

**CHARLES UNIVERSITY IN PRAGUE**  
**FACULTY OF SOCIAL SCIENCES**  
**Institute of Economic Studies**

**Cornelius Amponsah**

**The Determinants of Private Savings in the EU: The Case of the Group of Eight New  
Entrant Countries.**

*M A Dissertation*

**Prague, 2010.**

## TABLE OF CONTENTS

Table of Contents.....	2
Statement.....	3
Acknowledgement and Bibliographical Record.....	4
Bibliographical Record and Annotation.....	5
<b>Chapter One</b>	
Introduction.....	6
1.0 Problem Statement.....	6
1.1 Model.....	7
1.2 Hypothesis.....	
1.3 Method of Study.....	9
1.4 Data.....	9
1.5 Defining Private Saving.....	9
1.6 Organisation of Study.....	10
1.7 Review of Models.....	12
<b>Chapter Two</b>	
2.0 Literature Review (Introduction).....	13
2.1 Theoretical Review.....	13
2.2 Global Empirical Review of Literature on Private Saving.....	19
2.3 Determinants of Private Saving in the CEE Region.....	32
2.4 Private Saving and Social Security.....	40
2.5 Growth of Financial and Private Sectors in the CEE Region.....	41
<b>Chapter Three</b>	
3.0 Methodological Framework (Introduction).....	48
3.1 Measuring Private Savings.....	48
3.2 Limitations of Measure.....	50
3.3 Model.....	50
3.4 Expectations from the Independent Variables.....	51
3.5 Hypotheses.....	54
3.6 Estimating Fixed Effects.....	56
3.7 Generalised Method of Moments.....	57
3.7 Other Relevant Tests.....	59
3.8 Data.....	60
<b>Chapter Four</b>	
4.0 Analysis of Data (introduction).....	61
4.1 Trends in Private Saving in the CEE.....	61
4.2 Diagnostic Checking.....	63
4.3 Regression Results and Analyses.....	63
4.4 Policy Implications of Results.....	71
<b>Chapter Five</b>	
Conclusions and Recommendations (Introduction).....	73
5.1 Summary.....	73
5.2 Recommendations.....	74
5.3 Practical Limitations.....	75
5.4 Concluding Remarks.....	75
Bibliography.....	77
<b>Appendix I</b>	
<b>Appendix II</b>	
<b>Appendix III</b>	

## **Statement:**

1. This statement is to confirm that this paper is a product of my own work and also to confirm that I used the listed sources in producing it.
2. I agree that the paper can be checked for research and studying purposes.

Prague, 21 May 2010

Cornelius Amponsah

Author: **Cornelius Amponsah**

Supervisor: Dr Tomáš Holub.

Internal Examiner: **Prof Michal Mejstrik, CSc**

Date of Defence:

Assessment: .....

## Acknowledgement

My sincere thanks go to my supervisor, Dr Tomáš Holub for the useful suggestions and guidance he gave towards the successful completion of this work. I owe a depth of gratitude to my programme co-ordinators in Charles University in Prague particularly, Dr Jiri Vykoukal, Mr Simsa, Dr Novak, Professor Mejstrik and Mrs. Kolenovska for their invaluable support.

Many thanks to my peers on the first batch of the IMESS programme whose encouragement and suggestions enhanced the outcome of this work.

Finally, I express my sincere thanks to the immediate-past programme director of the IMESS course, Dr. Christopher Gerry and the current director Dr Richard Mole and all connected with this endeavour for their constant advice and support during the toughest times of the programme.

## Bibliographical Record

Amponsah, Cornelius. *The Determinants of Private Savings in the EU: The Case of the Group of Eight New Entrant Countries*. Prague: Charles University, Faculty of Sciences, Institute of Economic Studies (IES), 2009 101 p. Supervisor: Tomáš Holub PhD.

### **Annotation**

Private saving in the CEE countries can be described as having stabilised over the period of reform. Among the transition variables employed in the study, price liberalisation stands out as the most potent correlate of private saving. This is seen as a direct consequence the gradual removal of the soft budget constraint under the command system and by extension the elimination of involuntary saving. Another remarkable outcome from the GMM model is the positive response of the first lag of private saving which demonstrates persistence of savings in the CEE over the transition period. Tied to this is the strong response of private saving to sound macroeconomic discipline in the CEE countries. This is evidenced in the positive response to key variables like GDP growth and improvements in the terms of trade. Most importantly, the aged dependency ratio is seen as the most consistently strong influence on private saving. This brings to the fore the role of pension reforms in these countries and its impact on public and private funds.

**Keywords:** Central and Eastern Europe, EU, Private Saving, Stabilization, Transition.

## CHAPTER ONE

### Introduction

The 'Accession 8' Countries refer to the batch of eight post-communist states of Central and Eastern Europe (namely, Czech Republic, Hungary, Poland, Slovakia, Slovenia and the 3 Baltic states of Estonia, Lithuania and Latvia) which joined the European Union in 2004<sup>1</sup>. Prior to the commencement of the transition programme, most Central and Eastern European Countries (CEEC) recorded very high saving rates<sup>2</sup>. This was mainly due to the effect of Socialist involuntary savings. However, recent empirical works on saving in the region have interestingly sought to apply variables that were hitherto irrelevant to the CEEC<sup>3</sup>.

#### 1.0 Problem

From the period of what can be aptly described as "decades of involuntary saving" under the socialist regimes, the 8 Accession countries have emerged in the early 1990's as economies that were keen on achieving rapid transformation. With transition came a myriad of reforms in the structure of the macro-economy. The saving rate of the population which was among the highest in the world appears to have fallen drastically with the adoption of the market system. In short, the behaviour of private saving was tending towards that of Western Europe. However, the opposite view is that that liberalisation ensured greater credit accessibility to the population and this should translate into a positive or negative impact on private saving

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<sup>1</sup> This group of countries commenced their reform with quite similar approaches and were formally admitted to European Union upon a fulfilment of the Maastricht Criteria.

<sup>2</sup> Denizer C., Wolf H., and Ying Y. (2000): Household Savings in Transition Economies, Policy Research Working Paper WP 2299. The World Bank.

<sup>3</sup> After the collapse of the planned system, the mobilisation of domestic private saving became an important factor for achieving the desired levels of investment and growth. However, the previous system did not really emphasise the essence of the private saving although involuntary savings were high in these countries. As such saving by households was not really determined by key macroeconomic variables as it pertained in the West.

rate<sup>4</sup>. The strength or otherwise of these opposing views is an empirical question and has to be assessed with recourse to data.

### *Objectives*

1. To investigate the relevant factors responsible for the changing pattern of private saving in these countries.
2. To ascertain the nature of the relationship between private saving and the several independent variables in the A-8 countries.

### *Questions*

Have private saving rates significantly declined in these countries with the emergence of the market economy?<sup>5</sup>

Why have private saving rates declined in the region?

Are the variables that drive private savings in Central and Eastern Europe significantly different from the foremost market economy?

### **1.1 Model**

Following Laoyza et al (2000) and others the relevant a priori determinants of Private savings are identified among others as GDP growth rate, Public sector saving, the rate of inflation, the interest rate, the level of financial development, the age dependency ratio and the terms of trade. In line with these earlier studies we can investigate the behaviour of private in the CEE countries.

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<sup>4</sup> Financial Systems that are effective at pooling the saving of individuals and providing credit can greatly affect economic growth (Levine R. *Journal of Economic Literature* p.699.

<sup>5</sup> Current Literature on the topic generally points to an initial savings decline and both micro and aggregate levels with liberalisation. Denizer and Wolf (2000) *World bank Economic Review* p. 445. Serres and Pelgrin (2002) describes an overall decline in saving rates in OECD in the 1990s after they had risen in the 1980s and 1990s p.5.

The simplified OLS Model can be expressed as:

$$Psav\_gdp = f(PubSav, GDPGR, IR, FDEV, INF, TOT, DEPR, TRANS) \dots\dots\dots 1$$

Where Psav\_gdp is Private saving as percentage of GDP, GDPGR is the growth rate of Gross Domestic Product, PubSav represents Public Sector Savings, the level of Inflation is denoted by INF, IR represents the real interest rate, FDEV represents the level of Financial Development, TOT stands for the terms of trade and TRANS which represent the dummy variables capturing the extent of progress in the transition programme<sup>6</sup>. In regard to the direction of the variables, public sector saving, Inflation and Dependency ratio are normally expected to be negatively related to private saving, improvements in the terms of trade as well as sustained increases in the interest rate are expected to move along the same direction as private saving, while the outcomes of the Financial Development<sup>7</sup>, the growth in the GDP are often characterised by ambiguities.

