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Article

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Amfiteatru Economic Journal

Provided in Cooperation with:

The Bucharest University of Economic Studies

Suggested Citation: Dragos, Cristian; Dragos, Simona Laura (2012) : Econometric Estimations of the Services and Financial Sector Impact on Economic Growth Variations in Times of Crisis, Amfiteatru Economic Journal, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 14, Iss. Special No. 6, pp. 621-634

This Version is available at:

<https://hdl.handle.net/10419/168765>

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ECONOMETRIC ESTIMATIONS OF THE SERVICES AND FINANCIAL SECTOR IMPACT ON ECONOMIC GROWTH VARIATIONS IN TIMES OF CRISIS

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Abstract

The world economy has been recently upside-downed by the Global Financial Crisis. However, the effects have been extremely different from one country to another and from one economic sector to another. Starting from the economic assumptions formulated in the field's literature, the article analyzes the hypotheses of the disadvantageous influences of the services and financial sector upon the volatility of the economic growth rate and the unemployment rate in times of crisis. Econometric estimations using cross-sectional OLS Robust (White) Regressions on a sample of worldwide data taken from the World Bank confirm the theoretical hypotheses. The consequences of the highlighted mechanisms can be significant through the repositioning of the role of the different economic sectors.

Keywords: global financial crisis, services, financial services, economic growth, unemployment, cross-sectional econometric models

JEL Classification: C21, E32, O11, O47

Introduction

After the Second World War the services (financial services comprised) have grown up constantly as a percentage of the gross domestic product – GDP – in nearly all of the countries of the world in the detriment of agriculture and industry. The international tendencies are of expansion in the intensive capital sectors and of contraction of the sectors with intensive consumption of labor force. The main arguments for these tendencies consist in the perception that the capital intensive sectors generate a higher added value in the economy and are less exposed to the distresses caused by the economic international relations.

In the last decades, before the global financial crisis, the majority of the components of the services sector (mainly tourism, financial services and public services) have played the role of adjustment mechanisms and stability points in the way of the economic shock waves.

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Yet, in this period of economic recession (and slow post-recession for some countries) a series of economic adjustment mechanisms have suffered changes. Therefore, some services which involve lots of technology (IT sector and mobile communications) or those services that are extremely capital intensive (financial services), have become sources of instability for the economic development of a country.

In spite of the growing interest on the topic, the services sector in times of crisis has not been analyzed empirically as widely as would have been expected given its main statute in highly developed countries.

The main objective of this paper is to utilize worldwide data to assess the impact of the services sector in general and of the financial services in particular, upon the variation of the GDP per capita and upon the unemployment level during the crisis period 2007-2011.

The structure of this paper is organized as follows: Section 2 reviews previous studies on the relationship between economic growth and service development, Section 3 describes the research hypotheses, methodology and data used in this paper, Section 4 reports the empirical findings of the study and Section 5 provides conclusions.

1. Literature review

In the economic literature there exists a wide range of empirical studies on the relationship between financial services and growth. Kroszner, Laeven and Klingebiel (2007) investigate the impact of the banking crises on the sectors which are more or less dependent to the external financing. The conclusions show that in times of financial crises the sectors that rely mostly on external sources of finance are more affected in countries with profound financial systems. On the other side, a crisis in a country with a poorly developed financial system will have less of an effect upon the economic growth.

Rajan and Zingales (1998) argue that a deep (profound) financial system relaxes the credit constraints permitting a rapid growth in periods of non-crisis for the dependent sectors. As the banking system relaxes the credit constraints, a negative impact on these intermediaries generates an increased effect of contraction on the sectors whose growth depends on the banking services. Bolt, et al. (2012) found that, during severe recessions, each percentage point of contraction of the real gross domestic product (GDP) leads to a quarter of a percentage point reduction in the return on total bank assets.

As regards the telecommunication services, Dvornik and Sabolik (2007) distinguished a strong correlation between telecommunications and the economic development, especially in the transition countries. Lam and Shiu (2010) have proved that for the developed countries there is a two-dimensional connection between 'teledensity' (defined as telecommunication development) and real GDP.

