Year, Average Lending Rate; in %	Bank Lending Channel
Wage Growth Rate (WG)	Source: OECD, National Central Banks; Format: Gross Average Monthly Earnings, Percent Change; in %	Monetary Channel
Monetary Base (M2)	Source: CIS Stats; Format: Nominal, End-of-year, LN Transformation	Monetary Channel
Exchange Rate (ER)	Source: OECD; Format: Domestic Currency per 1 US Dollar, End-of-Year, LN Transformation	Exchange Rate Channel
Remittances (REM)	Source: World Bank Remittances Factbook 2008, 2011; Format: Total Inward Remittance Flow, in USD, Nominal, LN Transformation	Exchange Rate Channel (Exogenous)
Oil Prices (OILP)	Source: St. Louis Federal Reserve Bank Online Database; Format: Spot price per barrel, in USD, Annual-Average	Exchange Rate Channel (Exogenous)

Econometric Methodology

Short-Run Analysis Using VAR

As noted in the previous section, we will use a VAR framework to demonstrate the short-dynamics of the responses of our macroeconomic variables (CPI and GDP) to innovations in the various policy variables.

A VAR in the level form will be estimated ala Jamilov (2011). The VAR system in this paper will take the following form:

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \cdots + A_n Z_{t-n} + B X_t + \varepsilon_t$$

where, Z is a vector of n variables, X – vector of deterministic variables; ε – vector of innovations. For example, if we want to build a VAR model for the interest rate channel of Ukraine, we will use GDP, CPI, and the refinancing rate of Ukraine as endogenous variables, with the addition of the federal funds rate as a deterministic exogenous variable, plus the constant and the error term. In similar fashion, we will build VARs for all 9 countries and for each of the 4 channels of monetary transmission.

The preliminary VARs are required to determine the correct number of lags in the model, to ensure that there is no autocorrelation in the error terms, and that the residuals follow the pattern of a normal distribution. With the right number of lags, we construct the final VAR model in order to get impulse response functions and variance decompositions of the variables of interest.

In the preliminary stage, a set of unit-root tests must be carried out to ensure that variables in our models have unit roots. Should a variable have a unit root in the level form, stationarity is obtained usually by first-differencing. If variables are non-stationary, then we will achieve a long-run equilibrating equation by constructing a traditional Vector Error Correction model (VEC). Otherwise, we will have to adopt an Auto Regressive Distributed Lag model (ARDL) approach to cointegration, since this method doesn't require the variables to be non-stationary in level form.

As a brief theoretical note, a one-time movement in a policy variable will affect not only the real economic aggregates but also the future values of the policy variables

via the so-called feedback effect. It is important to account for these feedback effects if we want to estimate the monetary transmission models correctly. Therefore, an econometric method of vector auto regressions (VAR), not a conventional Ordinary Least Squares (OLS) framework, should be employed. A VAR model and impulse response functions would take the feedback effects into account.

Overall, we have 9 member-states of the CIS, 4 channels of monetary transmission, with 2 macro variables (CPI and GDP) and at least 1 and sometimes more policy variables in every channel. We will also use the federal funds rate, oil prices, and remittance flows as exogenous variables in certain VAR set-ups. In total, we have run 36 VAR models in order to obtain short-run coefficients for each country and for each channel of monetary transmission.

Long-Run Analysis Using ARDL

There are several reasons why we have decided to use the ARDL approach to cointegration (developed by Pesaran et al., 2001) as opposed to the more common VECM to study the long-run behavior of monetary policy transmission channels. First, this method solves the problem of variable endogeneity and the inability to test hypotheses on the estimated coefficients. Second, ARDL is far more superior than multivariate coointegration methods in the case of small samples, which is important in our case (Narayan, 2005). Second, ARDL models do not require the regressors to be non-stationary, and most of our variables will be indeed stationary in level form.

We now present how one of our channels of monetary transmission (we will use the example of the interest rate channel) would be represented in the ARDL form:

$$\ln GDP_{i,t} = \alpha_0 + \sum_{j=1}^{m} \alpha_{1i} \Delta \ln GDP_{i,t-j} + \sum_{j=0}^{m} \alpha_{2i} \Delta RR_{i,t-j} + \sum_{j=0}^{m} \alpha_{3i} \Delta FFR_{t-j} + \alpha_4 \ln GDP_{i,t-1} + \alpha_5 RR_{d,t-1} + \alpha_6 FFR_{f,t-1} + \nu_t \quad (2)$$

where m means lag length, $\ln GDP_{i,t}$ is the ln-transformed GDP of country i at time t, RR is the refinancing rate of country i and time t, and FFR is the US Federal Funds Rate. Similarly, we could have built an ARDL representation for CPI with the RR and FFR as model variables. Altogether, we will build 2 long-run models for each macro variable (GDP and CPI), for each country (9 CIS member states), for each channel of monetary transmission (4 channels). Overall, we have run 72

ARDL regressions in order to achieve long-run coefficients for each country and for each channel of monetary transmission.

As noted above, it is not necessary to test our variables for unit root processes. Instead, we can proceed with testing for cointegration. The ARDL approach achieves this by presenting an F-statistic which tests the null hypothesis of no cointegration (H_0: $b_5=b_6=b_7=b_8=0$) against the alternative hypothesis (H_1: $b_5\neq0$, $b_6\neq0$, $b_7\neq0$, $b_8\neq0$). For every significance level there are two sets of critical values. If the F-statistic exceeds the upper-bound critical value, then the null hypothesis is rejected. If the F-statistic is below the lower-bound, then the null is accepted and we have no cointegration. Finally, if the F-statistic is between the two bounds then the test has no conclusive result. There is another way of testing for cointegration, which is looking at the error correction term in the ARDL's short-run representation (Kremers et al., 1992). If the error correction term is statistically significant and negative, it implies that the variables are quick on approaching their long-run stabilizing conditions.

Panel-Data Analysis Using Panel Fixed Effects

Apart from attempting to investigate the channels of monetary transmission on individual-country basis, we have also devised a panel set-up for the period of 2000-2009, consisting of our 9 member-states of the CIS. We wish to find out how the CIS performs as a region with regards to monetary transmission. First, we have to test our panel data for the presence of a unit root. We will achieve this by running the Levin, Lin, and Chu (LLC, 2002) panel unit root test. This test is different from the individual unit root testing that we proposed in section 3.2.1. on individual-country VAR modeling.

If variables in our panel set-up are non-stationary, then we will have to resort to advanced panel cointegration techniques for non-stationary data. Otherwise, we will employ a long-run panel fixed-effects model of the following form:

$$\ln GDP_{it} = \alpha_{it} + \beta_{1,it} RR_{it} + \beta_{2,it} LR_{it} + \beta_{3,it} DR_{it} + \beta_{4,it} WG_{it} + \beta_{5,it} \ln M2_{it} + \beta_{6,it} \ln ER_{it} + \beta_{7,it} \ln REM_{it} + u_{it} \quad (3)$$

Consider that in a similar fashion we will devise the panel fixed-effects regression for inflation, with CPI as a dependent variable. Note that for the regression of CPI we will also add CPI(-1) – the lag of inflation, which will represent inflation inertia, to the list of independent variables. Overall, there will be 2 panel fixed effects regressions, for each of the two macroeconomic variables (GDP and CPI), which will determine which of the variables is best at explaining inflation and output in the CIS.

Results

Short-run Results for Individual Countries

We begin to present our short-run individual country results based on the VAR models. All the impulse response functions are available in the Appendix. Note that in our VAR set-up, the Federal Funds Rate (FFR), oil price (OILP), and remittances (REM) are treated as purely exogenous. Thus, an IRF representation for them will not be possible. Also consider that our small sample size limits the interpretational importance of the 5% statistical significance. Some of the responses will indeed be significant for several periods, and it will add more robustness for inference, but we are interested more in the general direction of each response and whether a given country will demonstrate any systematic evidence for efficiency in a particular transmission channel

Interest Rate Channel

Short-run individual country evidence for the interest rate channel is reported in the Figures 1 through 9. The primary policy variable for this channel is the refinancing rate. The US federal funds rate was taken as an exogenous variable. GDP and CPI are the macroeconomic aggregates by default.

The response of aggregate output to innovations in the refinancing rate in the case of Armenia is strongly negative and statistically significant up to the 6th period (Figure 1). Armenian GDP declines following a one standard deviation increase in the country's refinancing rate, which suggests that the interest rate channel is operational. The effect of the refinancing rate on inflation is almost negligible and not significant. For Azerbaijan, both GDP and CPI do not seem to be responding in a noticeable manner to refinancing rate innovations (Figure 2). The same conclusion could be applied to Belarus: there is no evidence that the interest rate channel is effective (Figure 3).

For Kazakhstan, the path of the response of both output and prices to the refinancing rate is highly unstable, although GDP seems to demonstrate the presence of a price effect in the short run as output rises slightly, but then falls until its long-run

equilibrium below the pre-innovation level (Figure 4). Again, the dynamic is too unstable. For Kyrgyzstan, inflation shows behavior similar to the case of Kazakh CPI: unstable and insignificant (Figure 5). However, output seems to be increasing following a positive innovation in the refinancing rate, which is surprising from the theoretical point of view.

CPI of Moldova has a significant positive response to the refinancing rate up to the 2nd period (Figure 6). Moldavian GDP, similarly to the case of Kazakh GDP, increases slightly following an intervention into the refinancing rate market. For Russia, although the effect is not significant, the refinancing rate carries a theoretically correct effect on aggregate output, since it declines when the interest rate is raised (Figure 7). Russian CPI movement is correlated with the direction of refinancing rate innovations, although in a very insignificant manner. For Tajikistan and Ukraine, we cannot detect any noticeable trend in the response of either output or inflation to the refinancing rate (Figure 8 and 9).

Overall, only for the cases of Armenia and Russia, domestic output seems to be determined by fluctuations in the refinancing rate. Inflation in none of the CIS states, according to our calculations, can be managed via the interest rate channel.

Figure 1. Response of GDP and CPI to Refinancing Rate – Armenia

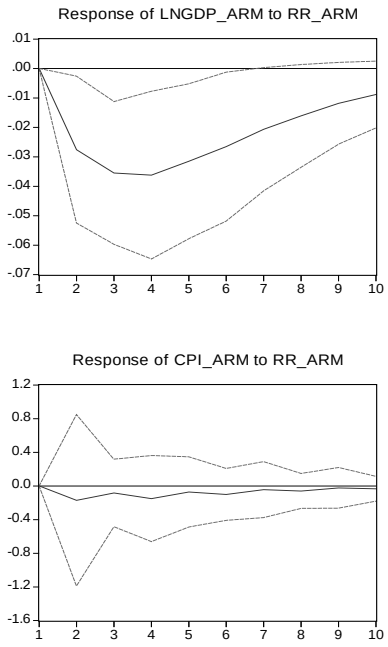


Figure 2. Response of GDP and CPI to Refinancing Rate – Azerbaijan

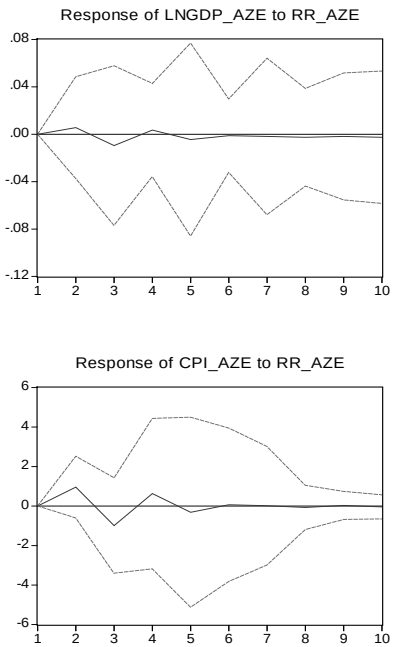


Figure 3. Response of GDP and CPI to Refinancing Rate – Belarus

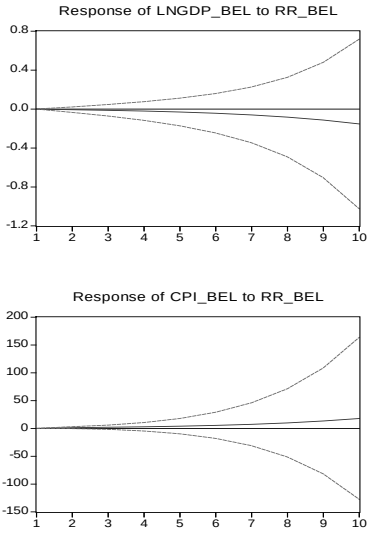


Figure 4. Response of GDP and CPI to Refinancing Rate – Kazakhstan

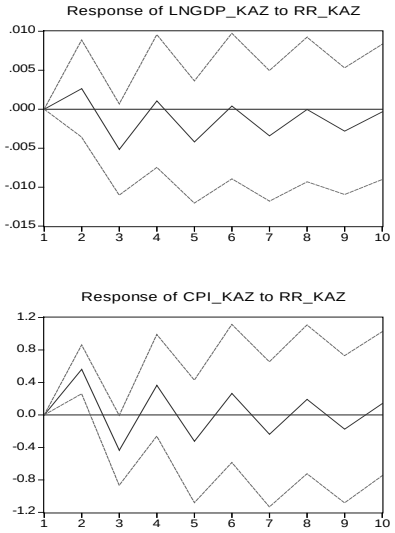


Figure 5. Response of GDP and CPI to Refinancing Rate – Kyrgyzstan

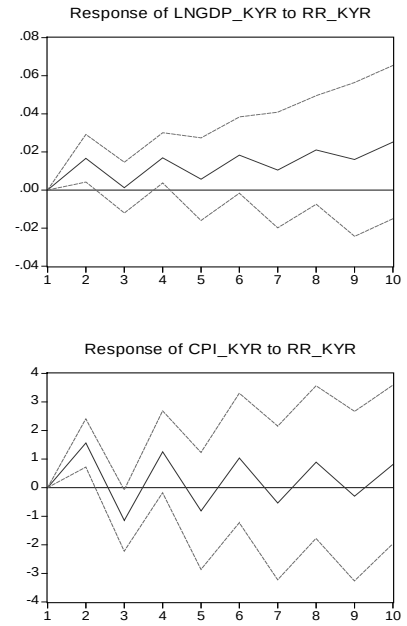


Figure 6. Response of GDP and CPI to Refinancing Rate – Moldova

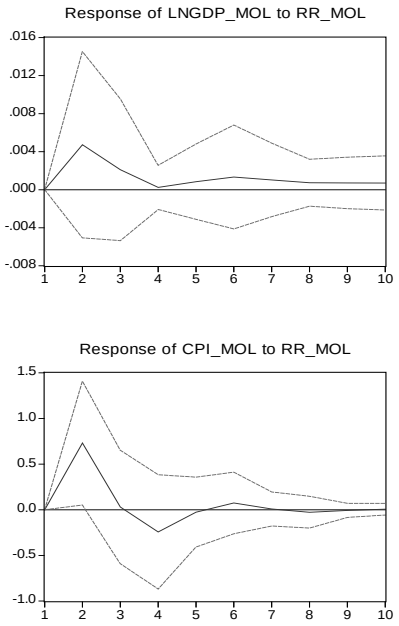


Figure 7. Response of GDP and CPI to Refinancing Rate – Russia

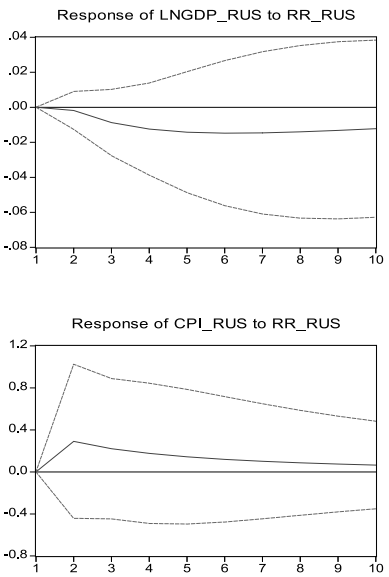


Figure 8. Response of GDP and CPI to Refinancing Rate – Tajikistan

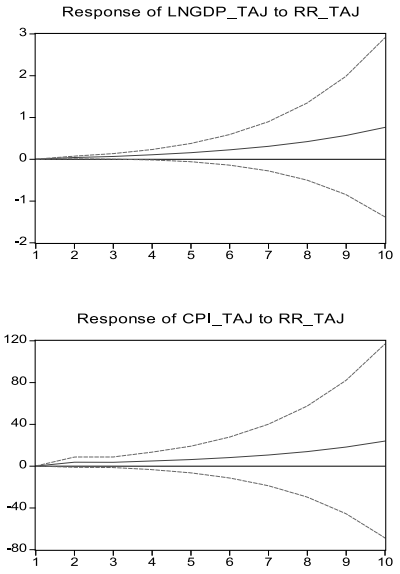
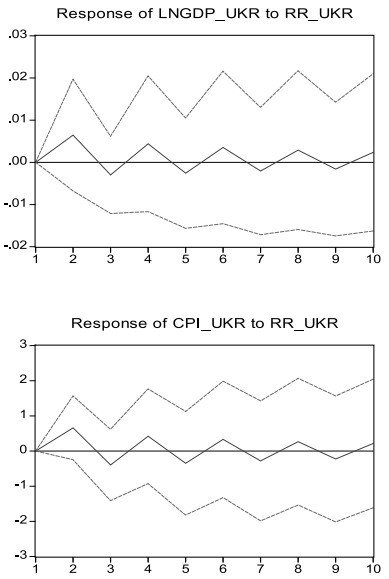


Figure 9. Response of GDP and CPI to Refinancing Rate – Ukraine



Exchange Rate Channel

Short-run individual country results for the exchange rate channel are presented in the Figures 10 through 18. The primary policy variable for this channel is the exchange rate between the national currency and the US dollar. Remittances and price of oil were selected as exogenous variables. Again, GDP and CPI are indicators of the broad macro-economy.

Armenian GDP responds positively and significantly to an innovation in the national exchange rate up to the 5th period (Figure 10). Inflation on the other hand seems to be unresponsive to the exchange rate fluctuations. In case of Azerbaijan, aggregate output rises as the exchange rate depreciates for one standard deviation; domestic prices do not react in any noticeable way (Figure 11).

Belarusian domestic aggregate output shows a slight short-run hike following an exchange rate devaluation, while inflation suffers a temporary decline (Figure 12). Both variables return to their pre-depreciation levels by the 4th period. GDP and CPI of Kazakhstan are not responsive to the country's exchange rate movements (Figure 13). Domestic output of Kyrgyzstan is equally unaffected by the ER innovations; the Kyrgyz inflation, however, rises slightly due to one standard deviation depreciation (Figure 14).

In the case of Moldova, both aggregate output and inflation exhibit a significant positive short-run response to a depreciation of the Leu (Figure 15). Interestingly, after several periods inflation declines and even falls below the pre-devaluation level. GDP of Russia increases following a currency devaluation, and the effect is significant for 3 periods. Russian CPI falls in response to the depreciation, also in a significant way up to the 2nd period (Figure 16).

Tajikistani GDP does not seem to be responsive to domestic exchange rate innovations (Figure 17). Inflation, however, has a significant negative short-run response to a one standard deviation fall in value of the somoni. In the long run, the exchange rate remains practically unchanged and returns to the initial equilibrium. For Ukraine, neither GDP nor CPI react in any substantial way to interventions into the exchange rate.

Overall, the exchange rate channel of monetary transmission, according to our calculations, is visibly operational in Armenia, Azerbaijan, and Moldova. Certain degrees of effectiveness are observed in Russia and Belarus.

Figure 10. Response of GDP and CPI to Exchange Rate – Armenia

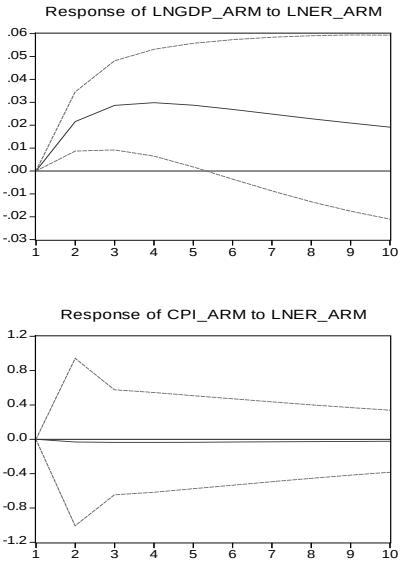


Figure 11. Response of GDP and CPI to Exchange Rate – Azerbaijan

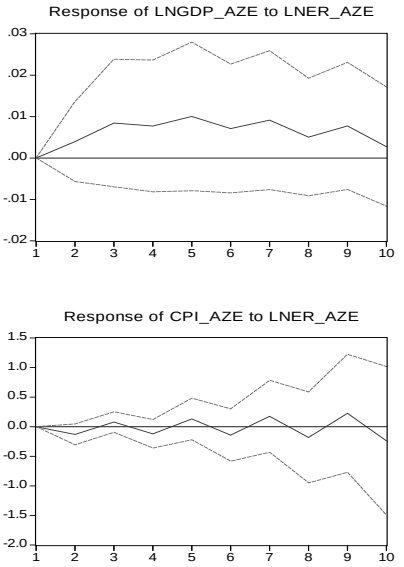


Figure 12. Response of GDP and CPI to Exchange Rate – Belarus

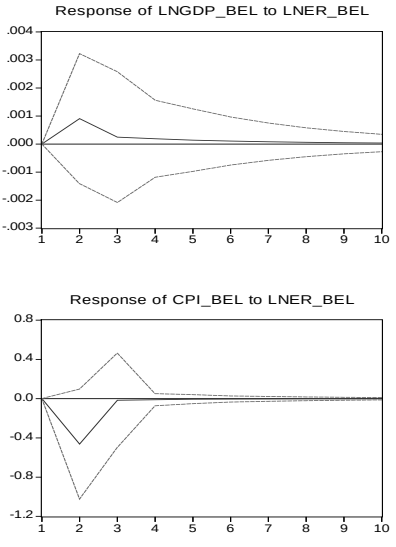


Figure 13. Response of GDP and CPI to Exchange Rate – Kazakhstan

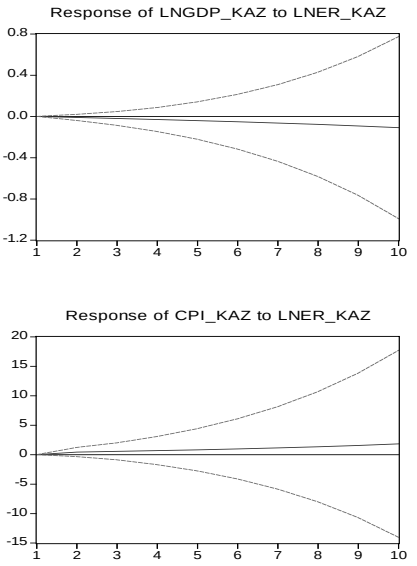


Figure 14. Response of GDP and CPI to Exchange Rate – Kyrgyzstan

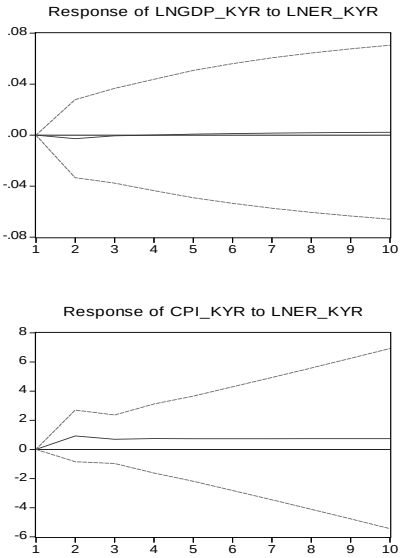


Figure 15. Response of GDP and CPI to Exchange Rate – Moldova

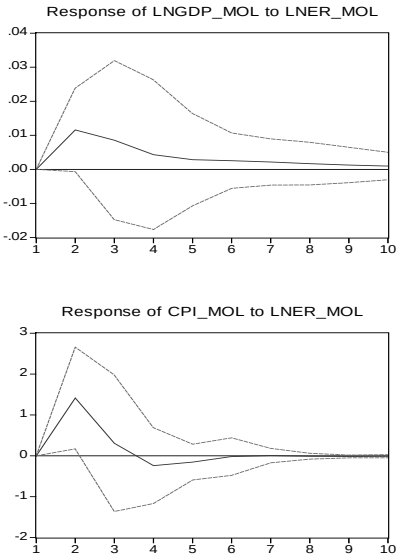


Figure 16. Response of GDP and CPI to Exchange Rate – Russia

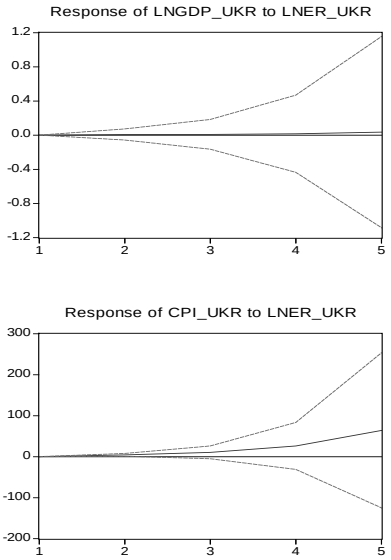


Figure 17. Response of GDP and CPI to Exchange Rate – Tajikistan

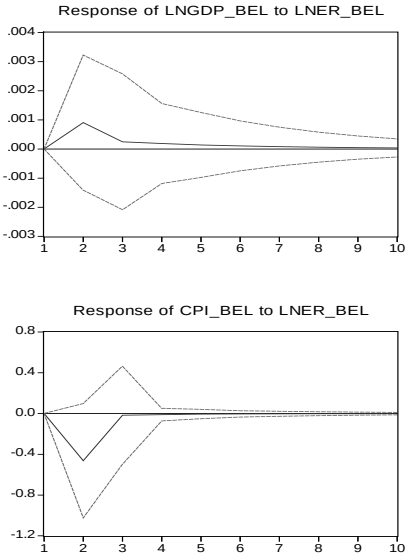
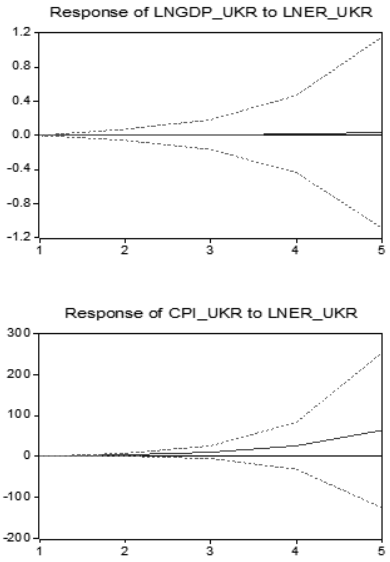


Figure 18. Response of GDP and CPI to Exchange Rate – Ukraine



Monetary Channel

Short-run individual country results for the monetary channel are available in the Appendix under Figures 19 through 27. GDP and CPI are the default indicators of domestic demand and inflation respectively. M2 and WG are the policy variables of the domestic supply of broad money and the average annualized growth rate of nominal wages, respectively.

Armenian GDP shows a positive response to an increase in wages, but not to M2. The effect is not statistically significant though (Figure 19). Inflation does not seem to be affected by WG, while for M2 the dynamic is too unstable and inconclusive, although there is a statistically significant price spike in the short run following the increase in the monetary base. For the case of Azerbaijan, neither wages nor money seem to be effective at influencing GDP or inflation (Figure 20).

Gross Domestic Product of Belarus displays a significant positive response up to the 4th period to an increase in M2 (Figure 21). M2 has a negative but a non-significant effect on inflation. With regards to wages, a one standard deviation increase in WG has a stably negative effect on output but a positive short-run effect on inflation.

Both effects are insignificant. For Kazakhstan, domestic output and inflation both increase in the short run due to an impulse of wage growth (Figure 22). Broad money supply has no effect on either Kazakh GDP or prices.

Wages carry a positive, although insignificant, impact on Kyrgyz GDP; the response of inflation is too unstable (Figure 23). M2 has no effect whatsoever on output or inflation. In the case of Moldova, an increase in M2 has a light positive effect on domestic production and no seemingly meaningful effect on prices (Figure 24). Wages cause no response from the dynamic of Moldavian GDP, although they initiate a decline in inflation in the short run and then a slight recovery. Neither effect is statistically significant, even at the 10% level.

For Russia, broad money does a poor job of affecting either GDP or CPI (Figure 25). Wages, on the other hand, have a significant positive effect on output in the short run (peculiar form of a price effect), which is followed by a long-run decline. Inflation follows a similar path: rising in the short run due to an increase in nominal wage growth, and falling after several periods. Tajikistani WG has a negative effect on inflation and on GDP. In the case of inflation, the impact is particularly strong and statistically significant for 2 periods. Both GDP and M2 increase slightly due to an expansion in the monetary base, although in an insignificant manner (Figure 26). For the case of Ukraine, M2 has no effect at all on domestic GDP and CPI. Wages carry a positive effect on aggregate output for all periods, while for inflation the effect is negative in the short run and positive after the 5th period.

All in all, for almost every country of the CIS either broad money or nominal wage growth can explain at least one of our two macro variables. In general, output has shown more sensitivity to monetary variable innovations than inflation.