Econometrically this is written as:

$$PSav\_gdp_{it} = \beta_0 + \beta_1 PubSav_{it} + \beta_2 GDPGR_{it} + \beta_3 IR_{it} + \beta_4 FDEV_{it} + \beta_5 INF_{it} + \beta_6 TOT_{it} + \beta_7 DEPR_{it} + \beta_8 TRANS_{it} + \mu_{it} \dots\dots\dots 2$$

Where  $\beta_i$  ( $i=0, 1, 2, \dots, 8$ ) and  $i$  is from the first country to the  $j^{th}$  country.

$\mu$  is the error term.

## 1.2 Hypotheses

The hypotheses of the study accesses whether there is a significant link between the private saving and the independent variables. We also ascertain the existence of joint time and country effects in the behaviour of private saving in the region.

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<sup>6</sup> Both the World bank and the EBRD provide data on the extent of progress in the reforms by transition economies. However, for the purpose of this work the latter is preferred to the fact that it has more direct oversight in these countries than the former.

<sup>7</sup> The amount of credit to the private sector is used as a proxy for the extent of development of the financial system.



### 1.3 Method of Study

The research is in two main parts, namely the theoretical and empirical investigations. The former which involves the use of the explorative research approach is a review of the relevant literature on growth and saving. The latter, which is the empirical part, is basically a descriptive and an analytical research. Specifically a panel data of the 8 EU Accession countries are used. Longitudinal data analysis involving OLS, fixed effects and the Generalised Method of Moments (GMM) methods adopted are compared.

### 1.4 Data

Panel data spanning the period 1993-2007 for the eight countries is employed for the purpose of this study. This is sourced mainly from the World Bank's World Development Indicators and the European Bank for Reconstruction and Development (EBRD) sources. Other sources are the World Bank's Global Development Finance (*GDF various issues*)<sup>8</sup> and the EBRD's European Development Indicators<sup>9</sup>. Individual Country databases are also consulted for this work.

### 1.5 Defining Private Saving

Most databases hardly provide specific data on private saving, so at best this is derived. Following Loayza N., Schmidt-Hebbel K. and Serven L. (2000)<sup>10</sup> Schrooten and Stephan (2003)<sup>11</sup>, private saving is obtained from the "World Development Indicators" from time series on domestic saving as published by the World Bank. Private saving is calculated

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<sup>8</sup> [www.worldbank.org/data](http://www.worldbank.org/data)

<sup>9</sup> <http://www.ebrd.com/country/sector/econo/stats/index.htm>

<sup>10</sup> Loayza N., Schmidt-Hebbel K. and Serven L.: What Drives Private Savings Around the World, *The Review of Economics and Statistics* Vol. LXXXII No.2, 2000.

<sup>11</sup> Schrooten M., and Sabine S.: Back on Track? Savings Puzzles in EU Accession Countries, *European Network of Economic Policy Research Institutes*, WP 23. 2003.

indirectly by deducting public from domestic. Although based on very simplified assumptions, this method was quite popular in the literature. Proceeding in the stead of Loayza, Schmidt-Hebbel and Serven (2000)<sup>12</sup> and Schrooten (2003)<sup>13</sup>, the private saving is computed as:

$$PSav_{it} = DomSav_{it} - PubSav_{it}$$

Where Psav represents Private Saving, DomSav is Domestic Saving and PubSav stands for public saving and where the overall government deficit is used as a proxy for public saving.

### 1.6 Review of Models

Any meaningful study on saving has as its basis Life Cycle Model (LCM) and the Neo-classical model. This section briefly looks at the intuitive reasoning behind models Following Carrol (1993 p.41), the LCM can be basically expressed as follows:

$$\text{Max } \sum_{i=t}^T \beta^{t-i} U(C_i) \dots\dots\dots 3$$

$$\text{Subject to } W_t = R(W_{t-1} + Y_t - C_t)$$

$$Y_t = G Y_{t-1} \dots\dots\dots 4$$

Where R, is the gross interest rate, the gross income growth rate is denoted by G which is equal to (1+g), while income and wealth are expressed by Y<sub>t</sub> and W<sub>t</sub> respectively.

In the midst of income uncertainty, the model can be solved to obtain the desired level of consumption at a certain age t:

$$C_t = K_t [R W_{t-1} + H_t] \dots\dots\dots 5$$

H= Human Capital and

<sup>12</sup> Loayza, N., Schmidt-Hebbel K. and Serven L (2000): What drives Private Savings Across the World? Review of Economics and Statistics Vol. LXXXII, Number 2.

<sup>13</sup> Schrooten M. and Stephan, S (2003): "Back on Track? Savings Puzzles In EU Accession Countries", European Network Of Economic Policy Research Institute. Working Paper No. 23.

$K_t = f$  (taste parameters of consumers' utility function)

The rate of saving expressed by:

$$S_t = \frac{rW_{t-1} + Y_t - C_t}{rW_{t-1} + Y_t} \dots\dots\dots 6$$

Working on the assumption that the average consumer starts life with zero assets, the saving rate for the first year is stated as :

$$S_t = \frac{(Y_t - C_t)}{Y_t} = \frac{Y_t - \frac{K_1 Y_t}{1 - G/R}}{Y_t} = 1 - \frac{K_1}{1 - G/R} \dots\dots\dots 7$$

Carroll and Weil (1993) describe the derivative of this expression with respect to G as negative as  $K_1$  is positive. An increasing G decreases the denominator of the last expression in equation (7). They also explain that consumers with a high G in their lifetime and young families tend to have lower saving rates, but their older counterparts have higher saving rates. This is what leads to argument that there is ambiguity in the negative derivative of saving with respect to income growth.

The Neoclassical model on the other hand equates consumption with the level that would be fixed by a policy analyst who aims at maximising the discounted sum of future utility. Carroll and Weil state this function as:

$$\sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\rho}}{1-\rho} \dots\dots\dots 8$$

The notations are explained as

$\rho$  = Coefficient of relative risk aversion

$\beta$  =Discount factor

They assume a Cobb-Douglas function, where there is a constant returns to scale with inelastic supply of labour and a population growth rate  $\lambda$ . The resultant output comes to:

$$Y_t = A e^{\lambda t} K_t^\alpha L_t^{1-\alpha} \dots\dots\dots 9$$

They further state the Capital Accumulation function as:

$$K_{t+1} = Y_t - C_t - (1-d)K_t \dots\dots\dots 10$$

Where  $d$ , denotes the depreciation rate.

There are a number of ways through which growth and saving are linked in the short to medium term. However, in the steady state  $\lambda$ , which is the technological growth parameter does not depend on saving. This makes the sign and size of saving in relation to growth ambiguous. While for those in support of the ‘Paradox of thrift’,  $\alpha$  is the exponent on capital in the production technology and it also measures the extent to which the rate of return on capital is raised by a lower capital stock, and ultimately raises the rates of saving and growth.<sup>14</sup> Mankiw, et al (1992) is among the papers that treat the long-term saving rate as an explanatory variable of growth<sup>15</sup>. While this latter model seems to relate saving to growth on the macro level, the arguments and assumptions also are analogous at the micro and individual levels.

### 1.7 Organisation of Study

On the whole the study is divided into five main chapters. After this introductory chapter, the rest of the work is arranged as follows: Chapter two comprises of a review of the empirical works on the determinants of private saving from across the world and also from Central and Eastern Europe. The third chapter presents the methods for analysis of the study. Chapter four presents the empirical results of determinants of private saving and their policy implications for the countries under consideration. Finally, the fifth chapter is dedicated to a summary and conclusions on the issues raised.

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<sup>14</sup> Although these assumptions are mainly applicable in macroeconomic analyses they are also analogous to the saving decisions of individuals and private agents.