Another challenge constitutes the relation between structural changes and the growth of productivity. In what concerns the structural change, the Baumol's article from 1967 'Macroeconomics of unbalanced growth' represents a major contribution to the specialty literature. The model sustains that tertialisation slows down the productivity growth of an economy and postpones the economic development. As cited in Hartwig (2012) the growth of productivity is higher in the secondary (progressive) sector than in the tertiary (stagnant) sector. Wages have mainly the same rate of growth, but prices rise much more rapidly in

the services (tertiary) sector than in the secondary sector. The demand for certain services (mainly education and health care) is hardly price elastic because consumers are willing to pay higher prices for these services. Even if the secondary and tertiary sectors are comparable in terms of real production, the great majority of expenditures will turn to the service sector generating the 'cost disease' phenomena. The model of Baumol leads to a decline in per-capita real GDP growth and to stagnation. This model contradicts the Kaldor model of 'stylized facts' which specifies that the rate of growth of per-capita GDP is relatively stable over time.

Maroto-Sanchez and Cuadrado-Roura (2009) have demonstrated on an OECD countries sample for the period 1980-2005 that there is a positive and statistical significance link between the global productivity and the growth of services. Further researches in recent years (Peneder, 2003; Mandos, 2008; Maroto-Sanchez and Cuadrado-Roura, 2009) have tried to determine the impact of tertialisation on the economic growth by using the shift share analysis as a main device. This is a technique that disaggregates the growth of productivity on a time period in a 'with-in effect' (productivity growth within each sector). The conclusion was that employment migrates towards the services sector thereby diminishing overall productivity growth. Desmarchelier, Djellal and Gallouj (2012) have proven that the source of productivity labor growth in the process of economic development have shifted from industry to the services sector. In spite of that the guiding strength of the tertialisation process remains the industrial, secondary sector.

Other researches (Laitner, 2000; Foellmi and Zweimuller, 2008; Bonatti and Felice, 2008) define structural change as the shift of employment and expenditures towards the 'stagnant' services sector with balanced (constant) aggregated growth. Qin (2006) has demonstrated in an empirical study that in China the expansion of the services sector leads to cost disease in accordance to the Baumol model of unbalanced growth. The positive contribution of the tertiary sector to the economic development is due to the migration of the labor force from the primary sector to the services sector. Hartwig (2012) has tested the relation between structural changes and economic growth through a Granger causality panel, reaching the conclusion that the migration of the labor force towards the tertiary sector (or the accumulation of human capital through education and health care) does not generate an endogenous economic growth. Yet if Japan is removed from the sample it turns up a statistically significant negative impact of the structural changes on economic growth. Hartwig's conclusions are closer to the Baumol's model than to the Kaldor's model.

Another part of the literature contradicts Baumol's findings and argues that expenditure migration towards the tertiary sector stimulates economic growth. This is due to the accumulating nature of services like education and health care. Timmer and de Vries (2009) have studied the direct contribution of sectors to accelerations in economic growth. They find that growth accelerations can be explained by productivity increases within sectors. Market services appear to be the most important contributors during accelerations in Asia and Latin America. This statement challenges the Baumol model regarding the lack of productivity growth in the services sector.

Unemployment and the migration of the labor force towards services has been another theme largely debated in the literature. Joshi (2004) emphasized the catalytic role played by the tertiary sector, at least in the medium term, in employment generation and poverty alleviation. Chaudhuri (2011) analyzes the consequences of foreign demand decreasing for 'non-traded' goods resulted from the global recession over skilled and unskilled labor

markets in an emerging economy. The result is not just a contraction of the wages for the tertiary and IT sector and of the national incomes but also a rise in unemployment for the skilled labor force if the services sector has more skilled labor force than the IT sector.

The relationship between education, human capital and economic development has been investigated in various studies and a general conclusion is that there exist strong correlations between them. Ljungberg and Nilsson (2009) try to establish if the human capital generates economic development (through labor productivity) or if the causality goes the other way. They conclude that human capital has been a causal factor in the Swedish economic development since the industrialization, but after 1975 the growth of human capital could not sustain the demands of the third industrial revolution. Vandebussche, Aghion and Meghir (2006) have analyzed the data for the OECD countries since 1960, finding out that the different levels of education do not have the same impact on the economic development. Thus, tertiary education influences the economic growth for the countries with a high technological level, while for developing countries low levels of education are more important. A good quality analyses about the circumstances in which the high education manifests its effects on short term in the professional environment, and on long term in the economic development is realized by Plaias et al. (2011).