Figure 19. Response of GDP and CPI to Wages and M2 – Armenia

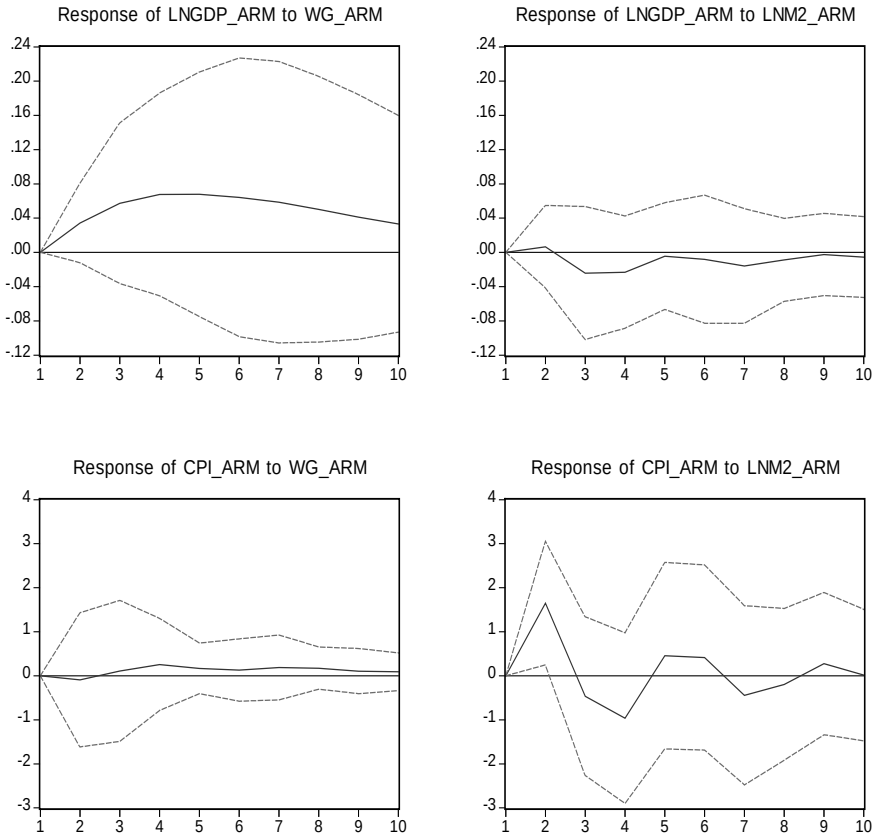


Figure 20. Response of GDP and CPI to Wages and M2 – Azerbaijan

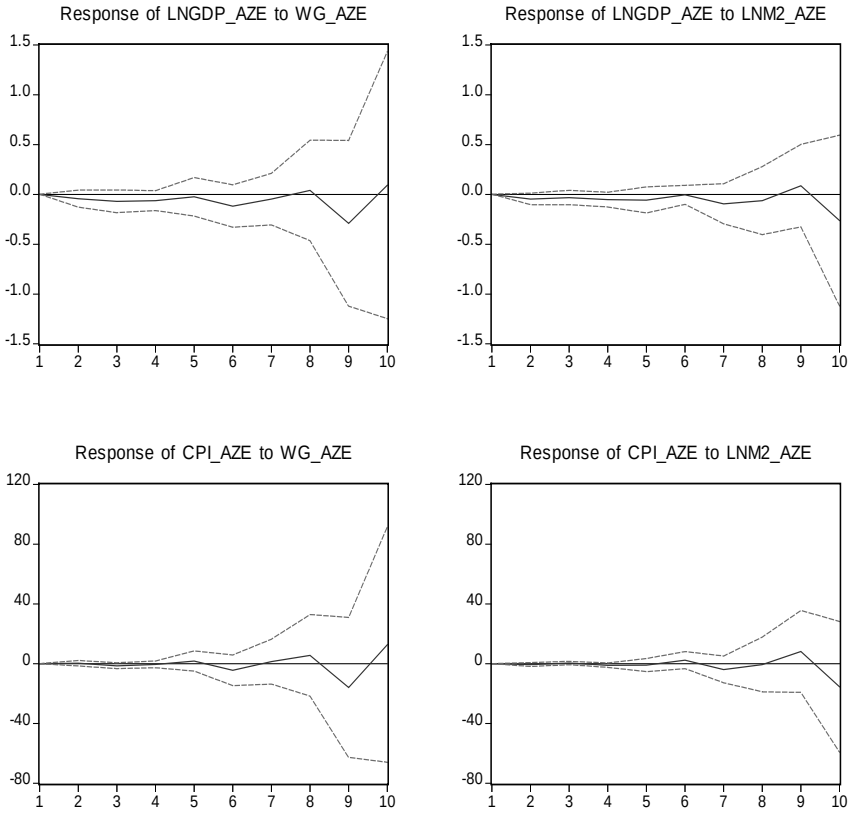


Figure 21. Response of GDP and CPI to Wages and M2 – Belarus

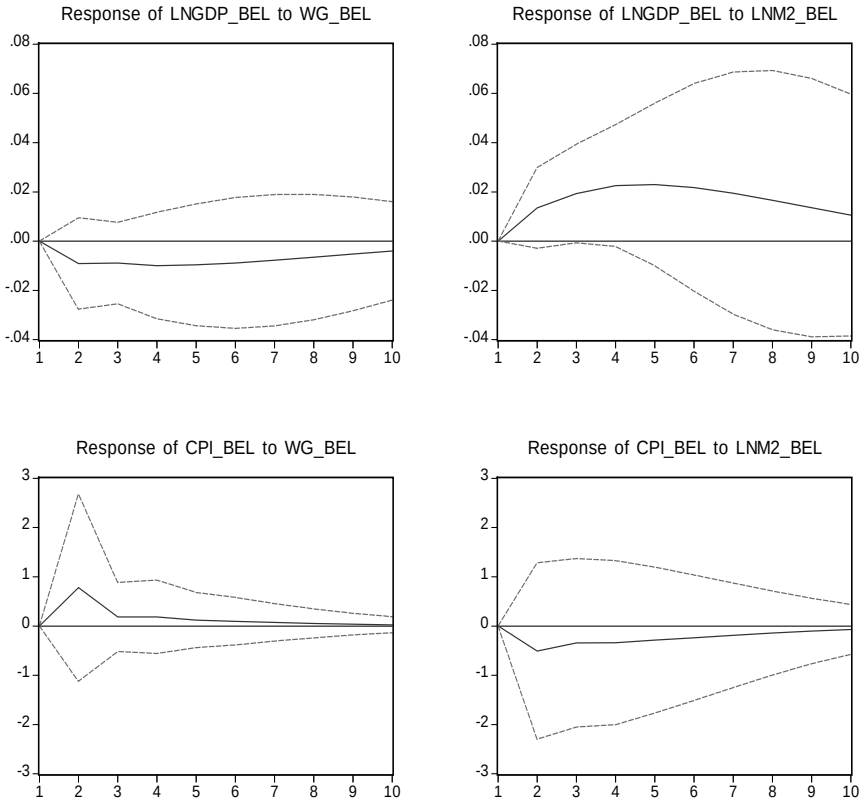


Figure 22. Response of GDP and CPI to Wages and M2 – Kazakhstan

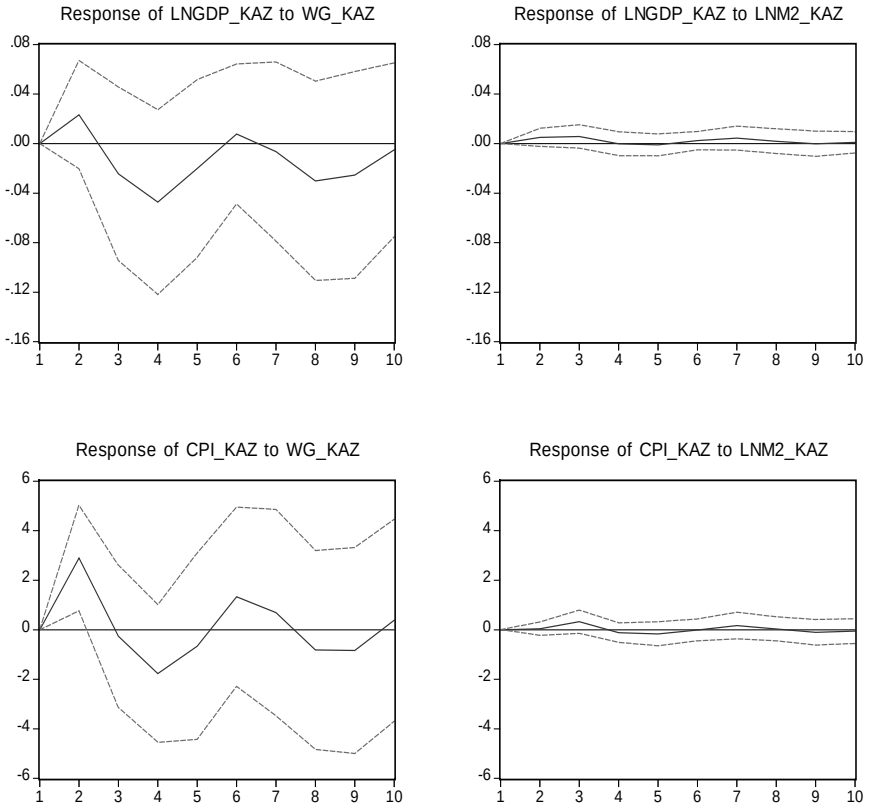


Figure 23. Response of GDP and CPI to Wages and M2 – Kyrgyzstan

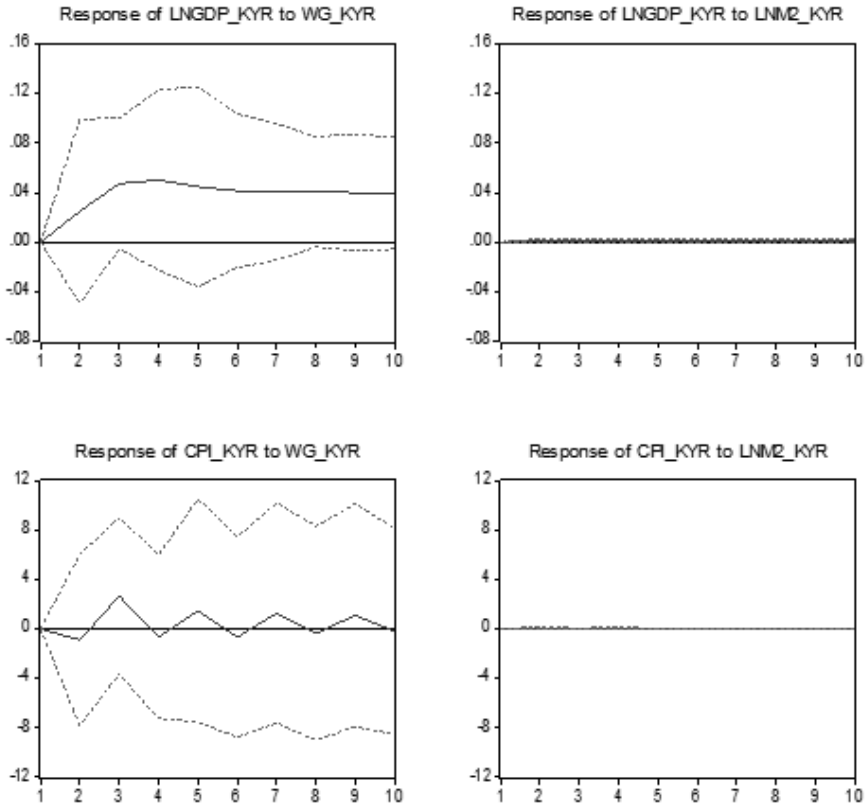


Figure 24 Response of GDP and CPI to Wages and M2 – Moldova

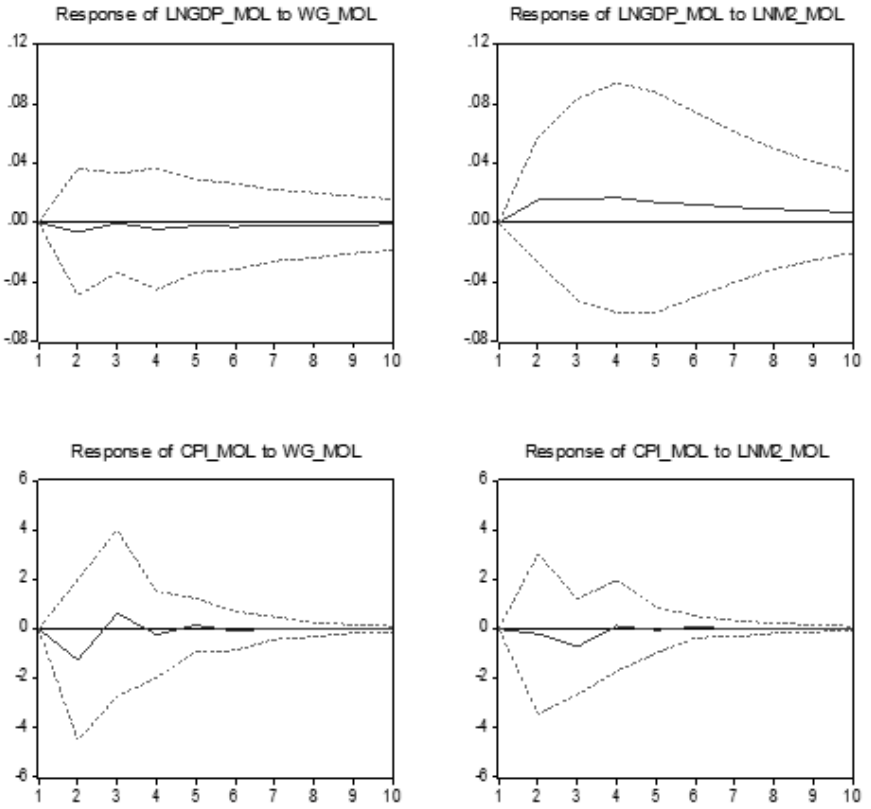


Figure 25. Response of GDP and CPI to Wages and M2 – Russia

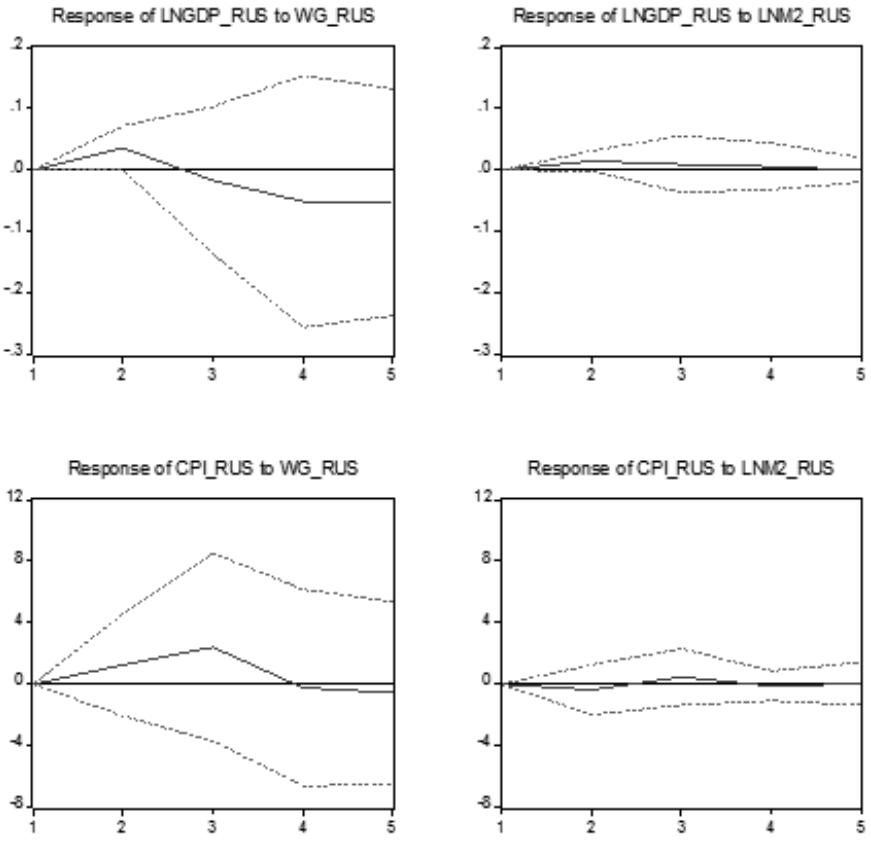


Figure 26. Response of GDP and CPI to Wages and M2 – Tajikistan

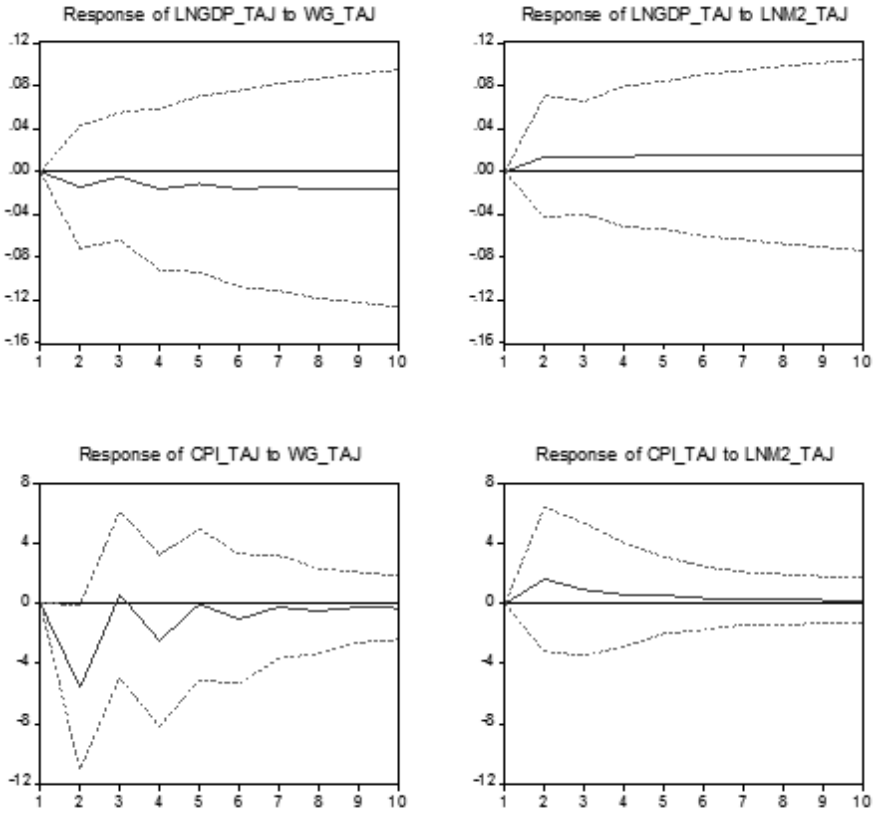
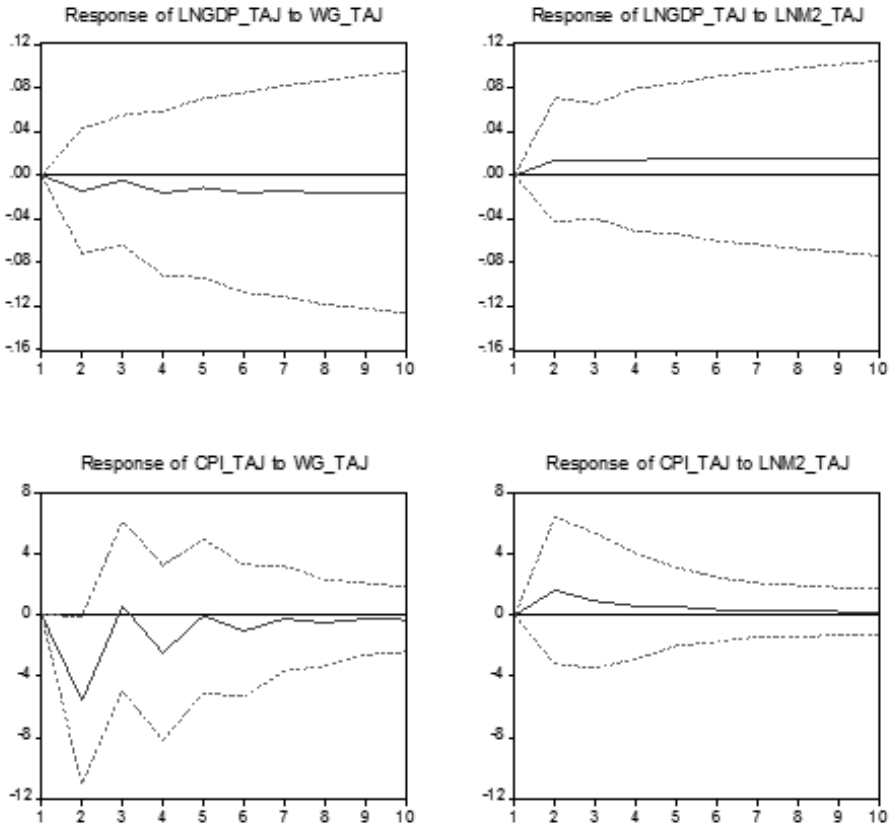


Figure 27. Response of GDP and CPI to Wages and M2 – Ukraine



Bank Lending Channel

Short-run individual country results for the bank lending channel are available in the Appendix under Figures 28 through 36. For the bank lending channel, which according to many theoretical and empirical papers on monetary transmission in developing economies, should be an efficient and relevant channel, we are using the deposit interest rate and the lending interest rate as main policy variables. GDP and CPI are once again taken as indicators of the overall macroeconomic environment.

For Armenia, the lending rate has no impact on either GDP or CPI (Figure 28). However, output shows a considerably negative, and almost completely significant up to the 6th period, response to a one standard deviation increase in domestic deposit rates. Inflation initially rises but then falls following an innovation in the interest rates on deposits. For Azerbaijan, there is no visible effect of either deposit or credit interest rates on both output and prices (Figure 29). In the case of Belarus, domestic inflation increases following a hike in the deposit interest rates, and the effect is significant for 2 periods (Figure 30). Prices are not affected by the credit rates, and Belarusian output does not react to either lending or deposit rates of interest. In Kazakhstan, the bank lending channel doesn't exhibit any sign of efficiency, as neither deposit nor lending interest rates affect GDP or inflation in any way (Figure 31.

For Kyrgyzstan, the bank lending channel does not present any evidence for functionality (Figure 32). In the case of Moldova, output responds in a negative way to an increase in domestic deposit rates (Figure 33). The effect is not significant, but considerable. No impact is observed on GDP from the impulse to LR. Inflation is not affected by the lending rates, while the effect from deposit rates is dual: falling inflation in the short run, and then recovery in the medium-long run. There is no clear trend and the dynamic is very unstable and follows a cyclical/sinusoidal trajectory.

Innovations in Russian domestic deposit and lending interest rates both negatively affect the country's GDP, and in a statistically significant way up to the 4th period (Figure 34). The bank lending channel is extremely homogenous for Russia, since interest rates on credit and deposit affect the real economy in much the same way. Inflation has a positive response to an increase in either lending or deposit rates. For Tajikistan, LR has no effect whatsoever on GDP or CPI (Figure 35). Rise in DR, however, has a visible short-run impact on output and prices. The dynamic afterwards is too unstable for any reasonable conclusion to be reached on the working of the channel in Tajikistan. Finally, neither lending nor deposit interest rates have any consistent effect on GDP and CPI in the case of Ukraine (Figure 36).

All in all, according to our results, the bank lending channel seems to be operational in Armenia, Moldova, and Russia. Again we observe that output is much more flexible to policy innovations than is inflation.

Figure 28. Response of GDP and CPI to Deposit and Lending Interest Rates – Armenia

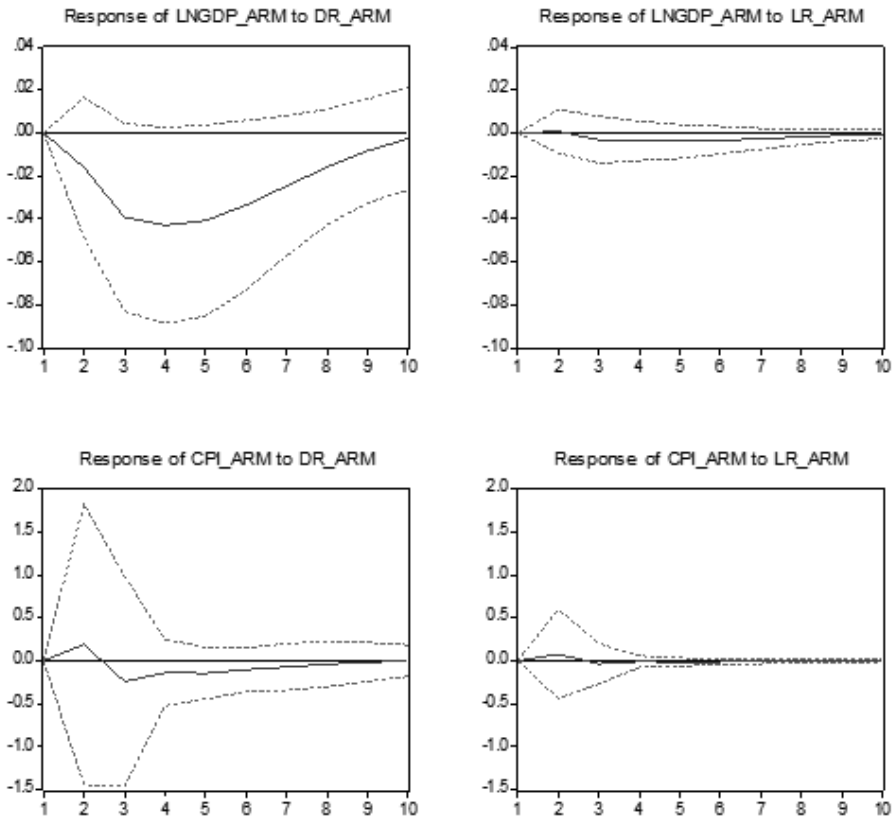


Figure 29. Response of GDP and CPI Deposit and Lending Interest Rates– Azerbaijan

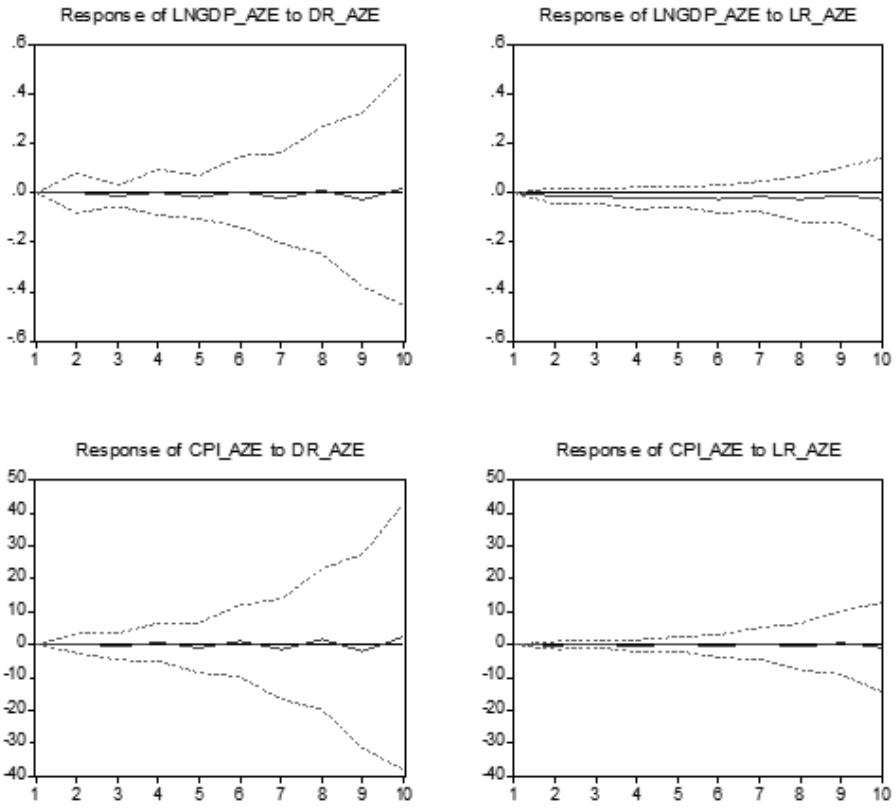


Figure 30. Response of GDP and CPI to Deposit and Lending Interest Rates – Belarus

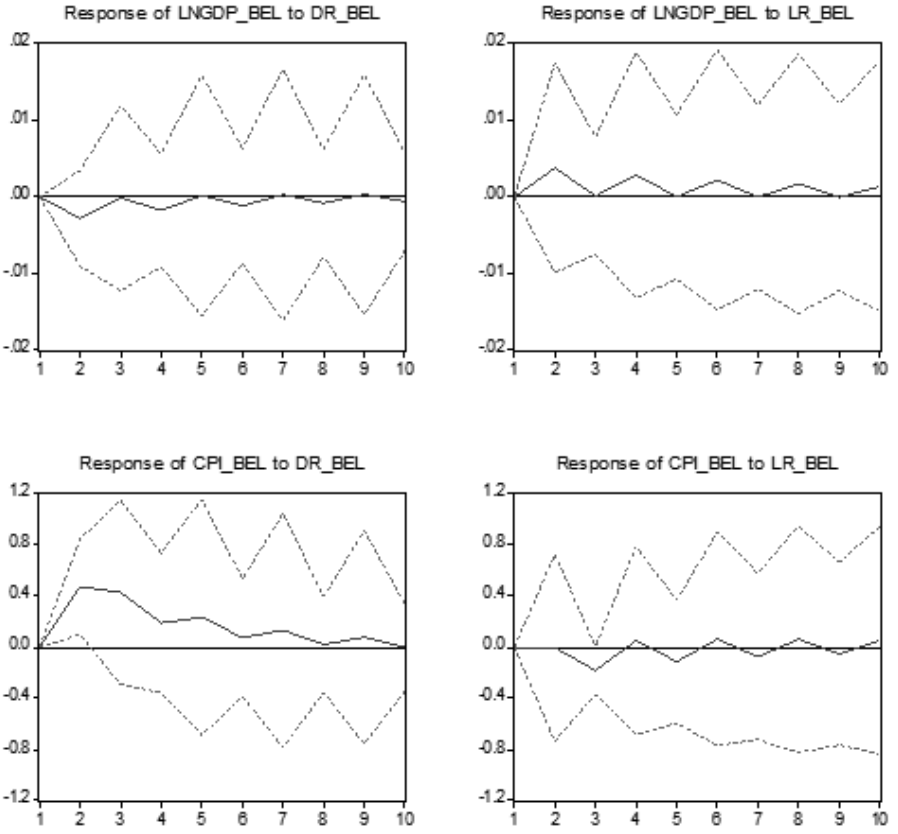


Figure 31. Response of GDP and CPI Deposit and Lending Interest Rates– Kazakhstan

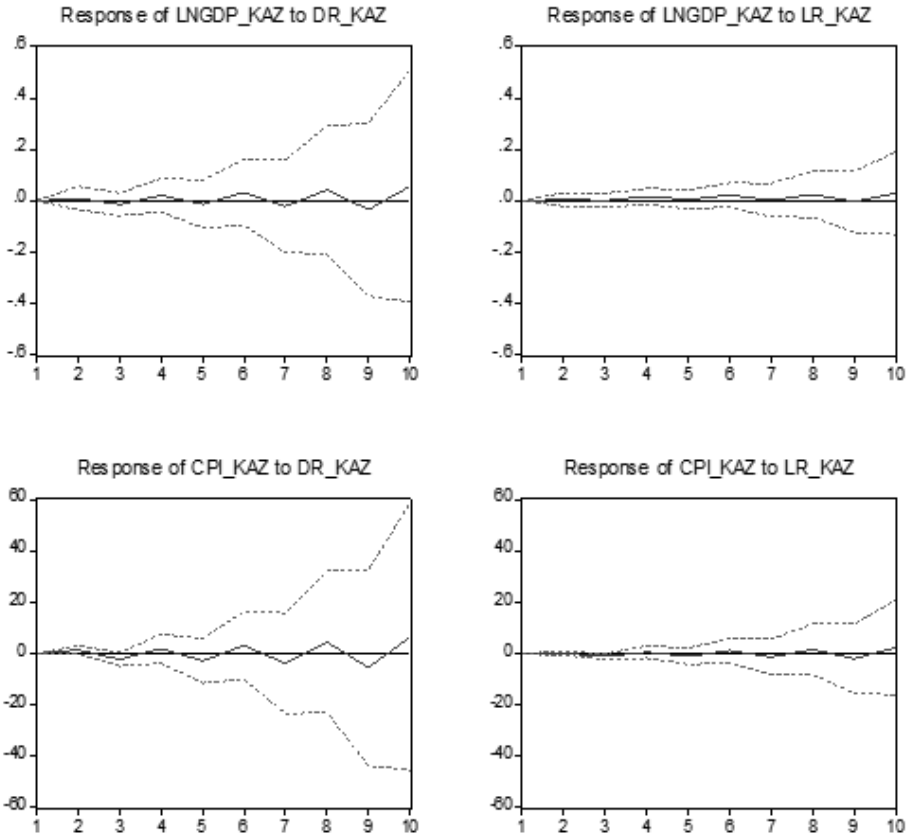


Figure 32. Response of GDP and CPI to Deposit and Lending Interest Rates – Kyrgyzstan

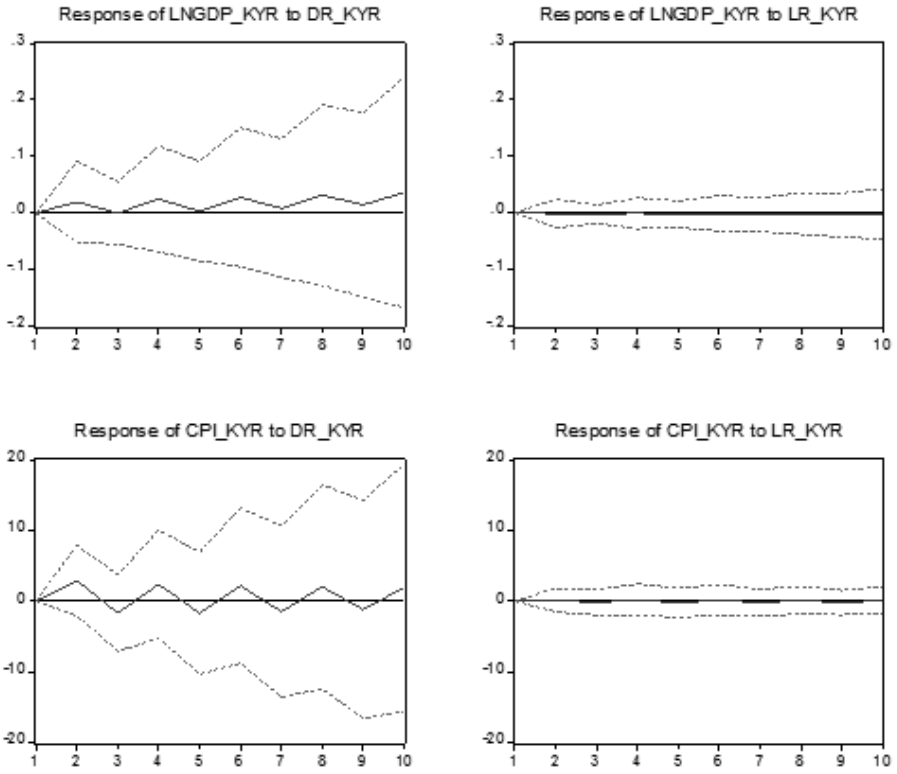


Figure 33. Response of GDP and CPI Deposit and Lending Interest Rates– Moldova

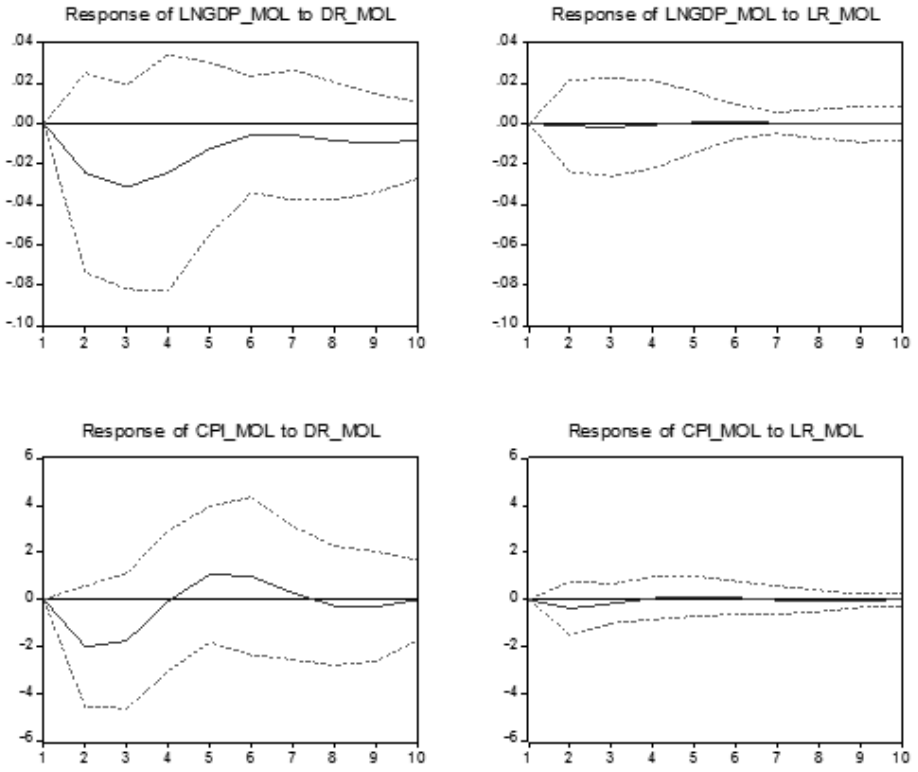


Figure 34. Response of GDP and CPI to Deposit and Lending Interest Rates – Russia

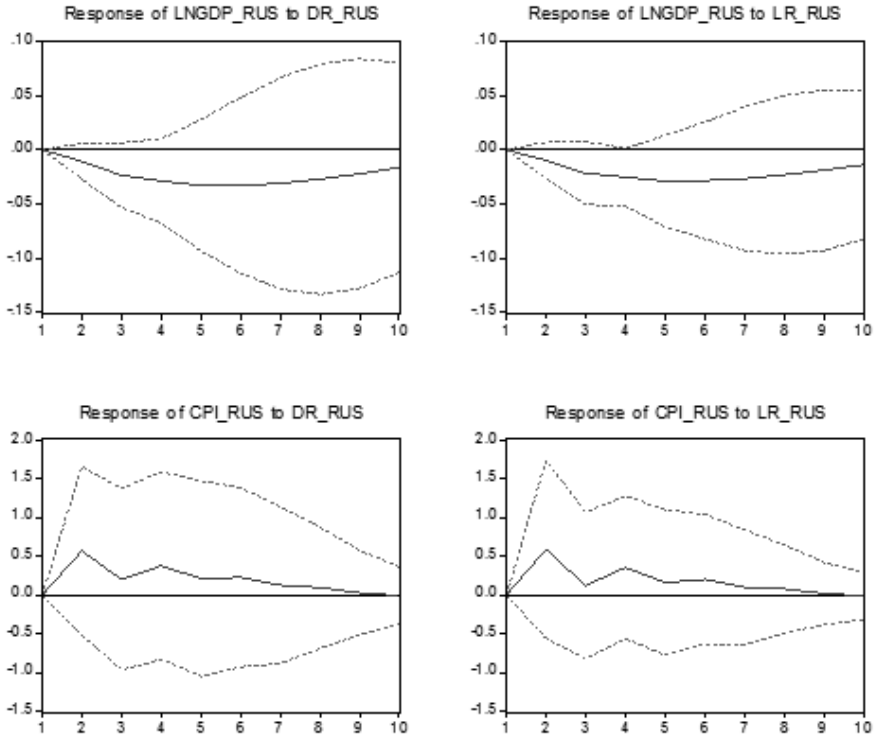


Figure 35. Response of GDP and CPI Deposit and Lending Interest Rates– Tajikistan

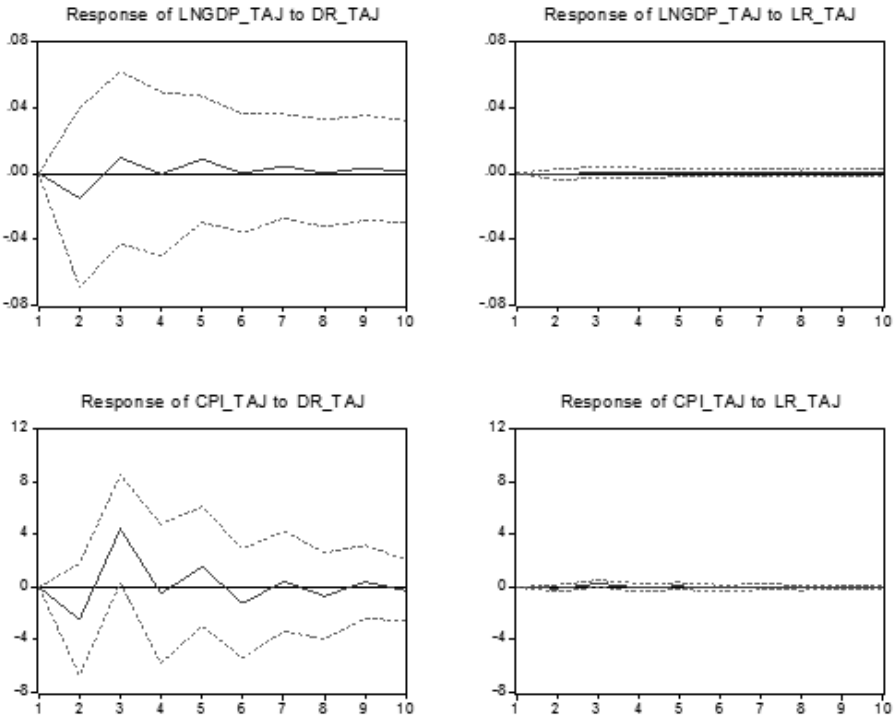
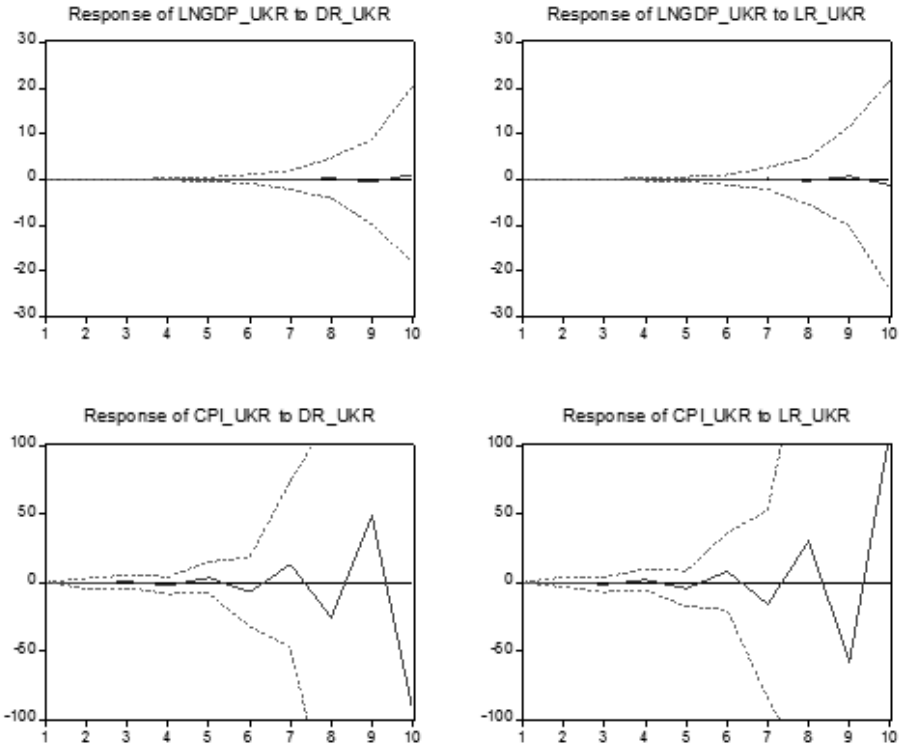


Figure 36. Response of GDP and CPI to Deposit and Lending Interest Rates – Ukraine



Long-Run Results for Individual Countries

We are now presenting results of our ARDL regressions to shed light on the long-run behavior of the channels of monetary transmission in the case of our 9 CIS countries. Firstly, we note that all of our regressions are cointegrated according the bound testing procedure. F-test results are omitted for brevity but are available upon request. We have run all the regressions and summarized the results for each country in one single table (Table 2 in the Appendix). We have once again investigated 4 channels of monetary transmission (interest rate channel, exchange rate channel, bank lending channel, and monetary channel) and used essentially the same variable set-ups as in the case of short-run VAR models presented in section 4.1. For example, we are still using the domestic refinancing rate as the prime policy variable in the interest rate channel, with the federal funds rate as the exogenous variable. Note that for the exchange rate channel, in addition to the exchange rate variable itself, we will also present for the first time quantitative evidence for using remittances as a channel of transmission.

For Armenia, the only channel which seems to operate in the long run is the monetary channel, through which both M2 and WG significantly affect the nation's aggregate output. No other effect is significant. Belarus demonstrates a high level of long-run workability in the bank lending channel. However, only the effect from the lending rate is negative, which is the theoretically correct response to a spike in interest rates. In addition, M2 has a positive significant effect on Belarusian GDP, and CPI is positively affected by innovations in the refinancing rate.

From Table 2 in the Appendix, we see that flow of remittance has a considerable and positive impact on both GDP and CPI of Azerbaijan in the long run. Monetary base (M2) positively and significantly affects the country's GDP, while an increase in the refinancing rate creates a significant positive response in the CPI. No other variables present statistically significant outcomes.

For Kazakhstan, the monetary channel seems to be the most important channel of transmission in the long run. CPI is affected both by wage growth and by the monetary base, and in a statistically significant way. GDP is also affected by the M2. Similarly to the case of Azerbaijan and Belarus, Kazakh inflation responds in a positive significant manner to innovations in the refinancing rate. Kyrgyzstan exhibits a strong monetary channel, since its domestic output is affected in a significant way by the broad money supply, and CPI responds in a positive and

significant way to a rise in the nominal wage growth rate. Also, flow of remittance has a negative significant effect on Kyrgyz CPI.

Moldovan CPI can only be influenced in a significant way by raising the domestic exchange rate. GDP, however, is sensitive both to the bank lending and to the monetary channels. Increases in either M2 or WG carry a significant positive effect on Moldova's GDP, and so does the deposit interest rate. Lending interest rates negatively affect GDP in the long run, which unlike the sign of the deposit rate impact, is the theoretically correct outcome.

For Russia, all channels of monetary transmission show some degree of workability in the long run. First, domestic refinancing rate affects GDP and CPI in a negative and in a positive way respectively. Second, lending interest rates have a significant negative effect on GDP, and a significant positive effect on CPI. In response to an increase in domestic deposit rates, Russian CPI declines. GDP also responds in a statistically significant way to an increase in M2. Inflation is highly responsive both to variations in the exchange rate of the Ruble, and to the flow of remittance from abroad.

Tajikistan shows signs of a working exchange rate channel in the long run, as the exchange rate of Somoni affects both the Tajik GDP and CPI. Remittances and domestic interest rates on deposit both explain inflation, and cause its decline in the long run. Finally, for the case of Ukraine, the refinancing rate has a positive significant effect on both output and inflation. So does the broad money base, as GDP and CPI increase in the long run following an impulse from M2. CPI can also be influenced by varying either interest rates on deposits or the domestic exchange rate, since both variables carry a significant positive effect on domestic price level.

By and large, long-run GDP of all CIS countries is responsive to innovations in the broad supply of money (M2). All 9 cases show that M2 positively affects GDP in the long run. For inflation the situation is different, as there is no universal conclusion. For some cases, CPI is driven by the exchange rate, for others – by the refinancing rate or the deposit interest rates. Consistent with our finding in Section 4.1, output is a lot more responsive to variations in policy variables than is inflation, suggesting that both in the short run and in the long run inflation cannot be systematically affected, or explained for that matter, in the region of CIS. Remittance, our original addition to the traditional discussion of monetary transmission channels, affects long-run inflation in a statistically significant way in 4 of 9 cases, and output only for the case of Azerbaijan.

Table 2. Long-run ARDL Estimates of the Channels of Monetary Transmission in individual CIS countries

	Dependent Variable	Interest Channel	Banking Channel		Monetary Channel		Exchange Rate Channel	
		RR	LR	DR	M2	WG	ER	REM
Armenia	GDP	-0.03241	-0.10789	0.003136	**0.49321**	**0.012336**	-6.7442	1.1154
	CPI	-0.13305	0.029878	-0.27944	1.1926	0.10831	9.2648	-0.67652
Azerbaijan	GDP	-1.0749	0.32143	-0.086	**0.77205**	-0.02417	-0.77127	**0.42941**
	CPI	**4.2079**	1.5718	0.091337	4.2565	-10.3781	-0.12487	**1.5576**
Belarus	GDP	0.027193	**-0.2526**	**0.33208**	**0.61478**	0.004057	0.91783	0.08743
	CPI	**1.0724**	**-2.5356**	**5.1889**	-10.7729	0.16538	-3.4737	-1.7363
Kazakhstan	GDP	0.12968	-0.1591	0.018284	**0.60873**	0.005028	-12.2264	-1.2213
	CPI	**2.8766**	2.135	-0.40912	**1.4938**	**0.53666**	-19.9	-27.925
Kyrgyzstan	GDP	-0.20092	0.090923	-0.23863	**0.41251**	0.028863	8.5998	3.5021
	CPI	1.998	-0.31599	-0.01535	2.2517	**0.75434**	12.5628	**-4.1365**
Moldova	GDP	0.12351	**-0.6562**	**0.17436**	**0.68782**	**0.013584**	5.1249	-0.16673
	CPI	1.2194	-10.9836	1.9765	1.2155	-0.31324	**8.1786**	0.16672
Russia	GDP	**-0.08053**	**-0.16297**	0.10564	**0.66078**	0.001362	2.055	0.44869
	CPI	**0.64986**	**1.661**	**-1.1322**	-1.7035	0.27264	**-6.7306**	**-11.3705**
Tajikistan	GDP	-0.39436	-0.37563	-0.39966	**0.63523**	0.030577	**5.4776**	-0.10471
	CPI	1.5514	-1.3845	**-2.2224**	4.7645	0.15076	**10.9657**	**-15.8348**
Ukraine	GDP	**0.19143**	0.12031	1.8635	**0.70479**	0.018636	-29.7124	-9.598
	CPI	**3.4232**	-0.60575	**2.3894**	**14.4865**	-0.70358	**35.0952**	4.5702

Note: RR – refinancing rate, LR – lending rate, DR – deposit rate, M2 – broad monetary base, WG – annual wage growth, ER – exchange rate, REM – remittances. Bold formatting indicates statistical significance of the coefficient at the 5% level. For example, the impact of the refinancing rate on the CPI of Azerbaijan is **4.2079**: statistically significant at the 5% level.

Panel Results for CIS as a Group

We conclude our presentation of results by reporting the outcome from our panel fixed effects analysis of the CIS as a distinct group. All our variables are non-stationary of order I(1) according to our panel unit root test results, which are omitted for brevity. We have run 2 equations for our panel: one with GDP and

the other with CPI as dependent variable. For the CPI regression we are adding an additional variable of CPI(-1), which is the lag of inflation, to check on inflation inertia in the CIS. Table 3 has the outcome of the GDP regression, and Table reports the numbers for the CPI model.

For CIS as a whole, output is influenced only by the fluctuations in the exchange rates and by the movements in the monetary base. None of our interest rate variables, nor the wage growth rate or flow of remittance has a significant effect on GDP. In essence, these panel results are consistent with what we achieved for the individual country long-run estimations in Section 4.2: M2 seems to have a strong impact over production and output in the CIS in the long run.

For the CPI regression, we conclude that the refinancing rate, nominal wage growth rate, and the flow of remittance carry statistically significant effects on long run regional inflation. Again, this outcome is similar to our conclusion following the analysis in Section 4.2: individual country results also confirmed that remittances and refinancing rate are good predictors of price fluctuations in the long run. Note that, although inflation does have inertia, the effect is not statistically significant. Also an interesting observation is that all interest rate variables affect the region-wise inflation in a positive way, whereas theory would predict CPI to be inversely related to interest rates.

Table 3. Panel Fixed Effects Estimates for the GDP Determinants in the CIS

Dependent Variable: LN_GDP				
Method: Panel Least Squares				
Sample: 2000 2009				
Cross-sections included: 7				
Total panel (balanced) observations: 70				
White cross-section standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.473668	0.455185	5.434422	0.0000
LN_ER	0.390588	0.106693	3.660861	0.0006
LN_M2	0.659864	0.014310	46.11061	0.0000
WG	-0.000358	0.000793	-0.451608	0.6533
DR	-0.001239	0.004514	-0.274427	0.7848
LR	0.008848	0.005782	1.530349	0.1316
RR	-0.003931	0.003813	-1.030912	0.3070
LN_REM	0.013141	0.014203	0.925220	0.3588
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.998682	Mean dependent var		8.797067
Adjusted R-squared	0.998376	S.D. dependent var		2.057362
S.E. of regression	0.082903	Akaike info criterion		-1.965434
Sum squared resid	0.384883	Schwarz criterion		-1.515735
Log likelihood	82.79019	F-statistic		3264.478
Durbin-Watson stat	1.979005	Prob(F-statistic)		0.000000

Note: RR- refinancing rate; DR – deposit rate; LR – lending rate; WG – nominal wage growth rate; ER – exchange rate vis-à-vis US Dollar; M2 – monetary base; REM –flow of remittances in USD.

Table 4. Panel Fixed Effects Estimates for the Inflation Determinants in the CIS

Dependent Variable: CPI
Method: Panel Least Squares
Sample (adjusted): 2001 2009
Cross-sections included: 7
Total panel (balanced) observations: 63

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-41.15838	21.20753	-1.940743	0.0582
CPI1	0.036606	0.046927	0.780072	0.4392
RR	0.699298	0.127161	5.499297	0.0000
DR	0.266550	0.288744	0.923137	0.3606
LR	0.075246	0.231706	0.324748	0.7468
WG	0.202738	0.056461	3.590758	0.0008
LN_ER	3.030569	4.244551	0.713991	0.4787
LN_M2	1.287421	0.806225	1.596851	0.1169
LN_REM	2.040335	0.790227	2.581962	0.0129

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.926820	Mean dependent var	10.56206
Adjusted R-squared	0.905476	S.D. dependent var	9.687898
S.E. of regression	2.978514	Akaike info criterion	5.224983
Sum squared resid	425.8343	Schwarz criterion	5.735253
Log likelihood	-149.5870	F-statistic	43.42291
Durbin-Watson stat	2.200179	Prob(F-statistic)	0.000000

Note: CPI1 indicates inflation inertia, i.e. the lag of CPI(-1); RR- refinancing rate; DR – deposit rate; LR – lending rate; WG – nominal wage growth rate; LN_ER – natural log of the exchange rate vis-à-vis US Dollar; LN_M2 – natural log of the broad monetary base; LN_REM – natural log of the flow of remittances in USD.

Discussion

We have achieved much heterogeneity for our short-run results: some countries of the CIS show strength virtually in all channels of monetary transmission, while others are effective just in one of the channels. In the long run, we can confidently state that GDP is affected by the supply of money, in addition to some marginal influence from the exchange rate. CPI is driven mainly by the movement in the refinancing rates, flow of remittance, and to some extent by the exchange rates and wages. Countries do differ greatly in the relative efficiency of their respective domestic monetary policies. However, there are some unifying arguments such as the monetary base being a universally strong factor of GDP, or the refinancing rate and remittances being a good predictor of inflation.