<sup>15</sup> Mankiw G. N., Romer D. and Weil D. N. (1992):A Contribution to the Empirics of Economic Growth, Quarterly Journal of Economics, Vol. 107, No.2 pp. 407-437.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 INTRODUCTION

This Chapter is divided into 3 main parts: first is a theoretical review of the ideas and literature on the subject matter. Secondly there is a review of the empirical literature on the determinants of private savings from across the world. Finally, there is a review of the relevant works on these determinants as they have been applied in the Central and Eastern European region.

#### 2.1 Theoretical Review

##### *Growth and Private Saving*

As indicated earlier the starting point of the discussion is Modigliani's (1988)<sup>16</sup> assertion of the existence of a positive cross-sectional relational relation between saving and income growth as shown in the Life Cycle Model (LCM). It must be noted that this work had as its precursor in Kuznet's (1946) observation that the saving rate of the US had remained relatively constant for the past century (Carroll and Weil, 1994 p.139)<sup>17</sup>. Perhaps the impact of the wars and the period of the Depression may have painted a different picture. The foremost argument is that in the face of a stagnant population growth rate, young peoples' saving rate is expected to exactly erase the dis-saving of old people and thus bring the resultant national rate of saving to zero. Here the assumption is that the intergenerational rate of saving is the same.

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<sup>16</sup> Modigliani F.: The Role of Intergenerational transfers and Life Cycle Savings in the Accumulation of Wealth, *Journal of Economic Perspectives*. Vol 2, No.2 p. 1.

<sup>17</sup> Carroll, Christopher D. and Weil, David N. "Saving and Growth: A Reinterpretation." *Carnegie- Rochester Conference Series on Public Policy*, June 1994, 40, p. 139.

To Modigliani in both high-growth economies and low-growth economies, the growth rate of income remains the same. Therefore, aggregate income growth is the result of increasing level of the lifetime income profile for succeeding generations (Carrol and Wiel p.7 1993)<sup>18</sup>. In furtherance of the theory, Carroll and Summers (1991)<sup>19</sup> builds up evidence against the idea of a relationship between individual and aggregate income growth. They equate household income growth to aggregate income growth with adjustments for occupation, age and related variables. All things being equal, an exogenous rise in the growth rate is expected to cause households to increase the consumption and save less. However, the Life Cycle Model has as its major complication a distinction between household and aggregate saving levels.

Neoclassical models like that produced by Solow (1956) suggest that a rise in the rate of saving leads to increased growth in the short-run steady state<sup>20</sup>. Romer (1986)<sup>21</sup> and Lucas (1988)<sup>22</sup> also hold that saving and investment can substantially raise the rate of growth. They however, maintain that increased saving must go along with technological progress and the accumulation of human capital.

### ***Private Saving and Public Saving***

Government's expansionary monetary policy results in a situation whereby it increases its borrowing. Other fiscal measures used are taxes and deficits spending and these are said to crowd out the private sector through interest rates. As private saving is interest rate sensitive,

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<sup>18</sup> Ibid. p. 140.

<sup>19</sup> Carrol D. C. and Summers L. H. : Consumption Growth Parallels Income Growth: Some New Evidence, *NBER Working Papers* 1991 p.5.

<sup>20</sup> Solow R. M.: A Contribution to the Theory of Economy. *The Quarterly Journal of Economics*, vol. 70, no. 1 (1956) p. 66.

<sup>21</sup> Romer P. M. :Increasing Returns and Long Run Growth, *the Journal of Political Economy*, Vol 94, No.5 1986 pp. 1002-1037.

<sup>22</sup> Lucas R. E. : On the Mechanics of Developments, *Journal of Monetary Economics* (1988) p.3-42.

a rise in government borrowing may result in an increase in interest rates and limit the ability of private agents to obtain credit.

Barro's (1974)<sup>23</sup> reformulation of the Ricardian equivalence states that issues at the macroeconomic level are not distinguishable from tax increases, and hence a change in government saving, all things being equal, should be offset by an equal and opposite change in private saving. For this to be true, however, the following conditions must prevail; that there should be equal discount rates for both private and public sectors, there should be no liquidity constraints and there should be certainty regarding future tax, public spending and income. Corbo and Schmidt Hebbel (1991)<sup>24</sup> testing the Ricardian Hypothesis for a sample of 13 developing countries, however, concluded that the Ricardian equivalence does not explain variations in consumption behaviour. Although these conditions rarely meet the Ricardian equivalence, they offer an explanation as to the impact of government expenditure and deficit financing on private savings.

### *Inflation*

Regarding the relationship between the rate of inflation and private saving the direction is unresolved as different levels of inflation can produce different outcomes. Increasing inflation rates is related to higher nominal interest rate which also leads to an increase in private nominal incomes and saving. High inflation causes consumers to save an anticipated real wealth in relation to the income. However, in economies with higher levels of uncertainty, inflation is said to result in lower savings due to the sheer depletion in real

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<sup>23</sup> Barro, Robert J. (1974): Are Government Net Wealth, *The Journal of Political Economy* Volume 82, Issue 6 (Nov.-Dec., 1974) 1095-1117.

<sup>24</sup> Corbo V., and Schmidt-Hebbel K.: Public Policies and Saving in Developing Countries. The World Bank - Policy Research and External Affairs. Working Paper 574, 1991.

incomes. It must be pointed out however, that in most cases private saving respond rather negatively to inflation and as such the latter argument is stronger by far.

### *Demography*

The age composition in a household or country invariably affects the level of saving. Therefore if a large percentage of the population of a country is in the working age bracket, the larger should be the level of private saving. As these workers work in lieu of their retirement, the level of aggregate savings should decline as that particular age group reaches retirement.

The hypothesis that a high birth rate is a constraint on private saving has two major arguments. In the first place basic population theory gives the indication that a continuously high birth rate impacts on the age composition of the population and results in a situation whereby a large proportion of the population is observed in the younger age bracket.

The reasoning behind the inverse relationship between private saving rates and the dependency ratios therefore, is that children constitute a huge weight on expenditure. Because expenditure on child care and the aged population is a major source of consumption in standard national accounting framework, "a high ratio of dependents on the working age population might be expected to impose a constraint on society's potential for savings." (Leff, 1969, p.887).<sup>25</sup> The link between private savings and the dependency ratio was pioneered in a broader study by Modigliani's (1965) work which incorporated several demographic factors.

It is however, noteworthy that the comments that followed Leff's work gave credence to the notion of a constraining effect of a rising dependency rate on the saving behaviour. Whereas

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<sup>25</sup> Leff, Nathaniel H.: Dependency Rates and Savings Rates, *The American Economic Review*, Vol 59 , No. 5, pp. 886-896.



a high dependency ratio constitute a drain on the overall incomes in household it also has the potential of stimulating hard work and thereby increase the per capita output of income earners in households. But on the whole it can be said that the former argument is much stronger than the latter.

### ***Financial Development and Private Saving***

The financial system in any economy is seen as providing two functions. They create the setting for the payment system which is a necessary requirement for all transactions. Secondly, they also foster an interaction between agents with excess credit on one hand and borrowers on the other hand. A characteristic feature in developed countries is that funds often flow from households who are agents with excess funds to firms. Importantly, the financial system offers credit which facilitates new investment and also promotes saving accumulation. By its selection and assessment of viable firms and projects it also ensures an efficient allocation (Carettoni et. al 2001)<sup>26</sup>.

The interaction between borrowers and lenders can be conducted in markets, where firms directly source funds from other firms or it can be done through financial intermediation whereby excess funds are taken up from creditors and offered to borrowing agents. This therefore, emphasises the two main financial systems namely, the market-oriented system and the bank-oriented. Economists however, agree that at a lower level of development, the latter performs best in terms of the saving allocation role of the financial system. In the advanced stage of development, however, investors can spread out risk without recourse to intermediaries. Therefore, the ultimate effect of transformation of the financial sector on private saving can at best be characterised as double-edged.

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<sup>26</sup> Carettoni A. Manzocchi S., and Padoan P. C.: Finance – Growth Nexus and European Integration; A Review of the Literature, EIFC, Working Paper. No 01-5, 2001.