Other recent researches deal with themes that assess services sector and economic crisis:

- Some services sectors comply with a supplementary stress in recession conditions because of the high elasticity of demand related to population incomes. Ozturk and Acaravci (2009) analyze the tourism as a typical example for such a behaviour. The study investigates the long-run relationship between the real GDP and international tourism in Turkey.
- Popa (2011) makes an individual analysis for each continent of the financial crisis' implications in international trade. Both economic and social dimensions are allowed for.
- A novel perspective of the economic depression through ecological and environmental services is taken into consideration by Gheres and Gogozan (2010). The authors consider that a healthy and sustainable economy cannot derive from dysfunctional, unsustainable human actions upon the ecology.
- Certain punctual economic aspects like the relation between the budgetary deficit and the economic growth are allowed for by some authors (Moldovan and Lazar, 2009, Mare and Litan, 2012). They study the particular behaviors of the emerging countries with the practical exemplification of Romania.
- The effects of the economic crises are often analyzed from microeconomic perspective through the provoked organizational changes (Androniceanu and Dragulanescu, 2012).

2. Research hypotheses, methodology and data

2.1 Research hypotheses

Based on previous studies and on the personal empirical observations during the appearance of the Global Financial Crisis, we have constructed the following working hypotheses:

H1. There is a positive correlation between the share of the services sector in the national economy and the GDP growth rate in times of crisis. The shock wave of economic growth that occurs in crisis and post-crisis is significantly increased in countries with a large services sector.

We expect the intensity of the relationship to increase as the effects of the crisis disappear and the services are no longer an adjustment mechanism in the national economy for shocks' intensification. Due to the decrease of the relative prices of the services during crises, the profitability of the services decreases in comparison with the industrial and agricultural ones, having as a consequence the economic acceleration induced by the latter sectors.

H2. A significant effect of a high employment in services (% of total employment) is the amplification of unemployment fluctuations.

Experience shows that the absorption of the labor force from services towards other sectors in periods of economic recession is a slowly process. In this way, the unemployment rate fluctuations are considerably augmented.

H3. The highly proportion of the financial-banking sector in economy in general and as part of the services in particular increases the economic instability through the fluctuating character of the GDP's growth rate. The speculative nature of many of the financial products is an intensifier of the shock waves from economy.

The economic theory and the empirical realities encourage the idea that the economic instability has been generated by some components of the financial sector: stock-markets, banking sector, insurance system, etc. The hypothesis will be analyzed on empirical data at worldwide level.

2.2 Methodology

For the purpose of our research we have employed OLS regressions for a cross-section of countries with robust White correction for heteroskedasticity.

Ordinary Last Squares - OLS robust regressions

The hypotheses were tested with classical OLS regressions with robust White (1980) correction for heteroskedasticity. This provides White's estimator, often referred to as HCE (heteroskedasticity-consistent estimator):

$$v_{HCE}(\hat{\beta}_{OLS}) = (X'X)^{-1} X' \text{diag}(\hat{\varepsilon}_1^2, \dots, \hat{\varepsilon}_n^2) X (X'X)^{-1} \quad (1)$$

2.3 Data, variables and models

The data consists in the values made public by the World Bank (2012) through its Statistics Bureau, in the section Indicators, topics Economic Policy and External Debt, Financial Sector and Labor and Social Protection. The figures collected are from 2007 to 2011. For some countries, data was not available for the entire period, so when analyses were run, the sample size was indicated.

The variables are presented below:

SERV.VAL.ADD = Services, value added (% of GDP). Services include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources (World Bank, 2012).

GDP.GROWTH = GDP growth (annual % rate). Annual percentage growth rate of GDP at market prices based on constant local currency (World Bank, 2012).

UNEMPL = Unemployment, total (% of total labor force). Unemployment refers to the share of the labor force that is without work but available for and seeking employment (World Bank, 2012).