We have witnessed once again that the question of monetary transmission channels is indeed very empirical and contextual, and depends as much on the country of focus as it does on theoretical models and generalizations. We also prove that treating CIS as a region is reasonable, since our results from the CIS panel fixed effects regressions do coincide with the individual country based VAR model. Our results are, by and large, consistent with the findings of previous literature. Flow of remittance, our original introduction to the exchange rate channel of monetary transmission, proves to be an important factor for future studies.

Based on the results of this study and our survey of the practices, failures, and success stories in monetary policy-making of CIS states in the past 20 years, we wish to list once again the key directions for progress that this region needs to adopt to ensure continuous development of the region's channels of monetary transmission.

- **Use short-term policy interest rates.** Based on the success stories of CIS states with very efficient interest rate channels of monetary transmission, it is desirable that CIS countries, and indeed all developing economies, would focus on policies affecting short-term policy interest rates, e.g. overnight repo rates. The shorter the duration of those rates, the more influential the channel becomes and the easier it is for policy makers to quickly and correctly influence market interest rates.
- **Adopt inflation-targeting regimes.** Although not exactly at the hyperinflation levels of early-mid 1990s, inflation rates in some CIS states are still structurally very high, especially when comparing with the developing parts of Central and Eastern Europe. Strategic shifts towards inflation targeting policy regimes would

serve a dual benevolent purpose for policy makers: it would not only drag the core inflation rate down, but also improve the overall working capacity of the channel of transmission.

- **De-dollarize the economy.** High degrees of dollarization do not allow monetary policy interventions to affect domestic market variables up to a satisfactory level. Elevation of trust into the purchasing strength of the domestic currency, credibility of the national money issuer (i.e. central bank), transparent and credible expectations on future monetary policy stances are all important factors that contribute to the rebalancing of the population's currency portfolio holdings towards the local currency and away from the foreign currency anchor.
- **Increase risk-premium for external financing.** The vice of all interest rate channels of monetary transmission is the ease of obtaining funds from the sources alternative to the formal route. Policy makers should identify the dominant types of domestic informal financing, and attempt to raise the premium that fund-seekers should pay to get access to those informal finances; either through bureaucracy, a form of taxation and a mixture of financial incentives, or through legal enforcement.
- **Minimize the informal sector and the shadow economy.** Econometric models of monetary transmission channels cannot assess (not in full, at least) the workings of the informal sectors of the economy. Coupled with the efforts to increase risk-premium for external financing, policy makers need to either eradicate the shadow economy completely or to at least make it feasible and beneficial for the informal agents to shift their interests towards the formal (legal) sector. Shadow economy minimization is an age old struggle but the benefits, which at least include an improvement of the monetary transmission channels, are worth the continuous effort.
- **Develop domestic capital markets and sources of non-bank financing.** For better or for worse, banks are still the chief allocators of resources in most emerging economies, and certainly in the CIS. Formation of an optimal market for transference of funds from those with excess to those with deficit is paramount for fluidity and mobility of the whole financial sector. Much focus must be placed on the development of pension funds, markets for short-term governmental and non-governmental corporate bonds, markets for stocks and equity. Also important is to educate economic and financial agents about the value and advantages of non-bank sources of funding.

- **Increase competitiveness in domestic banking sectors.** Precisely because the populations of transition economies do not have alternative ways of formal financing, the banking sectors typically become uncompetitive. A monopoly on resource provision leads both to sector consolidation and also to artificially high market interest rates. Although, typically by legal mandate, the national bank cannot influence market interest rates on deposit and/credit directly (it can achieve this only indirectly though policy rate innovations), the government can limit bank mergers and acquisitions to protect the idea of an "optimal bank size". It can also place interest rates on state-driven instruments (such as mortgage credit through the public/government channel) so low, that the bank-provided alternatives would seize to seem rational.
- **Establish a solid, transparent financial governing framework.** Much as a supporting caveat to the ongoing technical financial and monetary reform, CIS states must ensure that the region is governed by an easy-to-understand and robust legal foundation. Many countries in the CIS still do not have a modern law on mortgage lending, or are in need of an urgent and considerable pension reform. The problem is that the financial sector is developing quicker than the legal framework which supports it. Gaps and inefficiencies in the legal code create room for informal activities. It is necessary, however, to not overcomplicate legal procedures, which would have an adverse incentive effect such as the desire to circumvent complex requirements and seek an easier, once again an informal, way out.

Conclusion

In this paper we have attempted to gather the efforts of decades of theoretical and empirical work on the channels of monetary transmission and produce a comprehensive review for the case of CIS. We have provided an extensive introduction and literature review which identified the most common transmission channels and their applicability to the CIS. In the stage of empirical analysis, we have studied both the short-run and the long-run performance of 4 channels of monetary transmission for 9 countries of the CIS. We have also looked at how the region performs as a distinct economic unit, having employed a panel data approach.

We conclude that broad supply of money (M2) is the only consistent channel through which policy makers can affect aggregate output. Meanwhile, flow of remittance and domestic refinancing interest rate are the main factors and indicators of inflation. The exchange rate seems to be playing a supporting role, both for output and inflation determination. While it is clear that the sphere of the channels of monetary transmission is largely an empirical and contextual issue, we have also found that CIS does behave like an integral unit from this particular angle.

Although the region has accomplished a lot in the past two decades, still many challenges remain until the local channels of transmission reach its optimal level of efficiency. Among others, development of capital markets and non-bank sources of financing, adoption of inflation targeting regimes, improvement of the legal framework, and placement of a larger emphasis on short-term interest rate management are the questions to address for CIS policy makers in the years to come.

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Predicting Banking Distress in European Countries

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ABSTRACT

This paper seeks to investigate internal and external factors with relation to regulations in order to predict difficulties which the banks are exposed. The sample consists of 368 banks in 8 European countries for the period 2004-2007. The model was built primarily only on a set of ratios constituting the CAMEL rating system (Capital adequacy, Asset quality, Management quality, Earnings ability, Liquidity position). Secondly, we added the variables related to the regulatory environment. The application of the method panel logit shows that financial ratios relating to the rating system (CAMEL) are correlated with the likelihood of problems measured by binary variables. The probability of occurrence of problems in these banks is positively correlated with the presence of an explicit system of deposit insurance and negatively correlated with the presence of auditors who provide information to regulators in the event of illegal activities committed by managers. The ability to prosecute these regulators for their actions has a negative effect on the probability of distress. The role of the Central Bank in monitoring activity is also very important to maintain system's stability.

JEL Codes: *G21, G28*

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regulation, CAMEL, banking distress, deposit insurance.

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Introduction

The current crisis which has started since about 2008 has taken a set of considering the events it has induced incite to give special attention to the pertinence of regulations in the inside as well as in the outside of institutional organization such as banks. The accession of dysfunction incites to challenge classic methods usually used to predict the factors which constitute some of the causes of crisis inducing high costs to be avoided. More generally, the main questions we can make are concerned with the fact if the procedures which are adopted by some authorities take into account the special state of bank institutions when making decisions to enforce regulations? Is it possible that classic plans, such as the conventional device, the deposit insurance, the external auditors, and the lender of last resort, incite to increase the exposition of financial institutions to greater risk?

The primacy of recessions and scandals which have gone with the rapid spreading of tension in the international level leads to conclude that the progress realized in the in smoothing the vulnerability remains insufficient and inadequate. Considering these questions this paper seeks to reconsider the question about the early warning systems (hereafter EWS) which allow to identify the banks likely to be object of distress and failure. Secondly it permits to take necessary steps likely possible to solve the problem of dysfunction before it occurs.

The specificity of this study compared to previous one is that it links the stability of financial institutions to standard norms usually applied in international level. These norms includes among others techniques of internal analysis (Ratios) as well as institutional mechanisms which are able to give response to correction of asymmetric information worries and that of hazard moral (regulation variables). In this line, it will be important to give the large sample of banks to use methods already used in order to analyze the positions of financial institutions before the crises. Results are in conformity the idea that standard tools to predict in an irrevocably ways the distress. Once there are institutional ones, the dispositions usually used leads sometimes to exacerbate the moral hazard problems. This phenomenon which is more likely to appear in economies with good risk management is realized through a large diversification followed by a high centralization of assets. Organizations largely known as systematic (that with large size) are consequently at the forefront of public attention. This study seeks to detect early difficulties and not failures to allow political and monetary authorities to have enough time to take the appropriate

corrective measures and fill gaps that might disrupt the normal functioning of banks. In fact, we tried to make a synthesis between the various previous studies.

The objective of this study is to determine the integration effects of variables related to the regulatory environment, not just the effect of accounting ratios of bank distress. The integration of these variables can provide insight on improving supervision system.

The remainder of this paper is organized as follow: the first section presents the literature review and the previous empirical findings about the prediction of failures. The second describes data and methodology. Results and discussions are presented in the third section. Finally, the section 4 concludes.

Literature review

Following the multiple economic crises literature gives more attention to the prediction of bank failures. This approach presents great importance in real economy since it allows to judge the effectiveness of the process of regulations revised for many times spanning the last decades. Since the study of Sinkey (1975), numerous authors developed several techniques to predict the failure of financial institutions. This author has used multivariable discriminative analysis considering a sample of 220 American banks. About a half of these banks have been object of failure during the 1969-1972 period. Among the one hundred variables he used only ten which have presented a significant effect especially that related to the specificity of banks.

Altman (1977) developed a system for identifying serious financial problems in savings and loan associations. He used 25 ratios representing liquidity, asset quality, capital adequacy and earnings. Only12variables can explain the banking failure. Pantalone and Platt (1987) proposed a model integrating relative ratios of the CAMEL rating system.

They used a sample of 113 failed banks and 226 non-failed over the period of the early 80s. Using the logit method, the significant variables are representative of profitability, management quality, leverage, diversification and economic environment.

Thomson (1991) examined the bank failures that occurred in the United States during the 1980s. He used 16 variables. Unlike other studies, he included variables related to economic conditions in domestic markets banks.

Variables specific to the banking sector ratios were calculated from the balance sheet and income statement and represented capital adequacy, the risk of the loan portfolio, risk management, liquidity and income. The result shows that the probability that a bank will fail is a function of variables related to its solvency. Economic conditions in the markets where a bank operates also appear to affect the probability of bank failure as much as four years before the failure date.

Barr and Siems (1997) proposed a model for early warning of bank difficulties, whose aim is to realize the difficulties two years prior to insolvency. The explanatory variables included are representative of the CAMEL rating system plus a variable to capture local economic condition, quality management has been approximated using technical efficiency, derived from the nonparametric DEA (Data Envelopment Analysis) methodology. The result indicates that management is, indeed, important to the successful operation of a bank.

Capelle-Blanchard and Chauveau(2004) used the same methodology for the main European commercial banks from 1993 to 2000 and have examined the potential contribution to bank supervision of a model designed to include an off-site proxy of the management quality based only on publicly available financial information. The relevance of their EWS depends to some extent on its accuracy in predicting which banks will have their solvency degraded. They show that proxies for CAMELS (S: Sensitivity to market risk) do a good job for identifying the banks that are likely to have their solvency degraded in the future.

Gonzalez-Hermosillo (1999) examined the bank failures in the U.S., Mexico and Colombia, which took place in the 1980s and 1990s. She used the macroeconomics and microeconomics variables. The result shows that a low capital equity and reserves coverage of problem loan ratio is a leading indicator of bank distress, signaling a high likelihood of near term failure. Doganay et al., (2006) developed warning systems to predict bank failures, for at least three years before the date of bankruptcy. Using a sample of 42 banks in which 19 have been object of failures during the period 1997-2000 and considering twenty seven ratios, the authors conclude that logit model are the most appropriate to predict bankruptcy. Testing the same model for a sample of 906 institutions in which 319 have supported failures spanning the

period from 1980 to 1984, Barth et al., (1985) found that the composition of the loan portfolio, the capital ratio and the income structure affect significantly the bank failures. Godlewski (2003) integrated CAMEL variables in the specific case of emerging countries over the 1999-2000 period. The sample includes 1853 banks from Asia, Latin America and some Central and Eastern Europe countries with 270 of them are failed banks. Using the logit model, the author concludes the probability of bankruptcy is negatively correlated to the variables he used in his model. To investigate the same phenomenon for the cases of Japanese and Indonesian banks Montgomery et al., (2005) Introduce 18 financial ratios considering information in balance sheets and income statements.

Similarly, Konstandina (2006) identified for the case of Russia six macroeconomic factors and thirteen other specific explanatory variables related to banks to predict their failure. The author attributes specifically the increase in bankruptcy to the raise in bad loans and to the purchase of treasury bills. The use of a proportional hazard models have enabled her to identify the factors that are able to slow down the risk of bank in a period of financial crisis. Similarly to what have been theoretically predicted, the author confirms the result according to which the first banks exposed to bankruptcy risk are less efficient.

Considering 134 banks from sample composed of 11European countries Naouar (2007) found that variables measuring the regulatory, institutional and legal environments such as set in La Porta et al., (1998) and given in the World Bank reports constitute the most influential since they impact the process of risk taking. This confirms largely the fact that this factors are not without effects. The same results are shown in Abdennour et al., (2008). The use of an early warning system for banking problems based on accounting ratios and factors related to regulatory, institutional and legal environment has been with great importance for financial institutions in emerging countries. In this line, Badjio (2009) proposed application for the countries of Central Africa. He introduced variables representing the CAMEL rating system and taking into account the management style of banks in the Central African Economic and Monetary Community**.** Three variables have been statistically significant which are ratios measuring (Equity / Total loans), (Total Deposits / Total Assets) and (Total operating income / Total assets). The first has a negative effect while the two others have a positive influence on the dependent variable of his model. Giovanis (2010) developed a model of EWS of distress using a logistic regression and an Adaptive Neuro-Fuzzy Inference System (ANFIS). He adopted the same procedure in Gentry et al, (1985) to specify whether or not the company has been through some financial distress. In-

stitutions that distribute a few dividends may be having financial difficulties. Using a sample of 179 financial institutions from Taiwan Security Exchange (TSE) during the period 2002-2008, the author concluded, finally, that the Neuro-Fuzzy Inference system constitutes the most appropriate tool for financial risk management and for decision making in the Central Bank.

Besides the financial ratios some researchers have used macroeconomic variables. Banks are strongly influenced by contractions that the economy experiences over time. Banking distress is highly influenced by a number of macro variables. Among the variables, there are: interest rate, inflation, real GDP growth, output downturns, adverse terms of trade shocks, credit expansion, market pressure and losses of foreign exchange. These macro variables influence the functioning of financial and economic systems as a whole (Demirguc-Kunt and Detragiache 1998, 2000; Hutchison and McDill, 1999; Hutchison, 2002; Domac and Mertinez-Peria, 2000; Frankel Langrin, 2001; Heffernan, 1996; Borovikova , 2000; Yilmaz, 2003 ; Gunsel, 2008). The use of the macroeconomic variables will not be the object of our search. Our principal objective of this study is to determine the integration effects of variables in the regulatory environment, not just the effect of accounting ratios of bank distress.

Data and methodology

The sample:

Our sample consists of European banks. The choice of these countries is motivated by the number of bank defaults in these countries. It is very important in recent years. Many European banks were hit by the 2008 crisis, as U.S. banks but to a lesser degree. Banks do not seem to remember the lessons of past crises. Some countries in our sample have been hit by a crisis of indebtedness. Indeed, the Greek state has destroyed the entire financial and monetary European system.

Recognizing the principle of "Too Big To Fail", we select only big sized banks. We adopt this selection since the large banks are behind the latest crisis. Once they benefit from an implicit insurance against bankruptcy these banks increase their risky activities. So, to improve their profitability they are tempted to take more risk.The

data used was from the BankScope database. It includes balance sheets and income statements of the selected banks.

This information helps to build a set of ratios constituting the CAMEL rating system. The pretreatment of the data gave a sample of 368 banks in eight European countries.

Initially, a total asset was used as a criterion for exclusion of small banks. This technique was already applied by Godlewski (2004). The size of those banks is below the fifth percentile. So to integrate the counterparty risk, we selected the financial institutions that provide more credit. i.e banks whose total loans / assets ratio is greater than 32, 88% (the fifth percentile is eliminated).

A commercial bank is characterized by a high level of deposits. For this reason we opted for banks with high levels of deposits. The elimination of the fifth percentile can retain the institutions whose total deposits/ total assets is greater than 45,83% .

The incentives to undertake excessive risk come mainly from the banking regulation, and then two sources were used. The first comes from the study of Barth et al.,(2001) made to the World Bank and the second made by Demirgüç-Kunt and Detragiache, (2008). In the first study, the data collected from several surveys have been subdivided into ten sub-bases. Each one focuses on one aspect of standardization activity and prudential supervision: supervision of capital, the adoption of a system of deposit insurance, market discipline, the transparency of the banking market, ownership structure, liquidity and management of monitoring committees. The second study identifies factors that influence decisions about financial security of a country. It uses a comprehensive data covering 180 countries over the period 1960-2003.This analysis focuses on how institutional factors influence the adoption of a system of deposit insurance. The majority of this data is qualitative (often binary).

The variables:

Within the model, we attempt to explain the dependent variable (Y) which presents the probability of distress:

$$prob\ \{Y_{it} = 1\} = \frac{1}{1 + e^{-\alpha_i - \beta X_{it}}}$$

$Y_{i,t}$ is the binary dependent variable latent bank (i)at the period (t) i:

the number of banks from1 to 368;
$X_{i,t}$ is the explanatory variable of bank (i) at (t).
t: is the study period from 2004 to 2007.
α: the constant
β_i: the coefficient of explanatory variable X_i.
Y_{it} = 1 if the bank is undercapitalized
Y_{it} = 0 if the bank is well capitalized.
So to distinguish between a healthy bank and another in difficulty, we used the binary values 0 and 1.
A distressed bank = 1.
A healthy bank = 0.

Researchers often use the Tier (1) capital ratio, which is equal to 4%, or the ratio of capital Tier1 + Tier 2, which is equal to 8% as a threshold to distinguish between the two states. As part of this work, we refer to the works of Estrella et al., (2000) and Abdennour et al,(2008), taking 5.5% as an indicator. This proxy is considered a good indicator to detect early the first signs of banking fragility. Indeed, a bank whose capital ratio is above 5.5% is a healthier bank then a bank whose capital ratio is below 5.5% is considered in difficulties.

Presentation of the explanatory variables:

Our model includes two types of variables to predict the banking distress which are CAMEL variables and those related to regulatory environments.

Everywhere in the world, the systems of supervision try to evaluate the situation of banks through a set of financial ratios. Compared to other monitoring systems (PATROL in Italy, SAAB in France, BAKIS in Germany), CAMEL seems the easiest and the quickest to establish. It includes the most important indicators of fragility covering risks related to the capital adequacy, the asset quality, the profitability and the liquidity position. Moreover, the treatment of fragility using other systems can be made case by case, which generates a late prediction of problems. In addition, in the operating framework, they seem more costly than the CAMEL, so they present different disadvantages to the regulator. The CAMEL reveals financial information extracted from balance sheet and income statement of the bank. Calculated ratios

can explain the situation of banks. The acronym CAMEL combines the following five criteria: the capital adequacy (C), the asset quality (A), the management quality (M), the earnings ability (E), and the liquidity position (L).

Each indicator is approximated by one or several financial ratios. In this study, two ratios were used to explain each criterion by the acronym CAMEL. The choice of these ratios is based on them which are most relevant to the studied topic. Table 1 presents all ratios we used in our model as well as their expected signs.

The first two ratios (R1 and R2) indicate the adequacy of capital to the total loans. The ratio equity / total assets (R1) evaluates the ability of banks to assume their obligations to absorb unexpected losses and to absorb shocks. The second ratio, Equity / Total loans, is considered as a buffer to absorb potential losses (Godlewski, 2004). It measures the hedge funds against credit risk. These first two ratios affect negatively the probability of default. The quality of the assets, as approximated by R3 and R4 ratios, affects positively the probability of being undercapitalized.

Table 1. List of CAMEL's variables

Ratios	Variables	CAMEL	Expected sign
R1	Equity / Total Assets	C	-
R2	Equity/ Total Loans	C	-
R3	Net loans / Total Assets	A	+
R4	Total Other earnings / Total Assets	A	+
R5	Personnel expenses / Total operating expenses	M	-
R6	Total operating income/ Total Assets	M	-
R7	Net income/ Equity (ROE)	E	+/-
R8	Net income / Total Assets(ROA)	E	+/-
R9	Total Deposits / Total Assets	L	+/-
R10	Total Deposits / Total liabilities	L	+/-

The ratio Net Loans/Total Assets explains the importance given to loans. Indeed, the core business of banks is granting credits. This is, however, a risky activity increasing normally the likelihood of difficulty. The ratio of Total Other Operating Income / Total Assets measures the share of income generated outside the activity of the banking intermediation. It has a positive effect on the probability of default. Indeed, banks with investments in other projects (often high risk) present a significant probability to be in difficulty.

Management quality is assessed by the ratios Personnel expenses / Total Operating Expenses (R5) and Total Operating income / Total Assets (R6). Indeed, the effectiveness of managing risk increases with the consideration of the needs of staff (personnel costs while positively affecting the quality of management). Moreover, the probability of presence of problems in credit institutions is negatively correlated with the proportion of personnel costs of total operating expenses. The banks are undercapitalized characterized by low profitability. This profitability is measured by the ratios R7 and R8. The ratio Net income / Equity allows shareholders to monitor the returns earned on their investments, it is a guarantee of a sustainable solvency. According to the CAMEL model, this ratio allows to assess the level of profits relative to the capital invested. The ratio Net income/ Total Assets, measures the rate of return on average total assets held by the institution. This is an indicator of overall profitability.

The large level of deposits in total assets and total liabilities, measured respectively by R9 and R10 can have positive or negative effects on the likelihood of difficulty of the banks. The increase in deposits is an indicator of liquidity's availability. Thus, the bank can meet its commitments. In case of bank runs, the rush of depositors at the counters increases the distress probability. The regulatory environment variables and assumptions with CAMEL's variables, we also incorporated the external determinants of default, which are more particularly variables related to the regulatory environment. These estimated variables (binary variables), allow regulators to act in the interest of the bank has a serious trouble(the possibility of prosecution of supervisors for their acts, auditors inform the supervisors of illegal activities committed by managers, monitoring function is performed by the Central

Bank and the existence of an insurance deposit system). So, we formulated the following hypotheses:

H_1: When the auditors inform the supervisors about illegal activities through the audit report, the supervisors can then take appropriate disciplinary actions and can ensure system stability.

H_2: The presence of an insurance deposit system can prevent bank runs and can ensure stability.

H_3: The possibility of prosecution of supervisors for their acts, reduces the likelihood of distress.

H_4: The system stability can be maintained when the oversight function is delegated to the Central Bank.

Goodhart, (2008) used several regulatory variables mentioned in recent studies as factors that explain the failure of the system. Among these elements we can evoke:
1. Deposit insurance system;
2. Insolvency of the bank, and effectiveness "prompt corrective action";
3. Money market operations performed by Central Banks.

Indeed, when the Central Bank oversight decreases the probability of being under-capitalized.

First, the introduction of a deposit insurance fund protects depositors. It can reduce the excess of banking risk that no longer generates significant revenues to indicate a good performance to its customers and thus avoid liquidity problems. In most cases, all deposits are not covered and therefore a minimum of market discipline on the part of depositors are insured. This encourages banks to take more risks.

Table 2. Variables of regulatory environment

Dummy	Variables	Définition	Auteurs
D_1	regulatory discipline (-)	=1when the auditors report fraud or abuse committed by the leaders to supervisors =0 otherwise	Barth and al (2001) Godlewski(2003), Abdennour and al (2008)
D_2	Deposit insurance (+/-)	=1 in the presence of a system of explicit deposit insurance =0 otherwise	Barth et al (2001) Godlewski(2003), Demirgüç-Kunt.A and Detragiache. E (2008), Naouar(2007) Abdennour and al (2008)
D_3	Responsability of supervisors (+/-)	=1 in the case of prosecution of supervisors for their actions. =0 otherwise	Barth and al (2001) Godlewski(2003), Naouar(2007) Abdennour and al (2008)
D_4	Role of CB in monitoring (+/-)	=1 if the Central Bank has the task of monitoring and supervision =0 if the control and the supervision are carried out by another independent institution.	Barth and al (2001) Abdennour and al (2008)

Regarding the variable of the insurance deposits, we note that all the countries (eight countries) have an explicit system of deposit insurance. Therefore it is difficult to estimate the impact of this variable on the bank situation. For this reason, we follow the reasoning proposed by Demirguc-Kunt and Detragiache (2008) by integrating the determinants of the deposit insurance system.

DemirgüçKunt and Detragiache (2008) compile eight characteristics of deposit insurance. These are: The coverage ratio, insurance of foreign deposits, the coverage of interbank deposits, the existence of an insurer, the payment of coverage, premiums are adjusted for risk, the administration of the premium (for the state or the private sector), and membership is voluntary or mandatory.

Based on this study, we approximated the variable relating to the existence of a deposit insurance system and its determinants by using the principal component analysis (PCA).

Table3. Determinants of deposit insurance

Factor	Variables	Measure	Author
F	Foreign deposit insurance (D5) (+/-)	1 if there exists	Demirgüç-Kunt et al. (2008)
		0 otherwise	
	Co-insurance (D6) (+/-)	1 if there exists	
		0 otherwise	
	Interbank deposit insurance (D7) (+/-)	1 if there exists	
		0 otherwise	
	The premium risk-adjusted (D8) (+/-)	1 if exists	
		0 otherwise	
	Funding for the premium (D9) (+/-)	0 by the bank only	
		1 by the state and the bank together	
	Administration of the guarantee fund (D10) (+/-)	0 public	
		1 private	

Analysis and interpretation of results:

To test a model for detecting banking distress, it is useful to make these three tasks:

- The determination of correlations between the dependent variable and different ratios.

- Logit regression on CAMEL variables.
- Logit regression on CAMEL variables and factors that explain the regulatory environment.

According to t-test for independent sample, we note that healthy banks have higher solvency ratio and hedge ratio of loans by equity. Distressed banks have the following characteristics:
- These banks have a low capital ratio.
- They cannot cover all loans.
- They have also several related activities,
- less personal expenses and
- A weak economic profitability.

Table 4. T-Test for independent sample

	Ratios	Mean Distressed banks	Mean Healthy banks	The student's t
R1	Equity / Total Assets	0.037366	0.092207	-31,339***
R2	Equity / Total Loans	0.078390	0.155895	-15,695***
R3	Net loans/ Total Assets	0.561438	0.639403	-7,687***
R4	Total other operating income / Total Assets	0.390487	0.301731	9, 113***
R5	Personnel expenses/ Total operating expenses	0.478710	0.492294	-2,129**
R6	Total operating income / Total assets	0.020373	0.037457	-13,703***
R7	Net income/ equity (ROE)	0.112839	0.085162	5,184***
R8	Net income / Total Assets(ROA)	0.003974	0.008146	-10, 465***
R9	Total Deposits / Total Assets	0.730666	0.726927	0, 347
R10	Total Deposits / Total liabilities	0.760226	0.802188	-3,692***

Significant at the level of : (***) 1%, (**) 5% or (*) 10%.

Indeed, in the presence of difficulties probability, a bank has a risk of insolvency and a low level of coverage of loans. This is explained by the negative and significant difference of the first two ratios. Concerning profitability (presented by the ratios R7 and R8) two cases may exist: the bank that has a probability of default generates a low profitability. Or, the bank seeks by all way to realize more revenues and therefore take more risks. Since profitability is an increasing function of risk (a positive mean difference indicated by the ratioR7). Moreover, an increase in profitability increases the excess risk and potential distress.

Correlation

The correlation between the explanatory variables and the dependent variable is presented in the table below. The majority of the explanatory variables have expected signs.

Table 5. The correlation between dependent variable et independents variables

		corrélation	T student
R1	Equity / Total Assets	-0.772876	-46.69796***
R2	Equity / Total loans	-0.563211	-26.13278***
R3	Net loans/ Total Assets	-0.217567	-8.546381***
R4	Total other operating income / Total Assets	0.253322	10.03998***
R5	Personnel expenses/ Total operating expenses	-0.058349	-2.240956**
R6	Total operating income / Total Assets	-0.450022	-19.32112***
R7	Net income / Equity (ROE)	0.143175	5.546553***
R8	Net income / Total Assets(ROA)	-0.355255	-14.57115***
R9	Total Deposits / Total Assets	0.070277	2.701125***
R10	Total Deposits / Total liabilities	-0.071572	-2.751183***

Significant at the level of : (***) 1%, (**) 5% or (*) 10%.

The correlation test shows that there is a strong relationship between the approximate ratio of the solvency position and banking problems. This is the similar case of management quality approximated by the ratio (Total Operating Income /Total Assets) and the ability to realize revenues represented by profitability (Net Income / Total Assets).

Logit model application:

This study covers a period exceeding one year. The econometric method used is the Logit Panel. Indeed, when using panel data, incorporating a fixed effect in an empirical model representing the individual effect of each bank assumes that the dependent variable can vary according to institutions independently of all the explanatory variables in the regression. Nevertheless, the use of fixed effect can lead to undesirable results when the estimation period is short (eg. only two years). Moreover, when the explanatory variable does not vary with time (eg. regulatory variables) we use the random effect. About the estimated qualitative Logit model, the fact, integrating a fixed effect requires exclusion from the sample of all establishments which have not had problems (well-capitalized banks). However, it is preferable to use a

random effects model since the use of this technique involves the loss of a significant amount of information (Demirguç-Kunt and Detragiache, 1998).

The use of the bivariate correlation between the explanatory variables shows the presence of dependence between certain variables. Then they were tested separately seeking the most significant outcome. Indeed, indicators are classified by their degree of relevance for explaining the deterioration in the ratio capital of banks. In addition, each ratio must pass through a sieve of introduction or elimination depending on his individual contribution to explaining the dependent variable. The dependence between the ratios retained must be low (see the Pearson correlation for independent variables). In fact, among the 10 ratios only five ratios were selected to avoid the problem of multicollinearity.

Table 6. Pearson correlations for independent variables

	R2	R4	R 6	R8	R10
R2	1.000000				
R4	0.310776	1.000000			
	(12.53606)				
R6	0.344680	-0.298530	1.000000		
	(14.07790)	(-11.99269)			
R8	0.374857	-0.165892	0.464892	1.000000	
	(15.50263)	(-6.449770)	(20.13204)		
R10	0.284409	0.228212	-0.030003	-0.112675	1.000000
	(11.37413)	(8.986933)	(-1.150869)	(-4.347731)	

Value in parentheses is the t-student

The estimation results of models are presented in the table below. First, we test the Logit model (model 1), where it was built only from the five CAMEL variables. Then, in the second model, we add variables related to the regulatory environment except the variable relating to the existence of a deposit insurance system (D2). The latter is subsequently added at the third model after the application of the principal component analysis (PCA).

By estimating these three models were found almost the same expected signs. The main activity of the bank is granting of credits. The ratio R2 (Equity / Total Loans) is the rate of recovery of loans granted by the equity. This ratio is one of the best indicators of banking problems. It has negative consequences on the likelihood of having problems of bank failures. Indeed, when this variable is high, the bank has enough funds to withstand difficultie

Table 7. Results for the Logit model application

	Variables	Model 1	Model 2	Model 3
R2	Equity/ Total loans	-1.249984***	-1.089388***	-1.111983***
R4	Total other operating income / Total Assets	0.486333***	0.3536902***	0.4349359***
R6	Total operating income / Total Assets	-.0227529***	-0.019039***	-0.026969***
R8	Net Income / Total Assets	-0.288018***	-0.2373362*	-0.371062***
R10	Total Deposits / Total liabilities	0.0419052	-0.139140***	-0.14169***
D1	Audit		-15.54379***	-11.41524***
D2	Deposit insurance		-	2.853437*
D3	Responsibility of supervisors		-14.05587***	-12.14776***
D4	Role of CB		-4.414858**	-10.3024***
C	Constant	-5.511353	27.6227***	24.10395***
	Wald chi2(5)	285.01	438.76	767.62
	Likelihood ratio test	401.81	107.34	104.62
	AIC	404.134	375.644	374.925
	BIC	441.195	428.588	433.163
	Number of observations	1472	1472	1472

Significant at the level of : (***) 1%, (**) 5% or (*) 10%.

The asset quality of the credit institution by the ratio R4 (Total Other operating Income / Total Assets) is significant and affects the probability of being in trouble positively. A high level of this ratio can be seen as a signal of presence of difficulty in banks.

Management quality represented by the ratio R6 (Total Operating income / Total Assets) is statistically significant and negatively correlated with the probability of default. The economic profitability of the bank (Earning / Total Assets) has an expected negative sign and it is significant at 1%. Most often under-capitalized banks have low profitability. The liquidity is approximated by R10 (Total Deposits / Total Liabilities) and is a positive sign. By this standard, a troubled bank is a bank that has a high proportion of deposits. Following a bank run, depositors rush to withdraw deposits for counters because they are worried about the health of their banks. During the first estimate (model1), this variable appears insignificant. On these variables prescribed type, it was seen that after applying the first model we found significant results with the exception of R10.

Following the introduction of variables related to the regulatory environment by estimating the second model, there was improvement in the quality of the model (D1 (Audit), D3 (Responsibility of supervisors) and D4 (Role of Central Bank) as proposed by Barth et al. (2001). This improvement is justified econometrically by smaller values of AIC and BIC criteria from the first estimated model and the degree of significance. The coefficients for the new variables have negative signs and are significant at 5%. If we compare the results of this second model to those of the first, it shows that the ratio (R10) became significant with a negative sign. This can be explained by the presence of an explicit deposit insurance system in these eight countries. Indeed, in the presence of these systems, depositors are protected in case of bank failure. Depositors have no need to remove their funds deposited with banks. Therefore, this guarantee of deposits may limit the bank runs.

The results show that the probability of banking distress is reduced when the auditor report to supervisors, by obligation, illegal activities such as fraud or abuse committed in the internal management by bank managers. The operation of the bank may be threatened by the audit check report prepared by the auditor and disciplined when it carry out this carefully and objectively. Hypothesis 1 is then accepted.

This probability is a decreasing function when it is possible to take legal action against the supervisors for their actions (hypothesis 3 is confirmed). This action has the role of early warning of distressed banks in order to encourage them to make adjustments to their capital. Accountability of supervisors creates greater regulatory discipline and makes more efficient the monitoring process. These two variables (D1 and D3) are significant at 1% level.

The coefficient of D4 (sign is negative) shows that the Central Bank plays an active role in monitoring and supervision and has authority to deal with the problems of failure. The exercise of control and supervision of the Central Bank is negatively correlated with the probability of being undercapitalized (This variable is significant at 5%). Hypothesis 4 is then accepted.

To approximate the variable D2, (presence of deposit insurance) a third model using factor analysis (principal component analysis is the procedure followed by Demirgüç-Kunt and Detragiache, 2008). This author examines the determinants of deposit insurance, along with other variables used in his study; he describes the deposit insurance scheme). Using a single factor (F) presenting the three critical variables of a system of deposit insurance (The administration of funds; Coverage of deposits i.e. foreign, co-insur-

ance and interbank; and Financing of the premium) shows that the probability of difficulty increases with the presence of such a guarantee fund. The presence of such a system discourages depositors to monitor their banks because they feel protected.

Therefore, banks do not respect market discipline that motivates them to take more risks. This result is significant only at a threshold of 10%. Hypothesis 2 was therefore rejected. Whatever the model, the probability of having problems and being undercapitalized is negatively correlated with the solvency ratio, quality management, economic profitability approximated by ROA (return on assets) and the share of deposits in liabilities. By cons, this probability is an increasing function of income from other activities.

Furthermore, a bank in distress has the following characteristics:
- A low capital ratio,
- a poor quality of management,
- a low profitability,
- Important revenues from other activities and a small proportion of deposits compared to total liabilities.

Finally, we can conclude from the results that the banking supervision has a significant effect on the detection of potential problems in the credit institutions. The results of our study also indicate that the regulatory environment influence risk taking by financial institutions. The use of an advanced detection system incorporating external variables related to the regulatory environment is very useful for European banks. We found that a bank can resist to the turbulence when it has an explicit insurance system, when the central bank has monitoring power and take disciplinary measures to supervisors for their management.

Conclusion

This paper presented a model for detecting problems that the distressed banks may know.

The sample consists of 368 institutions from eight countries. The analysis showed that financial ratios relating to the rating system for predicting default CAMEL are correlated with the likelihood of problems measured by binary variables.

A bank in distress, which represents specific characteristics, can be summarized as follows: a low ratio of capital, poor management and low profitability. In front of difficulties, banks earn significant revenues from non-traditional activities. This result confirms the idea which concludes that regulation encourages banks to take more risks by circumventing the regulatory framework. Thus, diversification of activities complicates the monitoring system and increases the likelihood of difficulties. The establishment of deposit insurance systems which protects the depositors and makes risk-taking more expensive would further aggravate the moral hazard. So believing they are protected, the banks take more risks. In return, the presence of auditors providing information to regulators in case of rules default reduces potential problems in the banks. Moreover, sanction against negligent managers would be recommended. Similarly, the decreasing relationship between default probability and the role of the Central Bank in monitoring activity demonstrates that this organization plays an important role in maintaining stability and control of credit institutions. Overall, the results of the analysis, given the limitations of the technique have confirmed that a robustness tightening of supervision and control are able to reduce the probability of credit institutions distress. This conclusion might create problems of costs to establish this measure. From another point of view, it is likely to encourage banks to innovate more and harden supervision. Ultimately, we note that this study can be further enriched if one takes into account other types of variables.

Indeed, the predictive power of the model can be improved by adding variables that take into account the macroeconomic environment (inflation, growth rate of GDP, (Wong, 2010)). We can also add variables which describe the state of governance (internal, external) or use artificial intelligence as the adaptive Neuro-Fuzzy inference system (Giovanis, 2010) and artificial neuronal network (Shu and Lin, 2010).

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Collaborative Capacity Building for Community-Based Small Nonprofit Organizations

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ABSTRACT

This article focuses on the inter-organizational networks and adaptive capacity among nonprofit organizations in the State of Florida. Adaptive capacity is a function of the degree to which social institutions (e.g., government, civic institutions, and the private sector) possess a culture that empowers communities to make decisions and actions that support community-led initiatives. The article specifically focuses on network formation and sustainability among 40 nonprofit organizations and their networks with other cross-sector organizations identified as part of the asset mapping for the Strengthening Communities in Central Florida (SCCF) project in the state. Network relationships were strengthened and developed especially after the implementation of the capacity building program. Organizational factors such as leadership and the level of an organizations' engagement with the community have a statistically significant relationship with the adaptive capacity of the organizational network.

***JEL Codes**: D2, D4*

KEYWORDS

Adaptive Capacity, Inter-Organizational Networks, Network Analysis, Nonprofit Organizations, Capacity Building

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Introduction[1]

Inter-organizational networks are becoming the new shape of governance as they bring more opportunities to increase the capacities of communities (Gazley, 2008; Koliba, Meek and Zia, 2010; Provan and Kenis, 2007). Large scope services such as health care delivery, disaster preparedness and response, or disease control exceed the capacity of single organizations and require community capacity for collective action (Bryson, Crosby and Stone, 2006; Stone, Crosby, and Bryson, 2010; Provan, Nakama, Veaize, Teufel-Shone, and Huddleston, 2003). Improving communities' capacity to achieve service delivery goals increases their well-being. Fostering involvement of community stakeholders, especially nonprofit organizations, and other actors for service provision distributes the overall burden of individual organizations and benefits them (Bryce, 2005; Cruntchfield and Grant 2008).

Developing community capacity, establishing strong networks, increasing the capacity of existing ones, and adapting them to changing environmental conditions remain important tasks. A broad range of literature discusses the experiences and methods used to foster community capacity, network adaptive capacity, and network effectiveness. Chaskin (2001) defines community capacity building as "the interaction of human capital, organizational resources, and social capital existing within a given community that can be leveraged to solve collective problems and improve or maintain the well-being of a given community" (p. 295). Organizational success and effectiveness is closely related to the effectiveness of the network that the organization participates with. In some cases the effectiveness of a network may be given precedence over effectiveness of the individual organizations since some organizations reach their goals through the success of the networks they are part of. Provan and Milward's (1995, p.2) following statements highlight this point: "effectiveness must be assessed at the network level, since client well-being depends on the integrated and coordinated actions of many different agencies."

Network change and adaptation are critical for the success and effectiveness of service delivery networks as well as the individual organizations. In order to address network adaptation and capacity for better service delivery, the study aims to answer the following research questions as well as open new avenues for future research:

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What is network adaptive capacity? What are the key characteristics of adaptive networks? What intervention strategies and incentives work to increase the capacity of networks and build relationships among community nonprofit organizations? This article focuses on inter-organizational networks and the adaptive capacity among nonprofit organizations at the local level. This article specifically focuses on network formation and sustainability among 40 nonprofit organizations and their networks with other cross-sector organizations identified as part of the asset mapping for the Strengthening Central Florida Communities (SCCF) Fund project in three counties in a southeastern state. This research is timely and critical as the funding for this project focuses on economic recovery and the role of nonprofits in counties that are located in a distressed part of the state.

Literature Review

A relationship similar to one between individuals and organizations exists between individual organizations and inter-organizational networks (Knight, 2002). Reviewing the literature on organizational learning and development, capacity building, and change is necessary for understanding how these functions work at the inter-organizational network level. Organizational change and adaptability are closely associated concepts that are widely discussed in the literature (Argyris and Schön, 1996; Denison and Mishra, 1995; Kapucu, Healy, and Arslan, 2011). Adaptation, learning, or coping might be a slow, constant evolutionary process or a reflex for the purpose of maintaining a successful organization (Weick and Quinn, 1999). They also occur as a response to changes in the organizational environment (DiMaggio and Powell, 1983; Fiol and Lyles, 1985) and to avoid failure of the organization (Kraatz, 1998). Pelling and High (2005) categorize adaptations in two ways. The first type of adaptation reinforces existing systems or organizations (e.g. bureaucracy), whilst the second one modifies institutions through flexibility and adds resilience to organizations (e.g. rural culture or livelihood). Some consider network and organizational survival a function of adaptive capacity which is highly associated with the initial design of the structure of the organizations as well as the networks (Aldrich, 1999; Boin, Kuipers and Steenberger, 2010).

Staber and Sydow (2002) clearly differentiate between organizational adaptation and adaptive capacity. They argue that an adaptationist approach does not tolerate any unproven structures or changes within the organization that conflict with

organizational goals and drain organizational resources. Adaptation is relatively a predictable move and aims to create a best fit to the conditions for maximum exploitation. On the other hand, adaptive capacity can be considered "when learning takes place at a rate faster than the rate of change in the conditions that require dismantling old routines and creating new ones" (Staber and Sydow, 2002, p. 410-411). Adaptive capacity goes hand in hand with learning and offers continuous development, institutional memory, knowledge acquisition, and connectedness and communication with other members in the community.