### *The Terms of Trade and Private Saving*

A wide range of international economics literature including Sachs et al (1981)<sup>27</sup>, Obstfeld (1982)<sup>28</sup> and Svensson and Razin (1983)<sup>29</sup> has focused on the impact of terms of trade shocks on private saving. These studies employed macroeconomic modelling techniques based on the assumption that spending decisions are based on intergenerational optimisation. The theoretical basis for this argument is the Harberger-Laursen-Metzler Effect. This law basically states that private agents or individuals adjust slowly to their falling incomes by reducing savings and spending in a bid to smoothen out the consumption pattern. Therefore, deterioration in the terms of trade which results in the lowering of incomes, all things being equal is expected to lower private savings as well<sup>30</sup>.

The Harberger-Laursen-Metzler model has been appraised by some more recent works. Obstfeld (1982) argues that the outcome of an unexpected terms-of-trade shock casts doubts on the general validity of the model. His argument is that a worsening of the terms of trade between imports and exports often leads to a surplus instead of a deficit in the current account and that the overall claims on the future units imports are equal to zero. As such the Harberger-Laursen-Metzler assumption of complete specialisation holds and therefore the net spending which is measured in terms of the units of domestic goods must also fall.

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<sup>27</sup> Sachs J. D., Cooper R. N., and Fisher S.: The Current Account and Macroeconomic Adjustment in the 1970s, Brookings Papers on Economic Activities, Vol. 1981 No.1 pp. 201-282.

<sup>28</sup> Obstfeld M.: Aggregate Spending and the Terms of Trade; Is there a Laursen –Metzler Effect, The Quarterly Journal of Economics, Vol 97, No.2. 1982 pp. 251-270.

<sup>26</sup> Svensson L. E. O., and Razin, A.,: The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect, The Journal of Political Economy Vol. 91, No.1 pp. 97-125, 1983.

<sup>30</sup> Obstfeld 1982 p.1

Persson and Svensson (1985)<sup>31</sup> did their appraisal by employing the overlapping generations (OLG) model. Their results showed that the Harberger-Laursen-Metzler effect depends to a large extent on whether the shocks are temporary or permanent<sup>32</sup>

## *2.2 Global Empirical Literature on Private Saving and Growth.*

A good amount of work has been done on the determinants of private saving across the globe. Several of these have also applied panel data analysis in measuring the behaviour of saving. The purpose of this section is to review the relevant work on the topic with evidence from across the world. In doing this the individual variables are taken one after the other and their results of the signs and magnitude are assessed. Among the group of variable which are reviewed are; Income Growth, Public Saving, the Rate of Return variables of inflation and the interest rate, Level of Financial Development and Demographic variables.

### *Private Saving and Income Growth*

Using the UN system of national accounts for a group of ten countries, Schmidt-Hebbel, Webb and Corsetti (1992)<sup>33</sup> found a positive relationship between the income variables and the saving rate. They assert that the growth GDP per capita has a strong influence on private saving rate. From their result they established that a percentage increase in GDP per capita is

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28 Persson T and Svensson L. E. O.: Current Account Dynamics and the Terms of Trade: Harberger-Laursen-Metzler Two Generations Later, *The Journal of Political Economy*, Vol 93, No.1 pp. 43-65, 1985.

<sup>32</sup> Sen Partha and Turnovsky Stephen J. (1989): Deterioration of the Terms of Trade and Capital Accumulation; A Re-examination of the Laursen-Metzler Effect, *Journal of International Economics* 2b. p 227.

<sup>33</sup> Schmidt-Hebbel, K., Webb, Steven B. and Corsetti, Giancarlo: Household Saving in Developing Countries: First Cross-Country Evidence *The World Bank Economic Review*, Vol. 6. No. 3: 529-547 1992.

responsible for a 0.5 percentage points increase in saving<sup>34</sup>. Obviously given the limited number of countries that were sampled the evidence produced cannot be adjudged to be very strong for all developing countries although a great depth of household data was used.

Dayal and Thinman (1997)<sup>35</sup> also found evidence supporting a virtuous cycle between private saving and growth. In their comparison of a group of Southeast Asian and Latin American Countries they observed a significant positive relationship for the Asian countries where unrestricted regressions were used. However, with the inclusion of instruments, GDP growth rate assumed an insignificant value due to endogeneity bias. More specifically, a growth-induced increase in per capita income is expected to cause an increase private saving but only above a certain minimum level. However, a comparative study of this nature is often beset with some problems: first, is the problem associated with the computation of the income per capita in many developing regions where non-marketed output and services dominate. The second has to do with the regression method and perhaps the use of restricted regressions would have yielded an entirely different outcome.

Masson, Bayoumi and Samiei (1998)<sup>36</sup> using a combined panel data on both industrial and developing countries observed that an increase in GDP growth rate raises the level of private saving. However, after dividing his data into 2 different panels, that is, for the industrial and the developing countries, and find out that at lower levels of income (in relation to the US) private saving responds more positively to GDP growth. This finding only re-echoes the problems of measurement and also the pitfalls associated with comparative analyses.

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<sup>34</sup> Ibid p. 542.

<sup>35</sup> Dayal-Ghulati, A., and C. Thimann, "Saving in Southeast Asia and Latin America Compared: Searching for Policy Lessons," *IMF Working Paper* WP/97/110 (1997).

<sup>36</sup> Masson, Paul R. Bayoumi, Tamim and Hossein Samiei: International Evidence on the Determinants of Private Saving, *The World Bank Economic Review*, Vol. 12, No. 3: 483-S01 1998.

Edwards (1996)<sup>37</sup> also finds evidence in support of a 'virtuous cycle' of per capita income growth rates and private saving. GDP per capita growth rate was also found to be positive and significant in this study and this supported the view that in general countries with higher saving rates tend to also have higher levels of GDP (Edwards, 1996 p.33)<sup>38</sup>.

In both Ordinary Least Squares (OLS) and Two Stage Least Squares (2SLS) regressions Bailliu and Reisen (1998)<sup>39</sup>, however, did not establish a significant link between GDP per capita growth and private saving. Whereas the OLS results showed a negative relationship between the two variables, the 2SLS produced a positive coefficient for per capita GDP growth. Perhaps this study which observed 13 OECD countries over a period of 4 years was not adequate enough to provide strong evidence its stated hypothesis.

Callen and Thinman (1997)<sup>40</sup> also find evidence of a strong and positive correlation between private saving and income growth. Pooling data from 1975 to 1995 he confirms this positive relationship at a 5% error level. In both cross-sectional and panel analyses this result was achieved and therefore the length of the sample period, which is 21 years may have revealed more information than other studies.

Loayza, Schmidt-Hebbel and Serven (2000)<sup>41</sup> also found the growth rate of real per capita income drives private saving. The authors estimated that a doubling of the GDP per capita, other things being equal is expected to increase private savings by as much as 10%.<sup>42</sup>

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<sup>37</sup> Edwards, Sebastian, "Why Are Saving Rates So Different Across Countries?" An International Comparative Analysis." Working Paper No. 5097. Cambridge: NBER, April 1996.

<sup>38</sup> Ibid p. 33.

<sup>39</sup> Bailliu, Jeanine and Reisen, Helmut: Do Funded Pensions Contribute To Higher Aggregate Savings? A Cross-Country Analysis; *Research programme on Macroeconomic Interdependence and Capital* OCDE/GD(97)227, December 1997.

<sup>40</sup> Callen, T. and C. Thimann (1997), "Empirical Determinants of Household Saving, Evidence from OECD Countries", IMF Working Paper No. 97/181, Washington DC: IMF, December.

<sup>41</sup> Loayza, N., Schmidt-Hebbel, K. and Servén, L. (2000): "What drives private saving across the world", *The Review of Economics and Statistics*, 82, 165-81.

<sup>42</sup> Ibid p. 180.

Athukorala and Sen (2003)<sup>43</sup> in their study of the determinants of private savings from India used a modified version of the life cycle model which incorporates both the growth rate and level of per capita income. The estimation technique used is a simple OLS method with a simple first-difference equation. They found the income growth variable was positively signed in relation to private saving. This evidence goes to confirm the view that for countries at lower levels of development the level of income is an important factor affecting the ability to save. They thus, emphasise policies aimed at spurring development through private saving. More recently, Laski (2007)<sup>44</sup> has found an inverse relationship between private saving and the rate of GDP growth using data from Industrialised countries. Particularly, in the United States, Germany and Japan, Laski concludes that decreased private savings adds to stagnation.