DOM.CREDIT = Domestic credit provided by the banking sector (% GDP) includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits) - (World Bank, 2012).

VAR.GDP.GR. = The variation of the annual GDP growth rate is measured through the relative form of the variance. The GDP growth rate can be positive or negative. Consequently, for the denominator we will use the average of the absolute values in order to estimate the order of magnitude of the variable (author’s calculations):

$$VAR.GDP.GR = \frac{\sqrt{\sum_{j=2007}^{2011} \left[GDPGR_j - \left(\frac{1}{5} \sum_{j=2007}^{2011} GDPGR_j \right) \right]^2}}{\frac{1}{5} \sum_{j=2007}^{2011} |GDPGR_j|} \quad (2)$$

MEAN.SERV.VAL.ADD. = The share of agriculture in the GDP may vary form year to year due to the climatic factors. To eliminate their influence, we use the mean of the variable in the period 2007 – 2011 (author’s calculations):

$$MEAN.SERV.VAL.ADD = \frac{1}{5} \sum_{j=2007}^{2011} AGR.VAL.ADD_j \quad (3)$$

VAR.UNEMPL. = The annual variation of the unemployment rate is measured with the Pearson's variation coefficient, in relative form. Was taken into consideration data from 2007 to 2010, two years with extreme values in what regards national variations of the unemployment rate (author's calculations). For 2011 the data is available for a small sample of countries, thing that would have altered the worldwide character of the study and, consequently, the statistical significance of the analysis.

$$VAR.UNEMPL. = \frac{\sqrt{\sum_{j=2007}^{2011} \left[UNEMPL_j - \left(\frac{1}{4} \sum_{j=2007}^{2010} UNEMPL_j \right) \right]^2}}{\frac{1}{4} \sum_{j=2007}^{2010} UNEMPL_j} \quad (4)$$

MEAN.DOM.CREDIT = The domestic credit provided by the banking sector (%GDP) may slowly fluctuate from one year to another. In order for the data employed in the regression model not to be affected by an occasional outlier we prefer to use the mean of the variable in the period 2007 – 2011 (author's calculations):

$$MEAN.DOM.CREDIT = \frac{1}{5} \sum_{j=2007}^{2011} MEAN.DOM.CREDIT_j \quad (5)$$

To test the H_1 , H_2 and H_3 hypotheses we chose four linear specifications of the model and estimated the parameters using OLS regressions with robust White correction for heteroscedasticity:

$$VAR.GDP.GROWTH_i = b_0 + b_1 MEAN.SERV.VAL.ADD_i + \varepsilon_i \quad (\text{eq. 1})$$

$$VAR.GDP.GROWTH_i = b_0 + b_1 MEAN.SERV.VAL.ADD_i + b_2 DUMMY_k + \varepsilon_i \quad (\text{eq. 2})$$

$$VAR.UNEMPL_i = b_0 + b_1 MEAN.SERV.VAL.ADD_i + \varepsilon_i \quad (\text{eq. 3})$$

$$VAR.UNEMPL_i = b_0 + b_1 MEAN.SERV.ADD_i + b_2 DUMMY_k + \varepsilon_i \quad (\text{eq. 4})$$

$$VAR.GDP.GROWTH_i = b_0 + b_1 MEAN.DOM.CREDIT_i + \varepsilon_i \quad (\text{eq. 5})$$

$$VAR.GDP.GROWTH_i = b_0 + b_1 MEAN.DOM.CREDIT_i + b_2 DUMMY_k + \varepsilon_i \quad (\text{eq. 6})$$

The variables $DUMMY_k$ indexes the geographical region (according to World Bank classification) in which the country i is located (Europe, Arab World, Sub-Saharan Africa, Central Asia, South Asia, East Asia & Pacific, Latin America & Caribbean, North America). The error term ε_i is assumed to have the standard classical properties.

3. Results and discussions

According to H_1 we were interested to see if, at worldwide level, there can be descriptively evidenced any connection between the share of the services sector in the GDP and the economic development of a country, measured through the GDP growth rate.