Although change, learning, and adaptation do not connote the same meaning, there is a strong association between these concepts (Fiol and Lyles, 1985). Knight and Pye (2004) draw a line between learning and adaptation in a network or organization. They argue that strategic change represents a set of actions for change within a limited time frame and under the control of management, while network learning is a process that excludes hierarchy or formal administrative regulations. Adaptability and coping ability are imperative for effectiveness, organizational development and the general health of an organization (Knight and Pye, 2004). This means that every change in the organization may not stem from learning, some changes could result from imitation as DiMaggio and Powell (1983) note. However, learning may trigger change and development in the organization.

Organizations learn when knowledge is learned by individuals, or an individual with new knowledge joins the organization. Some suggest that knowledge could be learned by an organization only if it is institutionalized and becomes an asset of the organization (Argyris and Schön, 1996; Crossan, Lane, White, and Djurfeldt, 1995; Knight, 2002; Knight and Pye, 2005). Knight (2002) argues that learning is not limited to a specific group and adds that individuals, group of individuals, organizations, and networks can learn. Organizational and network learning outcomes can be behavioral and cognitive (Crossan et al., 1995; Denison and Mishra, 1995; Knight and Pye, 2005).

Inter-organizational Networks and Collaborative Capacity

The type and structure of interorganizational relationships creates various impacts on the capacity of communities as well as the adaptive capacity of service delivery networks. For example, Paarlberg and Varda's (2009) study shows that interorganizational networks may expand a community's carrying capacity (i.e. scope

of the resources to feed organizations) and allow a greater number of organizations to function within a community. Interorganizational networks catalyze the flow of information, development of confidence, and publicity for smaller organizations which helps them to gain resource flexibility and survive. To explain this situation, Paarlberg and Varda note that "new or less visible organizations developing relationships with larger, more established organizations may build public confidence in new services, attracting customers and other investors" (2009, p. 600).

Interorganizational networks not only help organizations to gain flexibility, but they are adaptable as well. Knoppen and Christiaanse (2007) discuss inter-organizational adaptation (IOAD) from technical and behavioral perspectives. According to them the technical dimension of IOAD "embraces explicit and visible relationship attributes which may be consciously decided upon and designed by both partners" (p. 219). The behavioral dimension, on the other hand, embraces the invisible and implicit relationships between the partnering organizations. The authors also integrate social capital into their theoretical discussions and highlight its positive impact on value creation, change, and organizational outcomes.

According to Knoppen and Christiannse (2007), networks affect development and inter-organizational adaptation in three ways. First, IOAD touches upon the common cognitive structure of partnering organizations. This refers to the establishment of common values, operations, and resources that are operational for all partners through the mutual recognition of connectedness. Second, IOAD addresses the interconnectivity of networking organizations, the connectivity and multiplexity of their relations, and the density and structure of network relationships. Third, IOAD refers to the alignment of goals, motivations, attitudes, and expectations of the associated organizations. Other studies also emphasize social capital's role in the reduction of transaction costs and strengthened connectedness of actors in a network (Pelling and High, 2005). Kraatz's (1998) findings indicate that smaller, more homogeneous, and older networks promote high capacity information links between participating organizations and that social learning occurs as a way of intra-network imitation. This strengthening of ties between members of a network increases trust, interaction, communication, information sharing, and diffusion of innovative ideas which translate into increased adaptive capacity in a network (Bouty, 2000; Tsai and Ghoshal, 1998). For example, in a study examining the relationship between network ties and organizational growth, Galaskiewicz et al. (2006) found that nonprofits that depended on the financial and operational support of the community had a higher

rate of growth if they were associated with urban leaders.
Cohen and Levinthal (1990) note that the internal and external network connections of an organization create an awareness of existing resources in the environment and can help that organization to strengthen its absorption capacity. Despite this, strong ties are necessary for managing the change under uncertainty so that the history of connections extends and the structure is more homogenous, in some cases weak ties can provide enough information for organizational change as well (Granovetter, 1973; Krackhardt, 1992; Kraatz, 1998). As opposed to weak ties in larger heterogeneous networks, small networks with strong ties provide more legitimacy in accepting information flowing from other network members and imitating them in terms of significant changes. Krackhardt (1992) notes that information is not enough for a major change in an organization but strong relationships provide the trust needed to propagator change and development.

Intervention Strategies for Collaborative Capacity

Management consultation, trainings, coaching, financial assistance, and technical assistance are some of the intervention strategies that are widely used and discussed. Consultations address process-related issues and improve the functioning ability of organizations. Strategic planning and employee-supervisor conflicts are examples of topics that are covered by consultations (Backer, Bleeg, and Groves, 2004; De Vita and Fleming, 2001). Trainings teach a variety of skills and abilities to managers and staff in organizations. Coaching includes efforts to clarify organizational goals, promote interactive learning, remove obstacles, and improve coachee's performance through mobilizing their own potential (Clutterbuck and Megginson, 2008; Cummings and Worley, 2009).

Efforts to develop community capacity focus on two different methods. The traditional way asserts solving community problems with external intervention while the alternative path focuses on development via the internal assets of the community. Asset-based development focuses on preserving and enhancing the values and potential of the community. It concentrates on effectiveness, building interdependencies, talent utilization of individuals, and empowering people in the community (Kretzmann and McKnight, 1993). Asset mapping is a method used in asset-based community development and can be defined as a systematic identification of tangible and intangible values and assets in a community (Kerka, 2003).

Varda (2011) finds that intervention strategies and "state society synergy" can strengthen community level social capital and networks. Literature on networks and organizational adaptive capacity suggests that organizational and network learning, inter-organizational ties and relationships, and social capital contribute to developing network adaptive capacity. Moreover, direct intervention strategies such as trainings and coaching also help to develop individual organizational capacity which contributes to developing overall network adaptive capacity.

Figure 1. Conceptual Map of Network Capacity

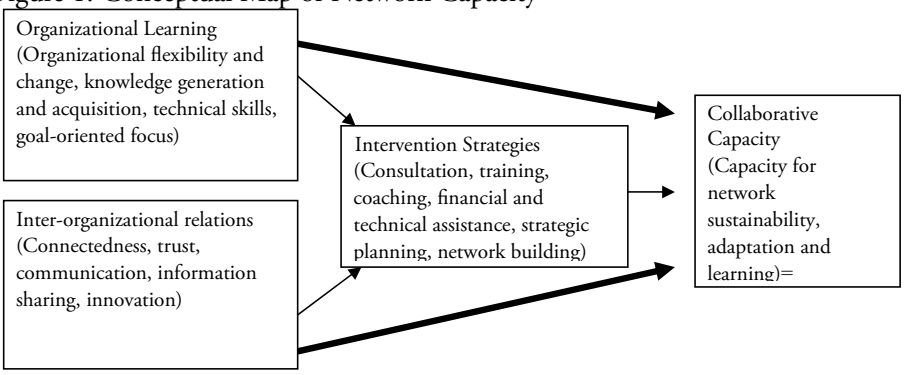


Figure 1 visualizes the conceptual association between predictors of building collaborative capacity. Connectedness in inter-organizational networks and the social capital between institutions and individuals who represent the organizations play an important role in the distribution of information, and establishment of a cognitive structure. They also help organizations and networks build adaptive capacity via operating on a common ground, sharing resources, and leading the change as opposed to following change in the environment. Leading change is in line with organizational and network learning because adaptive capacity develops when knowledge building occurs at a greater pace than environmental change. In order to enhance adaptive capacity, intervention strategies might be helpful in injecting external support through trainings and coaching activities. This means intervention strategies can foster inter-organizational social capital, network learning, and organizational adaptation and change (i.e. cognitive change and innovation).

Context of the Study

The Strengthening Central Florida Communities (SCCF) Fund program was funded by the U.S. Department of Health and Human Services Agency was conducted by the University of Central Florida. The goal was to provide capacity building training, technical assistance, and financial assistance to 10 faith-based and community organizations to empower them to address the broad economic recovery issues in three distressed counties in the state. The SCCF offers training and technical assistance opportunities for nonprofits, to assist in the transformation and improvement of their service delivery systems, by addressing the broad economic recovery issues present in these counties. By the end of the project, the research center at the university aimed to assist these organizations in increasing their sustainability and effectiveness, enhancing their ability to provide economic recovery social services, and creating collaborative service delivery mechanisms to better serve those most in need. These ten organizations are the core of the program, there are other organizations which participated in the program but received different and less intense technical and financial assistance.

Through a structured, but customized program, faculty, staff, and expert practitioners in the community provided over 30 hours of capacity building training to a total of 40 organizations. The trainers, plus graduate researchers, devoted over 430 hours of focused and customized technical assistance to 20 organizations which also received awards of financial assistance. The documented needs for improved nonprofit organization performance are in the critical areas of: organization development, collaboration and community engagement, and evaluation of success. Unemployment and poverty rates in the service area demonstrate two aspects of the distressed communities.

Methodology

The article focuses on the network formation and sustainability of 40 nonprofit organizations, and their networks with other cross-sector organizations, identified through asset mapping as part of the SCCF project in study area counties. During the first cycle of the program, 40 SCCF project participants were surveyed before and after the program. 39 organizations responded to the pre-program survey (March 2010), and a total of 25 responses were collected for the post program survey (October 2010); the first network analysis was conducted to determine changes in

the overall network of 40 agencies. The second network analysis was conducted to analyze change in the network of 23 agencies that responded both to the first and the second survey. The third network analysis was conducted to analyze change in the network of 10 core organizations that responded to the two surveys and received training, financial and technical assistance.

In the initial phase of the program, the project team intervened with different methods and incentives to increase the effectiveness of existing networks among community organizations and to build further relationships. Utilizing network analysis tools and procedures provides researchers with a useful means for measuring network structure and strength, as well as sustainability (Provan, Veaize, Staten, and Teufel-Shone, 2005). This research uses UCINET, a widely used social network analysis software program developed by Borgatti, Everett, and Freeman (2002), in the analysis of network data. UCINET is capable of providing visual and numerical representations of network relationships including cliques and subgroups, and major network centrality measures such as degree, betweenness, closeness, and eigenvector. Cliques and subgroups are nodes in a network which represent a higher connectedness to each other than the rest of the network. Subgroups can be considered the components of larger networks and it is argued that the study of large groups and social structures might start from smaller components such as cliques via a bottom up approach. Cliques and subgroups represent the structural patterns of a network and the behavior or preference of a node in the network.

Degree centrality explains the connectedness of a node within the network. It lays out the number of incoming and outgoing connections that a node has within the network. Betweenness centrality focuses on the mediating role of an actor in the network. It identifies to what degree an actor lies between the pathways of other actors, or how many nodes it connects to each other (Scott, 2009). Closeness centrality represents an actor's average path length to reach other nodes. The closeness of an actor is associated with the number of connections it has and the number of mediating actors it is connected to. A node's closeness to others is associated with both the ties incoming and outgoing to other nodes. Eigenvector centrality focuses on not only how many connections a node has, but also whom it is connected to. This approach is useful for detecting a central actor in large network settings (Knoke and Yang, 2008).

In addition to network analysis, a multiple regression analysis was conducted based on the survey responses of 39 organizations in the pre-program stage of the first

cycle. The analysis intended to analyze the relationship between human resources, the financial situation, community engagement, and leadership as independent variables, and adaptive capacity as the dependent variable. The main assumption, based on the literature, is that organizational and relational factors influence the level of adaptive capacity of organizations. This analysis was conducted using index variables created based on the item questions representing each index (see Table 14). Lastly, the study included the results of a survey of 10 core organizations that were participants in the first cycle of the SCCF program. This survey sought to attain additional qualitative insight about participants' view regarding the impact of the program on their capacity, organizational effectiveness, and community engagement.

Results and Analyses

This section comprises of survey results and network analyses. First, a snapshot of descriptive statistics is provided, followed by the network analysis of responding organizations, reflecting the organizational relationships before and after implementation of the program. Third, the results of a multiple regression analysis were provided and discussed. The regression analysis helped to explore the relationship between organizational and relational factors, and organizational capacity. Lastly, a review of the results of a qualitative survey administered to10 core agencies that received both training, financial assistance, and technical assistance is provided.

The response rate of the survey administered before and after the program was implemented varies. Thirty nine participants responded before the program, and the number of responses dropped to 25 after the program. Twenty three organizations were common in both surveys and the 10 core organizations also responded to both the close ended and open ended survey questions. The average number of board members and staff size for the 39 agencies before the program is 7.29 and 8.71 respectively, while the average number of board members and staff size for the 25 agencies after the program is 7.00 and 8.27. For the descriptive statistics of other relative questions chosen from the survey see Table 1. Generally, the descriptive statistics reveal that participants are not significantly dependent on collaborative approaches to sustain their organizational capacity. The results show that the SCCF program is a good fit for the participants, especially for those who are interested in increasing their organizational capacity through partnerships.

Table 1. Descriptive Statistics for Responses before and after Program Implementation (empty cells mean the response count is 0)

Q. #	Question/Statement	Response Options	Before Program (N = 39)				After Program (N = 25)			
			Freq	%	Valid %	Cum. %	Freq	%	Valid %	Cum. %
Q. 19	What is your total budget this fiscal year?	0-100,000	18	46.2	46.2	46.2	12	48.0	48.0	48.0
		100,001-300,000	11	28.2	28.2	74.4	9	36.0	36.0	84.0
		300,001-500,000	4	10.3	10.3	84.6	1	4.0	4.0	88.0
		500,000+	4	10.3	10.3	94.9	3	12.0	12.0	100.0
		not sure	2	5.1	5.1	100.0				
Q. 28	Which of the following provides the primary source of funding for your organization?	Individuals	20	51.3	57.1	57.1	14	56.0	58.3	58.3
		Government	8	20.5	22.9	80.0	2	8.0	8.3	66.7
		Foundations	3	7.7	8.6	88.6	3	12.0	12.5	79.2
		private corporation	1	2.6	2.9	91.4	2	8.0	8.3	87.5
		Other	3	7.7	8.6	100.0	3	12.0	12.5	100.0
Q. 33	Is your present level of funding adequate for the number of projects and services you offer?	No	32	82.1	86.5	86.5	23	92.0	92.0	92.0
		Yes	5	12.8	13.5	100.0	2	8.0	8.0	100.0
Q. 49	Do you presently work with other community organizations?	No	1	2.6	2.9	2.9	1	4.0	4.0	4.0
		Yes	34	87.2	97.1	100.0	24	96.0	96.0	100.0
Q. 75	My organization has a written plan in case of leadership transition or turnover?	strongly disagree	4	10.3	11.1	11.1	2	8.0	8.3	8.3
		Disagree	8	20.5	22.2	33.3	8	32.0	33.3	41.7
		Neutral	8	20.5	22.2	55.6	5	20.0	20.8	62.5
		Agree	8	20.5	22.2	77.8	7	28.0	29.2	91.7
		strongly agree	8	20.5	22.2	100.0	2	8.0	8.3	100.0
Q. 81	Changes in this organization are consistent with changes in the surrounding community	strongly disagree								
		Disagree								
		Neutral	8	20.5	23.5	23.5	4	16.0	16.7	16.7
		Agree	14	35.9	41.2	64.7	12	48.0	50.0	66.7
		strongly agree	12	30.8	35.3	100.0	8	32.0	33.3	100.0
Q. 82	The structure of this organization is well-designed to help it reach its goals	strongly disagree	1	2.6	2.9	2.9				
		Disagree	2	5.1	5.7	8.6				
		Neutral	10	25.6	28.6	37.1	7	28.0	29.2	29.2
		Agree	10	25.6	28.6	65.7	7	28.0	29.2	58.3
		strongly agree	12	30.8	34.3	100.0	10	40.0	41.7	100.0
Q. 87	This organization favors change	strongly disagree								
		Disagree	4	10.3	11.4	11.4	4	16.0	16.7	16.7
		Neutral	4	10.3	11.4	22.9	1	4.0	4.2	20.8
		Agree	12	30.8	34.3	57.1	7	28.0	29.2	50.0
		strongly agree	15	38.5	42.9	100.0	12	48.0	50.0	100.0
Q. 88	This organization has the ability to change	strongly disagree	1	2.6	2.9	2.9				
		Disagree	1	2.6	2.9	5.7				
		Neutral	2	5.1	5.7	11.4	2	8.0	8.7	8.7
		Agree	18	46.2	51.4	62.9	8	32.0	34.8	43.5
		strongly agree	13	33.3	37.1	100.0	13	52.0	56.5	100.0

Network Analysis

The surveys administered included questions for identifying friendship, actual work, and willingness to collaborate networks among the participating organizations. The analysis was conducted in both pre-SCCF and post-SCCF stages. This section is divided into three parts analyzing the networks with complete responses (39 for pre-program and 25 for post-program), analyzing the networks of the 23 organizations that responded to both pre- and post-program surveys, and networks of the 10 core agencies. Based on the responses degree, betweenness, eigenvector, and closeness centralities were calculated for each network.

Table 2 indicates the descriptive statistic results of the overall *friendship network* in the beginning of the program at both meso and macro levels. At the meso (average node) level, nodes have an average of 4 incoming and 4 outgoing connections with each other. This number is not quite high for a network of 40 organizations with 39 survey respondents. However, there is significant variation in the number of connections that a node has in the network. For Outdegree and Indegree, the range is 26 and 19 where standard deviation is 5.876 and 3.581 respectively. The range difference between the Outdegree and Indegree is important because it shows the homogeneity of the relationship structure within the network. The difference between these two ranges indicates an outgoing type of relationships which means that organizations are identified as friends by others without their knowledge. At the macro (entire network) level of analysis, network centrality for the Outdegree and Indegree is 48.724% and 33.176% respectively. These figures imply concentrated and heterogeneous relationships in the network. Betweenness centrality results indicate a significant variation in the nodes' betweenness values. This is understandable as some actors in the network were isolated while some had a significantly high number of connections with others.

Overall network centralization is relatively low implying that organizations can reach others without intermediaries. Eigenvector values indicate similar results in terms of the pattern of relationships and the structure of the network. The mean value is 0.109 with a standard deviation of 0.097, suggesting that there are inequalities in the actor centrality of power within the network. The network centralization index of eigenvector centrality is 52.33% indicating a heterogeneous structure in the network with respect to the centrality of power within the network. Closeness centrality figures in the table indicate an average Incloseness of 3.719 with an Outcloseness of 10.733. There is also a significant variation in Outcloseness measures of the network. The average distance of a random node to other nodes is measured as 3.155 implying that any node in the network can reach a random peer in the network through an average of 3 connections.

Table 2. Descriptive Statistics for Pre and Post-Program Friendship Network

Q-48	OutDegree		InDegree		Betweenness		Eigenvector		InCloseness		OutCloseness	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	post
Mean	4.064	3.840	4.064	3.840	44.574	10.100	0.109	-0.075	3.719	2.351	10.743	2.444
Std Dev	5.876	6.117	3.581	3.635	95.223	25.545	0.097	0.120	0.357	0.385	9.528	0.703
Sum	191.000	192.000	191.000	192.000	2095.000	505.000	5.115	-3.735	174.808	117.572	504.899	122.200
Var.	34.528	37.414	12.826	13.214	9067.450	652.536	0.009	0.014	0.127	0.148	90.782	0.494
Min.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.530	2.128	2.000	2.128	2.000
Max.	26.000	24.000	19.000	15.000	364.417	113.083	0.418	0.000	4.152	3.091	29.487	4.217
Obs.	47.000	50.000	47.000	50.000	47.000	50.000	47.000	50.000	47.000	50.000	47.000	50.000

	Pre	Post
Network Centralization (degree centrality)	= out: 48.724% - in: 33.176%	= out:41.983% - in: 23.240%
Network Density	= 0.0883	= 0.0784
Network Centralization Index	= 15.79% (betweenness centrality)	= 4.47% (betweenness centrality)
Network Centralization Index	=52.33% (eigenvector centrality)	=12.58% (eigenvector centrality)
Average distance (among reachable pairs)	= 3.155	= 2.075
Distance-based cohesion (Compactness)	= 0.205	= 0.168

The post-program work network results shown in Table 2 indicate slight differences compared to the pre-program work network shown in the previous table. The average number of links between nodes and standard deviations has not changed much, only the betweenness centrality values reflect a significant increase from 3.149 to 8.580. This change is also captured in the network centralization indices which exhibit a move towards a more heterogeneous network after program implementation. Moreover, more nodes are now playing a mediating role in the network and are influencing the network's homogeneity. Average path distance has also increased from 2.035 to 2.631, which validates the heterogeneity of the network since nodes need to use more mediators rather than direct links in the post-program network as shown in the centrality indices.

Based on the four centrality measure results at the micro level (individual level), Spotlight Outreach Ministries, First Community Christian Pentecostal (F.C.C.P.) Church of God, and Simeon Resource and Development Center for Men (Simeon Resource) have the top three outgoing connections with other actors in the network respectively. Workforce Central Florida, United Way of Lake and Sumter Counties, and Heart of Florida United Way have the most incoming connections with other actors, reflecting that these organizations are most frequently identified as a friend by other actors in the network. X-Tending Hands has the strongest brokerage role in the network because it indirectly connects the most number of actors in the network. Workforce Central Florida is the most easily reachable agency in the network while Spotlight Outreach Ministries is the agency that is closest to other agencies because of the number outgoing friendship ties it has.

Figures 2 and 3 illustrate the friendship networks of participating agencies before and after the program. The friendship network specifies which organization knows or is affiliated with which organizations. Ties with arrows represent the direction of the relationship. Circle shaped nodes represent the core ten agencies in the study that received both training, and financial and technical support.

Table 2 provides a comparison of pre and post program network structures. In the post program network, the average number of connections per node is 3.840 with a standard deviation of 6.177 which shows that there are a smaller number of connections and higher levels of variation in comparison to the pre-program friendship network. The table also indicates a decline in betweenness centrality

values. The values reflect a more homogenous network structure with respect to nodes' betweenness and eigenvector centralization indices. There is also a decline in the average path distance between two random nodes in the network, changing from an average of 3.155 (pre-program) to 2.075 (post-program).

Figure 2. Pre-Program Friendship Network (39 respondents)

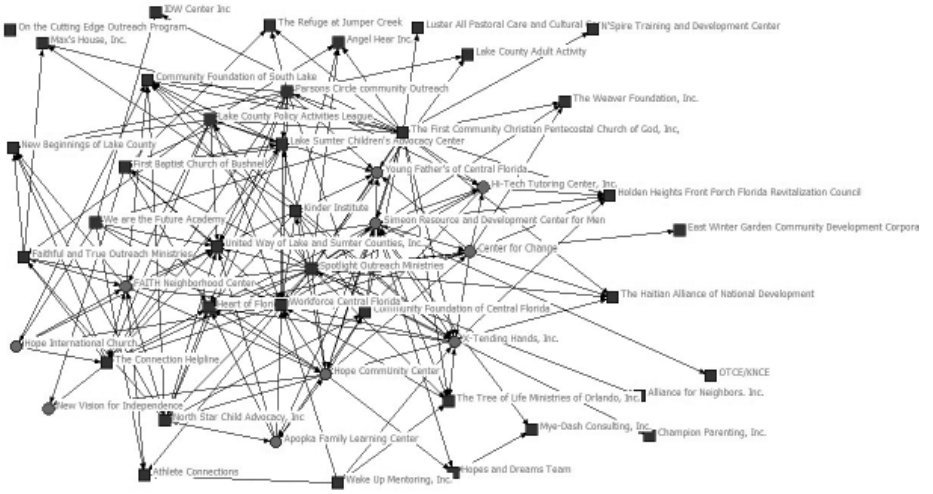
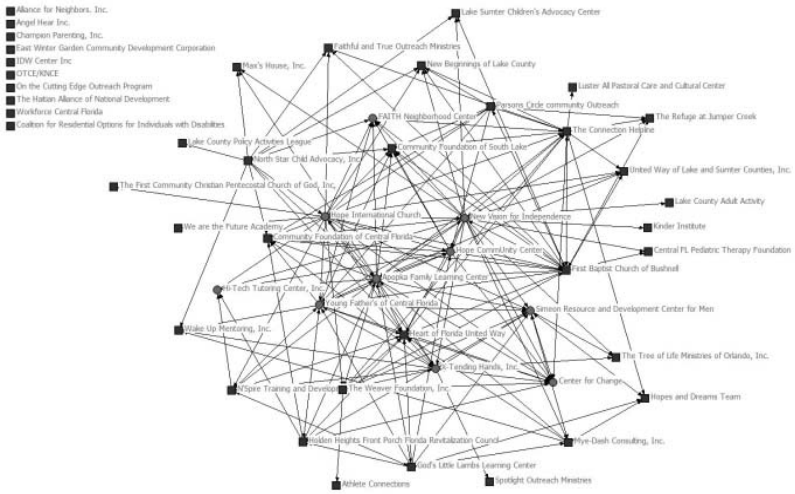


Figure 3. Post-Program Friendship Network (25 respondents)



Other agencies, which were central players in the pre-program results, have not experienced a significant increase in connectedness in the post-program network. This may be attributed to the relatively low response rate of the second survey and the incomplete picture of improved relationships between organizations. Figure 2 captured the pre-program friendship network and only showed one isolate, while the new network in Figure 3 (due to a lower response rate) shows ten isolated nodes. Overall, the friendship network looks similar to the pre-program friendship network. Based on the individual node positions in the network, the New Vision for Independence, Hope International Church, Apopka Learning Center, Young Fathers of Central Florida, and X-Tending Hands have significantly increased their relationship ties with other agencies in the network.

Table 3 summarizes the centrality results of the *advice network* of organizations based on survey responses relating to current work relationships between organizations. The table illustrates that there is an average of one link between organizations in the network. However, there is a substantial variation (2.347 standard deviation) in the distribution of the number of connections per node. The number of connections varies between 0 and 12. Betweenness centrality results indicate that the average betweenness score for a node is 3.149. This value is quite high when compared to degree centrality, although the overall centrality index (3.98%) is quite low. This implies that there is a homogenous distribution of betweenness centrality in the network. Similarly, the network centralization index of the eigenvector measure indicates a relatively homogenous network structure. The results also show that there is an average of 2 links between two random nodes within the network.

Based on the centrality measures at the individual node level, F.C.C.P. Church of God, Simeon Resource, and X-Tending Hands have the highest outgoing connections, suggesting that they work with their peers more often than other organizations in the network. A majority of the organizations identified Workforce Central Florida as an agency that they work with. This shows that it is the most preferred partner with respect to work relations in the network. Simeon Resource has the highest bridging power in the network. Both incoming (four links) and outgoing (nine links) ties bear a strong connector role to the organization. Based on the connections it has, Workforce Central Florida is the most easily accessible (closest) organization to other agencies. F.C.C.P. Church of God is the agency that can reach others through the shortest path because of the high Outdegree centrality or outgoing links it has.

Table 3. Descriptive Statistics for Pre and Post-Program Work Network

Q-49d	OutDegree		InDegree		Betweenness		Eigenvector		InCloseness		OutCloseness	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	post
Mean	1.064	1.080	1.064	1.080	3.149	8.580	0.092	0.064	2.290	2.263	2.325	2.346
Std Dev	2.347	2.058	1.359	1.440	10.935	23.807	0.113	0.126	0.213	0.294	0.427	0.613
Sum	50.000	54.000	50.000	54.000	148.000	429.000	4.307	3.210	107.613	113.145	109.270	117.297
Var.	5.507	4.234	1.847	2.074	119.574	566.765	0.013	0.016	0.046	0.086	0.182	0.376
Min.	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	0.000	2.128	2.000	2.128	2.000
Max.	12.000	9.000	12.000	7.000	65.500	127.600	0.485	0.541	2.926	2.827	4.440	3.880
Obs.	47.000	50.000	47.000	50.000	47.000	50.000	47.000	50.000	47.000	50.000	47.000	50.000

	Pre	Post
Network Centralization (degree centrality)	= out: 24.291% - in: 13.185%	= out: 16.493%- in: 12.328%
Network Density	= 0.0231	= 0.0220
Network Centralization Index	= 3.08% (betweenness centrality)	= 5.16% (betweenness centrality)
Network Centralization Index	= 66.75% (eigenvector centrality)	=80.22% (eigenvector centrality)
Average distance (among reachable pairs)	2.035	= 2.631
Distance-based cohesion (Compactness)	0.041	=0.053

Figure 4. Pre-Program Work Network (39 respondents)

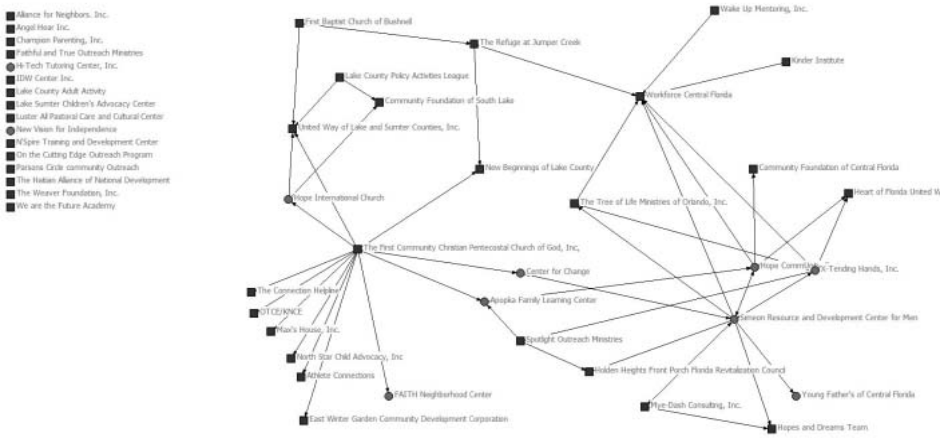
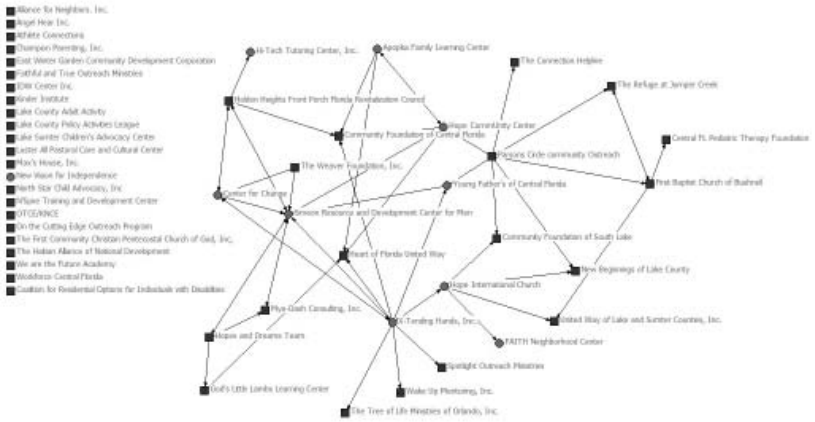


Figure 5. Post-Program Work Network (25 respondents)



Figures 4 and 5 depict the work network of the participating agencies. Some of the nodes in the networks are isolated from others because they did not report partnering with others in their work environment. As shown in Figure 5, there are more isolated nodes when compared to Figure 4, this reflected pre-program results due to a lower response rate. The post-program network also depicts patterned changes in the relationships between agencies. There were an important number

of dyads and triads in the pre-program work network whilst more connections appear between organizations in the post-program network. Advice network results for individual nodes indicate changes in organization rankings. X-Tending Hands, Hope International Church, Center for Change, and Apopka Family Learning Center now have an increased number of work connections with other organizations which reflects a higher level of cooperation between them.

Willingness to Collaborate Network

Organizations were not only asked about their existing affiliation and work relationships but were also asked about the collaborative relationships they want to develop. Results in Table 4 indicate that there is an average of 2.382 incoming and outgoing links per node in the preprogram network. Similar to other networks measured, there is high variation in this network. Standard deviation in Outdegree (6.803) is nearly three times larger than the mean value; however the standard deviation is quite small for Indegree results. This is because one agency identified all other organizations in the roster as potential partners. Moreover, there is an average of a 4.149 betweenness value per node with a significantly high standard deviation (10.657) and a range of 43. The density of the network is measured as 0.0518 which means only nearly 5% of the potential network connections were actualized. Network centrality indices (1.92% and 9.08%) imply a relatively homogenous network structure. The average path distance between two random nodes is less than two (1.848) which means a node in the network can reach a random actor in the network through less than two links.

In the post program network the average number of links per node has declined from 2.383 to 1.440 and there is also a significant decline in the variance of degree centrality. These changes might have occurred for two reasons: the lower response rate in the post-program survey, and the organization that identified all other nodes as potential future partners. There is an increase in the average betweenness centrality value which implies more mediators functioning in the post-program network as opposed to nodes having more direct links with others. This leads to an increase in the heterogeneity of the network and also leads to an increase in the average path distance between two random nodes in the network.

Based on the analyses of the organizations which are seeking cooperation and are sought for cooperation, Hope Community Center is an organization which seeks

cooperation more than any other agency in the network. F.C.C.P. Church of God is the second organization that is most willing to cooperate with other agencies. Workforce Central Florida, Hearth of Florida United Way, and Community Foundation of South Lake are the top agencies that others are willing to work with.

Figures 6 and 7 visualize the structures of willingness to work networks before and after the program. For the individual organizations seeking a high level of cooperation and being sought for cooperation, a dramatic change of in-degree centrality for Simeon Resource indicates a significant demand from other organizations to partner with the organization. Results also show that X-Tending Hands, Simeon Resource, Hope International Church, Young Fathers of Central Florida, and New Vision for Independence want to partner with other actors in the network.

Table 4. Descriptive Statistics for Pre and Post Program Willingness to Collaborate Network

Q-69	OutDegree		InDegree		Betweenness		Eigenvector		InCloseness		OutCloseness	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	post
Mean	2.383	1.440	2.383	1.440	4.149	10.100	-0.121	-0.075	2.386	2.351	5.450	2.444
Std Dev	6.803	2.351	1.745	1.813	10.657	25.545	0.082	0.120	0.202	0.385	15.659	0.703
Sum	112.000	72.000	112.000	72.000	195.000	505.000	-5.676	-3.735	112.141	117.572	256.148	122.200
Var.	46.279	5.526	3.045	3.286	113.563	652.536	0.007	0.014	0.041	0.148	245.207	0.494
Min.	0.000	0.000	1.000	0.000	0.000	0.000	-0.617	-0.530	2.174	2.000	2.128	2.000
Max.	46.000	10.000	9.000	8.000	43.000	113.083	-0.067	0.000	2.850	3.091	100.000	4.217
Obs.	47	50	47	50	47	50	47	50	47	50	47	50

	Pre	Post
Network Centralization (degree centrality)	= out: 96.881% - in: 14.698%	= in: 17.826%- out: 13.661%
Network Density	= 0.0518	= 2.5350
Network Centralization Index	= 1.92% (betweenness centrality)	= 4.47% (betweenness centrality)
Network Centralization Index	= 9.08% (eigenvector centrality)	=12.58% (eigenvector centrality)
Average distance (among reachable pairs)	= 1.848	= 2.535
Distance-based cohesion (Compactness)	= 0.075	=0.068

Figure 6. Pre-Program Willingness to Collaborate Network (39 respondents)

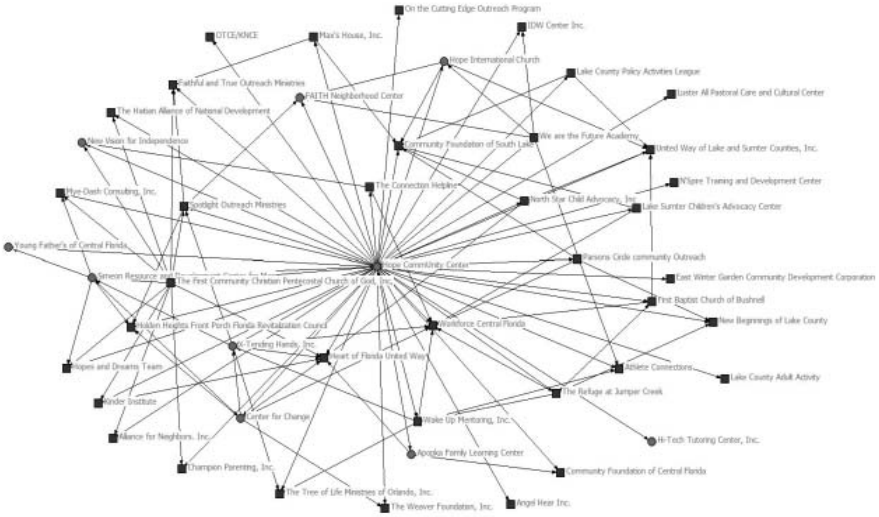
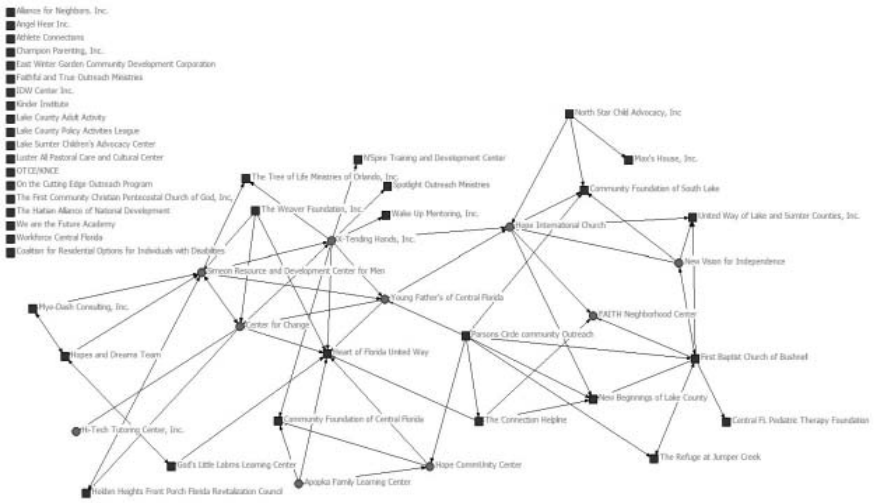


Figure 7. Post-Program Willingness to Collaborate Network (25 respondents)



As the environment changes overtime, the motives for cooperation change as well. Agencies were also asked about their previous collaborative and partnership experiences. Results show that service program compatibility is the primary reason why organizations partnered with others in the past. Grant proposals, statutory

issues, and advising are the least important motives of partnerships for the responding organizations.

Organizations were also asked about their current and previous motivations for cooperating with other organizations. Organizations reported that they mostly cooperate with other organizations because they share a common mission with them, have common economic recovery programs, enjoy service or program compatibility, or because they need advice from others. Less popular motivations included working on grant proposals together and seeking financial help and support.

Agencies were also asked about the resources they compete for with each other. All resources, except employees and volunteers, are almost equally important motives for organizations to compete. Funding resources are reported as the most important and common resource for which organizations compete with each other. Employees and clients are reported as more field specific resources which trigger competition but with a lower impact.

Pre- and Post-Program Comparision

To capture a complete comparison between pre and post-program implementation, results of the 23 organizations which were common in both pre and post-survey results, were analyzed separately. Figure 8 shows the comparison of pre and post program friendship, work, and willingness to collaborate networks. Figure 8a indicates the pre-program friendship network, which illustrates a relatively sparse network of relationships. Organizations are tied to each other with few links. Simeon Resource has the most central position in the network and it serves as a broker between organizations, while N'Sprie Training and Development Center is an isolate. The figure also indicates that there are two major cliques in the network which are tied to each other through two links (first link between Parsons Circle Community Outreach – Young Fathers of Central Florida and the second link between New Vision for Independence – Hope Community Center). Figure 8d shows the post-program friendship relationships between the 23 agencies. The network represents a denser network rather than a sparse network. The connections between organizations have increased and the network stands as one large structure as opposed to two pieces of a network as reflected in the pre-program results (Figure 8a). Also, the connectedness of each organization has increased significantly implying that organizations are able to reach their peers in the network via multiple

paths. Figure 8b shows the pre-program work network. The figure indicates that participants were significantly separated before the program in terms of their work relations. Three of the organizations were not tied to others. Simeon Resource continues to have a connecting role in this network. If Simeon Resource is excluded, the majority of agencies will become isolates. The post-program work network in Figure 8e shows an increase in the connectedness of organizations. Simeon Resource continues to play a critical role for connecting the organizations in the network, but eliminating it does not dissolve the entire network. The networks indicate that organizations have developed work relationships during the program, and they now have more sustainable work relationships when compared to pre-program conditions.