Ramajo, Garcia and Ferré (2006) observed that the real growth of GDP has a significant positive effect on private saving rate. It is implied from the estimates that an extra percentage point growth in GDP raises the private saving rate by approximately 0.2% in the short term and 0.5% in the long term<sup>45</sup>.

### *Public Saving and Public Saving*

Corbo, Schmidt-Hebbel (1991) did a survey of the impact of public saving and private saving in a group of developing countries. From their results they established that a \$1 increase in public saving which is reached by reducing current-period public expenditures leads to

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<sup>43</sup> Athukorala, Premachandra, and Kunal Sen. (1995). "Economic Reforms and Rate of Saving in India." *Economic and Political Weekly* 30:2184–90.

<sup>44</sup> Laski Kazimierz. (2007): "Do Increased Private Saving Rates Spur Economic Growth?"; The Vienna Institute for International Economic Studies. WIIW Working Papers 4.

<sup>45</sup> Ramajo Julián, García Agustín and Ferré Montserrat : Explaining aggregate private saving behaviour: new evidence from a panel of OECD countries, *Applied Financial Economics Letters* 2: 5 p. 314.

decreases in private saving by 16 to 50 cents<sup>46</sup>. Interestingly, reductions in public expenditure also reduce private saving by 47-50 cents per dollar due to the full or a combined effect of the crowding out and Ricardian equivalence between public saving and public saving.

Edwards (1995) used government saving as one of the variables in his study of 36 countries with data from the IMF dataset. From *a priori* public saving is expected to have a negative coefficient, reinforcing the view that government saving crowds out private saving. Although this negative value was obtained the result was not statistically significant. Edwards therefore, concludes that public saving does not offset private saving.

Callen and Thinman (1997) in their work on 21 OECD countries employed cross-sectional and fixed effects method to investigate the impact of public policies on household saving decisions. From their results they established that households alter their saving in response to changes in public saving. From the cross-sectional results they found that the offset to changes in public saving is significantly higher than generally found in time-series.

Masson, Bayoumi and Samiei (1998) obtained results indicating that the Ricardian offset is a bit greater than before. Government investment was found to have larger negative impact on private saving than the government consumption does<sup>47</sup>.

Loayza, Schmidt-Hebbel and Serven (2000) also finds evidence supporting the view that an increase in the public saving ratio leads to a statistically significant fall in the private saving rate. Their estimates show that the saving rate of the private sector is reduced by 0.29% for each percentage point percentage increase in the public saving ratio<sup>48</sup>.

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<sup>46</sup> For each \$1 increase in “permanent” or longer-term public saving achieved by a “permanent” \$1 decrease in public consumption, private saving declines by 47 -50 cents – which falls short of the 1.0 offset coefficient predicted by the Ricardian/direct crowding-out hypothesis (Corbo, Schmidt-Hebbel 1991, p.18).

<sup>47</sup> This may be partly due to the regenerative effect of government’s investment spending in relation to consumption expenditure.

<sup>48</sup> This study however, did not find evidence in favour of a full long-run Ricardian equivalence.

Serres and Pelgrin (2003)<sup>49</sup> obtained a significant net negative effect of public sector saving for a group of OECD countries. Their conclusion is that while private saving responds to changes in public saving significantly, the strength of the offset is considerably less than unity and therefore does not establish a complete Ricardian equivalence.

Athukorala and Sen (2003) observed a strong substitutability. However, the study could not establish the existence of the full Ricardian Equivalence which projects the counteracting effect of public sector savings by private saving.

Ramajo, Garcia and Ferré (2006) found that on the whole fiscal policy variables generally showed negative significant relationships with private saving. From their result a percentage point increase in public saving gives rise to a short run decrease in private saving of 0.3% and in the long run by 0.8%. However, the result they could not establish a full Ricardian equivalence at 5% error level<sup>50</sup>.

#### *Rate of Return Variables*

Corbo, Schmidt-Hebbel (1991)<sup>51</sup> observed that interest rate and inflation rates do not have a consistently negative and significantly impact on private consumption and saving. Whereas the interest rate had the negative signs in most regressions, a find which is in consonance with most of the results in other previous literature, the impact of inflation is also found to have a small, negative and insignificant effect on consumption and by extension saving.

Schmidt-Hebbel, Webb and Corsetti (1992) investigating the determinants of household saving for a cross-section of developing countries found that the real interest has a negative and insignificant effect on household savings. This observation goes to reinforce the current

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<sup>49</sup> Serres, A. and Pelgrin, F. (2002). "The decline in private saving rates in the 1990s in OECD countries: how much can be explained by non-wealth determinants?" OECD Economics Department Working Papers ECO/WKP (2002)/30.

<sup>50</sup> Ramajo Julián, García Agustín and Ferré Montserrat (2006): Explaining aggregate private saving behaviour: new evidence from a panel of OECD countries, *Applied Financial Economics Letters* 2: 5, pp.311 — 315

<sup>51</sup> Corbo, V. Schmidt-Hebbel K.(1991): *Public Policies and Savings in Developing Countries; Policy, Research and External Affairs*. Working Papers WPS 574.



notion that interest rates have a negligible effect on the consumption and saving decisions of private agents. The inflation rate was also found to be with expected negative sign although the variable was not significant in the regressions. They concluded that reductions in inflation tends to promote private saving, however, a rise in the deposit rate in relation to inflation does not have a remarkable effect on private saving.<sup>52</sup>

Loayza et al (2000) observe a negative effect of real interest rate on the private saving rate. This is suggestive of the fact that the income effect overwhelms the sum of substitution and endowment effects. The key finding is that in the short run a percentage point rise in real interest rate translates into a 0.25 percentage point decrease in the private saving rate<sup>53</sup>.

In regard to inflation, Loayza et al observed a positive coefficient between private saving and inflation, as such a reduction in inflation by ten percent causes a fall in private saving by more than one percent. The conclusion is that a rise in the macroeconomic uncertainty causes agents to save a larger percentage of their income for precautionary reasons. It is however, important to interpret these outcome with caution so as not to conclude that inflation stabilisation has an adverse impact on private saving, because stabilisation can also affects saving via alternative ways that are likely to make up for the negative direct impact of inflation.

In the study of Latin American countries Edwards (1996), the coefficient of real interest rates were not statistically significant in all the regressions it was included.

Callen and Thinman (1997)<sup>54</sup> found both real interest rate and inflation to be not statistically significant in their cross-sectional regressions. However, the variables proved significant in most specification in the panel data estimates. This may have also been affected by a sheer increase in the sample size.

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<sup>52</sup> Schmidt-Hebbel, Webb and Corsetti (1992) p. 543.

<sup>53</sup> Loayza et al (2000) p. 175.

<sup>54</sup> Callen, T. and C. Thinman (1997), "Empirical Determinants of Household Saving, Evidence from OECD Countries", IMF Working Paper No. 97/181, Washington DC: IMF, December.

Dayal and Thinman (1997) constructed the absolute deviations of the inflation rate from a moving average of 3-years. The study compared two regions which had similar income characteristics namely; Southeast Asia and Latin America. The authors found that there was a negative significant relationship for this proxy and private saving. This variation was particularly stronger for the Latin American countries which experienced a high level of volatility in the 1990<sup>55</sup>.

Bailliu and Reisen (1998) also plugged in the real interest rate into the regression but the coefficient obtained was not significant at conventional levels<sup>56</sup>.

In Haque, Pesaran Sharma (1999), the coefficients of real interest rate and inflation are better estimated and their magnitudes are significantly different across countries. When the Seemingly Unrelated Regression is used the variables display a fair amount of consistency across countries<sup>57</sup>.

Athukorala and Sen (2003) provided evidence in support of the a priori strong and negative effects of inflation on private saving. They observed that consumers try to keep a target real wealth in relation to income by lowering consumption when they are confronted with an inflation situation.

Serres and Pelgrin (2003) expectation of the impact of interest rate change on net private saving was ambiguous and their argument on one hand was that if private sector is a net creditor, then an increase in interest raises income and consumption and lowers saving. On the other hand, an increase in the interest rate causes a rise in the cost of consumption, creating an incentive to raise private savings. Their result is that private saving rate is

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<sup>55</sup> Dayal-Ghulati, A., and C. Thinman (1997), In Hicklin J., Robinson D. And Singh A. Eds : Macroeconomic Issues ASEAN Countries (1997) "*Saving in Southeast Asia and Latin America Compared: Searching for Policy Lessons*," IMF Papers p. 146.