The statements of the economic theory stipulate that the less developed countries usually have higher GDP growth rates and lower shares of services in the GDP during crises. However, we were interested more on the behaviour of the countries during the international crisis. Economic theory affirms that countries with a lower share of services in the GDP should be less affected by crises, i.e. their GDP growth rates should be higher. And, when comparing for each year the map of the services share in the GDP with the one of the GDP growth rate, we can see that, in times of crisis, the theory holds. The states that belong to the lower value groups based on the percentile distribution of the services share in the GDP are also to be found, more or less, in the same type of groups based on the GDP growth rates. This means they were more protected by the shocks related to the economic crisis and they have continued their developing paths.

The descriptive statistics indicate that the variables “Services, value added, % of GDP” (figure no.1) and “GDP growth annual rate, %” (figure no.2) are different enough from one country to another and present enough variance for testing *H1* by a regression model.

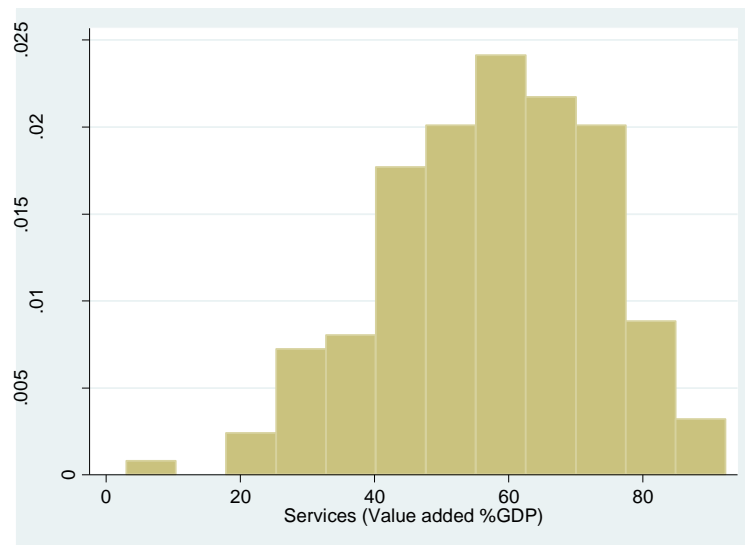


Figure no. 1: Distribution of the average values (2007 – 2010) of services (%GDP)

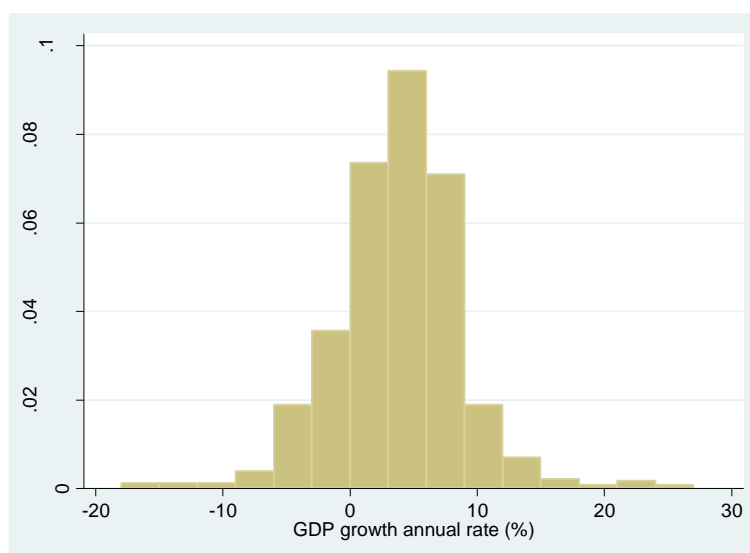


Figure no. 2: Distribution of the GDP growth, annual % (2007 – 2010)

The median value of the variable “Services, value added, % of GDP” is of 59%. The trend at global level is given by the values registered by the countries from the median sample, which is situated between 46% and 69% (the interquartile range). For the “GDP growth annual rate, %” in period 2007-2011 the values are often situated between -2.3% and +8.9% (the interdecile range).