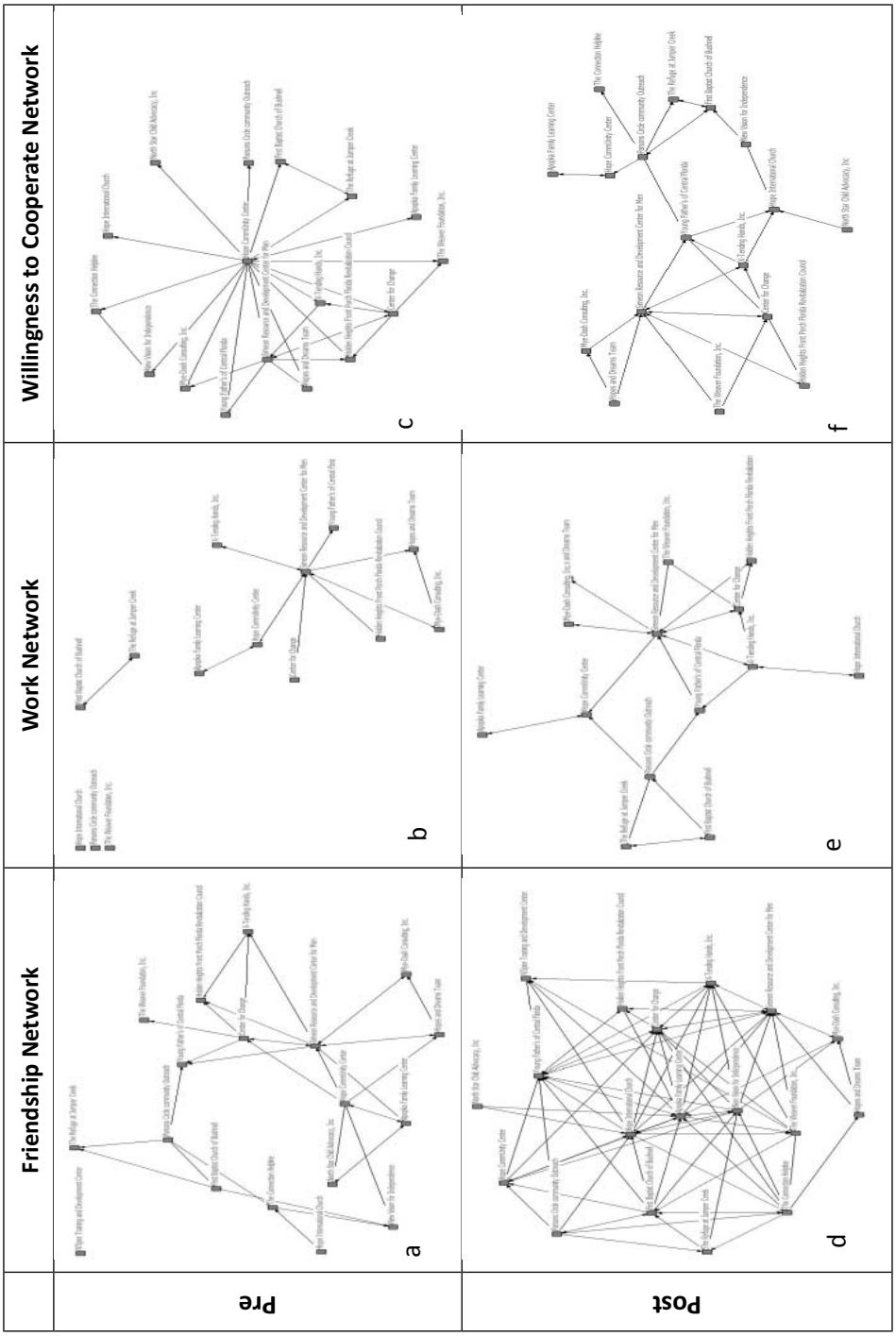


Figure 8: Comparison of pre and post program of friendship, work, and willingness to cooperate networks of 23 organizations

The willingness to cooperate in a network is important since it is a projection of future work relationships. Figure 8c indicates the pre-program willingness to cooperate network. Hope Community Center responded that they are willing to work with all organizations in the given roster. If this organization is ignored, other organizations in the network represent a sparse and disconnected network. Some of the organizations will also be isolated. Figure 8f illustrates a significant change in the willingness to cooperate network of organizations. Interestingly, Hope Community Center gave a different response this time and identified one organization with whom they are willing to work. Also, other organizations in the network identified their potential partners based on their compatible needs and interests. This figure projects potential healthy work relationships for the future which is a key outcome of the SCCF program.

10 Core Organizations: Pre- and Post-Program Results

Figure 9 presents the comparison of friendship, work, and willingness to cooperate networks before and after the program. Figure 9a shows the friendship network for the 10 core organizations that participated in the program, and received training as well as financial and technical assistance. The pre-program network is dispersed and organizations are weakly connected to each other. Six organizatons are tied to more than one peer in the network, while four have only one connection. Hope Community Center is a broker in the network which connects six organizations to other actors in the network. The friendship network after the program (Figure 9d) is significantly different from the pre-program situation in Figure 9a. There is a dense network of relationships after the program as organizations are tied to others by multiple connections.

The work relations of the ten core organizations are different as opposed to their friendship relations. Figure 9b shows a star network in which one organization has a central position and the rest connect to each other through this central organization. The figure shows that Simeon Resource is in the center of the network and five organizations are connected to each other through their ties with Simeon. Four organizations are isolated from the network as well, implying that they were not connected to others for work purposes before program implementation. Figure 9e shows a change in the work relations between the ten organizations. The star network in Figure 9b turns into a network consisting of three cliques in 9e. There are two organizaitons which are isolated as they did not respond to the survey.

Even with two nonresponses, the work network looks more connected than the pre-program state.

Figure 9c shows the pre-program willingness to collaborate network. The figure shows a star network with Hope Community Center as a central player since it identified every other organization in the roster as potential work partners. If Hope Community Center is taken out of the network, there would be only two small separated networks and three isolated nodes. Figure 9f shows that the post-program willingness to collaborate network is more connected when compared to pre-program results. Even though this network is not as dense as the friendship network, it reflects a general agreement between networking organizations to work together in the future.

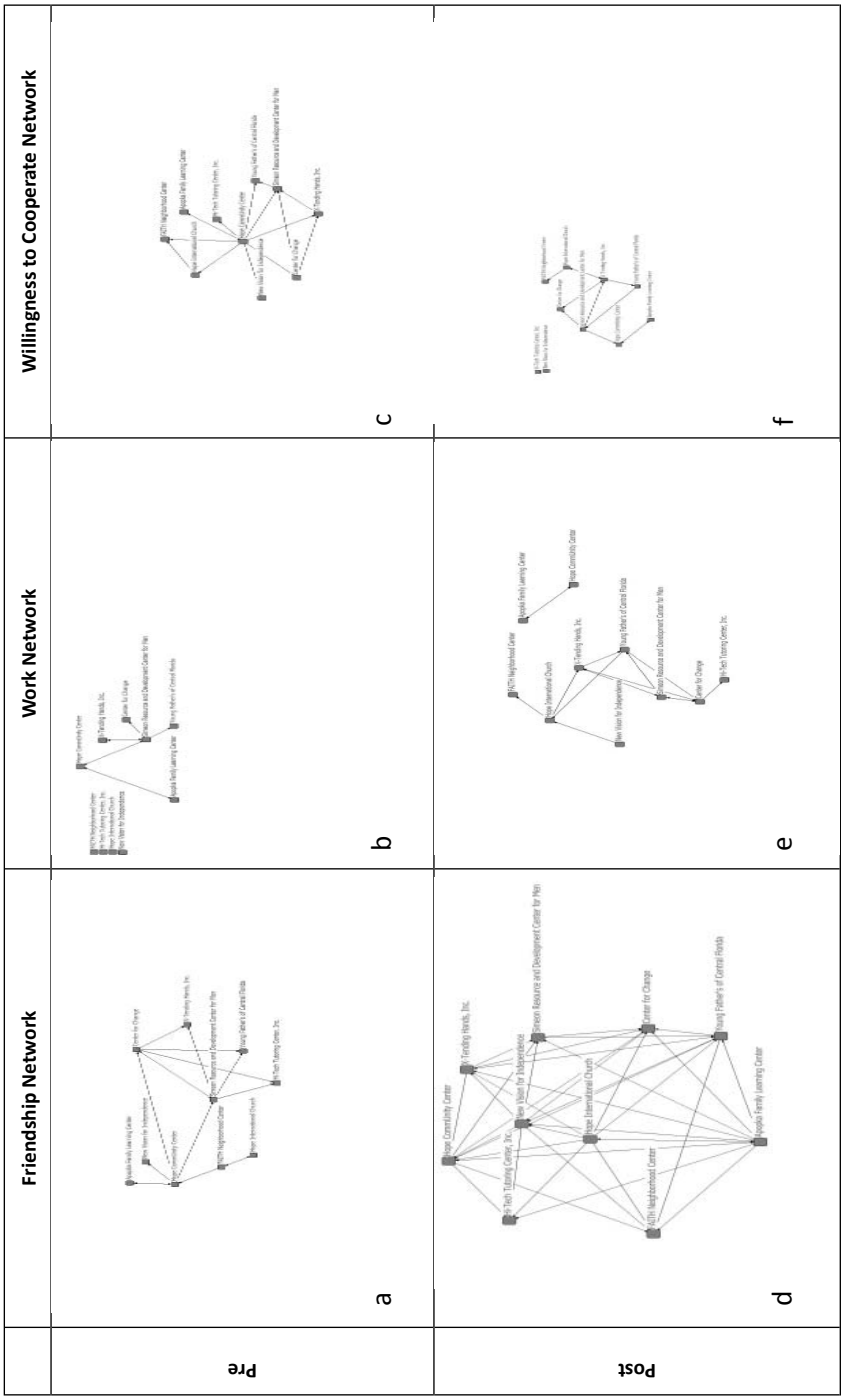


Figure 9: Comparison of networks of friendship, work, and willingness to cooperate before and after the program

Regression Analysis

To understand the relationship between several factors such as organizational development, program development, collaboration/community engagement, and leadership, with the perceived level of adaptive capacity of the respondent organizations', a multiple regression model was formed and analyzed. Data from the pre-program survey responses (39 first-cycle organizations) was used for analysis. Missing values in survey responses were replaced with mode values since the sample size was small. The next step was to create index variables for the constructs selected for analysis. Table 17 shows the list of index variables with their respective items and Cronbach's Alpha values. The table shows items that were left after the reliability analysis was conducted using SPSS, unrelated items were deleted to get the highest Cronbach's Alpha values. Several assumptions were also checked to ensure the validity of results.

Table 5. Summary Statistics for Multiple Regression Analysis

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
dimension0	1	.673[a]	.453	.370	.59082	2.155

b. Dependent Variable: ADACAP

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.529	5	1.906	5.460	.001[a]
	Residual	11.519	33	.349		
	Total	21.048	38			

a. Predictors: (Constant), LEADER, COLLAB, HUMRES, COMENG, FINSIT

The summary model adjusted R-square shown in Table 14 tells us that the model explains 37% of the variance in the dependent variable, which is Adaptive Capacity. According to the ANOVA statistics, the proposed model is statistically significant ($F_{5, 33}$=5.46) at the p value of .05. Table 16 below shows whether the model coefficients are statistically significant as well as their impact on the model.

Table 6. Coefficient Statistics for the Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.006	.684		1.471	.151
	HUMRES	.453	.279	.230	1.627	.113
	FINSIT	-.071	.386	-.026	-.183	.856
	COLLAB	.520	.440	.159	1.182	.246
	COMENG	.332	.163	.287	2.031	.050
	LEADER	.317	.131	.353	2.429	.021

Table 7. Index Variables created for Multiple Regression Analysis (N=39)

VARIABLE ROLE	INDEX	ITEMS	CRONBACH'S α
Dependent	Adaptive Capacity (ADACAP)	Changes in this organization are consistent with changes in the surrounding community The structure of this organization is well-designed to help it reach its goals This organization favors change	.706
Independent	Human Resources (HUMRES)	Does your organization have a formalized Board of Directors policy manual Does your organization have a formalized Human Resources policy manual Does your organization have dedicated Human Resources personnel	.692
Independent	Financial Situation (FINSIT)	Does your organization have individual donors Is your funding closely tied to the number of projects or services offered Is your funding closely tied to the number of people you serve Is your present level of funding adequate for the number of projects and services you offer	.624
Independent	Collaboration/ Partnerships (COLLAB)	Do you presently work with other community organizations Have you worked with other community organizations in the past Do you plan on working with other community organizations in the future Do you feel that cooperating with other organizations helps your organization	.744
Independent	Community Engagement (COMENG)	This organization has responded in light of the community's changes in needs This organization solicits feedback from its clients on ways to serve them better This organization provides programs or services that were suggested by its clients This organization is viewed by its clients as an "agent of change"	.665
Independent	Leadership (LEADER)	My organization has a board that reviews progress on the strategic plan (e.g., goals, strategies) My organization helps the executive director or other staff improve their leadership abilities My organization has board members with diverse experiences My organization runs effective board meetings (i.e. keeping minutes, attendance, commitments) My organization has a written plan in case of leadership transition or turnover My organization has a board and executive director with distinct roles and responsibilities My organization has board members who fulfill their commitments and responsibilities	.823

The coefficients statistics reveal that only community engagement (COMENG) and leadership (LEADER) are statistically significant coefficients at the p value of .05. In light of the results described above, it is possible to conclude that the adaptive capacity of an organization is closely related to the level of community engagement and leadership in that organization. While this analysis was performed based on the data from 39 respondents before the program was implemented, a larger sample might provide additional insight and a more accurate picture of the model representation.

In addition to the regression analysis, 10 core agency representatives in this study were surveyed to get their insight about the perceived impact of the SCCF program. The following questions/statements were administered to the participants, and they were asked to respond to the questions and elaborate if they agreed with the statements provided:

1.	As a result of my organizations participation in the SCCF, my organization is better equipped with the tools necessary to form successful partnerships and collaborations with other organizations.
2.	As a result of my organizations participation in the SCCF, my organization formed more successful collaborations than before the start of the SCCF.
3.	As a result of my organizations participation in the SCCF, my organization formed more successful collaborations than before the start of the SCCF.
4.	What tools did the program provide you that supported these successes?
5.	We learned a great deal of knowledge from the program that will assist us in forming new partnerships in the future and help sustain existing programs.
6.	As a result of my organizations participation in the SCCF my organization is now included in a greater formal network of organizations.
7.	As a result of my organization's participation in the SCCF my organization is able to leverage resources from non SCCF participants, i.e. Community Foundation?
8.	Please provide any other comments related to collaboration and community engagement.

Table 8. Open ended statements

In regard to the first statement, all 10 agencies agreed that they are more prepared for and aware of the opportunities entailed by the collaborations/partnerships. The main tenet of the responses can be summarized by the following statement of an organization: "I've learned to be very strategic in seeking and developing partnerships". In regard to the second statement, organizations generally agreed that they increased either the number or the quality of their collaborations/partnerships. The main tenet of the responses can be summarized by the following statement of

an organization: "We have had the opportunity to meet and interact with many organizations that we were not even aware of. This gives us the opportunity to share ideas and form partnerships that help all of us provide increased services through referrals and with increased knowledge."

In terms of the third and fourth statements, organizations specified the tools of the SCCF that were part of their success. Fundraising, volunteer management, board development, strategic planning, networking, needs assessment, bookkeeping, data collection, and marketing strategies are among the tools that benefited participants of the program. In response to the fifth and sixth statements, organizations agreed with the fact that SCCF increased their networking capabilities and vision, which also led to newly developed or enhanced relationships with other nonprofits. In addition, they specified the importance of SCCF's grant-writing and fundraising trainings for increasing their financial capacity.

In terms of the last statement, organizations acknowledged the benefit of the program in terms of increasing collaborations/partnerships with others as well as in terms of an increase in technical capacity. The following statement of an organization summarizes organizations' views: "I know that our participation in the SCCF has provided [us] with greater skills and knowledge for capacity building overall, including increased collaborations and community engagement. I believe that additional opportunities for collaboration will continue to present themselves, and that we are better equipped to pursue collaborations."

Conclusion

This study was carried out to explore and understand the relationship between organizational factors, network relationships, and collaborative capacity. The results of the network analysis show that network relationships were strengthened and developed especially after the implementation of the capacity building program. Thus this program has been beneficial in terms of capacity building through network relationships. The main assumption that network relationships impact the level and quality of organizational and collaborative capacity are mainly supported from the analysis. In terms of network analysis, affiliation and cooperation networks provided an understanding that collaboration with others is beneficial for developing organizational capacity.

Organizational factors such as leadership and the level of organizations' engagement with the community have a statistically significant relationship with the adaptive capacity of the organizational network. This implies that organizations need to invest in developing leadership and stronger relationships with the community in order to develop their capacity. Lastly, qualitative responses from the core 10 organizations that received both training, and financial and technical assistance support the previous analyses by confirming that collaboration is and should be a part of organizations' long-term strategies. Overall, this study contributes to the understanding of relationships between networks and organizational capacity.

Future research will be conducted in the following years to see the long term impact of the capacity building programs on network formations and sustainability for small nonprofit organizations. Even though the study focused on a region in a southern state, results of the study can be applied to other similar capacity building programs, with the aim of achieving collective action in response to challenging complex problems.

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Evaluating the employment probability: Men and women in comparative perspective in Attica and Central Macedonia

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ABSTRACT

This paper investigates unemployment risk and job prospects of males and females in the two Greece's most populated regions - Attica and Central Macedonia - during the implementation of the first Community Support Framework (1989-1993). Originality lies in the separate analyses for males and females. The sample is based on anonymous records (micro-data) of the Labour Force Survey for both employed and unemployed at Nomenclature of Territorial Units for Statistics-2 level. Firstly, social and demographic characteristics increasing the odds of being employed are examined - i.e. age, marital status, residence, education and training. Secondly, the issue of whether University graduates have lesser odds of being employed is investigated. The findings indicate that gender differences in odds of being employed appear mainly across education levels. Moreover, higher education attainment increases the odds of being employed particularly for females. The paper delivers conclusions that can be used for comparative research among European regions.

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KEYWORDS

Cross-sectional Models, Labour Economics Policies, Human Capital, Skills, Unemployment Models, Regional, urban and rural analyses

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Introduction

The programmes implemented in Greece and other EU member states under the Community Support Frameworks (CSFs) - which were infrastructure-related development projects and investments in physical and human capital - aimed to gear the economy onto a sustainable path of economic growth and development. The CSF goal of promoting growth through investments in infrastructure and human capital was the prerequisite for the cohesion of EU and the sustainability of the nominal convergence objective of the Maastricht Treaty in the way to the European Economic and Monetary Union. In this context, it is interesting to see if investment in human capital (education and training) in Greece had a real impact on the labour market.

The aim of the paper is to study the impact that social and demographic characteristics had on the labour market in the Greek Nomenclature of Territorial Units for Statistics (NUTS)-2 regions of Central Macedonia and Attica**,** during the implementation of the CSF-1 (1989-93). Greece consists of thirteen NUTS-2 regions. During the examined time period both regions belonged to the Objective 1 (European regions with a GDP per head less than 75% of the EU mean) of the EU Structural Funds. We choose Central Macedonia and Attica because the above regions are the largest in Greece in terms of population, and the two biggest urban agglomerations in the country (Athens and Thessaloniki) are situated in the regions under study; so, we research half of the Greek population. The reason we choose these years is because 1988 is the last year before the start of the implementation of the Structural Funds, whereas 1992 is the year of the Maastricht Treaty and also the first year of getting information on training programmes in the Greek Labour Force Survey (LFS). So, other studies can compare that period with more recent years. The main questions to be answered, analysing the data separately for males and females, are:

(i) What are the social and demographic characteristics that increase the chances of someone in the examined population finding a job?

(ii) Whether University graduates face greater difficulties in finding a job than the non-University graduates, as a series of studies (see Meghir *et al.*, 1989; OECD, 1990; Iliades, 1995; IN.E./GSEE-ADEDY, 1999; Katsikas, 2005) or aggregate statistics (LFS; Eurostat: Education and Employment Prospects, 1995) for Greece conclude.

(iii) How does the participation in training courses affect the chances of getting an employment?

We test male vs. female unemployment, and the human capital theory which provides one of the main explanations for the uneven incidence of unemployment by skill (education and training); we try to research whether the more educated and the more trained a person is, the higher the probability of him finding a job.

Previous labour market studies for Greece were based on qualitative research and LFS aggregated data. Our analysis of investigating the unemployment risk in the Greek labour market - at Nomenclature of Territorial Units for Statistics (NUTS) 2 level - is based on the micro-data of the Greek LFS. The access to the individual anonymised records of the Greek LFS was not allowed to researchers until the summer of 2005, due to the Data Protection Act.

The article starts discussing the gender unemployment issue. Then, we examine the relation between education and unemployment in the EU, and the impact of training programmes on the employment prospects of individuals in the EU and the rest of the OECD according to a series of studies; the results are based on both cross-sectional and longitudinal data. We also discuss the vocational training policies for the unemployed in Greece. Then, we refer to the macroeconomic indicators of the examined regions and follow a logit model for the years 1988 and 1992 - based on micro-data of the Greek LFS - for the two regions under study working separately for men and women. The article concludes with the impact of the socio-economic variables used on employment probability in the examined regions, and ends with some general comments on the merit and value of this study.

Literature Review

Male versus female unemployment: The theoretical context

There is an enormous literature on gender gaps in pay and a vast literature on gender gaps in labour force participation rates (see Altonji and Blank, 1999, and Blau and Kahn, 2003). Yet, there is very little written on gender gaps in unemployment rates (OECD, 2002, p. 63). According to OECD Statistical Compendium (1999b) the largest gender gaps in unemployment rates are to be found in the Mediterranean countries (Greece, Spain, Italy and France), following by the Benelux countries

(Belgium, the Netherlands and Luxembourg), the "Germanic" countries (Germany, Austria and Switzerland), then the "Nordic" countries (Sweden, Finland and Norway) and, finally, the "Anglo-Saxons" (US, UK, Ireland, Australia, Canada and New Zealand). In a number of the Mediterranean countries the 'unemployment problem' is largely a problem of female unemployment.

According to International Labour Organisation (ILO) to be classified as unemployed people must have looked for work in the recent past and are available to start work in the near future. Sometimes women that do not want to work because of domestic responsibilities (to take care of children and the elderlies) are considered as unemployed, not as inactive. This fact 'spills over' into a higher female unemployment rate. If this is true then the female unemployed in 'high-gap' countries may be less serious about wanting a job and taking steps to get one than the male unemployed (Azmat *et al.*, 2004b).

In many of the European countries with high unemployment rates, the female unemployment rate is substantially above the male. Women in all countries tend to have higher flows into inactivity both from employment and unemployment. However, in the 'high-gap' countries (namely with a large gender gap in unemployment rates) women tend to have higher flows from employment into unemployment and from unemployment into employment, namely in both flows. Providing explanations for this is not so easy and it is much simpler to present evidence against hypotheses than evidence in favour of them (Azmat *et al.,* 2004a).

Data from the first six waves 1994-1999 of the European Community Household Panel Survey (ECHPS) shows that in the Mediterranean or 'high-gap' countries, the gender gaps in unemployment rates are largest among the young, the married and those with young children.

It is true that there is a lot of variation in the extent of part-time employment and that it tends to be relatively rare in the 'Mediterranean' countries which have large gender gaps in unemployment rates. But the unemployed women in these countries do not report that they are looking for part-time jobs and it seems likely that the lack of availability of part-time work can explain low female participation rates in some countries but not their high unemployment rates (Eurostat, LFS, 1996).

The human capital approach and the human capital theory

The role of education in explaining how the labour market operates represents one of the main areas of disagreement between labour market theories. During the late 1950s and early 1960s the current neoclassical theory of the labour market emerged with the development of the human capital theory. Gary Becker (1964 - 2nd ed., 1975) published a book with the title "Human Capital" which developed a theory of human capital formation and analysed the rate of return to investment in education and training. However, investment in human capital remains a controversial issue (Woodhall, 1987; Kapstein, 2001; de la Fuente, 2003).

Whilst the human capital literature has highlighted a number of productivity-related characteristics, human capital theorists give most emphasis to the importance of education and training as the main component of productivity (Blaug, 1975). Education, it is suggested, provides the basic skills of reading and writing, cognitive skills, and the "ability to learn" which will increase an individual's productivity in all jobs (general human capital), whilst vocational education, on the other hand, will increase an individual's productivity in a narrower range of jobs by providing more specific skills (specific human capital).

Becker (1962) distinguishes general from specific human capital of workers, and within specific human capital between employer- and employee-financed on-the-job training. Most broadly the theory of specific human capital predicts that where the fixed costs of employment, due to on-the-job training, are greatest, unemployment is lowest (Rees, 1973, pp.118-20).

Following Becker's (1964) analysis on the economic role of human capital, particularly education, there is now a considerable amount of empirical research on the closely related topics of education and skills [see Prais (1995); Murray and Steedman (1998)] and, more specifically, the increasing role of skilled labour in the economy [Berman *et al.* (1994); Machin (1996); Machin and van Reenen (1998)].

Training as a human capital

To examine what constitutes training, it is necessary to divide it into two significant purposes. Firstly, it is possible to view training as an investment in human capital,

perhaps adding to the skills gained in the first education. Secondly, training can be a replacement of initial education with company training when there is a mismatch between skills the employee has and those needed. Theoretically, these different purposes belong to two theoretical viewpoints, which sometimes coincide: the human capital theory and matching theory. It can be considered that these theories coincide because it could be an investment to train to add to skills. However, the two theories are based on diverse approaches to training (van Smoorenburg and van der Velden, 2000).

Human capital theory holds that it is the type of training input that largely determines the amount of increase in job tenure. In actual fact, training is not totally general or totally particular (Stevens, 1994). Job tenure will become greater if training is particularly connected to the company, than if it is general (in the classroom). It is less likely the worker will leave then. Also, employers are not keep to let workers go when they have paid for them to learn particular skills. However, when training is general, there is nothing to tie the worker to his existing job, since his skills may be of use in all companies. This difference also applies where weakly transferable and widely transferable training are involved. If this is true, it is reasonable to assume that classroom training is more transferable for the unemployed and training at work leads to greater job tenure (Cockx *et al.*, 1998). On the whole, employers need skilled workers, involving work experience as well as training, so classroom training is not sufficient on its own.

Matching theory claims that under-education will result in an increased necessity for more training. Less necessity for training, however, arises from over-education. It is not yet certain if training can make up for inadequacies in formal education (substitution) or if it can just add to variations in human capital (complementarity) that are already present. It might be inferred, though, that it is only the features of the job (level and kind of job) in which the substitution features of training are to be found and that it is only in the features of the formal education (level and breadth) that the complementarity nature of training is obvious (van Smoorenburg and van der Velden, 2000).

According to credentialist and screening theories (Blaug, 1975), initial training does not serve as an investment aimed at increasing human capital so much, but instead certificates acquired from training can reveal what workers are capable of. On the other hand, Blaug notes various kinds of credentialist theory and the weak kind is not at variance with human capital (Tatch *et al.*, 1998).

Unemployment and skills in Greece and the rest of the EU

Educational level and unemployment in the EU

Table 1 gives unemployment rates by qualification in different EU countries according to Eurostat data. The differences were enormous. There are only a few countries where this inverse relation between unemployment and qualification did not exist: in Greece and Portugal unemployment among people on ISCED (International Standard Classification of Education) 3 level (Lyceum) was higher than among the less qualified, but not among the University graduates (ISCED 5-7); in Italy and Luxembourg, unemployment rates among the highly qualified (ISCED 5-7, University) exceeded those of people with intermediate qualifications.

Table 1. Unemployment rates by level of educational attainment[(1)]; EU 1994

Country	ISCED 0-2[c]	ISCED 3[b]	ISCED 5-7[a]
BEL	12.5	7.5	3.7
DEN	12.6	8.3	4.6
GER	14.8	8.9	5.3
GRE	6.2	8.3	5.3
ESP	22.4	20.0	15.1
FRA	14.8	9.7	6.6
IRL	21.0	9.1	5.3
ITA	9.3	7.4	8.1
LUX	3.7	1.9	2.4
NL	12.6	7.7	5.5
POR	6.1	6.4	2.4
UK	11.2	7.9	4.1
EU-12	**13.2**	**8.8**	**6.1**

(1) 25-59 years old
Source: Eurostat: Education and Employment prospects, 1995.
[a] All first and higher degrees. All teaching, nursing qualifications. HNC/HND.
[b] 1 or more A-level passes, GNVQ 3 and equivalent, NVQ 3 and equivalent. Trade apprenticeship. GNVQ 2 or equivalent, NVQ2 or equivalent.
[c] ISCED 2: 1 or more O-level/ GCSE passes, 1 or more CSE passes. All other qualifications.

ISCED 0-1: No qualifications.

Looking at the long-term unemployment (LTU) of different skill levels, we again find that intermediate and higher educated people were less affected. This is true for the whole Union except Spain and Greece, where LTU was higher on ISCED levels 3 and 5-7 compared to levels 0-2, for Italy where LTU was the highest on ISCED 3

level, and for Luxembourg and Portugal where the ratios of ISCED levels 0-2 and 3 were equal (Eurostat, Education and Employment Prospects, 1995).

Training evaluation in Europe and Greece

Findings on European training programmes' evaluation

Up-to-date evaluation studies point to minor impacts of European training policies and they are most likely less significant and not always as positive as those responsible for designing them had wished. Although the cross-national figures show a few positive results from programmes, it is impossible to disregard the more negative results. The findings allow us to conclude that training programmes seem to have some positive effects on employment and no effects on earnings. Moreover, effects diminish over time. The negative effects reported by several evaluations can be explained, on the one hand by a locking-in effect, and on the other by the fact that some participants seem to enrol in training merely in order to collect unemployment insurance benefits (Cueto and Mato, 2009). The conclusions based on the recent studies are somewhat similar to those of Heckman et al. (1999) and Stanley et al. (1999) for the U.S.

In spite of being restricted to only a small number of nations, micro-economic studies of effect evaluations, based on both cross-sectional and longitudinal data, indicate that some programmes have managed to noticeably better employment prospects for those taking part. On the other hand, the findings include a number of programmes which appear to have had almost no effect. Programmes with fairly specific targeting have managed positive results and this may be due to the fact that these programmes usually take account of individual requirements. However, a number of programmes that were most widely targeted have had little impact.[1]

1 See Kaitz, 1979; Ridder, 1986; Card and Sullivan, 1988; Ham and Lalonde, 1991; Gritz, 1993; OECD, 1993; Bonnal *et al.*, 1994; Torp, 1994; Calmfors and Skedinger, 1995; Jackman, 1995; Bjorklund and Regner, 1996; Fay, 1996; Jackman *et al.*, 1996; Zweimuller and Winter-Ebmer, 1996; Cockx *et al.*, 1998; Kluve *et al.*, 1999; Gerfin and Lechner, 2000; Lechner, 2000; Brodaty *et al.*, 2001; van Ours, 2001; Kluve and Schmidt, 2002; Raaum and Torp, 2002; Regner, 2002; Cockx, 2003; Weber and Hofer, 2003; Graversen, 2004; Hamalainen and Ollikainen, 2004; Hujer *et al.*, 2004; Leetmaa and Vork, 2004; Rosholm and Svarer, 2004; Albrecht *et al.*, 2005; Arellano, 2005; Cavaco *et al.*, 2005; Centeno *et al.*, 2005; Fitzenberger and Speckesser, 2005**;** Hogelund and Holm, 2005; Kluve *et al.*, 2005; Lechner *et al.*, 2005; Lorentzen and Dahl, 2005; Malmberg-Heimonen and Vuori, 2005; Steiger, 2005; Stenberg, 2005; Aakvik and Dahl, 2006; Winter-Ebmer, 2006; Biewen *et al.*, 2007; Lechner *et al.*, 2007; Mato and Cueto, 2008; Meadows and Metcalf, 2008; Rosholm and Skipper, 2009; Kluve, 2010.

Lastly, to establish the ways in which programmes can be made better more research is necessary.

Vocational training policies for the unemployed in Greece

The situation in Greece is complicated with low level of investments to training programmes compared to the rest of the EU, and weak interconnection among targeting of training programmes and needs of labour market.
The structure of expenditures for "active" interventions in 1997 shows that the level of expenditures in Greece (0.35%), as a percentage of the GDP, is behind that of the EU-15 average (1.13%) concerning all specific interventions, with the exception of "measures for the young" (youth vocational education and training, etc. 0.10%) which are comparable to the European average (0.13%). Furthermore, there is a quite low level of expenditures on the training of adults (0.06% for Greece in comparison to 0.29% for the EU-15) - (OECD, Employment Outlook, 1999a).

The system of continuing vocational training (CVT) in Greece was developed mainly due to its incorporation in Community funding programmes (Iliades, 1995; Chletsos, 1998; Papakonstantinou, 1998). Policies concerned with training and retraining for the unemployed have been confined to continuing training programmes. Vocational training programmes for the unemployed were unconnected with employment policies (Gravaris, 1991, p. 37; Christodoulakis and Kalyvitis, 1995; Balourdos and Chryssakis, 1998; Economic and Social Committee of Greece, 1998). This is reflected in the fact that the unemployment rate for those (20-29 years old) with complementary vocational training in Greece was 20%, compared to 14% for those with only compulsory schooling; the corresponding figures for the EU were 11.5% and 23.5% (see *Table 2*).

Table 2. Unemployment rates among young people (20-29) with basic education and those with supplementary vocational education and training (EU - 1995 figures)

COUNTRIES	BASIC EDUCATION	BASIC EDUCATION PLUS SUPPLEMENTARY VOCATIONAL EDUCATION / TRAINING
EU-14	**23.5**	**11.5**
Belgium	24.3	19.7
Denmark	17.7	8.5
Germany	16.2	7.6
Greece	14.3	20
Spain	33.9	34.9
France	30	17.1
Italy	22.2	15.9
Luxembourg	5.7	:
Netherlands	14.8	7.2
Austria	:	4
Portugal	11.2	16.2
Finland	35.4	23.6
Sweden	21.7	:
UK	18.5	10

Ireland – No figures available
: = Data unreliable
Source: Eurostat (as quoted in Economic and Social Committee of Greece, 1998, p. 31).

The market of CVT in Greece is insufficiently covered, leaving many sectors unattended, mainly due to the lack of specific demand and supply structures (Chasapis, 1994). Training in Greece runs in the same way from early 1990s up to now and there is no in-depth and detailed analysis of the labour market needs. Although in the field of training in Greece the real expenditure (absorption) of EU funds is 100%, there is no change in the philosophy, design and implementation of programmes during the three CSFs (INE/GSEE, 2008). Only the financial control was strict during the second and the third CSFs. The most successful programmes in terms of matching supply and demand for labour are mainly those on accountancy and informatics (authors' personal experience).

Particularly with regard to training programmes for the unemployed in Greece, the method of identifying skills requirements, on the basis of which the programmes were offered, was wholly inadequate. It was based on changes in labour force categories derived from the LFS, on estimates of the impact of investment programmes on employment (where these existed or where such estimates were possible) and on Job Market

Surveys. These last record shortages of skills on the basis of company estimates of their own shortages, which were often inaccurate or did not correspond to the capacity of the firms to utilise the skills demanded (Linardos-Rylmon, 1998).

Macroeconomic data of the examined regions

The Region of Central Macedonia (RCM)

Central Macedonia is the largest region of Greece (19,147 km^2 - 14.5% of the country's surface) and is situated in the centre of Northern Greece. The RCM consists of seven NUTS-3 areas (Thessaloniki, Serres, Chalkidiki, Imathia, Pella, Kilkis and Pieria) and is the second largest Greek region in terms of population (about 1.7 million inhabitants according to 1991 census) after that of Attica, whereas the population of the entire Greece was approximately 10.26 million. Between the census of 1991 and 2001 the population rose by 9.6%, a rise higher than the national mean (6.9%). Also, the major urban centre and capital of Central Macedonia is Thessaloniki, which is the second most important Greek city. According to 1991 census the population of the Thessaloniki Area was about 750,000 inhabitants, whereas that of the county of Thessaloniki was approximately 945,000 inhabitants. The main cities are Thessaloniki-Veria-Serres-Katerini-Naoussa-Edessa-Polygyros-Kilkis. The main industries were textiles, plastic-chemicals, food-beverages and clothing. In 2003, the region's per capita GDP (PPS) was 17,110 euro (83% of the EU-25 average), whereas Thessaloniki and Chalkidiki were the richest counties of the region having a GDP per head equal to 90.3% and 89.5% correspondingly of the EU-25 mean. In 2003 the region produced 17.6% of the country's GDP (the second largest contributor after Attica) - 18% of the national agricultural produce (first in the country), 20% of the manufacturing production (second in the country) and 18% of services (second in the country). The unemployment rate in the RCM was 9.2% in 1992 and increased to 11.5% in 2002 [source: ΕΣΥΕ (www.statistics.gr)].

The Region of Attica

The Region of Attica (NUTS-2) - which is geographically situated in Central Greece - is the one and only region-county (NUTS-3) in Greece, since according to 1991 census its population size was about 3.5 million inhabitants; namely, 3 out of 10

Greeks lived in Attica. The capital of the region is the city of Athens, which is by far the most important Greek city in economic, administrative and political terms. In 1988, Attica's GDP was equal to 61% of the EU-12 average (58% for Greece as a whole), whereas in 1996 the region improved its position since its GDP was 77% of the EU-15 mean (68% for the country as a whole) and 86% of the EU-25 mean in 2003 (80.9% for Greece as a whole). In 2003, Attica was ranked third among the 13 Greek regions, based on that criterion (GDP per capita), after Central Greece and the Southern Aegean. The Region of Attica produces 37.4% of the country's GDP - 2.7% of the country's agricultural produce, 35.5% of the manufacturing and 42% of services (2001) – [sources: www.ypes.gr/attiki and ΕΣΥΕ (www.statistics.gr)]. There was an increase in the percentage of unemployed from 10% in 1988 to 11.7% of the workforce in 1995[2]. The male unemployment rate was 6.47% in 1988 and 8.4% in 1995, whereas the corresponding female percentages were 16.32% and 16.86%. LTU - as percentage of total unemployment - amounted to 45.4% in 1988 and 50.9% in 1995 (LFS).

Methodology, Analysis/Findings/Discussions

Econometric model: Logistic regression for unemployment

The logistic regression based on the micro-data of the Greek LFS

European Community Household Panel Survey (ECHPS) and Survey on Income and Living Conditions (SILC) data have been designed for the country as a whole in the case of Greece, so we cannot really work at regional level. Also, individual census records do not exist in Greece, like e.g. in Denmark, so the only way is to base our research on the LFS micro-data.

The originality of this research is that we use individual anonymised records (micro-data) of the LFS for both employed and unemployed (about 1.5% of the total population of each region). The questionnaire of the Greek LFS was greatly modified in 1992.

2 The percentage of unemployment is characterized by an augmentative tendency with the exception of the two year period 1989-1990, during which it shows a temporary decrease.

Tables 3 and 4 display the frequency distribution of the binary variables for 1988 and 1992 respectively. Due to their binary nature, statistics about their central tendency and dispersion would be perplexing. Apart from the system missing records, following the limitation of age (15-64 years old) and removing the non-active population, we ended with the following numbers of records available for analysis in each region (in the spring and early summer, namely from the 14th to 26th week of the year):

Table 3. Descriptive statistics for the sample of 1988

Variables	Central Macedonia				Attica			
	Males (6.075)		Females (3.633)		Males (12.708)		Females (7.214)	
	Frequencies	Share	Frequencies	Share	Frequencies	Share	Frequencies	Share
Employed	5,804	95.50%	3,233	89.00%	11,876	93.50%	6,028	83.60%
Unemployed	271	4.50%	400	11%	832	7.50%	1,186	16.40%
Married or divorced or widows	4,763	78.40%	2,777	76.40%	9,507	74.80%	4,705	65.20%
Aged 15-24	657	10.80%	580	16.00%	1,157	9.10%	1,342	18.60%
Aged 25-34	1,361	22.40%	957	26.30%	3,358	26.40%	2,489	34.50%
Aged 35-44	1,578	26.00%	929	25.60%	3,691	29.00%	1,936	26.80%
Aged 45-64	2,479	40.80%	1,167	32.10%	4,502	35.40%	1,447	20.10%
MSc or PhD holders	27	0.40%	11	0.30%	175	1.40%	70	1.00%
University graduates	525	8.60%	400	11.00%	1,778	14.00%	1,208	16.70%
TEI graduates	225	3.70%	177	4.90%	1,386	10.90%	821	11.40%
12 years of schooling	933	15.40%	641	17.60%	2,835	22.30%	2,307	32.00%
9 years compulsory education	794	13.10%	255	7.00%	1,877	14.80%	545	7.60%
Primary school graduates and below	3,494	57.50%	2,080	57.30%	4,429	34.90%	2,017	28.00%

Table 4. Descriptive statistics for the sample of 1992

Variables	Central Macedonia				Attica			
	Males (5.815)		Females (3.475)		Males (12.559)		Females (7.742)	
	Frequencies	Share	Frequencies	Share	Frequencies	Share	Frequencies	Share
Employed	5,537	95.20%	3,056	87.90%	11,703	93.20%	6,453	83.40%
Unemployed	278	4.80%	419	12.10%	856	6.80%	1,289	16.60%
Married or divorced or widows	4,385	75.40%	2,579	74.20%	9,021	71.80%	5,097	65.80%
Aged 15-24	579	10.00%	525	15.10%	1,260	10.00%	1,360	17.60%
Aged 25-34	1,307	22.50%	935	26.90%	3,367	26.80%	2,478	32.00%
Aged 35-44	1,467	25.20%	934	26.90%	3,414	27.20%	2,236	28.90%
Aged 45-64	2,462	42.30%	1,081	31.10%	4,518	36.00%	1,668	21.50%
MSc or PhD holders	33	0.60%	17	0.50%	100	0.80%	37	0.50%
University graduates	583	10.00%	460	13.20%	2,197	17.50%	1,435	18.50%
TEI graduates	221	3.80%	221	6.40%	892	7.10%	708	9.10%
12 years of schooling	1,132	19.50%	769	22.10%	3,529	28.10%	2,990	38.60%
9 years compulsory education	794	13.70%	307	8.80%	1,879	15.00%	641	8.30%
Primary school graduates and below	3,052	52.50%	1,701	48.90%	3,962	31.50%	1,931	24.90%
Apprenticeship	34	0.60%	27	0.80%	53	0.40%	32	0.40%
Intra-firm training	13	0.20%	9	0.30%	7	0.10%	5	0.10%
CVT	41	0.70%	9	0.30%	37	0.30%	10	0.10%
Popular training	5	0.10%	5	0.10%	3	0.00%	0	0.00%
Non-participation in trainings course(s) ever	5,722	98.40%	3,425	98.60%	12,459	99.20%	7,695	99.40%

The majority of individuals in the sample are married (over two thirds of total population), divorced or widowed. Both in 1988 and 1992, most males are in the age range of 45-64, while the age range 15-24 represents roughly 10% of total males. A similar but not that dispersed division of age groups population is also depicted for females in Central Macedonia, both for 1988 and 1992. On the contrary, female population of Attica both in 1988 and 1992 is primarily concentrated on the age

groups of 25-34 and 35-44. With regard to education, the majority of the population is concentrated to primary school graduates and twelve years of schooling. Females and the residents of Attica indicate a higher share in higher education. Participation in training courses is particularly small, mainly through CVT and apprenticeship for males, and apprenticeship for females.

The basic aim of the econometric analysis is to test the impact that various social and demographic characteristics had on people's job prospects in the Regions of Central Macedonia and Attica, during the implementation of the CSF-1 (1989-93). We use a logistic regression model. Regression models allow for group comparisons adjusting for demographic and socio-economic variables. It should be noted that regression-adjusted comparisons may still provide misleading results when other important variables that might have an effect are omitted.

The dependent variable takes two possible values (employed versus unemployed). A full description of the explanatory variables is given below and are among the most important variables generally acknowledged as affecting access to labour market. The models were fitted using SPSS version 18.0.

The effect of demographic variables such as age, gender, marital status, as well as educational level and participation in training programmes (the last is only available in 1992) on the employment status, is investigated with a logistic regression model due to the categorical nature of the dependent variable. The binary logistic regression equation is:

$$e = \beta_0 + \beta_1 m.s. + \beta_{2\text{-}4} a.g. + \beta_{5\text{-}9} educ. \qquad (1988)$$

$$e = \beta_0 + \beta_1 m.s. + \beta_{2\text{-}4} a.g. + \beta_{5\text{-}9} educ. + \beta_{10\text{-}13} tr. \qquad (1992)$$

where e (employment status) is the logit (ln of the odds) of being unemployed. The independent variables are – in the order appearing in the equation – gender, marital status, age groups, education achieved and training (or not). Age groups, education achieved and training are groups of contrasting variables. The parameter estimates $\beta - \beta_0$ is the constant – are the odds ratio of the independent variables.