<sup>56</sup> This is a surprising because they worked with a sample of OECD countries where most variables are interest rate-sensitive.

<sup>57</sup> Haque, Pesaran Sharma (1999) p. 20.

negatively related to the real interest rate<sup>58</sup>. In terms of inflation, Serres and Pelgrin expected the variable to have a positive sign in relation to private saving.<sup>59</sup> This is in spite of the fact that a given rise in nominal interest receipts is shown in measured income and as such household saving rate often rises artificially with inflation as opposed to corporate and government saving rate. The result obtained showed that inflation does not have a significant impact on private saving.

### *Financial Development Variables*

Loayza and Shankar (1994)<sup>60</sup> used the ratio of domestic credit to the private sector over GDP as the variable to represent financial development the regressions clearly establish a significant negative relationship between the variables. This goes to confirm the view that financial development enables firms and households to defer spot payments on their mortgages and products they buy. This causes a reduction in private saving as private agents are able to smooth out their consumption given their current levels of consumption.

Rojas –Suarez and Weisbrod (1996)<sup>61</sup> studied the impact of financial development on private saving for Latin American countries and found evidence in support of earlier work. Employing the ratio of corporate demand for bank liquid assets to household demand for bank liquid assets as a measure of confidence in the financial system, they showed that low private a low level of confidence in the financial system is associated with low levels of private saving.

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<sup>58</sup> Serres and Pelgrin (2003) p.19

<sup>59</sup> This is observed to be a rather unusual outcome as the variable often move in the same direction in most macroeconomic analyses.

<sup>60</sup> Loayza and Shankar (1994): Private Saving in India The World Bank Economic Review, Vol. 14, No. 3: p. 588.

<sup>61</sup> Rojas-Suarez, Liliana and. Weisbrod Steven R (1996): "*Financial Markets and the Behaviour of Private Savings in Latin America*". IDB - OECD Conference. *Promoting Savings in Latin America*. Held in Paris on November 7 and 8, 1996 p.20.

Applying domestic credit as a proportion of GDP to capture financial development, Bailliu and Reisen (1998) found the variable to be highly significant at the conventional levels in both OLS and 2SLS regressions.

In a cointegration and panel integration analysis of the effect of financial sector development on private savings for a group of 17 African countries, Kelley and Movratas (2003)<sup>62</sup> apply three different measures of financial development. These are the Beck, Demirguc-Kunt and Levine's (2000)<sup>63</sup> measure which incorporates size, activity and efficiency of financial markets and intermediaries. The other measure is that which takes into account the relative importance of the deposit money banks in relation to central banks which have also been applied by Levine, Laoyza and Beck (2000)<sup>64</sup>. The last measure is of financial depth deals with the absolute size of the financial sector in relation to the GDP. Although the overall analysis of the effect of financial development on private saving is inconclusive, they observed a positive relationship between the two variables in most of the estimates of the individual countries in the sample.

As a measure of the degree of financial development in the Indian economy Athukorala and Sen (2003) used the population per bank branch or bank density. This variable was observed to be very significant and that it explains variations in the private savings rate. The result showed that a 10% rise in the bank density causes a 0.4% point increase in the rate of private savings<sup>65</sup>. This is quite understandable in a developing country where modern banking habits are now gaining popularity.

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<sup>62</sup> Kelly, Roger and Mavrotas, George (2003): *"Savings and Financial Sector Development: Panel Cointegration Evidence from Africa"*, WIDER, United Nations University, Discussion Paper No.2003/12 p.18.

<sup>63</sup> Beck, Demirguc-Kunt A and Levine R. (2000): *A New Database on the Structure and Development Of the Financial Sector*, The World Bank Economic Review, Vol. 14, No. 3: 597-605.

<sup>64</sup> Levine R, Laoyza N. and Beck T. (2000): *Financial intermediation and growth: Causality and causes*, Journal of Monetary Economics 46 (2000) pp. 31-77.

<sup>65</sup> Athukorala and Sen (2003) p.2189

Bhandar, Dhakal, Pradhan and Upadhyaya (2007)<sup>66</sup> use was broad money (M2) as a percentage of GDP to measure the extent of the development in the financial market on his study in South East Asia. The variable was observed to have the expected positive coefficient and statistically significant in almost all of the countries studied. It must be pointed out that although, broad money is the widely visible money in such developing regions it influences consumption more than it does to saving.

### *Terms of Trade*

Masson et al (1998) found the terms of trade to be only positively significant for the group of industrialised countries in the sample in their panel estimates. However, in a combined panel of industrial and developing countries the coefficient of the variable was observed to be insignificant. The conclusion is that the terms-of-trade coefficient does not have strong effect on saving<sup>67</sup>.

Dayal-Ghulati and Thinman (1997) provide evidence of the impact of terms of trade shocks and variability on private savings. When separate estimates were undertaken for the 2 regions under their study, Latin America showed the highest level of significance. Haque et al (1999) using fixed effects and cross-country regressions, found that the impact of the percentage change in the terms of trade on private saving was statistically significant for a few countries in the study. However, in dynamic cross-country estimates the coefficient of the variable proved to be significant at the conventional levels in the long run.

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<sup>66</sup>Bhandari, Rabindra., Dhakal, Dharmendra., Pradhan, Gyan., and Upadhyaya. Kamal P. (2007): "*Determinants of Private Saving in South Asia*"; *South Asia Economic Journal* 2007 Vol. 8; p. 215.

<sup>67</sup> Masson et al (1998) p.493

Loayza et al (2000) reported private saving is increased by 0.74 percent when the terms-of-trade is improved by 10 percentage points<sup>68</sup>. However, they fell short of establishing the permanence of this estimate because of the volatility in the variable. Serres and Pelgrin (2003) also put forth some evidence from their work on the OECD countries. They concluded that a percentage point change in the terms-of-trade has a positive and significant impact on the rate of private savings. Their finding partially supports the Harberger-Laursen-Metzler effect notwithstanding their relatively small sample<sup>69</sup>.

Athukorala and Sen (2003) produced results which confirmed a strong positive relationship between changes in the terms of trade and private saving which is suggestive of the fact that households in India increase their savings when they foresee a higher future real incomes resulting from the improvement of the terms of trade. This outcome came as a surprise due to India's relatively low reliance on external trade.

In their study of the Nigerian economy Nwanchuku and Egwaikhide (2007)<sup>70</sup> have also provided evidence that confirm a strong positive relationship between the terms-of-trade and private saving. The implication is that private agents in his sample tend to consider deterioration in the terms of trade as a momentary shock.

### *Demography*

Edwards (1995) in a study of a cross section of countries found evidence that lend more support to the life cycle models. The coefficient of age dependency ratio had the expected negative sign and was highly significant in the estimates. Edwards (1996) in his attempt to explain why private savings are so low in Latin America observes that this state of affairs in

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<sup>68</sup> Loayza et al (2000) p.174.

<sup>69</sup> The postulate states that saving out of any given level of income decreases with a deterioration of the terms of trade (Svensson and Razin, Journal of Political Economy Vol. 91, No.1 p.97).

<sup>70</sup> Nwanchuku T. E and Egwaikhide F. O. (2007) An Error-Correction Model of the Determinants of Private Saving in Nigeria, A Paper presented at the African Economic Society (AES) Conference, Cape Town, South Africa, July 2007, p 18.

the region was a result of a very high dependency ratio. They however, stated that due to the demographic transition that was taking place in the 1990s the rate of private saving was expected to improve.

Dayal-Ghulati and Thinman (1997) also observed that in their total samples the results pointed to a negative and significant relationship between private saving and age dependency ratio. However, when the model was re-specified and instruments were included the variable lost its significance<sup>71</sup>.

Callen and Thinman (1997) in the work on the OECD countries reported on results from both cross-sectional and panel analysis. The ratio of people aged 65 years and above to the working-age population was their definition of the dependency ratio. In the cross-sectional estimation they demonstrated clearly that a higher age dependency ratio is linked to a lower saving rate. The panel estimation also yielded a similar outcome<sup>72</sup>.