Table no. 1: H_1 - the impact of services on GDP variation (regression coefficients from the OLS White’s heteroscedasticity-consistent estimations)

	Equation 1	Equation 2
Mean.Serv.Val.Add.	0.010*** (5.03)	0.016** (2.48)
Europe	.	0.000 (ref.)
North America	.	0.015 (0.26)
Latin Am. & Carib.	.	-0.187** (-2.16)
Africa	.	-0.386*** (-4.22)
Arab World	.	-0.277** (-2.21)
Central Asia	.	-0.220** (-2.00)
South Asia	.	-0.530*** (-3.89)
East Asia & Pacific	.	-0.244** (-2.57)
Constant	0.125 (1.02)	0.592*** (3.43)
	$R^2 = 0.161$	$R^2 = 0.287$
	N = 167	N = 167

***, **, * : significant at 1%, 5% and 10% level
 Source: own calculations using STATA 9.1 software.

The main results confirm the hypotheses made (H_1). In the two regressions (equation 1 and 2) the coefficients of the variable *the mean of the share of the services in the GDP* are

highly significant. In the second model, the dummy variables indicating the geographical areas are also significant. When considering as a reference Europe, we obtain negative and statistically significant coefficients for the other regions of the World (except North America). This means that, at the same level of the share of the services sector in the national economy, countries in Europe and North America are much more subjected to fluctuations in the real GDP growth during the crisis. The explanation is to be found in a higher degree of development of the financial market and the international trade in these countries.

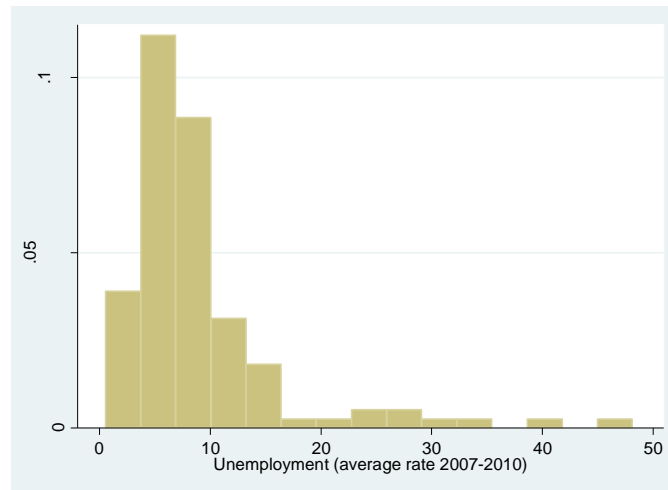


Figure no. 3: Distribution of the average value (2007 – 2010) of unemployment ratio

Table no. 2: H_2 - the impact of services on unemployment rate variation (regression coefficients from the OLS White’s heteroscedasticity-consistent estimations)

	Equation 3	Equation 4
Mean.Serv.Val.Add.	0.190*** (4.59)	0.102*** (2.79)
Europe	.	0.000 (ref.)
North America	.	4.539 (1.09)
Latin Am. & Carib.	.	-4.899** (-2.49)
Africa	.	-6.680** (-3.70)
Arab World	.	-5.299** (-2.60)
Central Asia	.	-4.639** (-2.31)
South Asia	.	-5.782*** (-3.11)
East Asia & Pacific	.	-4.608** (-2.38)
Constant	-0.558 (-0.26)	8.018*** (2.73)
	R ² = 0.112	R ² = 0.233
	N = 107	N = 107

***, **, * : significant at 1%, 5% and 10% level
 Source: own calculations using STATA 9.1 software.

In the fourth model "Europe" is still the reference. The dummy variables for all the other regions (except for North America) are highly significant. These are all countries with the labour force mostly employed in low value added sectors, such as agriculture or heavy industry. Therefore the H_2 hypothesis may also be accepted.

In order to study the effects of the financial sector influence, namely of the banking sector, on the economic development fluctuations in crisis and post-crisis, we test the H_3 hypothesis.

We use as a proxy for indebtedness the variable "domestic credits by banks (%GDP)". The data is available, as for the previous variables on the web-site of World Bank (2012).