It should be noted that we are only capturing causal effects under very strong and unrealistic assumptions, but the estimates are still interesting as they show whether the descriptive patterns hold up against additional control variables.

Also, measurement errors in the "treatment" variables (education and/or training) will lead to downward bias in the regression's estimates.

A limitation of the research is that the data available are cross-sectional rather than longitudinal and therefore we cannot study any population changes across time.

Description of the variables

We define now the complete list of variables together with their coding values that we use in the model. The reference category of each variable is underlined.

Dependent variable

Employment Status (STA1) (Unemployed, Employed)

Explanatory variables

1) Gender (Female, Male)

2) Marital status (Married or divorced or widows *against* Non-married)

3) Age groups
   15-24 years old
   25-34 years old
   35-44 years old
   45-64 years old

4) Level of education
   University graduates
   MSc or PhD holders
   Technological Educational Institutions (TEI) graduates
   Lyceum graduates (12 years of schooling) or not finished University
   High-school graduates (9 years-compulsory education)
   Primary school graduates or not finished primary school or never in school.

5) Participation in the past in training course(s)
   Apprenticeship
   Intra-firm training
   Continuing vocational training (CVT)
   Popular training
   Non-participation in the past in training course(s)

The base (or reference) categories are those that appear in the *Tables 5-8* with empty cells and with which the rest of the corresponding variables are compared. The reference categories are chosen so as to match the needs of the research.

The working age population is between 14-65 years old. However, marking in SPSS the ages 14 and 65 we also include those who are 13 and 66 years old something which we want to avoid; so, we include people from 15 to 64. We examine people below and over 30 since until the age of 30 years old, employment is often not "permanent" due to (post)graduate studies and working experience acquisition, plus fulfilment of compulsory military service for men.

The variable "participation in the past in training course(s)" first appeared in the 1992 questionnaire; it means that the interviewee had completed one or more training courses. This is also an indication of the attitude towards training in Greece at the beginning of the 1990s. The duration of apprenticeship and intra-firm training had to be at least one year according to the questionnaire of the Greek LFS. The term "popular training" (*laiki epimorphosi* in Greek) means training courses intended mainly for elderly people independently of their educational level, where the curriculum includes largely courses of general knowledge. We cannot examine the impact of training on earnings, because this kind of information does not exist in the questionnaire of the Greek LFS.

Concerning the residence location (see robustness checks in sections 5.2 and 5.3) in the case of Attica in 1988 there were some reservations which may be related to the fact that the 1992 LFS data are better than those of 1988, as the most recent data are better than those of 1992. Consequently the investigation of the subsequent years is needed in order to have a clearer picture in the 1990s given the fact that, as mentioned in the introduction, the Greek LFS micro-data are now available to researchers.

Tables 5-8 present the estimated coefficients (B) and their standard errors (S.E.) of each explanatory variable in the logistic regression for unemployment. The column "Sig." (level of statistical significance or p value) corresponds to the probability of the rejection area.

Results for Central Macedonia

Table 5 displays the odds of being unemployed at Central Macedonia in 1988. The $Exp(b_k)$ column displays the odds ratio. Odds ratios less than 1.000 correspond to decreases and odds ratios more than 1.000 correspond to increases in odds. Odds ratios close to 1.000 indicate that unit changes in that independent variable do not affect the dependent variable. Parameter estimates are significant at 1% level except for some groups in education (MSc or PhD holders, TEI graduates, 12 years of schooling for males, and these plus 9 years compulsory education for females).

Gender differences are present only for the level of education. Both for males and females, the odds of being unemployed compared to being employed are increased by being not-married rather than married. Both for males and females, the odds of being unemployed compared to being employed are decreased by being 25 years old or more. Both for males and females, the odds of being unemployed compared to being employed are increased by holding a first degree except for two educational categories. For males, the odds of being unemployed compared to being employed are increased being a TEI graduate rather to holding a first degree. For females, the odds of being unemployed compared to being employed are increased by completing postgraduate education rather to holding a first degree.

The robustness checks provide evidence of structural validity and vary according to the distribution of the population. They indicate that the odds for employment are increased for higher education graduates/postgraduates aged 30 and more or not leaving in Thessaloniki (the latter is not demonstrated for males).

A notable difference for geographical grouping with respect to males, is that the odds of being unemployed compared to being employed are increased for being a TEI graduate rather to holding a first degree, when based in Thessaloniki. The respective odds are significantly decreased when based in rural areas. For males aged less than 30 the odds of being unemployed compared to being employed are increased by completing postgraduate education and decrease by being a TEI graduate rather to holding a first degree. On the other hand, for males aged 30 or more, the odds of being unemployed compared to being employed are increased considerably by achieving any educational level (except for postgraduate education) rather to holding a first degree.

In addition, for females in rest urban areas the odds of being unemployed compared to being employed are increased by achieving any educational level (postgraduate education is not available) rather to holding a first degree. For females aged less than 30 the odds of being unemployed compared to being employed are increased by completing postgraduate education rather to holding a first degree. For females aged more than 30 the odds of being unemployed compared to being employed are increased by achieving any educational level (except for postgraduate education) rather to holding a first degree.

Table 5. Results for Central Macedonia (1988)

MALES					Robustness checks							
					Thessaloniki		Rural areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-1.38	0.21	0	0.252	0	0.223	0.18	0.475	0	0.205	0	0.197
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-0.94	0.17	0	0.393	0	0.32	0.01	0.34	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.5	0.28	0	0.223	0	0.199	0	0.109	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-1.09	0.27	0	0.338	0.01	0.383	0	0.082	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	-0.13	1.05	0.9	0.88	0.87	0.843	n.a.	n.a.	0.84	1.292	0.74	0.085
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	0.151	0.34	0.65	1.163	0.57	1.254	0.47	0.407	0.42	0.725	0.26	2.402
12 years of schooling	0.061	0.22	0.78	1.063	0.93	0.977	0.41	0.538	0.06	0.617	0.01	4.375
9 years compulsory education	-0.76	0.24	0	0.468	0.02	0.459	0.05	0.211	0	0.255	0.06	3.118
Primary school graduates and below	-0.65	0.21	0	0.521	0.34	0.783	0.03	0.208	0	0.194	0.02	3.395
Constant	-1.01	0.2	0	0.364	0	0.44	0.48	0.605	0	0.486	0	0.028

FEMALES					Robustness checks							
					Thessaloniki		Rest of urban areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-0.73	0.14	0	0.481	0	0.491	0	0.387	0	0.388	0	0.46
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-0.68	0.15	0	0.507	0	0.4	0.15	0.619	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.27	0.2	0	0.28	0	0.244	0	0.243	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-1.78	0.23	0	0.169	0	0.187	0.01	0.332	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	0.339	0.82	0.68	1.404	0.67	1.418	n.a.	n.a.	0.35	3.249	0.73	0.064
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	-0.37	0.25	0.14	0.688	0.03	0.471	0.95	1.036	0.03	0.528	0.47	1.592
12 years of schooling	-0.19	0.17	0.26	0.829	0.07	0.702	0.3	1.552	0	0.506	0	3.983
9 years compulsory education	-0.19	0.21	0.35	0.824	0.58	0.866	0.24	1.798	0	0.427	0	8.312
Primary school graduates and below	-0.57	0.17	0	0.567	0.27	0.784	0.31	1.51	0	0.3	0.07	2.074
Constant	-0.43	0.15	0	0.648	0.09	0.751	0.13	0.567	0.36	0.87	0	0.049

Table 6 displays the odds of being unemployed at Central Macedonia in 1992. Parameter estimates are significant at 1% level except for education (lyceum graduates are significant for women) and training. Marital status for females is significant at 5% level.

Gender differences are present only for the level of education and training. Both for males and females, the odds of being unemployed compared to being employed are increased by being not-married rather than married. Both for males and females, the odds of being unemployed compared to being employed are decreased by being 25 years old or more. For males, the odds of being unemployed compared to being employed are increased by completing secondary education or being an MSc or PhD holder rather to holding a first degree. For females, the odds of being unemployed compared to being employed are increased by achieving any educational level (except for postgraduate education) rather to holding a first degree. For males, the odds of being unemployed compared to being employed are increased by completing an apprenticeship rather to not participating in training courses. For females, the odds of being unemployed compared to being employed are not increased only by completing CVT.

The robustness checks provide evidence of structural validity and vary according to the distribution of the population. In general, they indicate that the odds for employment are increased for higher education graduates aged 30 and more or leaving in Thessaloniki (TEI graduates also enjoy increased odds in some categories). Moreover, apprenticeship increases the odds for employment for males that do not reside in Thessaloniki.

A notable difference for males of Thessaloniki - as compared to those of rural areas - is in the increased odds of being unemployed compared to being employed by completing all educational levels (except for 9 years compulsory education) rather to holding a first degree. Also for males in rural areas the odds of being unemployed compared to being employed are significantly decreased by completing an apprenticeship rather to not participating in training courses. Another notable difference is for males aged more than 30 years old - as compared to those less than 30 - where the odds of being unemployed compared to being employed are not increased only by being a TEI graduate rather to holding a first degree. MSc or PhD holders have greater odds to be unemployed compared to those holding a first degree.

The difference between Thessaloniki and the rest of urban areas for females is in the decreased odds of being unemployed by being a TEI graduate rather to holding a first degree. Another difference regarding the rest of urban areas is in the increased odds of apprenticeship. The differences between the age groups of females are in the decreased odds of being

unemployed by being a postgraduate or completing up to nine years of schooling (two categories) rather to holding a first degree for the group of less than 30 years old. Another difference is in the increased odds of apprenticeship for the group of 30 years old or over, and the increased odds of intra-firm and popular training for the group of less than 30 years old.

Table 6. Results for Central Macedonia (1992)

MALES					Robustness checks							
					Thessaloniki		Rural areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-1.18	0.192	0	0.307	0	0.292	0.02	0.174	0	0.332	0	0.235
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-0.42	0.165	0.01	0.658	0.01	0.569	0.06	0.397	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.23	0.267	0	0.293	0	0.231	0.25	0.359	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-1.01	0.259	0	0.365	0	0.287	0.56	0.625	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	0.979	0.653	0.13	2.661	0.08	3.333	n.a.	n.a.	0.74	1.601	0.18	2.964
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	-0.1	0.363	0.79	0.907	0.57	1.282	0.27	0.253	0.8	0.895	0.28	0.321
12 years of schooling	0.128	0.232	0.58	1.136	0.31	1.339	0.17	0.342	0.41	0.784	0.28	1.528
9 years compulsory education	-0.42	0.261	0.11	0.66	0.47	0.78	0.04	0.191	0	0.311	0.07	2.056
Primary school graduates and below	-0.33	0.231	0.15	0.717	0.14	1.551	0.01	0.133	0	0.377	0.34	1.395
Apprenticeship	0.342	0.639	0.59	1.408	0.75	1.418	0.73	0.008	0.89	1.122	0.59	1.743
Intra-firm training	-4.22	9.881	0.67	0.015	0.63	0.042	0.92	0.027	0.76	0.019	0.77	0.035
CVT	-0.79	1.027	0.44	0.455	0.4	0.421	0.8	0.014	0.78	0.748	0.58	0.026
Popular training	-3.68	16.22	0.82	0.025	0.79	0.052	0.96	0.17	n.a.	n.a.	0.84	0.038
Non-participation in trainings course(s) ever	-	-	-	-	-	-	-	-	-	-	-	-
Constant	-1.48	0.24	0	0.229	0	0.244	0.37	0.525	0	0.308	0	0.062

FEMALES					Robustness checks							
					Thessaloniki		Rest of urban areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-0.3	0.146	0.04	0.74	0.17	0.781	0.03	0.449	0	0.575	0.12	0.673
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-0.78	0.157	0	0.457	0	0.424	0	0.304	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.15	0.193	0	0.315	0	0.253	0	0.229	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-1.82	0.224	0	0.162	0	0.165	0	0.159	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	-0.46	1.047	0.66	0.629	0.66	0.63	n.a.	n.a.	0.69	0.022	0.71	1.497
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	0.295	0.25	0.24	1.344	0.48	0.797	0.08	3.125	0.35	1.33	0.93	1.046
12 years of schooling	0.52	0.191	0.01	1.682	0.08	1.464	0.08	2.851	0.05	1.59	0.01	2.3
9 years compulsory education	0.237	0.23	0.3	1.268	0.37	1.281	0.44	1.702	0.77	0.919	0	3.503
Primary school graduates and below	0.121	0.195	0.54	1.128	0.02	1.73	0	5.857	0.06	0.563	0.06	1.768
Apprenticeship	0.551	0.468	0.24	1.735	0.99	0.996	0.6	1.164	0.17	0.231	0	6.934
Intra-firm training	0.149	0.845	0.86	1.161	0.45	0.017	n.a.	n.a.	0.73	1.353	0.77	0.024
CVT	-0.73	1.081	0.5	0.48	0.58	0.026	0.71	0.035	0.74	0.689	0.74	0.027
Popular training	1.133	1.144	0.32	3.104	0.26	3.746	n.a.	n.a.	0.64	5.585	0.72	0.02
Non-participation in trainings course(s) ever	-	-	-	-	-	-	-	-	-	-	-	-
Constant	-1.13	0.195	0	0.324	0	0.371	0.14	0.397	0	0.323	0	0.061

Results for Attica

Table 7 displays the odds of being unemployed at Attica in 1988. Parameter estimates are significant at 1% level except for some groups in education. Significant estimates for education groups regarding males are those for MSc or PhD holders and 9 years compulsory education (10% level). The latter category has also significant estimates for females (3% level).

Gender differences are present only for the level of education. Both for males and females, the odds of being unemployed compared to being employed are increased by being not-married rather than married. Both for males and females, the odds of being unemployed compared to being employed are decreased by being 25 years old or more. For males, the odds of being unemployed compared to being employed are decreased by any level of education attained rather to holding a first degree. For

females, the odds of being unemployed compared to being employed are increased by completing all levels until secondary education rather to holding a first degree.

The robustness checks provide evidence of structural validity and vary according to the distribution of the population. They indicate that the odds for employment are increased for higher education graduates/postgraduates aged 30 and more or not leaving in Athens (the latter is not demonstrated for males).

A notable difference for males of rest urban areas is in the increased odds of being unemployed compared to being employed by being 45-64 years old rather to being 15-24 years old. In addition, the level of education attained has a different effect on each age group. For males aged 30 or more, the odds of being unemployed compared to being employed are increased considerably by achieving any educational level (except for postgraduate education) rather to holding a first degree.

A notable difference for females between Athens and semi-urban areas is in the increased odds of being unemployed compared to being employed for any level of education attained especially by being a TEI graduate - rather to holding a first degree. For females aged 30 or over, the odds ratios of being unemployed compared to being employed are increased considerably by achieving any educational level rather to holding a first degree.

Table 7. Results for Attica (1988)

MALES					Robustness checks							
					Athens		Rest of urban areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-1.35	0.1	0	0.259	0	0.262	0.01	0.213	0	0.169	0	0.32
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-0.64	0.1	0	0.527	0	0.512	0.93	0.953	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.03	0.14	0	0.358	0	0.336	0.74	0.775	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-0.84	0.14	0	0.432	0	0.416	0.93	1.068	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	-0.83	0.47	0.08	0.436	0.09	0.452	0.82	0.007	0.26	0.417	0.63	0.748
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	-0.04	0.14	0.75	0.957	0.68	0.944	0.55	0.518	0	0.558	0	2.071
12 years of schooling	-0.12	0.11	0.29	0.886	0.39	0.904	0.69	0.691	0	0.593	0.02	1.639
9 years compulsory education	-0.25	0.13	0.05	0.779	0.16	0.831	0.24	0.323	0	0.446	0	1.898
Primary school graduates and below	-0.11	0.11	0.33	0.895	0.62	0.943	0.5	0.57	0	0.437	0	1.979
Constant	-1.08	0.11	0	0.339	0	0.35	0.17	0.308	0	0.436	0	0.06

FEMALES					Robustness checks							
					Athens		Semi-urban areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-0.26	0.08	0	0.772	0.01	0.786	0.36	0.576	0	0.453	0.37	1.142
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-1.17	0.09	0	0.31	0	0.302	0.51	0.653	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.58	0.11	0	0.205	0	0.204	0.01	0.085	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-2.22	0.15	0	0.109	0	0.113	0.02	0.056	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	-0.08	0.39	0.85	0.928	0.83	0.921	n.a.	n.a.	0.5	0.669	0.23	1.94
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	-0.18	0.13	0.16	0.838	0.12	0.819	0.09	8.868	0	0.562	0	2.619
12 years of schooling	0.06	0.09	0.52	1.062	0.59	1.052	0.29	3.311	0.05	0.803	0	2.912
9 years compulsory education	0.282	0.13	0.03	1.326	0.01	1.424	0.48	2.415	0.86	1.028	0	4.828
Primary school graduates and below	0.117	0.11	0.28	1.124	0.2	1.154	0.1	6.077	0	0.597	0	2.749
Constant	-0.44	0.09	0	0.645	0	0.652	0.07	0.125	0	0.627	0	0.036

Table 8 displays the odds of being unemployed at Attica in 1992. Parameter estimates are significant at 1% level except for some groups in education and all training groups. With regard to males only MSc or PhD holders (10% level) and primary school graduates and below (3% level) have significant estimates. Education categories with significant estimates for females are 12 years of schooling, 9 years compulsory education and primary school graduates and below (all at 1% level).

There are no gender differences regarding the values of odds (e.g. less or more than 1) for the general model. Both for males and females, the odds of being unemployed compared to being employed are increased by being not-married rather than married. Both for males and females, the odds of being unemployed compared to being employed are decreased by being 25 years old or more. Both for males and females, the odds of being unemployed compared to being employed are increased for achieving any level of education other than a first degree. Both for males and females the odds of being unemployed compared to being employed are increased by completing CVT.

The robustness checks provide evidence of structural validity and vary according to the distribution of the population. Males in rest of urban areas completing primary

education have increased odds of being employed compared to holding a first degree. In addition, for males in rest of urban areas apprenticeship seems to be very important in employment prospects. Holding a first degree is particularly important for the employment prospects of males aged more than 30 years old. The picture for females is more integrated as only two estimators resulting from the age groups robustness tests deviate from the general model.

A notable difference for males of rest of urban areas - as compared to those of Athens - is in the decreased odds of being unemployed compared to being employed when being a primary school graduate rather to holding a first degree. Also for males in Athens - compared to the general findings - the odds of being unemployed compared to being employed are increased by completing an apprenticeship rather to not participating in training courses (the opposite is indicated for males in rest of urban areas). Moreover, males aged 30 and more have more odds to be employed by holding a first degree. On the other hand, males aged less than 30 have a greater odd to be employed only over those having finished postgraduate studies. Also for males aged more than 30 years old the odds of being unemployed compared to being employed are increased by completing CVT.

The residential robustness tests for females are not differentiated from the general model (e.g. the values of odds remain for each variable less or more than 1). Furthermore, females less than 30 that hold a first degree have decreased odds to employment only against postgraduates. Females aged 30 and more have increased odds to employment by holding a first degree. Finally, for females aged more than 30 years old the odds of being unemployed compared to being employed are increased by completing CVT rather to not participating in training courses. About the non-impact of training programmes on the Greek labour market at national and regional (NUTS-2) level see also Rodokanakis, 2009 & 2010; Rodokanakis and Tryfonidis, 2009; Rodokanakis and Vlachos, 2012.

Table 8. Results for Attica (1992)

MALES					Robustness checks							
					Athens		Rest of urban areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-1.13	0.107	0	0.322	0	0.304	0.09	0.412	0	0.209	0	0.363
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-0.97	0.099	0	0.379	0	0.361	0.06	0.414	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.33	0.142	0	0.263	0	0.246	0.53	0.669	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-1.04	0.142	0	0.355	0	0.337	0.42	0.592	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	0.655	0.371	0.08	1.925	0.06	2.011	n.a.	n.a.	0.68	1.333	0.053	2.389
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	0.104	0.173	0.55	1.109	0.72	1.069	0.1	3.846	0.8	0.942	0.948	1.018
12 years of schooling	0.175	0.125	0.16	1.191	0.16	1.202	0.91	1.09	0.8	0.955	0.027	1.48
9 years compulsory education	0.079	0.142	0.58	1.082	0.58	1.088	0.92	1.073	0.42	0.854	0.032	1.55
Primary school graduates and below	0.301	0.127	0.02	1.351	0	1.479	0.57	0.681	0.1	0.69	0	2.151
Apprenticeship	-0.06	0.541	0.92	0.945	0.91	1.061	0.82	0.007	0.91	1.075	0.695	0.67
Intra-firm training	-3.73	8.057	0.64	0.024	0.64	0.024	n.a.	n.a.	0.6	0.017	0.854	0.034
CVT	0.522	0.559	0.35	1.685	0.32	1.745	n.a.	n.a.	0.72	0.679	0.053	3.326
Popular training	-2.72	12.81	0.83	0.066	0.83	0.069	n.a.	n.a.	n.a.	n.a.	0.856	0.022
Non-participation in trainings course(s) ever	-	-	-	-	-	-	-	-	-	-	-	-
Constant	-1.27	0.131	0	0.281	0	0.292	0.06	0.269	0	0.264	0	0.06

FEMALES					Robustness checks							
					Athens		Semi-urban areas		Aged less than 30		Aged 30 and more	
Variables	b_k	s.e.	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)	Sig.	Exp(b_k)
Marital status	-0.23	0.083	0.01	0.795	0.01	0.807	0.17	0.516	0	0.533	0.676	0.947
Aged 15-24	-	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.
Aged 25-34	-0.9	0.091	0	0.405	0	0.393	0.13	0.459	n.a.	n.a.	n.a.	n.a.
Aged 35-44	-1.41	0.111	0	0.245	0	0.239	0.04	0.29	n.a.	n.a.	n.a.	n.a.
Aged 45-64	-1.79	0.127	0	0.167	0	0.174	0	0.085	n.a.	n.a.	n.a.	n.a.
MSc or PhD holders	0.094	0.546	0.86	1.099	0.8	1.151	n.a.	n.a.	0.54	0.521	0.282	1.962
University graduates	-	-	-	-	-	-	-	-	-	-	-	-
TEI graduates	0.197	0.141	0.16	1.217	0.12	1.254	0.75	1.291	0.08	1.362	0.115	1.459
12 years of schooling	0.392	0.105	0	1.48	0	1.532	0.53	1.557	0	1.713	0	1.892
9 years compulsory education	0.691	0.135	0	1.995	0	2.031	0.48	1.782	0	2.177	0	2.913
Primary school graduates and below	0.949	0.114	0	2.584	0	2.533	0.02	4.819	0	2.405	0	3.064
Apprenticeship	-0.33	0.509	0.51	0.717	0.31	0.565	n.a.	n.a.	0.95	0.963	0.548	0.539
Intra-firm training	-3.14	6.016	0.6	0.043	0.6	0.044	n.a.	n.a.	0.68	0.02	0.756	0.019
CVT	0.364	0.849	0.67	1.439	0.65	1.468	n.a.	n.a.	0.21	4.78	0.651	0.023
Popular training	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Non-participation in trainings course(s) ever	-	-	-	-	-	-	n.a.	n.a.	-	-	-	-
Constant	-0.99	0.109	0	0.371	0	0.358	0.24	0.439	0	0.274	0	0.061

Conclusions

Binary logistic regression is employed in order to determine the effects of gender, marital status, age, education and training - the latter only for 1992 - on unemployment/employment. There are separate analyses with respect to gender for each region and for each year. The robustness checks based on residential and age grouping provide evidence of structural validity and vary according to the distribution of the population.

Regarding marital status for both areas in 1988 and 1992, the odds of being unemployed increase for non-married. Moreover, for both areas and for the same period, the most vulnerable age group to unemployment is between 15-24 years of age.

Gender differences both in Central Macedonia and Attica for 1988, are present only for the level of education. For Central Macedonia, the individuals most vulnerable to unemployment are females holding a postgraduate degree and males that have achieved a TEI degree. For Attica, the individuals most vulnerable to unemployment are males holding a first degree and females that have attended up to secondary education.

While there are not any gender differences in Attica for 1992, gender is differentiated to the level of education and training in Central Macedonia for the same year. For Central Macedonia, the individuals most vulnerable to unemployment are males holding a postgraduate degree or completed secondary education, and females completing any level of education up to achieving a TEI degree. For Attica, the individuals less vulnerable to unemployment are those holding a first degree. Regarding training, for Central Macedonia, the males most vulnerable to unemployment are those that have completed an apprenticeship and the females less vulnerable to unemployment are only those that have completed CVT. On the other hand, the odds for males and females in Attica of being unemployed compared to being employed are increased by completing CVT.

Higher education attainment (over TEI) for females in Central Macedonia in 1992, and in Attica in 1988 for females increases the odds for employment. Both male and female university graduates in Attica in 1992 have increased odds to be employed. It would not be proper to conclude on the effect of training on the odds of being employed in 1992, as active population in Greece was not interested in participating to training programmes (the Greek LFS is representative of active population

in Greece). However, even if we were to rely on these insignificant estimators, there would be a mixed outcome since different forms of training - both across sexes and regions - seem to increase the odds of being employed.

Since the sample does indicate very little participation in training programmes, we cannot obtain significant results. It seems, however, that the relative preference of both males and females for apprenticeship did not pay off, since the odds of being unemployed compared to being employed are increased. Nevertheless, the choice of no participation to training programmes is not always the best choice, as CVT both for males and females, and intra-firm training and popular training have decreased odds of being unemployed.

The research would merit attention of a wider international readership, since the paper does offer evidences that could be useful for comparative research among European regions, especially comparing CSFs.

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Relationship Between Human Capital and Economic Growth: Panel Causality Analysis for Selected OECD Countries

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ABSTRACT

In this study, the relation between education and health expenditures that are accepted as an indicator of human capital and economic growth is tested empirically. According to the findings of the study, based on 1999 – 2008 period for 20 OECD countries that are selected by the panel casuality test, a bidirectional casuality relation is observed between the education and health expenditures and economic growth in the period and country group under discussion. The obtained findings both support the intrinsic growth theories and tally with the empirical studies on the subject.

KEYWORDS

Education expenditures, health care expenditure, human capital, economic growth, panel causality.

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Introduction

Studies on growth in the economics literature are usually divided into two groups. The first one is the Neo-classical growth theory that was dominant until 1980s and it identifies the source of economic growth with technology and increase in population which is considered as external in the model. The Neo-classical growth theories, which take shape depending upon savings, capital-labour and income variables, propound that there will be no long-term discrepancy between countries in terms of level of development. The theories that emerged as alternatives to the Neo-classical theory are called as endogenous growth theories. Emerging endogenous growth theories bring forward the idea that endogenous conditions like human capital, foreign trade policies, financial development and public expenditures of a country can affect economic growth.

Considering the subject within the frame of endogenous growth theories, it is ascertained that the human capital resources of a country have a great impact on growth. In recent years, the empirical studies on economic growth also increasingly emphasize the role of human capital in economic growth process. As often expressed in the empirical studies, the most important indicators of the human capital are health care and education. For education and health, the number of people graduated from collages and life expectancy at birth or total public expenditure intended on education and health care are used as variables in empirical models. Education and health care expenditures increase the quality of labour force and positively contribute to the production capacity and thus to the economic growth. It is also emphasized by the endogenous growth theories that in the development process, health care and education expenditures play an important role in the formation of human capital and have a significant contribution to the sustainable economic growth in long-term.

In this study, within the frame of theoretical and empirical arguments presented above in summary, the relationship between education, health care expenditures and economic growth is tested by the panel causality test for 20 OECD member countries that are selected considering data sufficiency for 1999 – 2008 period. In the first part of the study that composed of three parts, the theoretical frame is presented. After the second part that summarizes the findings of relevant empirical studies, the empirical model and the findings of the model are evaluated. The study reveals the importance of human capital for economic development.

Empirical Literature

Empirical literature about the relationship between human capital and economic growth is summarized in Table 1.

Table 1. The Empirical Literature

Author	Method	Period	Country	Result
Romer (1989)	Endegenous Growth Model	1960-1985	Transnational	Positive effect of education on growth
Mulligan and Sala-i Martin (1992)	Endegenous Growth Model			Economic growth increases the rate of return on human capital
Barro and Lee (1993)	Panel Method	1960-1985	189 Country	Positive effect of education on growth
Kelly (1997)	Ordinary Least Squares	1970-1989	73 Country	Do not have any effect on economic growth of health spending
Rivera and Currais (1998)	Ordinary Least Squares	1960-1990	OECD Countries	Positive effect of health spending on economic growth
Freire-Serén (2001)	Two-Step OLS	1960-1990	Transnational	There are two-way causal relationship between human capital and economic growth
Kar and Ağır (2003)	Granger Causality, VECM	1926-1994	Turkey	-causality of education spending to economic growth -causality of economic growth to health spending
Serel and Masatçı (2005)	Johansen cointegration	1950-2000	Turkey	-Human capital has a positive effect on growth in the long term -Causality of economic growth to human capital
Taban (2006)	Johansen cointegration, Granger Causality	1968-2003	Turkey	Two-way causal relationship between health indicators and economic growth
Taban and Kar (2006)	Granger Causality	1969-2001	Turkey	Two-way causal relationship between educaiton and economic growth
Haldar and Mallik (2010)	Johansen cointegration, ARDL	1960-2006	India	investment in education and health are very important and has a significant positive long run effect on per capita GNP growth
Şimşek and Kadılar (2010)	Cointegraiton, granger causality, ARDL	1960-2004	Turkey	-Causality of human capital to GDP in the short and long term - Causality of GDP to human capital in the short term
Keskin (2011)	Multiple Linear Regression	Cross-Sectional Data	177 BM Countries	Has important effects on economic development, educatiton and health spending
Yaylalı and Lebe (2011)	Cointegraiton and VAR	1938-2007	Turkey	Two-way causal relationship between educaiton and economic growth

Model, Data and Methods

In this study, the estimated models are shown in the following equations.

$$GDP_t = \alpha_0 + \sum_{B=1}^{m} \alpha_B GDP_{t-B} + \sum_{k=1}^{n} \delta_k EDUC_{t-k} + u_t \quad (1)$$

$$EDUC_t = \alpha_0 + \sum_{B=1}^{m} \alpha_B EDUC_{t-B} + \sum_{k=1}^{n} \delta_k GDP_{t-k} + u_t \quad (2)$$

$$GDP_t = \alpha_0 + \sum_{B=1}^{m} \alpha_B GDP_{t-B} + \sum_{k=1}^{n} \delta_k HEALTH_{t-k} + u_t \quad (3)$$

$$HEALTH_t = \alpha_0 + \sum_{B=1}^{m} \alpha_B HEALTH_{t-B} + \sum_{k=1}^{n} \delta_k GDP_{t-k} + u_t \quad (4)$$

In the model, GDP symbolizes the rate of growth, EDUC symbolizes the GDP ratio of total education expenditures, HEALTH symbolizes the GDP ratio of total health expenditures, a and ds symbolize the parameters and m and n symbolize the lag length. According to Schwarz information criterion 3 is determined as the length of delay. Besides, employment (EMP) is added as a control variable to the model as it can be in relation to growth, education and health. The data used in the analysis is obtained from World Bank WDI, OECD-STAN data bases. The data set used icludes 1999 – 2008 period and 20 OECD member countries: Austria, Czech Republic, France, Hungary, Ireland, Israel, Italy, Japan, Holland, Spain, UK, Denmark, Germany, Poland, Portugal, Slovakia, Finland, Iceland and USA.

According to Holtz-Eakin, Newey and Rosen (1988), the hypothesis test can be made in equation 5 in order to examine whether model in equation 1 cause GDP to EDUC and model in equation 2 EDUC to GDP. This hypothesis test can also be made for equations 3 and 4 that present the relation between GDP and HEALTH.

$$\delta_1 = \delta_2 = \delta_3 = 0 \quad (5)$$

The economics literature suggests three approaches to test casuality in panel data set. The first approach is based on the generalized method of moments (GMM) and the Wald test in equation 3. The GMM method requires the panel data set to be N>T. The second one is suggested by Hurlin (2008) and fixed effects are based on panel data approach. The fixed effect panel data approach can be applied only for static series. The third one is proposed by Kónya (2006) and it is based on the estimates of seemingly unrelated regression (SUR). The last approach requires the panel data set

to be T>N. In this study, the GMM - system approach is preferred since the data set used is N>T and some variables in the model are I(1).

Holtz-Eakin, Newey and Rosen (1988), Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) developed the GMM – system approach which can solve the endogeneity and it can be and applied to T<N feature samples. This method is basically an instrumental variable method. It is based on producing instrumental variables which have the similar characteristics of moment instead of variables that are considered to have the problem of endogeneity and using instrumental variables in regression model. It is possible to express GMM β estimator as in equation 6 for a model in the form of $y_i = x_i'\beta + u_i$ (Cameron and Triverdi, 2009, p. 175):

$$\hat{\beta}_{GMM} = \left(X'ZWZ'X\right)^{-1} X'ZWZ'y \tag{6}$$

In equation 6, X represents the matrix of independent variable, Z represents the matrix instrumental variable, Y represents the matrix of dependent variable and W represents the matrix of symmetric weight. The GMM β estimator minimizes the objective function. The objective function is indicated in equation 7.

$$Q(\beta) = \left\{\frac{1}{N}\left(y - X\beta\right)' Z\right\} W \left\{\frac{1}{N} Z'\left(y - X\beta\right)\right\} \tag{7}$$

When the matrix of weight is taken in the quadratic form, it is equal to $Z'\left(y - X\beta\right)$. However, when the matrix of weight is selected as in two-staged least square the optimal GMM estimator is reached. The optimal GMM is indicated in equation 8.

$$\hat{\beta}_{OGMM} = \left(X'Z\hat{S}^{-1}Z'X\right)^{-1} X'Z\hat{S}^{-1}Z'y \tag{8}$$

In the equation 8 $\hat{S}$ is the estimation of $Var\left(N^{-1/2}Z'u\right)$. The efficiency of the GMM estimator depends on selecting the right matrix of instrumental variable. There are three tests used for this purpose. The first one is the AR(1) and AR(2) tests developed by Arellano and Bond (1991). The AR(1) test examines the null hypothesis in the form of "no first-order autocorrelation." Because of the method of obtaining instrumental variable, first-order autocorrelation should be observed automatically in the error term of the model and the null hypothesis should be rejected at a %5 statistical significance level. Otherwise, it is understood that the instrumental variables cannot be determined correctly. On the other hand, AR(2) test examines the null hypothesis in the form of "no second-order autocorrelation." The no second-order autocorrelation should not be rejected at a %5 statistical significance level in the model. Oth-

erwise, it is again understood that the instrumental variables cannot be determined correctly. The second test is known as the Sargan test. It examines the null hypothesis in the form of "instrumental variable is valid." Therefore, the null hypothesis should not be rejected at a %5 statistical significance level. The last test is known as Hansen's J test. The J test also examines the null hypothesis in the form of "instrumental variable is valid" and the null hypothesis should not be rejected at a %5 statistical significance level. Furthermore, if the tests are ranked according to the degree of reliability, AR(1) and AR(2) tests are in the first place, the Sargan test is in the second and the J test take the last place. Particularly, as the number of instrumental variables increase the success of the J test decreases (Roodman, 2006, p. 14).

Finally, Windmeijer (2005) proved that the GMM estimate is exposed to small sample deviation in a finite number of observations and proposed a method to correct this small sample deviation that emerge in standart errors. Moreover, the author proves that when this deviation arising from the small sample is corrected, the deviations observed in standard errors and coefficients decrease as well. In order to correct the results of the GMM method used in this study, the correction proposed by Windmeijer (2005) is followed. The only code that can implement this correction is written by Roodman (2006). For this reason, the code written by Roodman (2006) is used for GMM estimation.

Findings

In table 2, the results of the model estimation that examines whether there is a casual relationship from education to growth is shown.

Table 2. Estimation Results of Model 1

Independent Variables	Coefficient	Corrected Standard Error	T Statistics	Probability
GDP_{t-1}	0.67*	0.111	6.05	0.000
EDUC	-6.19*	0.980	-6.32	0.000
$EDUC_{t-1}$	7.72*	1.502	5.14	0.000
$EDUC_{t-2}$	-0.75	1.471	-0.52	0.607
$EDUC_{t-3}$	-0.84	0.964	-0.88	0.382
Arellano-Bond AR(1) Statistics		-4.21 (0.000)	F Statistics	18.56 (0.000)*
Arellano-Bond AR(2) Statistics		-0.79 (0.429)	No. Of Observations	120
			Cross-Section	20
			Time Dimension	10 years
Wald Statistics ($EDUC_{t-1} = EDUC_{t-2} = EDUC_{t-3} = 0$) 10.94 (0.0071)			Method	Two Staged Panel GMM-system

Note: * symbol shows the %1 statistically significant coefficients. In the statistics related to the model, the values before the parentheses show the related statistic values and the values in parentheses indicate the possibilities.

According to the findings, the F statistics show that the model, as a whole, is statistically significant at a %5 significance level. The AR(1) statistics show first-order autocorrelation is observed in the error terms of the model and AR(2) statistics show no second-order autocorrelation. The Wald statistics that examine $EDUC_{t-1} = EDUC_{t-2} = EDUC_{t-3} = 0$ hyphothesis is rejected at a significance level of %1. This finding means that the education expenditures are the reasons of growth.

In table 3, the results of the model estimation that examines whether there is a casual relationship from growth to education expenditures is shown.

Table 3. Estimation Results of Model 2

Independent Variables	Coefficient	Corrected Standard Error	T Statistics	Probability
$EDUC_{t-1}$	0.954*	0.038	25.03	0.000
GDP	-0.041*	0.009	-4.28	0.000
GDP_{t-1}	0.010	0.015	0.65	0.515
GDP_{t-2}	0.034**	0.015	2.20	0.030
GDP_{t-3}	0.006	0.012	0.56	0.577
Arellano-Bond AR(1) Statistics		-4.48 (0.000)	F Statistics	165.54 (0.000)*
Arellano-Bond AR(2) Statistics		0.56 (0.577)	No. Of Observations	120
			Cross-Section	20
			Time Dimension	10 years
Wald Statistics ($GDP_{t-1} = GDP_{t-2} = GDP_{t-3} = 0$) 10.49 (0.0071)			Method	Two-Staged Panel GMM-system

Note: * symbol shows %1 ** shows %5 statistically significant coefficients. In the statistics related to the model, the values before the parentheses show the related statistic values and the values in parentheses indicate the possibilities.

According to the no. 2 model estimation results, the model is significant at a %1 significance level and the instrumental variables are valid. Besides, the Wald statistics cannot reject the H_0 hypothesis at %1, %5 and %10 significance levels in the form of growth is not the reason of education expenditures.

In table 4, there are the results of a casual relationship research from health expenditures to growth that is stated above in no. 3 model.

Table 4. Estimation Results of Model 3

Independent Variables	Coefficient	Corrected Standard Error	T Statistics	Probability
GDP_{t-1}	0.462*	0.131	3.52	0.001
HEALTH	-5.529*	0.732	-7.55	0.000
$HEALTH_{t-1}$	6.072*	1.260	4.82	0.000
$HEALTH_{t-2}$	-0.674	1.292	-0.52	0.603
$HEALTH_{t-3}$	-0.467	0.824	-0.57	0.572
Arellano-Bond AR(1) Statistics		-4.20 (0.000)	F Statistics	24.09 (0.000)*
Arellano-Bond AR(2) Statistics		-0.65 (0.513)	No. Of Observations	120
			Cross-Section	20
			Time Dimension	10 years
Wald Statistics ($HEALTH_{t-1} = HEALTH_{t-2} = HEALTH_{t-3} = 0$) 17.05 (0.0000)			Method	Two-Staged Panel GMM-system

Note: * symbol shows %1 ** shows %5 statistically significant coefficients. In the statistics related to the model, the values before the parentheses show the related statistic values and the values in parentheses indicate the possibilities.

According to the no. 3 model estimation results, the model is significant at a %1 significance level and the instrumental variables are valid. Besides, the Wald statistics cannot reject the H_0 hypothesis at %1, %5 and %10 significance levels in the form of growth is not the reason of health expenditures.

In table 5, there are the results of a casual relationship research from growth to health expenditures that is stated above in equation 4.

Table 5. Estimation Results of Model 4

Independent Variables	Coefficient	Corrected Standard Error	T Statistics	Probability
$HEALTH_{t-1}$	0.928	0.257	36.06	0.000
GDP	-0.769	0.013	-5.84	0.000
GDP_{t-1}	-0.005	0.020	-0.25	0.805
GDP_{t-2}	0.009	0.021	0.46	0.645
GDP_{t-3}	0.040	0.015	2.56	0.012
Arellano-Bond AR(1) Statistics		-3.57 (0.000)	F Statistics	527.27(0.000)*
Arellano-Bond AR(2) Statistics		-0.18 (0.860)	No. Of Observations	120
			Cross-Section	20
			Time Dimension	10 years
Wald Statistics ($GDP_{t-1} = GDP_{t-2} = GDP_{t-3} = 0$) 18.06 (0.0000)			Method	Two-Staged Panel GMM-system

Note: * symbol shows %1 ** shows %5 statistically significant coefficients. In the statistics related to the model, the values before the parentheses show the related statistic values and the values in parentheses indicate the possibilities.

According to results of no.4 model estimation results that is summarized in table 5, the model is significant at a %1 significance level and the instrumental variables are valid. Besides, the Wald statistics accept the that there is a casual relationship from growth to health expenditures at %1significance level .

Conclusion

In economic literature, two theoretical structures about economic growth that are endogenous and neo-classical, attract the attention. These theories, taking into account different criteria, provide a theoretical framework for growth. Endogenous growth theories discuss investments in human capital among the sources of growth. Studies that are done within the context of endogenous growth theories, variables are generally used as education and health expenditures for human capital.

In this study the nexus between human capital and economic growth was tested empirically using panel causality test for 20 OECD countries. Achieved evidence indicates that there are bi-directional causal relationship between education expenses and economic growth. Furthermore two-sided causal relationship between health expenses and economic growth was found. These findings support the suggestion of endogenous growth theory which is a competitor of Neo classical growth theory. The findings prove similar results for the studies done with different countries, different time zones and different methods. In this context, the human capital investments that are represented by education and health expenditures have a positive effect on the economic growth of the countries.