Bailliu and Reisen (1998) also obtained a negative coefficient in their estimation of the relationship between private saving and the dependency ratio, but this was not statistically significant at the conventional levels. However, they employed another variable which is the pension assets relative to the working-age population and this had a positive and significant effect on private savings<sup>73</sup>. In regard to demographic variables Masson et al (1998) used the dependency ratio. The main conclusion was that demographic factors are vital determinants of private saving, although the size of the coefficient of the dependency ratio in their regression was smaller than what had been estimated in earlier studies. This notwithstanding, the variable was found to be statistically significant in cross-sectional and panel studies.

Haque et al estimated a quadratic relationship between the dependency ratio and private saving. Their observation was that this nonlinear specification was robust than in most linear

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<sup>71</sup> The explanation is that other variables like financial depth may be collinear with the dependency ratio – and thus cause a reduction in the significance levels in small samples.

<sup>72</sup> Callen and Thinman (1997) p.14.

<sup>73</sup> This underscores the importance of expected future assets on current saving habits of the present working population.

specifications. Overall their conclusion was that although demographic variables remain important they were not among the vital determinants of private saving in industrial countries that the study covered. Loayza et al (2000) used three correlates that represent demographic factors. These are urbanisation ratio, the young dependency ratio and old dependency ratio. The variables were significant and they also had a negative effect on private savings. The results, particularly those of the dependency ratios tended to support earlier empirical findings that confirm the life cycle model. Serres and Pelgrin (2003) using both young and old dependency ratios and found that the combination of the two variables was not so robust and a positive relationship could not be established.

Ramajo, Garcia and Ferré (2006) also used the urbanisation rate and the result showed that a percentage point increase in the proportion of the urban population induces a short-run increase of 0.05% in the private saving rate on the average and a long-run rise of a little of 0.1%<sup>74</sup>.

### ***2.3 Determinants of Private Saving in the Central and Eastern European Region***

Most economies in transition, particularly those in Central and Eastern Europe have undergone a rapid decline in private domestic saving. What is becoming a regular feature is the shift in the make-up of saving in the direction of households and away from corporate entities and government. A good number of studies have sought to examine the behaviour of saving in transition economies. These include Borensztein and Montiel (1991)<sup>75</sup>, Conway (1995), Denizer and Wolf (2000), and Chowdhury (2004). The most consistent and coherent work on the region of Central and Eastern Europe are those of Schrooten and Stephan (2001), (2003: 1), (2003:2) and (2004).

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<sup>74</sup> Ramajo et al p.3140.

<sup>75</sup> Borensztein, E. R. and P. J. Montiel (1991): "*Savings, Investment and Growth in Eastern Europe*", Working Paper No. 91/61, Washington DC: IMF.



Borenzstein and Montiel's (1991) study had at its focus on the growth and investment in the 3 foremost Central and Eastern Europe. They also linked the severity of the savings to the degree of success that is achievable in generating investment. They identified the emergence of strong private saving and investment demand with the level of uncertainty that came along with the transition process<sup>76</sup>. They recommended measures that must be designed will stimulate private saving and investment.

Conway (1995) looked at evidence on expenditure in Belarus, Georgia, Kazakhstan and Ukraine. He observes that private saving has declined in these countries since independence. Additionally, there had also been a shift of financial assets from bank deposits to alternative financial instruments including foreign currency, trust company shares and private loans<sup>77</sup>.

Conway argued that the decline in private saving in the countries of the former Soviet states is primarily due to the high level of inflation which is also a result of the implementation of the stabilization programmes. He also cites the development of the financial sector in these countries as having a massive impact on the saving behaviour in these countries. The transition to the market system also meant a shift on the part of private agents from banking deposits to alternative financial assets like trust funds and foreign currency. Conway viewed the new financial systems in the region to be reacting slowly to these new developments. However, this slow response has not been a permanent feature for the entire transition period especially in the post-accession period.

Denizer, Wolf and Ying (2000) have studied a sample of 10 transition economies in Central and Eastern Europe namely; Albania, Bulgaria, Czech Republic, FYR Macedonia, Hungary, Poland, Romania, Slovak Republic and Slovenia and the 3 Baltic states and 12 former states of the erstwhile USSR. In this study they focused on the ratio of gross domestic saving to gross domestic product. They examined the presence and level of involuntary saving through

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<sup>76</sup> Ibid p. 16.

<sup>77</sup> Conway, Patrick (1995): "*Saving in Transition Economies*"; Policy Research Working Paper 1509, p. 1.

the computation of predicted savings rate of countries that were in the free market system but had similar macroeconomic fundamentals as the pre-transition countries. The outcome was indicative of the fact that these predicted savings rates were lower than actual saving rates and this was particularly the case for the countries of the former Soviet Union and the 3 Baltic states<sup>78</sup>. This finding is the strong evidence backing the view of a disproportionate pre-transition savings. Their conclusion is that the savings collapse in the region can be attributed to either the phasing out of involuntary savings or a shift from the equilibrium which is also a reflection of an adjustment in economic circumstance and also future expectation. They observed that the differences in the extent of liberalisation had an effect on the saving rates in the cross section of transition economies. As such a high level liberalisation in these countries is associated with lower saving with a year's lag<sup>79</sup>.

Chowdhury (2004) also analyses data from 21 transition economies employing a dynamic panel model and concludes that most of the determinants of saving as can be found in the literature can also be found to hold in transition economies. With his focus on the terms of trade, he also asserts that: "The transitory component in the terms of trade has a larger positive impact than the permanent component (Chowdhury 2004 p.1)<sup>80</sup>". He employed the GMM dynamic panel data technique which afforded him the advantage of combining into one system the estimates of both levels and changes while permitting the use of specific sets of instrumental variables<sup>81</sup>.

The results obtained were quite remarkable in regard to the signs and magnitude. The coefficient for financial development which he represented by the ratio of broad money (M2) to GDP was highly significant and also had the expected negative effect on private saving.

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<sup>78</sup>Denizer, Cevdet, Wolf, Holger C., Ying, Yvonne, "Household Savings in Transition Economies." Working Paper No. 2299. Washington DC: The World Bank, March 2000.

<sup>79</sup> Ibid p.1

<sup>80</sup> Chowdhury, Abdur R. (2004): "Private Savings in Transition Economies: Are there Terms of Trade Shocks?" Comparative Economic Studies, 2004, 46, (487-514) p 503.

<sup>81</sup> The Generalised Method of Moments first put forward by Hansen (1982) has undergone a lot of changes since.

Also the rate of return variable of inflation had the positive effect on private saving. Although the impact of public sector saving on private saving was negative and significant, he could not make a case of a full Ricardian equivalence since long-term coefficient was less than one.

In terms of demographic factors Chowdhury used the dependency ratio which was also met the a priori expectation but a rather weak level of significance. Regarding the terms-of-trade on which the study was focused, he reported that its coefficient was positive and statistically significant. However, the volatility of the terms-of-trade was found to be negative and significant. This goes to confirm the asymmetric effect of the terms-of-trade shocks although this is rather low in the transition economies<sup>82</sup>.

Schrooten and Stephan's (2001) work on the Central and Eastern European economies included variables discussed in the theoretical review. In particular they find the growth rate of GDP which they used as the proxy income to be rather insignificant in their estimation. Their argument is that both the young and the old-age dependency ratio in these countries behave in the expected manner (Schrooten and Stephan 2001, p.14)<sup>83</sup>. This was an indication of the fact that a larger percentage of the populations were not in the work force, and a bigger number out of these were either with low or no incomes.

Regarding inflation which was the variable that captured the level of uncertainty in these economies, their estimates showed a positively significant relationship between it and private saving. This gave support to the argument that greater uncertainty gives rise to precautionary saving. Particularly in economies in transition uncertainty has the tendency of fuelling the phenomena of capital flight and dollarization.

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<sup>82</sup> Chowdhury Abdur. (2004) p. 504.

<sup>83</sup> Schrooten Mechthild and Stephan Sabine (2001): "Savings in Central Eastern Europe", Discussion Paper No. 250 German Institute of Economic Research (Berlin).

The impact of public sector savings in these countries was not different from what a priori theory and empirical works have set out. The coefficient was negative and the level of significance was quite high. However, as in many cases the authors did not confirm the validity of the Ricardian equivalence in the region. Schrooten and Stephan also included a transformation variable that took into account the progress the individual countries have made in the process of transformation. In this respect they used an index which was decomposed into three dummy variables and classify the countries under them. Through this empirical strategy they were able to observe that saving rates were indeed much higher at the beginning of the transformation period than it was during the process. Their key conclusion is that private saving and capital from the international markets are not to be seen as substitutes, an observation which showed the low level of integration these economies had achieved in their bid to enter the mainstream of the global financial system.