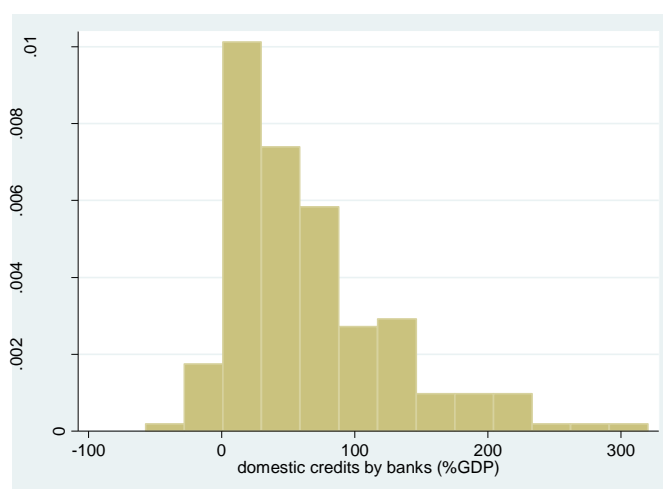


Figure no. 4: Distribution of the average values (2007-2011) at country level for the variable "domestic credits by banks (%GDP)"

Values of the variable that measures the indebtedness degree of population are extremely different from one country to another. We can remark the exceptional situations: 5.4% of the countries present negative values, which correspond to the situation of deposits exceeding the total value of credits; 4.5% of the countries have a percentage of domestic bank loans from GDP superior to the threshold of 200%.

Table no. 3: H_3 - the impact of domestic credit by banks (%GDP) on GDP variation (regression coefficients from the OLS White's heteroskedasticity-consistent estimations)

	Equation 5	Equation 6
Mean.Domestic.Credits.	0.0024*** (6.08)	0.0014*** (2.53)
Europe	.	0.000 (ref.)
North America	.	-0.022 (-0.20)
Latin Am. & Carib.	.	-0.133 (-1.30)
Africa	.	-0.403*** (-4.37)
Arab World	.	-0.298** (-2.26)
Central Asia	.	-0.109** (-1.14)
South Asia	.	-0.523*** (-3.40)
East Asia & Pacific	.	-0.302*** (-2.82)

Constant	0.549*** (13.37)	0.837*** (9.90)
	R ² = 0.139 N = 156	R ² = 0.299 N = 156

***, **, * : significant at 1%, 5% and 10% level

Source: own calculations using STATA 9.1 software.

The obtained results are in accordance with the economic theory and with the H_3 hypothesis formulated previously. The positive sign for the explicative variable coefficient shows an increase of economic instability in crisis and post-crisis for the countries in which the indebted level at banks is high. The dummy reference variable is still ‘Europe’ and we cannot identify a different behavior for North America, Latin America and Caribbean. All these regions have an identical behavior of population loans. In exchange all the other regions have a different and statistically significant behavior of loans which comes from local specificities: Islamic banks (constituted as non-profit societies), mutual aid non-banking systems, etc.

Conclusions

Our study does not exhaustively approach the beginning, spreading and conservation mechanisms of an economic crisis. Some theoretical hypotheses have not been empirically tested because of the lack of pertinent data. For example, the effects of the human capital, essential in the services sphere, couldn’t be evaluated. Nevertheless, the article responds to some precise research questions in well-defined economic conditions (crisis and post-crisis), concerning:

- (1) a correlation between the share of services sector in the national economy and the variation of the GDP growth rate;
- (2) a correlation between the share of services sector and the variation of unemployment rate;
- and (3) a correlation between the level of domestic credit by banks and the fluctuation of GDP growth.

The implications of these evidences upon the economic policies are very important. The services have been strongly sustained and encouraged by the governmental authorities because of the fact that they permitted employment of labor force sheltered from agriculture and industry because of the continuous increase in productivity. However they proved to be a neuralgic point, instability generator in times of crisis. Certain services are even more sensitive because of precise causes: high elasticity related to incomes (tourism), high level of incorporated technologies (IT and mobile communications), extremely intensive capital (financial services).

At present, the global economy is attempting to recover after the suffered shock. Still, the recovery cannot be done without the repositioning of the economic sectors and the identification of some new star domains with the role of economic development’s engine.

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