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Animal Spirits and Trading Volume in International Financial Markets between 2002 and 2011

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ABSTRACT

The change in trading volume and returns and the dysfunction of the economy and more specifically of financial markets has been increasingly attracting attention of researchers, analysts, practitioners, institutions as well as government organizations. This paper investigates the factors that are able to explain how financial markets work. Testing the rational expectation hypothesis and different components of animal spirits including investors' beliefs and their behavioral biases, results show that economy is driven by animal spirits and not by rational behavior. Considering the classification of the sample by periods of stability and periods of excessive volatility, results incite to think that financial markets work in terms of economic cycles.

JEL Codes: *G02, G11, G12, G14, G17.*

KEYWORDS

Investors' Beliefs, Animal Spirits, Economy Dysfunction, Volatility, Rational Expectation.

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Introduction

Financial markets have witnessed an excessive change in trading volume and returns which causes abnormal losses and tremendous financial recessions and scandals affecting the financial and economic world during about the last thirty years (July 1990 to March 1991, March to November 2001 and the recession that began in December 2007 in the case of the U.S., the recession of the 1990s for the Japan, Indonesia after 1998, Argentina after 2001, European Union during 2000 and 2001, East Asia during 1997,…). In the real economic world, these recessions and scandals have not been known only in recent decades, they have been observed since more than one hundred years. The best known are, however, as an indication and not limitation, those of the crash of October 1929 and the oil crisis of 1973.

Although the importance of investigations they made, economists have failed to understand how the economy really works (Posner, 2009). In this sense, different explanations are theoretically considered to explain the excessive crises and scandals affecting largely the financial and economic spheres, especially, spanning about the last five decades. In financial markets, the authors analyze the efficiency of markets and the rationality of investors and attribute the dysfunction of financial markets to informational bias. However, in spite of the importance of its implications the rational expectation hypothesis, largely based on the efficient market hypothesis, fails to explain the excessive change in trading and returns in the major financial markets in developed and emerging countries (*see*, Lavoie, 2010). Numerous other authors attribute the excessive change in returns and trading volume in the major international markets to behavioral biases and investors' belief such as overconfidence (Daniel, Hirshleifer and Subrahmanyam, 1998), optimism (Haruvy, Stahl and Wilson, 1999; Weinstein, 1989; Otten, 1989) or pessimism (De Bondt and Thaler, 1987; Barberis Shleifer and Vishny, 1998). More recently, Akerlof and Shiller (2009) come back to reconsider the Keynesian *General Theory* recommendation and introduce what they call, such as used for the first time by Keynes (1936), the "*animal spirits*" in order to explain how the economy really works.

However, in spite of the importance of prior investigations, the causes of financial and economic crises and recessions remain disputable and the results remain non-conclusive. This leads to investigate the dysfunction of financial markets introducing variables other than that referred to the rational expectation considering, among others, investors' beliefs and behaviors. The aim of this paper is, consequently, to examine the causes of crises and scandals in the financial and economic world and

to understand how the economy really works. In order to do, we investigate together the hypothesis of rational expectation as well as the behavioral biases. These latter are expressed in terms of animal spirits including optimism, pessimism, overconfidence and spontaneous reaction. This investigation gives answers to our main question, which is the following:

What are the factors influencing the way how financial and economic spheres work?

Considering the trading volume and the stock market index as a financial proxy for the economy work, results, using data for 12 International Capital Markets over the period spanning August 2002 to mid-November 2011, remain non conclusive. Classification of the analysis by periods of stability and periods of excessive volatility indicates same impacts of explanatory variables on the trading volume for different periods and for about all markets. However, in the global vision, economy is largely driven by animal spirits. The rational expectation hypothesis loses of significance and fails to explain how the economy works.

The remainder of this paper is organized as follows: section 2 presents a theoretical overview of the factors which are likely able to explain how the economy works. Section 3 describes the methodology and the data framework of this study and specifies the model to estimate. In section 4, we present and discuss the main results. Section 5 is spared to the conclusion.

Literature Review

Economists consider that economic and financial recessions and crises are mainly caused by factors excluding changing in thought patterns. They attribute the dysfunction of economies and more specifically of financial markets to the failure of investors to expect rationally the future incomes and the evolution of stock returns. Beliefs and sentiments are largely excluded from theoretical and empirical models. Behavioral finance, however, introduces the beliefs and sentiments such as optimism, pessimism, overconfidence… to explain the excessive volatility in prices and trading volumes. Akerlof and Shiller (2009, p. 4) argue in the specific framework of

behavior explanation that "*the current crisis bears witness to the role of such changes in thinking. It was caused precisely by our changing confidence, temptations, envy, resentment, and illusions*". These thinking components compose according to Akerlof and Shiller what they call the "*Animal Spirits*". In this specific framework, they consider that Human psychology drives the economy and matters for global capitalism. This behavior argument (i.e. *animal spirits*) has appeared since about more than seventy years ago when Keyens (1936) has noted, in his *Genaral Theory,* that about most of what we do in our life and especially in economic life are mainly due to behavioral biases such as animal spirits and not as a simple result of rational reaction toward acts and events. In this specific area, he argues that "*most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the results of animal spirits* […] *and not at the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities*" (Keynes, 1932, p. 168). This point of view is supported more recently by Akerlof and Shiller (2009, p. 168) who insist on an explicit manner on the importance of the behavioral components of which the animal spirits in the economic life. They argue, "*It is necessary to incorporate animal spirits into macroeconomic theory in order to know how the economy really works*. *In this respect the macroeconomics of the past thirty years has gone in the wrong direction. In their attempts to clean up macroeconomics and make it more scientific, the standard macroeconomists have imposed research structure and discipline by focusing on how the economy would behave if people had only economic motives and if they were also fully rational.*". Here, the authors challenge in an explicit manner the rational expectation hypothesis. We note, accordingly, that the authors insist on the incorporation of psychological components to explain the evolution of markets and economies. Thus, a non surprising sentence shown on the cover page of their book is "*How Human Psychology Drives the Economy and Why it Matters for Global Capitalism"*. This incites to new thinking in the framework of the evolution of the financial economic world.

Considering both the definition given by Keynes (1936) and that of Akerlof and Shiller (2009) to the concept of "ani*mal spirits*", we can investigate the impact of several psychological factors on the evolution of the two components of financial markets namely stock prices and trading volume. However, before these investigations, we try to define the concept of "animal spirits" according to these authors. Keynes (1936, p.161) defines the "animal spirits" as "*a spontaneous urge to action rather than inaction*". From this definition, Keynes excludes all rational components from investors' behavior. Akerlof and Shiller (2009) continue in the same line of idea and enlarge this

definition to insert other behavioral components such as Antisocial behavior or Social limits of profits, Monetary illusion, Changes in economic equity, Fairness, Legends instead facts and figures, Corruption, History, Exuberance and overconfidence (*see* Akelrlof and Shiller (2009, p. 5-6) and Guldberg (2010) for more details). In this framework, Keynes (1936) as well as Akerlof and Shiller (2009) challenge the rational expectation hypothesis and incite to introduce human psychology as the crucial factor driving investors' decisions and, therefore, markets and economies.

Keynes challenges, especially, the rational expectation hypothesis since it is based on a quantitative model neglecting human aspects. He considers, however, that Human aspects matter more than rational expectation in making decision. In this line, he argues explicitly that about the majority of our decisions depends only on these behavioral components.

Several empirical studies have confirmed the behavior based explanations of the economy works in the major international markets in developed and emerging countries. In a recent work, Dhaoui, Farhani and Garfatta. (2012) attribute the changes in trading volume in the Japanese market to the aggressive reaction of overconfident investors. Dhaoui (2011) introduce several behavioral components to explain the economy works in the case of five developed countries: Japan, U.S., Switzerland, U.K. and France. He developed an empirical model in order to investigate the impact of rational expectation as well as investors' beliefs such as Overconfidence, Pessimism, Optimism and Sponateous reaction on trading volume. The results of the study show that the rational expectation hypothesis fails to explain the evolution of the trading volume as one of the financial components of a stock market. The impact of the behavioral factors varies, however, from one market to the other depending on the specificity and the characteristics of the population. The changes of the trading volume in the context of the Japanese is explained by the aggressive reaction of more overconfident investors. Oppositely, the change of trading in the French Market is due, especially, to the excessive pessimism in the investors' beliefs. The excessive change in trading in the U.S., the Swiss and the U.K. markets are due, however, to more than one psychological factor. The reactions of optimistic, pessimistic or overconfident investors as well as that of those with spontaneous reaction drive these markets and influence largely the evolution of trading.

The investors' beliefs as components of animal spirits are also considered in several other studies (Daniel, Hirshleifer and Subrahmanyam, 1998; Haruvy, Stahl and Wilson, 1999; Weinstein, 1989; Otten, 1989; De Bondt and Thaler, 1987; Barberis

Shleifer and Vishny, 1998; Ciccone, 2003; Piroscă, 2011). A point of view commonly shared by the major of authors is that investors' beliefs impact significantly the economy works and explain in a major part the economy dysfunction.

Taken together, these empirical and theoretical arguments give explanations to the financial distress. The financial recessions can be interpreted as a consequence of an interruption of normal functioning of markets. In these lines, Hakkio and Keeton (2009, p. 6) argue theoretically that "*financial stress can be thought of as an interruption to the normal functioning of financial markets".* The interruption in markets functioning implies the reject of the hypotheses according to which financial markets react following fundamental prediction. Anomalies and behavioral biases play therefore a pivotal role in the decision-making process. The investors' beliefs are, hence, the most important factors driving the economy works. In this sense, Hakkio and Keeton (2009, p. 6) consider that "*one common sign of financial stress is increased uncertainty among lenders and investors about the fundamental values of financial assets*". This uncertainty can be explained as a consequence of the non-rational reaction of investors. The behavioral based reaction induces a distorted prevision of the price evolution given the uncertainty in investors' beliefs and sentiments. This influences significantly the evolution of the two components of financial markets namely returns and trading volumes. Accordingly, the abnormal changes in trading volumes and the low returns largely observed in the major international markets can be explained among others by the reaction of non-rational investors. In this same vein, Dhaoui (2011) among others found that the rational expectation hypothesis loses of significance in the major international markets and that economies are driven by behavioral biases such Overconfidence and Optimism for the specific case of the Japanese Stock Market, Pessimism and "Spontaneous urge to action rather than inaction" for the case of French Stock Exchange and all factors comprising the "Animal Spirits" behavioral bias, including Overconfidence, Spontaneous Reaction, Opromism and Pessimism, for the cases of the U.S. the U.K. and the Swiss Stock Markets.

Data and Methodology

This section presents a description of the sample and the period of analysis. It illustrates also the measurement of each dependent and independent variable that is used and specifies the model to estimate.

Sample Period and Stock Markets Investigated

The sample covers the period spanning from 01 August 2002 to 17 November 2011. The analyses include different markets that have been affected by at least one crisis during this period. We include here different stock markets in order to investigate the impact of investors' behavior during the periods of stability and those of excessive volatility on trading volume. The stock markets investigated are those of U.S (Nasdaq), Japan (Nikkei225), U.K. (FTSE100), France (CAC40), Switzerland (SSMI), Malaysia (MLSE), New Zealand (NZSE), Seoul (KS11), Shanghai (SCE composite), Hong Kong (HIS), Bombay (BSE) and Australia (All ordinaries). Data is available online on the yahoo Finance pages and on the website of each Stock Market.

Proxy for Used Variables

The investors' beliefs change following the evolution of gains and losses across the unit of time. Ciccone (2003) uses annual earnings forecast to determine optimism. Optimism is present when the mean annual earnings forecast exceeds the corresponding actual earnings. By extension, pessimism is present when the mean annual earnings forecast is lower than the corresponding actual earnings. In our case, we consider than optimism (respectively pessimism) is present when returns exceed (decrease under) a target level. Accordingly, investors act in optimistic way when they realize gains that exceed a desired level. Let $(\overline{R} + \sigma_{(R)})$ the level starting from which the investor can be considered optimistic, with $\overline{R}$ the average return and $\sigma_{(R)}$ the standard deviation of returns. In this sense, the investor is considered optimistic when he realized returns higher than $(\overline{R} + \sigma_{(R)})$ at the time (t-1). the investors act as optimistic when prior returns are higher than this level and in the normal way if not. Accordingly, the indicator of optimistic sentiments of the investor takes the value $R_{(t-1)}$ when $R_{(t-1)} \geq (\overline{R} + \sigma_{(R)})$ and 0 otherwise. This measure was used in Dhaoui (2011).

Oppositely, pessimistic belief occurs when losses decrease below the level $(\overline{R} - \sigma_{(R)})$. Considering the same structure, investors are pessimistic when $R_{(t-1)} \leq (\overline{R} - \sigma_{(R)})$ and

then the indicator of pessimism takes the value $R_{(t-1)}$, and takes the value 0 if not. This measure was used in Dhaoui (2011).

When returns are included in the interval $\left[(\overline{R}-\sigma_{(R)}),(\overline{R}+\sigma_{(R)})\right]$ investors react in a spontaneous manner. The spontaneous reaction variable takes, thus, the value $R_{(t-1)}$ when $R_{(t-1)} \in \left[(\overline{R}-\sigma_{(R)}),(\overline{R}+\sigma_{(R)})\right]$ and 0 otherwise.

Overconfidence occurs when an investor realizes gains in previous date. Overconfidence is more pronounced once investor realizes at the time "t" a gain higher than that in time (t-1). Considering investor who will make a decision at the time "t", he reacts in overconfidence manner if his gains in (t-1) exceed his gains in time (t-2). Oppositely when gains at time (t-1) decrease below their level in (t-2) the investor loses of confidence. The variable overconfidence will be investigated considering the impact of observed return at the time (t-1) (i.e. $R_{(t-1)}$) on the trading volume at the time "t" (i.e. V_t). This measure was used in Boynton, Oppenheimer and Reid (2009), Ulussever, Guranyumusak and Kar (2011) and Dhaoui et al. (2012).

Rational expectation supposes that investors anticipate future evolution of returns considering the realized return at the current time and adjust their anticipations by the error of anticipation of the returns for the current time. Considering the time interval $\left[(t-1),t\right]$, the rational expectation for the time "t" follows this relation : $R_t^{Exp} = R_{(t-1)} + E_{(t-1)}$, with R_t^{Exp} represents the expected return at the time "t", and $E_{(t-1)}$ represents the error of expectation at the time (t-1) that is equal to the difference between realized return and expected return at the time (t-1) : $E_{(t-1)} = R_{(t-1)} - R_{(t-1)}^{Exp}$.

The Model

To investigate the contribution of investors' beliefs and behaviors to the explanation of the evolution of trading volume across the time we develop the following model:

$$V_t = \alpha + \beta_1 RatExp_t + \beta_2 OverConf_t + \beta_3 Spont\,\mathrm{Re}act_t + \beta_4 Optimism_t + \beta_5 Pessimism_t + \varepsilon_t \qquad (1)$$

With V_t represents the natural logarithm of trading volume and ε_t is an error term.

Results of estimation will take into account the periods of excessive volatility of returns and that of stability. Excessive volatility gives an idea on the dysfunction of financial markets or more specifically financial crises and recessions.

Results and Discussions

To investigate the causes of financial recessions we investigate the effect of the investors' beliefs on the variability of trading volume in periods of stability and in periods of high volatility of returns. The periods of high volatility are determined approximately following dates of crashes and recessions indicated by international financial and economic organizations (World Bank, IMF, WTO…) and the classification relies on the results of graphical analyses. Hereafter we present graphs of the evolution of returns spanning the whole period from August 2002 to November 2011 by stock market.

Graph 1. 1st panel : Countries with one single period of Volatility

Figure 1: Mlaysia (KLSE), 2287 obs.

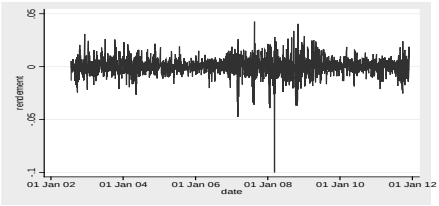


Figure 2: Japan (Nikkei225), 2328 obs.

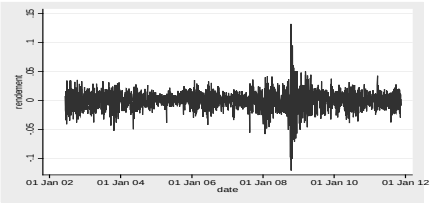


Figure 3: New Zealand (NZSE50), 1757 obs.

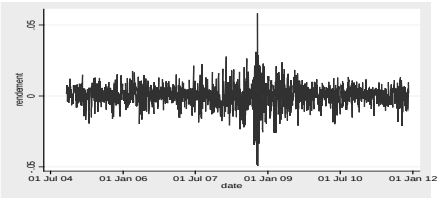


Figure 4: Shanghai (SSE Composite Index), 1493 obs.

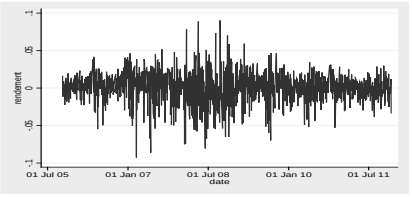
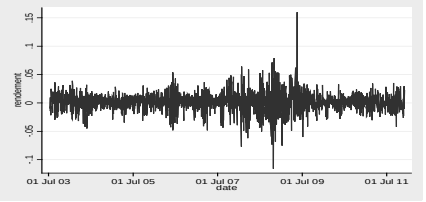


Figure 5: Bombay Stock Exchange (BSE), 2072 obs.



Graph 2. 2nd panel : Countries with two periods of Volatility

Figure 6. Hong Kong (HIS), 2281 obs.

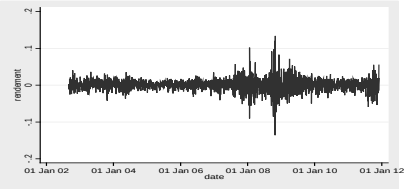


Figure 7. Australian Securities Exchanges (AORD All Ordinaries), 2214 obs.

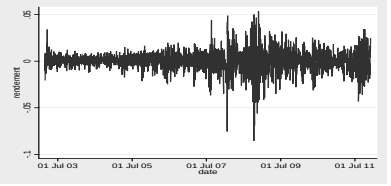
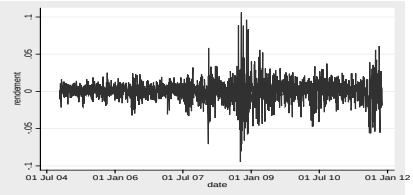


Figure 8. France (CAC40), 2310 obs.



Graph 3. 3rd panel : Countries with three periods of Volatility

Figure 9. Switzerland (Swiss Market SSMI), 2255 obs.

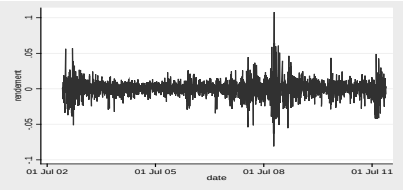


Figure 10. U.K. (FTSE 100), 2263 obs.

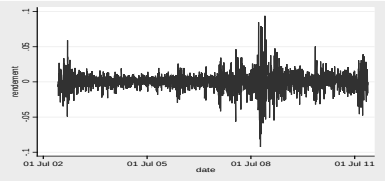


Figure 11. U.S. (Nasdaq 100), 2318 obs.

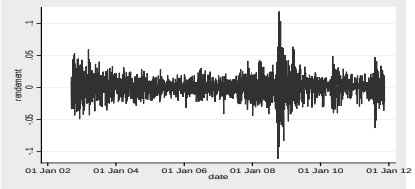
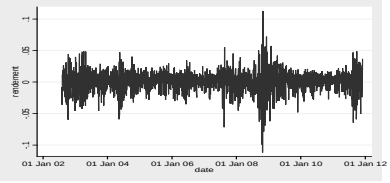


Figure 12. Seoul Composite (KS11), 2318 obs.



Graphical analyses give an idea about the classification of the countries by periods of stability and of the high volatility of their markets. Table 1 summarizes this classification by periods of stability and high volatility.

Table 1. Classification of stable vs volatile period by stock markets

	Markets	August 2002 to March 2003	April 2003 to Jun 2007	July 2007 to September 2009	October 2009 to July 2011	After August 2011
1st Panel	Japan	Stability		**Volatility**	Stability	
	Bombay Stock Exchange	Stability		**Volatility**	Stability	
	New Zealand	Stability		**Volatility**	Stability	
	Shanghai	Stability		**Volatility**	Stability	
	Malaysia	Stability		**Volatility**	Stability	
2nd Panel	Hong Kong	Stability		**Volatility**	Stability	**Volatility**
	France	Stability		**Volatility**	Stability	**Volatility**
	Australian Securities Exchange	Stability		**Volatility**	Stability	**Volatility**
3rd Panel	Switzerland	**Volatility**	Stability	**Volatility**	Stability	**Volatility**
	U.K.	**Volatility**	Stability	**Volatility**	Stability	**Volatility**
	U.S.	**Volatility**	Stability	**Volatility**	Stability	**Volatility**
	Seoul Composite	**Volatility**	Stability	**Volatility**	Stability	**Volatility**

According to table 1, we can classify the countries composing our sample in three panels. The first contains the Japan, Bombay, Shanghai, New Zealand and Malaysia. These countries have known a high volatility in their markets starting July 2007 to September 2009.

The second panel includes three countries having two volatile periods namely Hong Kong, France and Australia. The first volatile period starts in July 2007 and finishes in September 2009. The second period of volatility starts in August 2011. And, finally, the last panel contains four countries namely Switzerland, U.K., U.S. and Seoul. These countries have known three periods of volatility. The first starts in August 2002 and finishes in March 2003. The second period of volatility plains for all the period between July 2007 and September 2009. The third period starts in August 2011. For all panels, starting and final dates are determined approximately using results in the graphics above.

Considering these characteristics of international Markets we adopt the same classification and analyze the evolution of investors' behavior across the periods of stability and those of high volatility. This allows to determine the factors influencing the investors' reaction.

Tables 2 to 6 present results for the first panel including markets with a single volatile period covering July 2007 to September 2009.

Table 2. Results for Malaysian Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 17/011/2011 (Stability)
Malaysia	Rational expectation	-0,0018671 (-0,02)	0,029306 (0,22)	-0,000863 (-0,06)
	Optimism	3,952122 *** (10,12)	2,457814 *** (5,21)	2,027082 *** (4,02)
	Pessimism	-2,966418 *** (-8,85)	-2,085144 *** (-4,20)	-2,630279 *** (-6,38)
	Spontaneous Reaction	1,772425 *** (4,39)	1,639592 ** (2,02)	6,02156 * (1,73)
	Overconfidence	5,415741 *** (2,56)	5,529746 * (1,86)	-0,900518 (-0,66)
	Cons_	18,21633 *** (16,15)	19,02779 *** (10,34)	18,4898 *** (12,92)
	R-Square Adj R-Square N. obs.	0,1163 0,1133 1456	0,1356 0,1214 309	0,1994 0,1918 532

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 3. Results for Japanese Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 17/011/2011 (Stability)
Japan	Rational expectation	-0,0146175 (-0,18)	-0,00048082 (-0,61)	0,0017469 (0,16)
	Optimism	5,496744 (4,19)***	3,987197 (5,96)***	6,365698 (4,64)***
	Pessimism	-6,383355 (-5,41)***	-3,651358 (-6,36)***	-4,947251 (-3,80)***
	Spontaneous Reaction	-3,443485 *** (-2,75)	1,487952 (1,11)	0,5675622 (0,43)
	Overconfidence	1,781031 *** (-2,56)	-0,18953 (-0,49)	0,4319584 (0,59)
	Cons_	12,52128 (13,15)***	11,80451 (11,29)***	11,80701 (11,17)
	R-Square Adj R-Square N. obs.	0,2457 0,2427 1245	0,1119 0,1038 549	0,1602 0,1519 514

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 4. Results for New Ealand Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 17/011/2011 (Stability)
New Zealand	Rational expectation	-0,0648184 (-0,706)	0,0371711 (0,74)	0,0073104 (0,22)
	Optimism	9,17813 ** (2,02)	10,88856 *** (4,35)	9,682107 *** (4,69)
	Pessimism	-12,42906 *** (-2,68)	-3,853524 * (-1,71)	-5,591399 *** (-3,00)
	Spontaneous Reaction	0,3652308 (0,08)	1,419302 (0,29)	0,5953874 (0,22)
	Overconfidence	-0,3954135 (-0,15)	-1,033097 (-0,72)	-1,184377 (-1,01)
	Cons_	17,06697 (10,31)	17,17036 (9,21)	17,15519 *** (16,78)
	R-Square Adj R-Square N. obs.	0,2164 0,2103 652	0,3571 0,3514 566	0,1677 0,1653 1757

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 5. Results for Shanghai Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 17/011/2011 (Stability)
Shanghai	Rational expectation	0,1174147 (0,079)	0,0000294 (0,02)	0,0000666 (0,96)
	Optimism	10,9254 *** (5,19)	0,3974354 *** (2,70)	0,0021573 (0,24)
	Pessimism	-6,389313 *** (-3,6)	-0,1794908 (-1,38)	-0,0021634 (-0,33)
	Spontaneous Reaction	7,528852 *** (2,87)	0,5108541 ** (2,02)	0,0055034 (0,81)
	Overconfidence	-1,677286 (-0,83)	0,3199599 *** (3,88)	0,0007502 (0,18)
	Cons_	21,8397 *** (70,35)	22,1649 (89,75)	22,18064 (3,8)
	R-Square Adj R-Square N. obs.	0,4959 0,4898 416	0,4359 0,4307 549	0,3618 0,3556 523

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 6. Results for Bombay Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 17/011/2011 (Stability)
Bombay	Rational expectation	0,0001376 (0,01)	-0,0232592 (-0,51)	0,0063136 (0,32)
	Optimism	5,975804 (2,60)***	2,754436 (1,96)**	10,53096 (5,59)***
	Pessimism	-6,315796 (-2,78)***	-7,391564 (-5,12)***	-11,76311 (-6,89)***
	Spontaneous Reaction	1,315978 (0,73)	-1,754886 (-0,56)	-1,575617 (-0,91)
	Overconfidence	-0,2895931 (-0,024)	0,221533 (0,26)	0,1298517 (0,14)
	Cons_	9,65496 *** (65,42)	10,12245 *** (37,98)	9,843536 *** (66,67)
	R-Square Adj R-Square N. obs.	0,2642 0,2573 538	0,4983 0,4937 550	0,7266 0,7252 983

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Results in tables 2 to 6 indicate that the hypothesis of rational expectation loses of significance to explain the variability of trading volume in both: periods of stability and the period of high volatility in the five stock markets composing this sub-sample. Oppositely, the animal spirits behavior of investors explains about the whole the variability of trading volume in the same way in periods of stability and in the period of excessive volatile trading in the case of Malaysian, Bombay and Japanese Markets. In fact, the reaction of the optimistic investors influences positively the trading volume. Oppositely, the reaction of the pessimistic investors impacts negatively the trading volume.

Except the case of the Market of Shanghai, for all the other markets (Japan, Malaysia, Bombay and New Zealand) all the components of animal spirits variable impact in about a similar way the trading volume even in periods of stability or in that of high volatility. Thus, in the case of these stock markets we cannot attribute the high variability of trading volume in the period of non-stability to the decisions made by investors with the animal spirits reaction.

Tables 7 to 9 give results for countries having known two periods of high volatility. The first takes place spanning from July 2007 to September 2009 and the second starts in August 2011.

Table 7. Results for Hong Kong Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 31/07/2011 (Stability)	01/08/2011 to 17/011/2011 (High volatility)
Hong Kong	Rational expectation	0,0094716 (0,38)	-0,0086295 (-0,32)	-0,110444 (-1,27)	0,0569733 (0,48)
	Optimism	9,727746 (2,76)***	8,921321 (11,49)***	9,428507 (3,79)***	7,884296 (2,62)***
	Pessimism	-1,411207 (-3,96)***	-8,101631 (-10,51)***	-13,29175 (-6,22)***	-6,516842 (-2,52)***
	Spontaneous Reaction	7,963819 (3,07)***	4,095233 (2,07)**	0,6893569 (0,37)	-0,3024628 (-0,06)
	Overconfidence	4,144081 (2,33)**	1,599998 (3,38)***	-0,4723748 (-0,40)	0,529921 (0,31)
	Cons_	19,67071 (10,57)***	21,42976 (13,60)***	21,10563 (14,04)***	21,36374 (43,87)***
	R-Square Adj R-Square N. obs.	0,2956 0,2926 1192	0,2573 0,2505 555	0,1101 0,1000 447	0,1165 0,0613 86

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 8. Results for Australian Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 31/07/2011 (Stability)	01/08/2011 to 17/011/2011 (High volatility)
Australia	Rational expectation	-0,0733917** (-1,98)	-0,0141237 (-0,41)	-0,008164 (-0,53)	0,0058698 (0,18)
	Optimism	12,60348*** (3,52)	3,956039* (1,90)	7,341521*** (2,66)	3,530575 (1,05)
	Pessimism	-12,88308*** (-4,03)	-1,486838 (-0,82)	-10,31233*** (-4,24)	-4,137054 (-1,30)
	Spontaneous Reaction	1,081162 (0,47)	4,417508 (1,04)	1,79318 (0,64)	1,420481** (2,00)
	Overconfidence	-1,995823 (-1,21)	-0,6302036 (-0,54)	-1,346957 (-0,92)	-1,872936 (-0,98)
	Cons_	20,17996*** (18,17)	20,6959*** (84,77)	20,89099 (13,52)	20,83000*** (50,92)
	R-Square Adj R-Square N. obs.	0,3181 0,315 1094	0,3295 0,3236 572	0,5447 0,2396 456	0,6179 0,5949 89

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 9. Results for French Stock Exchange

Countries	Variables	01/08/2002 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 31/07/2011 (Stability)	01/08/2011 to 17/011/2011 (High volatility)
France	Rational expectation	0,0021435 (0,02)	0,0009854 (0,09)	-0,0084168 (-0,83)	-0,0144636 (-0,378)
	Optimism	1,382417*** (3,78)	7,443982*** (7,27)	6,406972*** (2,75)	5,60802*** (2,49)
	Pessimism	-2,007958*** (-6,00)	-8,564161*** (-8,79)	-13,11779 (-6,52)	-7,076897*** (-3,64)
	Spontaneous Reaction	-1,344369 (-0,66)	-0,6155619 (-0,31)	-1,952723 (-0,86)	-6,716509 (-1,32)
	Overconfidence	-1,794604 (-1,14)	-0,7888018 (-1,26)	-2,153704* (-1,83)	-3,137049*** (-2,56)
	Cons_	18,43785*** (13,92)	18,77479*** (12,72)	18,64237*** (10,73)	18,93855*** (44,66)
	R-Square Adj R-Square N. obs.	0,4708 0,467 698	0,1748 0,1675 574	0,1058 0,0961 468	0,2636 0,2132 79

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Results in tables 7 to 9 indicate for the three countries (France, Hong Kong and Australia) that optimism and pessimism hypotheses as components of animal spirits bias explain the economy works in both: periods of stability and periods of high volatility. For the specific case of Hong Kong, results show also that the reactions of overconfident investors and those with spontaneous reaction impact in their turn the economy works. The hypothesis of rational expectation remain non-significant for the three countries even the period is of stability or of high volatility.

Results for countries with three volatile periods are given in tables 10 to 13.

Table 10. Results for Swiss Stock Exchange

Countries	Variables	01/08/2002 to 31/03/2003 (High volatility)	01/04/2003 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 31/07/2011 (Stability)	01/08/2011 to 17/11/2011 (High volatility)
Switzerland	Rational expectation	-0,1111289 (-0,55)	-0,0126377 (-0,51)	0,0073701 (0,71)	0,0127327 (1,56)	-0,0034019 (-0,19)
	Optimism	8,386031*** (2,44)	6,39788** (2,25)	8,499868*** (6,87)	6,928711** (2,09)	9,748404*** (2,91)
	Pessimism	-1,886762 (-0,59)	-6,534211*** (-6,04)	-9,597526*** (-8,05)	-8,147291*** (-6,57)	-11,218586*** (-3,76)
	Spontaneous Reaction	4,607594 (0,61)	0,7302884 (0,34)	-3,699637 (-1,42)	-1,872912 (-0,72)	2,218586 (0,31)
	Overconfidence	1,456902 (0,67)	-1,798946 -1,26	-1,260576* (-1,67)	-3,097999* (-1,90)	-4,712409*** (-2,48)
	Cons_	17,69276 (35,37)	17,80328*** (14,19)	18,17439*** (11,68)	17,77902*** (11,37)	17,8621*** (38,28)
	R-Square Adj R-Square N. obs.	0,1164 0,0559 79	0,3831 0,3802 1071	0,1629 0,1554 564	0,1134 0,1037 463	0,2936 0,2446 78

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 11. Results for UK Stock Exchange

Countries	Variables	01/08/2002 to 31/03/2003 (High volatility)	01/04/2003 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 31/07/2011 (Stability)	01/08/2011 to 17/11/2011 (High volatility)
UK	Rational expectation	0,0019037 (0,02)	0,0065213 (0,39)	-0,0014575 (-0,07)	0,0027181 (0,12)	-0,138409 (-0,14)
	Optimism	2,977028 (0,59)	3,993008* (1,69)	3,729751*** (3,15)	6,913669*** (2,62)	6,150827*** (2,34)
	Pessimism	-4,354747 (-0,84)	-8,801088*** (-3,89)	-5,386519*** (-4,85)	-4,992221*** (-5,84)	-8,58405*** (-3,60)
	Spontaneous Reaction	-11,50274 (-1,09)	-1,253282 (-0,85)	-2,563612 (-1,06)	-2,953955 (-1,08)	4,72253 (0,88)
	Overconfidence	-3,349596 (-1,02)	-1,881756* (-1,73)	-1,403448** (-1,96)	-4,08298*** (-2,76)	-3,493217*** (-2,42)
	Cons_	21,07296 (30,97)	21,17952*** (25,71)	20,94948*** (13,09)	20,59363*** (12,03)	20,57805** (56,537)
	R-Square Adj R-Square N. obs.	0,4505 0,4143 82	0,196 0,1922 1073	0,361 0,3553 570	0,1016 0,0917 460	0,2585 0,207 78

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 12. Results for US Stock Exchange

Countries	Variables	01/08/2002 to 31/03/2003 (High volatility)	01/04/2003 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 31/07/2011 (Stability)	01/08/2011 to 17/11/2011 (High volatility)
US	Rational expectation	-0,0013339 (-0,05)	0,0060562 (0,34)	0,0027018 (0,19)	-0,0149435 (-0,30)	0,023649 (0,91)
	Optimism	4,77477*** (4,30)	2,655937** (1,96)	2,548728*** (3,82)	1,6657 (0,67)	4,279347*** (2,29)
	Pessimism	-1,711587 (-1,31)	-3,733872*** (-2,6)	-2,644234*** (-4,23)	-8,066696*** (-3,72)	-7,355007*** (-4,85)
	Spontaneous Reaction	9,967913*** (3,62)	-1,079388 (-0,90)	-0,2475651 (-0,18)	-5,27086** (-2,25)	2,132501 (0,65)
	Overconfidence	0,4343431 (0,61)	-0,4189386 (-0,56)	-0,9743913*** (-2,42)	-3,109979*** (-2,38)	-2,874493*** (-2,93)
	Cons_	21,06314 (97,67)	21,28201*** (23,93)	21,46282*** (21,67)	21,44617*** (13,21)	21,38062*** (76,58)
	R-Square Adj R-Square N. obs.	0,1862 0,1561 141	0,2117 0,2078 1027	0, 4599 0,4554 611	0,3575 0,3504 461	0,3421 0,2965 78

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Table 13. Results for Seoul Stock Exchange

Countries	Variables	01/08/2002 to 31/03/2003 (High volatility)	01/04/2003 to 30/06/2007 (Stability)	01/07/2007 to 30/09/2009 (High volatility)	01/10/2009 to 31/07/2011 (Stability)	01/08/2011 to 17/11/2011 (High volatility)
Seoul	Rational expectation	-0,0500564 (-0,35)	0,006156 (0,50)	-0,0014951 (-0,12)	0,0019769 (0,34)	0,000056 (0,09)
	Optimism	6,323745*** (2,55)	5,3764027*** (2,78)	4,455644*** (2,51)	0,2132635 (0,10)	0,1409836 (0,09)
	Pessimism	3,448822 (1,54)	-2,934043 (-1,51)	-0,0555116 (-0,04)	-2,642974* (-1,66)	-2,506756* (-1,80)
	Spontaneous Reaction	-2,143304 (-0,52)	3,009507 (1,36)	2,603327 (0,82)	-0,3265051 (-0,24)	-0,9799284 (-0,31)
	Overconfidence	3,455121*** (2,40)	2,152928* (1,88)	2,143484** (2,11)	0,348115 (0,38)	-0,6763232 (-0,76)
	Cons_	13,54845*** (39,96)	12,80747*** (78,72)	12,90968*** (52,13)	12,75659*** (12,68)	12,82902*** (48,73)
	R-Square Adj R-Square N. obs.	0,3976 0,3787 165	0,2213 0,2176 1054	0,1874 0,1801 559	0,1636 0,1542 453	0,1653 0,1125 85

***: Significant at the level 1%, **: Significant at the level 5%, *: Significant at the level 10%.

Results in tables 10 to 13 indicate even for countries having three periods of volatility that the hypothesis of rational expectations loses of significance and fails to explain the evolution of trading volume. Sentiments and beliefs drive, however, the economy. In fact, optimism affects significantly and positively the trading volumes whereas pessimism presents significant and negative influences. The weight of impacts is similar even the period is of stability or characterized by a high volatility.

Taken together results for the whole sample including countries with one single volatile period, those with two periods and those with three volatile periods tend toward the same conclusions. The rationality fails to explain how the economy really works; sentiments, beliefs and animal spirits drive, however, the economy. These results are consistent with the prediction of Keynes (1936) who argues that all decisions to do something constitutes most probably a consequence of only animal spirits reaction of the decision-makers and not a result of rational thinking based on statics and models. The results confirm and spur the prediction of Akerlof and Shiller (2009) who plead in favor of the fact that "*Human Psychology Drives the Economy*".

Considering these results we cannot conclude moreover that *Human Psychology* constitutes the only factor which causes definitely the dysfunction of the economy. We

can conclude, however, that sentiments, beliefs or animal spirits can be considered among the main causes of crises once there is no institutional and governmental control. Markets trade ordinary and the accumulation of biases caused by the reaction of non-rational investors induces across the time abnormal losses or abnormal gains. Non-rational investors (those with animal spirits reaction) continue their trading even when markets are not healthy and this behavior lunches the first signs of dysfunction of the financial markets. When institutions and government organizations delay their intervention the impact on the trading can be exacerbated.

Conclusion

The causes of financial recessions and economy dysfunction has come to the forefront of attention of academics, analysts, practitioners, investors, government and all who are interested in financial markets and this probably because of the problems which have been revealed in the economic sphere.
Non-rational expectation, investor sentiments, behavioral biases, animal spirits are all factors considered to explain the dysfunction of the economy once the hypothesis of rationality loses of power to explain the excessive volatility and the abnormal gains and losses in the financial markets.

Using a sample of 12 international markets over a period of analysis spanning August 2002 to the mid-September 2011, results shown that economy works is explained in terms of animal spirits and that the hypothesis of rational expectation loses of significance and this for all the markets.

After classification of the analysis by periods of stability and volatility, results indicate that beliefs and animal spirits drive the economies whatever the period is of stability or of high volatility.

Results cannot serve, however, to conclude what factor affects the variety of trading across the periods of high volatility opposite to that during the periods of stability. They allow, however, to understand only what factors can explain how the economy works. Financial markets trade in non-rational way. Investors' belief and their behavioral bias conduct their decision-making process and induce therefore a cumulative dysfunction on financial markets taking the form of repeated cycles.

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The Factors Which Caused the Decline in the Amount of the Newly One Family Houses Sold in US

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ABSTRACT
The new privately owned one-family house sold (C25) is recognized as great indicator for economy. The monthly data indicates that 250.000 houses were sold in February 2011. Compared to 2006 when 1,061,000 were sold, we understand that the total number of houses sold decreased by 76% in 2011. The purpose of this paper is to analyze factors that determine the decline of number of C25 in US. The empirical results indicate when the interest rate increases 1%, the number of new privately owned one-family houses sold decreases by 20 thousand.When the unemployment rate increases 1%, the number of new privately owned one-family houses sold decreases 81 thousand, holding all other variables constant. The results show a positive relationship may exist if rising home prices increase the quantity demanded for housing. Income and house sold have positive relationship but it's not significant. For the population variable, the coefficient is a negative number. The result of monthly dummy test indicates that none of the months has significant effects. We could be able to conclude that current mortgage rate is significant at 1% level; mortgage rate at lag one time period is significant at 5% level; both real personal incomes at lag one time period and unemployment rate at lag two time period are significant at 10% level.
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Introduction

Sales of new and existing privately owned single-family homes[1] represent the number of housing units sold. New homes are newly constructed houses that are sold by the developer to the first owner. Existing homes are houses that are at least one year old. The number of new and existing homes available for sale indicates the inventory of unsold houses that are on the market.

Economic output is increased far more by the purchase of a new house than of an existing house because of the materials and construction work required in building a new house, although renovation work is sometimes done when an existing house is purchased. While existing-home sales have a much smaller direct impact on the economy than new-home sales, existing and new-home sales are in fact closely linked because existing-home owners often can afford to buy a new home only by selling their current home. Thus, the market for existing homes strongly influences sales of new homes. In addition, both new and existing home sales generate purchases of furniture, appliances, and other house furnishings, which is a secondary stimulus to the economy.

Home sales are sensitive to changes in economic conditions related to employment, personal income and saving, interest rates, housing starts, housing affordability index, and mortgage delinquency and foreclosure. Although housing is a necessity of living, home sales are highly cyclical because households are most likely to purchase a home during prosperous times when they can best afford it, but they tend to defer a home purchase during depressed times when they can least afford it (Chea, 2010).

The new privately owned one-family house sold[2] (C25) is recognized as great indicator for economy. The Housing Sales Survey is conducted by the Bureau of the Census under contract with the U.S Department of Housing and Urban Development. Sales of single-family homes were 250,000, according to the new monthly data[3] in February 2011. Compared to five years ago, 1,061,000 in 2006 were decreased by 76%.

1 Single-family homes are unattached houses and townhouses, including individually owned and operated housing units as well as single-family townhouse condominiums. Currently, some 66 percent of all U.S. housing consists of single or one-family homes (Listokin, D.,& Burchell, R.W. *Housing (shelter)*, Microsoft® Student 2009 [DVD], Redmond, WA: Microsoft Corporation).

2 It's commonly known as C25.

3 Measures of new-home sales and of new homes available for sale are prepared monthly by the Bureau of the Census in the U.S. Department of Commerce and the U.S. Department of Housing and Urban Development.

What are the causes to the dramatic decline of number of C25? The purpose of this paper is to analyze factors that determine the decline of number of C25 in US.

Literature Review

An extensive body of literature exists concerning housing demand and home sales with most works confined to specific subtopics within the housing market.

In recent years, researchers have devoted much of their effort to identify factors that determine the housing market mechanism (Sander and Testa, 2009; Lyytikäinen, 2009; Fratantoni and Schuh, 2003; Taylor, 2007; Bradley, Gabriel, and Wohar, 1995; Vargas-Silva, 2008). Many factors have been cited (Ewing and Wang, 2005; Baffoe-Bonnie, 1998; Huang, 1973; Thom, 1985) as sources of housing market dynamics; among these, housing price (Rapach and Strauss, 2009) and housing starts (Lyytikäinen, 2009; Ewing and Wang, 2005; Puri and Lierop, 1988; Huang, 1973) play a very important role. This literature review relates to the variables in statistical models and their explanatory power in the case of home sales and housing demand.

Rising home prices would tend to result in a decrease in the quantity demanded for housing. However, as Campbell and Cocco (2007) found, a positive relationship may exist if rising home prices increase the perceived wealth of house holds, or lead to relaxed borrowing constraints. Their work also suggested that a reverse causality could result, with relaxed borrowing constraints increasing housing demand and therefore prices. Goodwin (1986) noted that inflation –distorted home prices may actually increase demand by acting as inflation hedges, with homeowners using increased home equity to compensate for rising prices in other areas.

Unemployment, by lowering a person's income, would tend to dampen the demand for new housing. Literature concerning the effects of unemployment on housing have largely ignored this simple assumption and instead focused on the effect homeownership has on unemployment. Oswald (1996) found that a 10 percent increase in homeownership increased unemployment by 2 percent. A study using Spanish data by Garcia and Hernandez (2004) that included extensive demographic variables concerning age, income and marital status found that the previous literature was not relevant for the Spanish market, where high homeownership rates were negatively correlated to unemployment.

Inflation can produce a number of effects on the housing market. By increasing the price of housing, inflation can be assumed to reduce the demand for housing in inflationary times. Yet if used as an inflation hedge, housing demand may actually increase with inflation (Goodwin, 1986). The tax deductible nature of nominal rates of mortgage interest can actually lower the real cost of capital and therefore stimulates demand and homeownership (Rosen and Rosen, 1980), especially given the fact that capital gains are not taxable for first-time home sales. Kearl's (1979) often cited work stated that inflation's effect on housing costs serves to lower housing demand, while Feldstein and Summers (1978) observed that inflation decreases housing's attractiveness as an investment. Hendershott (1980) confirmed the negative relationship between inflation and housing demand, and found that carrying costs were much more important in determining this demand than capital gains.

According to Follain (1982), a 1 percent increase in the anticipated inflation rate reduced homeownership by more than three percentage points for all households with a larger effect occurring for non-elderly married couples. Complicit in this finding was the result that higher interest rates necessarily constrain borrowing. Homeownership usually necessitates borrowing, making the interest rate a key factor in the demand for housing. Aspergis (2003) stated that interest rates were the most important factor influencing housing demand, outweighing both inflation and unemployment as an explanatory variable which reinforced a conclusion suggested by Goodwin (1986), among others. Feldstein and Summers (1978) noted that the tax deductibility of mortgage interest plays a role in increasing the real interest rate, with cost depreciation lowering it. Their work also confirmed the Fisher effect link between inflation and nominal interest rates, with the two variables working together to either increase or decrease housing demand (Kagochi and Mace, 2009,p. 134-135).

Data and Research Methodology

The purpose of this paper is to analyze factors that determine the decline of number of the newly one-family houses sold in US. For this reason, our dependent variable is the new privately owned one-family house sold.

People have a tendency to buy a house when the mortgage rate is low. Historically, the new home sales usually have a lagged reaction to changing mortgage rates.

Therefore, our first independent variable is long–term mortgage rate. People have a tendency to buy a house when the mortgage rate is low.Our prediction to the sign of the slope should be negative.

We think people's income should be another cause to C25. Following the same idea, the unemployment rate will also capture people's expectation about their future income. If people lose their job, logically, they will not risk borrowing a 30 years mortgage.

Another rational thought would be a C25 increase when population increases. So, population in United States is our fourth independent variable.

A principle of microeconomics assumes that, holding all other factors equal, as the price of a product or service goes up, demand for that product or service declines. Conversely, if the price declines, demand goes up. Finally, we take the House Price Index for the United States as our last independent variable.

Thus, our independent variables include 30 years mortgage rate, real personal income (seasonal adjusted), unemployment rate, population, and house price index.

After determining our independent variables, we tried to search proper data to answer our question. The sample period is a time series of monthly data beginning February 1, 1980 and ending February 1, 2011. It contains 31 years and a total of 373 data sets. Data are collected from the Federal Reserve Bank of St. Louis economic research database.

The reason why we have chosen Federal Reserve Bank of St. Louis economic research database as our resource is twofold. First, most of the data sets come with a nice graph which is a good source for visualization. Second, all the data sets have a downloading option in excel. This option made our data input session smooth. However, there are still some problems we have encountered during the data gathering process. Variables such as mortgage rate, income, and unemployment rate are collected monthly. But the house price index is collected quarterly; the population is collected annually. In order to have the same statistical measurement, we duplicated the last two variables in a respective monthly time series.

Before we started to perform any test, we made some prediction about our variables' slope sign and the significance of the variables. We predicted that the slopes of real personal income and a population should be positive. It makes sense when

incomes increase people have more money to consume. Similarly, population increase should lead to more people needing houses. We also predicted that the slopes of mortgage rate, unemployment rate, and price index should be negative. As mortgage rates increase, people tend to borrow less to purchase houses. When a high unemployment rate occurs, people are more likely to have lower income expectation. The house price index is the average house price for a given period. Normally, we expect that a price increase leads to a demand decrease. That is the reason why the last three slopes are negative.

Empirical Analysis

We used Gretl[4] as a tool to perform our entire statistics tests. The first test that we run was the Ordinary Least Squares (OLS). We generate a multiple regression model which include our dependent variable, Housesold and our independent variables, HPIndex_(β1), Mortgage_(β2), Population_(β3), Real personal income_(β4), and Unemployment_(β5). The result of Ordinary Least Squares model is shown in Table 1.

According to the Table 1, excluding the constant, mortgage rate and unemployment rate are significant at 1% significance level (p-value). Since the p-value of HPIndex, Population and RPIncome variables are above 0.10, these variables have no significant effect on house sold. The Gretl result also shows that the R^2 is 0.452. The interpretation of R^2 is the proportion of the variable explained by the regression model. In this case, we can use our five independent variables to explain 45% of the reason why the new house sold.

4 Gretl is an open-sourcestatistical package, mainly for econometrics. The name is an acronym for *G*nu*R*egression, *E*conometrics and *T*ime-series *L*ibrary. Though it can't be considered as a general-purpose statistical software (its main functions are time series analysis, regression analysis and various econometric tests), it is very useful thanks also to its perfect integration with R. and with two other statistical packages used in seasonal adjustments: Tramo-Seatss and X-12-Arima, http://gretl.sourceforge.net, 16.11.2012.

Table 1. Ordinary least squares, using observations 1-373, Dependent variable: Housesold

	coefficient	std. error	t-ratio	p-value
Const	2500.60	806.541	3.100	0.0021
HPIndex	0.698577	0.592120	1.180	0.2388
Mortgage	-20.3564	7.08586	-2.873	0.0043
Population	-5.68910	4.53039	-1.256	0.2100
RPIncome	0.0380852	0.0735233	0.5180	0.6048
Unemployment	-81.4594	6.11404	-13.32	2.63e-033

Mean dependent var	721.3190	S.D. dependent var	238.4758
Sum squared resid	11603099	S.E. of regression	177.8091
R-squared	0.451543	Adjusted R-squared	0.444071
F(5, 367)	60.43004	P-value(F)	7.86e-46
Log-likelihood	-2458.645	Akaike criterion	4929.289
Schwarz criterion	4952.819	Hannan-Quinn	4938.633
Rho	0.959309	Durbin-Watson	0.087015

Housesold=2,500.6+0.699HPindex-20.356Mortgage-5.689Population+0.038RPincome-81.459Unemployment

There are some surprises due to the sign of the slopes. Initially, we predicted the coefficient of population should be positive since more people need more houses. Nevertheless, the coefficient of the population in the OLS model is about -5. And our prediction for house price index coefficient is negative, but here it is positive 0.699. We need to continue a further investigation of this model or our data sets. Before we make any conclusion, we should interpret the OLS model first.

The coefficient for the 30-year Mortgage (β2) rate is negative 20.356. The p-value for the β2 is 0.0043. It shows that the β2 is significant at 1% significance level. The coefficient for the unemployment (β5) is negative 81.459. The p-value for β5 is smaller than 0.001. We can say that with 99% confidence level that the unemployment variable is significant. The p-value is 0.2388 for β1. It means that this variable is not significant at even the 10% significance level. The coefficient for real personal income is 0.038 and the p-value is 0.605.

In order to test the monthly effects, we include 11 month dummy variables in our new model. Since our data is time series, we notice that our Durbin-Watson

statistic is equal to 0.084. We also performed a Durbin-Watson test to check the autocorrelation error in the model. Table 2 shows the OLS, using observations for 1980:02 2011:02.

Table 2. Ordinary least squares, using observations 1980:02 2011:02

Dependent variable: Housesold (T = 373)

	coefficient	std. error	t-ratio	p-value
const	2657.05	868.735	3.059	0.0024
HPIndex	0.659071	0.607389	1.085	0.2786
Mortgage	-21.1217	7.30748	-2.890	0.0041
Population	-6.51837	4.92045	-1.325	0.1861
RPIncome	0.0499770	0.0790419	0.6323	0.5276
Unemployment	-81.2761	6.21222	-13.08	3.30e-032
dm1	-26.2139	45.8000	-0.5724	0.5674
dm2	-25.4406	45.7532	-0.5560	0.5785
dm3	0.327942	47.4696	0.006908	0.9945
dm4	-4.43171	47.3711	-0.09355	0.9255
dm5	-3.23851	46.5742	-0.06953	0.9446
dm6	-0.805373	46.6899	-0.01725	0.9862
dm7	2.85291	46.3886	0.06150	0.9510
dm8	-8.65891	46.2479	-0.1872	0.8516
dm9	-6.80871	46.2805	-0.1471	0.8831
dm10	-6.62623	46.1451	-0.1436	0.8859
dm11	-8.69124	45.9089	-0.1893	0.8500

Mean dependent var	721.3190	S.D. dependent var	238.4758
Sum squared resid	11572504	S.E. of regression	180.2971
R-squared	0.452989	Adjusted R-squared	0.428405
F(16, 356)	18.42562	P-value(F)	1.24e-37
Log-likelihood	-2458.152	Akaike criterion	4950.305
Schwarz criterion	5016.971	Hannan-Quinn	4976.777
rho	0.960583	Durbin-Watson	0.084113
Durbin-Watson statistic	0.0870146	p-value	0

According to the Durbin-Watson test, p-value is equal to zero shows that the model has autocorrelation problem. We should correct the model with a proper statistical method. Since the Durbin-Watson statistic equal to 0.087, it shows a positive first order autocorrelation.

The following result is the Prais-Winsten correction model, here we took lag-2 time period. Comparing to our lag-1 period result, the lag-2 period has a DW result closer to 2. This is the reason why we took lag-2 time period. Table 3 shows the Prais-Winsten correction model.

Table 3. Prais-Winsten, using observations 1980: 04 - 2011: 02

Dependent variable: Housesold (T = 371)

	Coefficient	std. error	t-ratio	p-value
const	-205.993	239.504	-0.8601	0.3903
HPIndex	-0.137471	1.03831	-0.1324	0.8947
HPIndex_1	0.122039	1.34883	0.09048	0.9280
HPIndex_2	-0.257960	1.01868	-0.2532	0.8002
Mortgage	-29.3433	9.40833	-3.119	0.0020
Mortgage _1	-3.93193	22.0249	-0.1785	0.8584
Mortgage _2	32.0894	15.5183	2.068	0.0394
Population	-1.35884	3.21593	-0.4225	0.6729
Population_1	6.66001	4.68142	1.423	0.1557
Population_2	-4.20546	3.35179	-1.255	0.2104
RPIncome	0.0493773	0.0445178	1.109	0.2681
RPIncome_1	-0.111914	0.0587686	-1.904	0.0577
RPIncome_2	0.0560686	0.0457059	1.227	0.2207
Unemployment	1.68362	15.3669	0.1096	0.9128
Unemployment _1	29.2876	23.5791	1.242	0.2150
Unemployment _2	-28.4143	15.1497	-1.876	0.0615

Statistics based on the rho-differenced data

Mean dependent var	722.4717	S.D. dependent var	238.5867
Sum squared resid	734764.0	S.E. of regression	45.62329
R-squared	0.965114	Adjusted R-squared	0.963434
F(17, 353)	827.8281	P-value(F)	2.0e-272
Rho	-0.038935	Durbin-Watson	2.076334

After the Prais-Winsten correction (Table 3), we noticed that the Durbin-Watson statistic is 2.076. It means that the autocorrelation error is very low. In this new model, current mortgage rate is significant at 1% level; mortgage rate at lag -1time period is significant at 5% level; both real personal incomes at lag-1 time period and unemployment rate at lag-2 time period are significant at 10% level.

The new R Square, 96%, is much higher than the OLS model. It also has a lower t-ratio. These indications might reveal a multicollinearity relationship existing among the independent variables. When a multicollinearity problem exists in this model, it is possible that each of the individual coefficients may be individually insignificant, but the joint effect may have a significant impact on the dependent variable. Since some independent variables in this model are not significant, we decided to perform a Wald-test to test the joint effect of these factors: Price index, real personal income, unemployment rate, and population.

H0: $\beta1=\beta2=\beta3=\beta5=\beta7=\beta8=\beta9=\beta10=\beta12=\beta13=\beta14=0$
H1: at least one of the β is not zero

The Wald-test result is below:
Wald-test formula: $F = [(ESS_R - ESS_U) / m] / \{ESS / [N - (k + 1)]\}$
Test statistic: $F(12, 353) = 1.94718$, with p-value = 0.0282136

Where the following notation applies:
ESS_R, error sum of squares of Model R
ESS_U, error sum of squares of Model U
ESS, error sum of squares

Model R is called the restricted model
Model U is called the unrestricted model

m=number of restrictions
N= number of observations
k= number of regressors in unrestricted regression

Since the p-value of the Wald-test is 0.028, we do have enough evidence to reject the null hypothesis at 5% significance level. In another word, the joint effects of the non-significant variable are great than zero. Given the result of Wald test, we should continue an investigation the multicollinearity among the independent variables. Therefore, we carried on a series of Auxiliary Regressions. By using Auxiliary regressions, we can compute variance inflation factor(VIF) which is a measure of the effect of multicollinearity on the variance parameter estimates. The auxiliary regression and VIF result is presented in Table 4.

Table 4. The Auxiliary regression and VIF result

In-Variables	HPIndex	Mortgage	PoPula	RPI	Unemp
VIF	433.35	150.01	188.52	238.63	105.828
In-Variables	HPIndex_1	Mortgage_1	Popula_1	RPI_1	Unemp_1
VIF	2084.58	392.72	2093.87	1798.31	213.71
In-Variables	HPIndex_2	Mortgage_2	Popula_2	RPI_2	Unemp_2
VIF	1378.97	136.64	1236.1	1208.83	103.95

High VIFs suggest the presence of a multicollinearity problem. When VIF>30 usually indicates a sever multicollinearity. The VIF results for all the variables are great than 30. It means that all the variables are highly correlated. It also means that we have a small sample size.

Conclusion

Housing sales play a significant role as leading indicator of the economy, and thereforeunderstanding the market dynamics cannot be overemphasized, especially in light of the recenthousing market turmoil and its effect on the economy as a whole. Since, the factors in thehousing market will likely continue to play an important role in the business and economy (Gupta& Das, 2010; Bernanke and Gertler, 1995), understanding the market mechanism, specifically thelead-lag relationship between factors can offer policy makers a notion about the direction of theoverall market trajectory in advance, and thus, provides a better control for designing appropriatepolicies for housing market stabilization (Choudhury**,** 2010, p.45).

As a result of such importance of the housing market on the economy,the purpose of this paper is to analyze factors that determine the decline of number of C25 in US. The study found that the coefficient for the 30-year Mortgage (β2) rate is negative 20.356. It indicates when the interest rate increases 1%, the number of new privately owned one-family houses sold decreases by 20 thousand, holding all other variables constant. This is not a surprise result for this regression analysis. The mortgage rate plays a critical role in house market. The 30-year mortgage rate decreases more than 50% from 13% in the1980s to 5%-7% in the 2000s. At the same time, the number of houses sold increases about 50% from 541,000 in the 1980s to 1,000,000 in 2006, before the 2007 recession.

The coefficient for the unemployment (β5) is negative 81.459. It indicates when the unemployment rate increases 1%, the number of new privately owned one-family houses sold decreases 81 thousand, holding all other variables constant. This result proves our prediction in the sign of the slope. New houses sold and labor markets tend to go together. When the unemployment rate is low, people have a positive expectation for their future income. These expectations will strengthen the house market. Similarly, when a large number of people lose their jobs, the house market will move slowly. It's also true that these two factors are strong indicators for the economy. Currently, we have a slow house market and a low employment rate.

One of the unexpected results is the positive sign of the coefficient β1for the house price index. As we explained previously, we thought when price goes up the demand should go down. But it doesn't fit in this case. One possible explanation is that this is all a function of rising demand and the rising prices for houses simply reflects the rising demand and the inadequate supply of new construction for homes. The second possibility is that rising prices actually cause an increase in demand. This is because the purchase of a house has two components: the usefulness of the house as a place to live, and the anticipated future income to be obtained from selling the house later at a higher price. Rising home prices increase buyers' expectation of future profits from selling their houses, so they are willing to pay more for a house.

The coefficient β4 for the real personal income variable is 0.038 and the p-value is 0.605. This result indicates that income and house sold have positive relationship but it's not significant. This may due to the unemployment rate variable which captures most income effects. In another way, it shows that real personal income and unemployment have a high correlation.For the population variable, the p-value is 0.21, so it has no significance effect on house sold.

In order to test the monthly effects, we include 11 month dummy variables in our new model. The result of monthly dummy test indicates that none of the months has significant effects. However, from March to July the slopes of the months have positive or lower negativeeffects. It means that these few months have more houses sold than other months.

Consequently, it's impossible to determine all the causes to the number of new house sold since many factors are interrelated. However, through our series of statistical tests, wecould be able to conclude that current mortgage rate is significant at 1% level; mortgage rate at lag one time period is significant at 5% level; both real

personal incomes at lag one time period and unemployment rate at lag two time period are significant at 10% level.

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The Effect of Financial Development on Economic Growth in BRIC-T Countries: Panel Data Analysis

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ABSTRACT

In this study, the effect of financial development on economic growth was researched for the most rapidly developing countries (emerging markets) (Brazil, Russia, India, China and Turkey, BRIC-T) via panel data analysis using the annual data for the period from 1989 to 2010. Foreign direct investments and trade openness, which was thought to have effects on the growth, were included in the analysis. According to empirical evidence derived from the study made with panel data analysis it was found that the effect of financial development on economic growth was positive and statistically significant in line with theoretical expectations. Evidence that even foreign direct investments and openness contributed to the growth positively was also found.

***JEL Codes**: E49, F19, G29*

KEYWORDS

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Introduction

An increase in financial instruments and the foundation of these instruments more commonly available in a country is defined as financial development. In other words, financial growth means the development of financial markets (Erim and Türk, 2005). Financial growth is the change of the financial system in terms of size and structure. However, financial deepening expresses the share of the money supply in national income and it becomes a measure for financial growth and financial instrument variety (Saltoğlu, 1998). Financial growth can be expressed as a channel that transforms the savings to the investment in the financial changing process.

In its literature, great contributions of the financial markets and institutions to the economic growth process of the countries in many ways are emphasised and this constitutes the subjects of many empirical studies. In the studies it is generally stated that a financial system which performs its financial functions would contribute to the economic growth in the long term (King and Levine, 1993a, 1993b; Arestis and Demetriades, 1997; Thiel, 2001; Levine, 2004; Eschenbach, 2004; Lawrence, 2006; Shan and Jianhong, 2006). Smoothly running financial markets in the economy support the capital accumulation, help the small funds direct to the big investments, encourage the disseminations of new technologies and therefore provide the most effective usage of the sources; they support the economic productivity and growth (Aslan and Küçükaksoy, 2006).

Economic growth of that country will be high if financial institutions provide the credit demands of the real sector. In early studies about financial and economic growth (Gurley and Shaw, 1955, 1967), we observe that the effect of financial intermediation function on economic growth process is stated, although the theoretical thoughts cannot be expressed as a whole.

Although Gurley and Shaw have made an important contribution to the literature by expressing the relationship between the financial sector and economic growth for the first time, they do not make any comment about whether or not there is a causality relationship between financial development and economic growth or if there is, what the direction of this relationship is. Patrick (1966) for the first time dealt with the relationship between the financial sector and economic growth by conceptualising. He expressed the idea that the causality between the financial sector and economic growth could be in two different forms and explained this relationship by using the demand-following and supply-leading concepts. On the demand-following case he expresses the financial sector growth to supply the demand occurring as

a result of the developments in real sector and in supply-leading he explains that the growth of the financial sector would institutionally stimulate economic growth.

It is very difficult to say if there is an agreement in many studies performed in order to determine the direction of the causality between the financial sector and economic growth. In the empirical analysis between financial development and economic growth we can see that there are studies expressing that the causality relationship is both one-sided and two-sided (Arestis and Demetriades, 1997; Thiel, 2001; Eschenbach, 2004; Lawrence, 2006; Shan and Jianhong, 2006). In some studies it is also stated that the relationship between financial development and economic growth variables is weak, even though financial growth may play a decreasing role in the economic growth process (Singh, 1997; Deidda, 2006).

First named BRIC in the early 2000s, countries such as Brazil, Russia, India and China that have common characters such as a wide area, large population and rapid economic growth are accepted as the fastest growing "emerging markets" in the economic world (O'Neill, 2001:1-16). The total area of these countries covers more than 25% of the world's area and more than 40% of the world's population. It is argued that the BRIC group would take the G7 group's place and obtain leadership of the world's economy when the economic indicators are considered (Frank and Frank, 2010:46-54). Goldman Sachs, who studied the BRIC countries, estimates that in 2050 China will be the greatest economy in the world, India will be the third, Brazil will be the fourth and Russia will be the sixth largest economy.

Based on these indicators, with the help of panel data analysis using the annual data of 1989 and 2010, in our study the effect of financial development on economic growth is researched for BRIC countries and Turkey, which is a developing country after China and has a developing economy. In the second section of the study, the literature review of empirical studies is presented as a table. In the following section the data set and method used in the analysis are introduced and evidence is presented. In the final section a general evaluation is conducted.

Literature Review

The first studies researching the relationship between financial development and economic growth were conducted by Schumpeter (1912). In his study, Schumpeter

(1912) indicated that a smooth running economy would support the investors economically by providing the finance of technological innovations that was necessary for producing the new products most effectively and productively. Meanwhile, he expressed the opinion that the growth of the financial sector, especially the growth of the banking sector, was necessary for economic growth. In literature following Schumpeter (1912), many theoretical and empirical studies were performed. The studies researching the relationship between the financial development and economic growth, country group and the used methods and results are indicated in Table 1. As we can observe from Table 1, the view that financial development positively effects economic growth is supported, although there was no agreement between financial development and economic growth in terms of causality in the studies generally.

Table 1. The Abstract of Some Theoretic and Empirical Studies Researching the Relationship between Financial Development and Economic Growth

Writers	Sampling and Econometric Method	Basic Evidence
King and Levine (1993)	An International study–80 countries over the period of 1960-1980	They found that all indicators of financial development were highly related with economic growth rates, physical capital accumulation and economic productivity increase.
Demirgüç-Kunt and Maksimoviç (1998)	An international analysis for 30 developed and developing countries.	An active stock market and a well-developed legal system facilitate the growth of the firms.
Kang and Sawada (2000)	Time series data for 20 country's Endogenous Growth Model	Financial development and trade liberalisation accelerate economic growth by increasing the marginal benefits of human capital investments.
Shan et al. (2001)	9 OECD Countries and China Causality and VAR Analysis	He found two sided causality in 5 countries and supply leading to causality in 3 countries, although in 2 countries he found no relationship.
Shan and Morris (2002)	19 OECD Countries and China Causality Test	They reached the results that financial development causes economic growth either directly or indirectly.
Müslümov and Aras (2002)	OECD Sample (22 countries) Granger Causality and Panel Data	A one sided relationship was obtained from the development of the capital market to economic growth.
Calderon and Liu (2003)	109 Developed and Developing Countries	They reached the result that financial development affects economic growth via capital accumulation and productivity.
Fink et al. (2003)	13 Developed Countries Co-integration and Correction Model Analysis	They found evidence supporting the "demand-following" and "supply-leading" approaches in Italy, Japan and Finland; "supply-leading" in USA, Germany, Austria, England, Switzerland and weak "supply-demand" in Holland and Spain.
Beck and Levine (2004)	40 countries Panel Data Analysis	They emphasised the importance of financial development in the economic growth process.

Thangavelu et al. (2004)	Australia Sample VAR Methodology	They found causality from economic growth to the development of financial intermediaries, although they could not find evidence that the development of financial markets would cause economic growth.
Christopoulos and Tsionas (2004)	10 Developing Countries Panel Co-integration Analysis	They found evidence that economic growth was the cause of financial development.
Caporale et al. (2005)	5 South-eastern Asian Countries Co-integration Granger Causality	It was found that the capital market increased economic growth by increasing investment activity.
Ndikumana (2005)	99 Countries Panel Data Analysis	He presented evidence that the development of financial intermediation increased investments.
McCaig and Stengos (2005)	71 Countries	They identified that the development of financial intermediation affected the growth strongly and positively.
Rousseau and Vuthipadadorn (2005)	10 Asian Countries Co-integration Granger Causality	They found that financial development stimulated the investments and there was a one-sided relationship (supply-leading) from financial development to investments in many countries.
Shan and Jianhong (2006)	Chine Sample VAR Methodology	They found that there was a two sided causality relationship between financial development and economic growth.
Artan (2007)	79 Countries Sample Panel Data Analysis	In underdeveloped countries financial development negatively affects growth.
Ağır et al. (2009)	Turkey Sample Literature Review	He expressed the idea that the relationship between financial development and economic growth could be simultaneous.
Kar et al. (2011)	MENA Countries(1980-2007) Panel Granger Causality Test	They inferred that it was impossible to make a certain statement about the causality between financial development and economic growth.
Hassan, Sanchez Yu (2011)	168 Countries Classified According to Income Level Panel Data Analysis	It was stated that there was a positive relationship between financial development and economic growth in developing countries. For many country samples a two sided causality was obtained for the short term.
İnce (2011)	Turkey Sample (1980-2010) Co-integration Analysis Granger Causality Analysis	They found that although there was a strong relationship between economic growth and financial development in the short term, there was no relationship in the long term.

Source: Study of the writers and Kularatne, 2001: 10-11.

There are also studies researching the relationship between financial development and economic growth in the Turkish sample. In empirical studies on Turkey it can be said that there is no consensus about the causality relationship between financial development and economic growth.

Financial Development Indicators

In financial development literature, the proportion of the financial sector to GDP is defined as financial depth (Feldman and Gang, 1990; Outreville, 1999). The indicators based on the size of the loan and money are the variables that are used as a measure of financial development. In the literature the proportion of narrow and broad money supply to GDP (M1/GDP, M2/GDP, M2Y/GDP), private sector loans/GDP, private sector credits of the banks/GDP, market value of the firms in Stock Exchange Market/GDP and effective money/GDP are used as the indicator of financial development and financial depth (Outreville, 1999, Darrat, 1999, King and Levine, 1993; Demetriades and Hussein, 1996, Halıcıoğlu, 2007). The "loans for the private sector" variable that has been used recently as an alternative indicator for financial intermediation is not preferred, because the indicators based on the monetary size (M1, M2, M2Y) in some studies do not represent financial development (Khan and Senhadji, 2000).

The most fundamental of these indicators are the indicators giving the proportion of narrow and broadly defined money supply/GDP. It is indicated that the M1/GDP proportion is not in strong relation to the growth, although the M2/GDP proportion indicates the measure of the size of the whole sector in financial intermediation and it is in strong relation to the change in per capita real GDP (King and Levine, 1993).

Empirical Analysis

Data Set and Model

In this study the effect of financial development on economic growth was researched using the data for the 1989-2010 periods in the sample of 5 developing countries that have an important place in the economic world (Brazil, Russia, India, China and Turkey-BRIC-T). In the analysis, besides the financial development, foreign direct investments and trade openness, which was thought to affect the growth, was included in the model. From the variables used in the analysis *y;* represents the growth rate (GDP), *fd;* represents Financial Development (M2/GDP), *fdi*; repre-

sents Foreign Direct Investments (FDI/GDP) and *open;* represents trade openness (Export+Import/GDP). The data was obtained from the web pages of the IMF and the World Bank (www.imf.org, www.worldbank.org).

For analysis Stata 11.0 and Eviews 7.0 econometric analysis programmes were used and for model choice and correction test codes were used.

Method

Panel data analysis was used to research the data from different countries together. Panel data analysis was based on decomposing the error term (u_{it}) to its components in terms of its individual and time effects (Baltagi, 2001; Gujarati, 1999 and Tarı, 2010):

$$Y_{it} = \propto + X_{it}^{'}\beta + u_{it} \qquad (1)$$

In the model, *i* indicate the countries, *t* indicates the time. When the error term (u_{it}) was decomposed the:

$$u_{it} = \mu_i + \lambda_t + \vartheta_{it} \qquad (2)$$

equation (2) was obtained. This final equation is called error component model. Here u_i indicates the individual effects, λ_t indicates the time effects. It is supposed u_i, λ_t and $\vartheta_{it} \sim IID(0, \sigma^2)$ (Independent Identically Distributed), in other words the average of error terms is zero, its variant is fixed and it is distributed normally (with a white noise process).

In the panel data analysis the stationarity of the series was first researched through panel unit root tests. The type of individual and time effects should then be identified. An endogeneity test should be conducted among the variables when there is a variable which is considered to have a close relation with the given variable, therefore it is suspected for its endogeneity. After that a model should be estimated and the problems of heteroscedasticity and autocorrelation in the model should be tested.

Panel Unit Root Analysis

It is accepted that the panel unit root tests, which regard the information about both time and cross section dimensions of the data, are statistically stronger than the time series unit root tests, which only regard the information about the time dimension (Im, Pesaran and Shin, 1997; Maddala and Wu, 1999; Taylor and Sarno, 1998; Levin, Lin and Chu, 2002; Hadri, 2000; Pesaran, 2006; Beyaert and Camacho, 2008), because the variability in the data increases when the cross section dimension is included to the analysis.

The first problem with the panel unit root test is whether or not the cross sections forming the panel are independent. At that point panel unit root tests are classified as the first generation and the second generation. The first generation tests are also classified as homogeneous and heterogeneous. While Levin, Lin and Chu (2002), Breitung (2000) and Hadri (2000) are based on homogeneous model hypothesis, Im, Pesaran and Shin (2003), Maddala and Wu (1999), Choi (2001) are based on heterogeneous model hypothesis. Conversely, the main second generation unit root tests are MADF (Taylor and Sarno, 1998), SURADF (Breuer, McKnown and Wallace, 2002), Bai and Ng (2004) and CADF (Pesaran, 2006).

Since the countries included in the analysis are not homogeneous, Im, Pesaran and Shin (2003) we used (IPS) testing this study. This test:

$$\Delta Y_{it} = \propto_i Y_{it-1} + \sum_{j=1}^{p_j} \beta_{ij} \Delta Y_{it-j} + X_{it}' \delta + \varepsilon_{it} \qquad (3)$$

is based on the model in equation (3). Here; $\propto_i$ is error correction term and when $|\propto_i| < 1$ happens; we understand that the series is trend stationary, conversely when $|\propto_i| \geq 1$ happens, it has unit root, therefore it is not stationary. The IPS test enables the $\propto_i$ to differentiate for the cross section units, in other words the heterogeneous panel structure. Test hypotheses:

H_0: $\propto_i = 1$ for all the cross section units, so the series is not stationary.

H_1: $\propto_i < 1$ for at least one cross section unit, so the series is stationary.

When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected and it is decided that the series is stationary. The IPS panel unit root test results are presented in Table 4.

Table 4. IPS Panel Unit Root Test Results

Variable	Level	Prob-Value	First Difference	Prob-Value
y	-0.74	0.77	-2.64	0.00
fd	-0.21	0.41	-4.60	0.00
fdi	-1.04	0.14	-3.29	0.00
open	3.66	0.99	-3.79	0.00

Note: In Panel unit root test Schwarz criterions used and lag length is regarded as 1.

When we examine the results on Table 4, it is observed that all series are not stationary in level value, although the series becomes stationary when the first differences of the series are taken. In other words, in the studied period it is found that macroeconomic variables are not stationary and the shock effects on these variables do not disappear after a while.

Breush-Pagan Lagrange Multiplier (LM) Test

In this stage of the analysis the LM test was performed in order to determine the type of time effect and individual effects (random or fixed). Because the selected countries aren't in a certain economic group, it was anticipated that individual effects would be random and also the time effects of financial development on the growth would be random for the countries in the studied period. Whether or not the effects are really random can be determined with the LM test (Baltagi. 2001:15).

The LM test is classified as LM_1 and LM_2. $LM=LM_1+LM_2$. LM_1; tests the individual effects are random and LM_2 tests the time effects are random. In LM_1 test; H_0: $\sigma_\mu^2 = 0$ (no random individual effects) hypothesis is tested through LM_1 statistics. LM_1 statistics are calculated with the formula below.

$$LM_1 = \frac{N.T}{2.(T-1)}\left[\frac{\sum_{i=1}^{N}(\sum_{t=1}^{T}\hat{u}_{it})^2}{\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{u}_{it}^2} - 1\right]^2 \qquad (4)$$

Here, μ; indicates the individual effects in the equation (2), *N;* indicates the cross section (country) number, *T*; indicates the time dimension, $\hat{u}$; indicates the prediction for the error terms in the equation (1). When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected and it is decided that individual effects are random.

In LM_2 test; H_0: $\sigma_\lambda^2 = 0$ (No random time effect) hypothesis is tested by LM_2 statistics. LM_2 statistics are calculated with the formula below.

$$LM_2 = \frac{N.T}{2.(N-1)}\left[\frac{\sum_{t=1}^{T}(\sum_{n=1}^{TN}\hat{u}_{it})^2}{\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{u}_{it}^{\,2}} - 1\right]^2 \qquad (5)$$

Here, μ; indicates the individual effects in the equation (2), *N*; indicates the cross section (country) number, *T*; indicates the time dimension, $\hat{u}$; indicates the predictions for the error terms in the equation (1). When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected and it is decided that the time effects are random.

In $LM=LM_1+LM_2$ test;

H_0: $Cov(\mu_i, x_{it}) = 0$ (no random individual and time effects)

H_1: $Cov(\mu_i, x_{it}) \neq 0$ At least one and at least one (random effects both).

When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected and it is decided that both of the effects are random. In this case a prediction is made through the two-way random effect model. The LM tests results are presented in Table 5.

Table 5. LM Tests

Test	Prob-Value	Decision
LM_1	0.004	Individual Effects are random.
LM_2	0.001	Time Effects are random.
LM	0.001	Individual Effects and Time Effects are random.

When we look the results in Table 5, we can see that individual and time effects are random. According to this result the prediction was made using the two-way random effect model.

Hausman Endogeneity Test

In this stage of the study, whether or not there was a relationship between the individual effects and the explanatory variables was tested with the Hausman method. Test hypotheses:

H_0: Cov(No endogeneity problem.

H_1: Cov(An endogeneity problem.

Here, ; indicates the individual effects in the equation (2), although indicates the explanatory variables in the equation (1). When the probability value of obtained from the analysis is smaller than 0.05, H_0 is rejected and it is decided that there is an endogeneity problem in the model. In this case the fixed effects model is used (Greene, 2003). However, when H_0 is accepted, the random effects model is used. This prediction is effective, non-deviated and coherent. The Hausman test is not an alternative for the LM test. However, it works as a function to check the decision from the LM test. The Hausman test was conducted and χ^2=14.62 ve χ^2 probability value=0.404 was obtained and since this value was bigger than 0.05, H_0 hypothesis was accepted and it was decided that there is no endogeneity problem in the model. In this case, it is necessary to carry out the analysis with the random effects model and this result supports the LM test results.

Two-way Random Effects Model Estimations

Panel data analysis is estimated with the two-way random effect model and the results are presented in Table 6.

Table 6. Estimation Results

Variable	Coefficient	Standard Error	t-Statistics*
fd	1.332	0.949	1.403
fdi	0.792	0.439	1.802
open	4.315	2.596	1.662
Constant Term	2.310	1.101	2.097
Weighted R^2=0.46 F_{ist}= 4.28			

*: %10 level of significance was used.

In the random effect models weighted statistics values are used (Baltagi 2001: 21). When we look at the weighted test statistics in Table 6, we can see that the model is reliable statistically. Whether there are heteroscedasticity and autocorrelation problems in the model are tested below.

Lagrange Multiplier (LM) Heteroscedasticity Test

The most common test in order to test whether the error terms variance of the model changes from cross section to cross section is the LM test (Greene, 2003). Test hypotheses:

H_0: $\sigma_{u_1}^2 = \sigma_{u_2}^2 = \ldots = \sigma_{u_n}^2 = \sigma_u^2$ Variant is fix. So there is no heteroscedasticity problem.

H_1: At least one $\sigma_{u_i}^2 \neq \sigma_u^2$ Variant is not fix. So there is a heteroscedasticity problem.

The required statistics to test these hypotheses are calculated through the following formula:

$$LM = \frac{T}{2}\sum_{i=1}^{N}\left[\frac{\sigma_{u_i}^2}{\sigma_u^2} - 1\right]^2 \qquad (6)$$

When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected. In other words it is decided that there is a heteroscedasticity problem in the model (Greene, 2003). LM test was conducted and the probability value was found 0.05. In this case H_0 was rejected and it was decided that there was no heteroscedasticity problem in the model.

Autocorrelation Test

This is a test to examine the relationship of the error terms of the model with its lagged values. The equation to measure this relationship is the AR (1) process (Wooldridge, 2002):

$$u_{it} = \rho u_{i,t-1} + \varepsilon_{it} \qquad (7)$$

Test hypotheses:

H_0: $\rho = 0$ No autocorrelation problem.

H_1: $\rho \neq 0$ An autocorrelation problem.

The required statistics to test these hypotheses are calculated with the following formula:

$$F = \frac{(SSR_R - SSR_{UR})/g}{SSR_{UR}/df} \quad (8)$$

Here, SSR_R; indicates the sum of the squares of the error terms of the restricted model in the equation (3) SSR_{UR}; indicates the sum of the squares of error terms of the unrestricted model, *g*; indicates the constraint number and *df*; indicates the degree of freedom. When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected. It is decided that there is an autocorrelation problem in the model (Drukker, 2003). The F test was conducted and the probability value was found 0.052. In this case H_0 is accepted and it was decided that there was no autocorrelation problem in the model.

Since there are no heteroscedasticity or autocorrelation problems in the model, the prediction results are reliable and interpretable. As can be seen from Table 6, the financial development level positively affects economic growth in line with the theoretical expectations. A 1% increase in the financial development level will increase the growth with the rate of 1.33%. The importance of foreign direct investments especially in developing countries is often emphasised. As a result of the analysis the effect of a 1% increase in the foreign direct investments on the growth will be 0.79%. Also trade openness variable used in the model was observed as the most effective variable in growth and it was found out that a 1% increase in openness level increased the growth with the rate of 4.31%. Therefore, this affected Turkey mostly in terms of the decrease in export depending on the decrease in external demand as a result of the 2008 global economic crisis (Somel, 2009).

Conclusion

In this study the effect of financial development on economic growth was researched via a panel data analysis method in the sample of 5 developing countries that have an

important place in the world's economy (emerging markets, Brazil, Russia, India, China and Turkey-BRIC-T). The foreign direct investments and trade openness, which was considered to affect the growth, as well as financial development, were included in the study where the annual data of 1989-2010 periods was used. At the panel unit root analysis result it was found that series were not stationary and the effects of shocks on the series did not disappear after a while and therefore it was determined that macroeconomic shocks affected the economy of the countries significantly.

Regarding the LM tests result conducted to define the applicable panel data analysis method it was found that individual and time effects were random, for that reason an analysis with the two-way random effect model was carried out. Regarding the endogeneity test result it was found that there was no endogeneity problem in the model. In the diagnosis tests result it was found that there were no heteroscedasticity and autocorrelation problems in the model. In this regard, the estimated model is reliable econometrically.

As a result of analysis it has been found that financial development increased the economic growth. Financial systems function for markets by meeting the funding needs of real sector. Therefore, they provide a source by contributing to the effective distribution of savings and eventually they support the economic growth.

The fact that trade openness affects the economic growth most is a finding that has to be focused on in the analysis. Switching of the analyzed countries especially Turkey to the export-led growth model instead of import-substitution industrialization after 1980's and in parallel with these reaching very high figures in foreign trade volume and economic growth supports the model results.

For sustainable growth countries need external sources in case of insufficient national savings. In this context, foreign direct investments are a significant source of growth. When the foreign direct investments to BRIC-T countries drawing attention with their high growth rate in 2011 are analyzed, China is the second in the world with $ 220.1 billion, Brazil is the fifth in the world with $ 71.5 billion, Russian Federation is the eighth with $ 52.8 billion, India is the thirteenth with $ 32.1 billion and Turkey is the twenty first with $ 16 billion. Being also the most foreign direct investment attracting countries BRIC-T countries considered as emerging markets in the world is compatible with the analysis results.

To summarise, in the study the effect of financial development, foreign direct investments and openness on economic growth were researched and it was found that

openness, financial development and foreign investments in turn had the most significant affected on the growth. When we considered that sustainable growth is one of the most important macroeconomic variables for the countries, the increase in foreign trade especially in export, the stimulations for the foreign direct investments and the increase in financial development level are extremely important.

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