Schrooten and Stephan's (2003) paper was essentially an upgrade of the 2001 paper. The results obtained here also lead to same remarkable conclusions. In particular they introduced the first lag of private saving itself as an explanatory variable. Through this they were able to come to the conclusion that the saving rate in the past period has a positive a strongly significant impact on current saving and that there is some degree of persistence in the behaviour of private saving in the region. They also used instrumental variables for the growth rate of income and income level and both of these clearly demonstrated that income is positively related to saving. This second paper also corroborated the first one in terms of the effect of public sector savings on private savings although they could not make a case for the presence of the Ricardian equivalence.

The demography were represented by the dependency ratio was observed as having the expected inverse relationship with saving. This lends support to their observation in the previous work and is also in line with the life cycle model.

The coefficient of inflation in the results was found to be significantly positive meaning that a fall in the inflation leads to a fall in private saving. This is yet another argument for the precautionary motive for saving. In regard to the international financial integration the indicator of transition which the authors employed was also significantly positive. This shows that better institutional frameworks promote higher private saving. In short the EU-entrant countries of 2004 showed features that were similar to those of the foremost countries in the market system in terms of the drivers of private savings.

Schrooten and Stephan (2004) involved the use of panel data analysis using the GMM estimator. Their main conclusions were that there are wide differences in private savings among the states in the sample. Private saving is seen as having a degree of persistence while the per capita growth of income has a positive effect on private saving. The results also indicated financial development, particularly the bank-based system as it pertains in Europe also affect private savings.

Below is a selection of some of the empirical studies on private saving from across the world.

Authors	Sample	Method	Interest
Schmidt-Hebbel, Webb And Corsetti (1992)	10 countries with data drawn from UN System of National	Fixed Country-Specific effects	Household saving in Developing Countries: First Cross – Country Evidence
Edwards (1995)	36 Industrial Countries (11 OECD countries and 25 Developing Countries)	Instrumental Variables Method	What are the Determinants of Private and Public Savings?
Callen and Thinman	21 OECD Countries	Cross – sections and Impact on the Household Saving Decision?	Have Public Policies an
Dayal-Ghulati and Thinman (1997)	14 Countries (5 ASEAN Members and 9 Latin American Countries) (1975 -1995)	Comparative Panel Estimation	Saving in South East Asia and Latin America Compared
Masson, Bayoumi And Samiei (1998)	21 Industrial Countries (1971-1993) and 40 Developing Countries (1983-1993)	Cross-sections and Static Fixed Effects	International Evidence on the Determinants of Private Savings
Haque, Pesaran and Sharma (1999)	21 OECD Countries Pooled MG Estimation	Fixed-Effects and Dynamics in Cross Country	Neglected Heterogeneity and

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Loayza, Schmidt – Hebbel and Serven (2000)	OECD 1966-1995 Estimators	GMM and Systems of National and Private Saving	What are the Determinants of
Schrooten and Stephan (2001)	8 CEEC Countries (1989 – 1998)	Fixed Effect Model	Savings in Central Eastern Europe
Serres and Pelgrin (2003)	15 OECD Countries (1970 – 2000)	Panel Error Correction and Cointegration	The Decline of Private Saving Rates in the 1990s and OECD Countries: How much can be Explained by Non-wealth Determinants?
Schrooten and Stephan (2003)	8 CEE Countries (1990 – 1999)	Fixed Effect Model	Back on Track? Saving Puzzle in EU Accession Countries.
Schrooten and Stephan (2004)	8 CEE Countries	Generalised - Method of Moments (GMM) Estimation	Does Macroeconomic Policy Affect Private in Europe? Evidence From a Dynamic Data Model

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**Table 1: List of Selected Empirical Panel Data Studies from Across the World.**

## 2.4 Private Saving and Social Security

One of the major factors influencing the saving behaviour of individual and households is the nature and size of the social security cover. Among the earlier works on this link are Modigliani and Brumberg (1954) and Modigliani and Sterling (1981)<sup>84</sup> which looked at the determinants of private saving emphasis on the role of social security. These were done in the framework of the Life Cycle Model and the latter work focused on the determinants of individual and aggregate wealth with its steady state implications.<sup>85</sup> The intuition is that with stability in growth, the private saving,  $s$ , is expressed as the product of the rate of growth of income  $p$ , multiplied by the private wealth-income ratio, and this is expressed as:

$$s = \frac{S}{Y} = P \frac{A}{Y} \equiv p.a \dots\dots\dots 11$$

Where  $S$  denotes the aggregate private saving,  $Y$  represents aggregate disposable income and  $A$  stands for total private wealth. The authors worked with assumptions for both a stationary and a non-stationary economy.<sup>86</sup> The conclusions of the study suggests that a rise in social security coverage may tend to reduce private per capita saving and wealth as the saving rate is maintained through the working life span and by extension in the income per capita.<sup>87</sup> One area of contention with this study is the specification of the working life span, and in particular the retiring age which the authors put at 65.<sup>88</sup>

<sup>84</sup> Modigliani F. and Sterling (1981) p.1.

<sup>85</sup> Ibid p.2

<sup>86</sup> Ibid p.27

<sup>87</sup> Ibid

<sup>88</sup> For most developing countries this may differ greatly due to the low life expectancy. In addition, most people are said to enter the labour market much earlier through the informal sector.



Feldstein (1976)<sup>89</sup> in contributing to the extension of the Life Cycle model notes that workers often have an incentive to opt for an earlier retirement if they are covered by pensions. He identifies two major reasons for this: In the first place social security payments reduce personal savings of workers as it is a substitute for household assets. On the other hand, it also induces an increase in personal saving because it prolongs the period of retirement across which accumulated assets are spread.<sup>90</sup> Feldstein maintains that the age of retirement and pensions is influenced to a very large extent by the life expectancy and the general health conditions of the people or workers of the country in any sample. In analysing US time series data after two decades Feldstein (1996) reaffirms his earlier finding that each dollar of social security wealth reduces private saving by two to three cents.<sup>91</sup>

## **2.5 Growth of Financial and Private Sectors and the CEE Countries**

The development of the financial instruments and institutions in any economy has a great impact on the saving behaviour of individuals and households. This section of the study briefly summarises the growth of the financial sector in transition for the CEE countries and its impact on private saving.

Lending to the household sector has become the most rapidly growing areas in the operations of the banking system in Hungary although, they initially regarded as mere sources of deposits. This condition gave a strong motivation to households to borrow as there were a wide range of sources to borrow from. The increasing stock of credit to the financial institutions to the households sector continued to rise consistently and estimated to have reached 50% by 2001 (Zsamboki 2002 in Thinman, p.111). A majority of these loans had

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<sup>89</sup> Feldstein M. (1972): The Extended Life Cycle Theory. The American Economic Review Vol.66 No.2 pp.77-86.

<sup>90</sup> Ibid p.81

<sup>91</sup> Feldstein M. (1996): Social Security and Saving: New Time Series Evidence, National Tax Journal, vol. 49 No.2 p.151-64.

maturity periods of more than 1 year. In addition to this the credit institutions provided more consumer credit facilities more than any other product to households. In the period after 2001, the institutions begun to provide more housing credit whereas specialised financed institutions also provided auto financing loans to the general public.

The overall lending of banks to the corporate business sector also witnessed significant increases after 2000. Loans to small and medium scale enterprises (SMEs) saw a large expansion after the period. On the other hand, most of the banking institutions have been reluctant to lend to industries in the food and agricultural sector because of the relative risk involved. Hungary has also seen the growth of non-bank financing institutions as major financial intermediaries. These institutions include investment funds, insurance companies and private pension funds.

There has been a mixed outcome in terms of the performance of the entire financial sector. While the proportion of large banks continued to drop as a result of mergers and acquisitions, medium-sized banks consistently increased their market share by 2001. Savings and loans institutions also saw a huge growth as a consequence of the channelling of savings into deposit contracts (Zsomboki in Thinman, 2002 p.105). The financial sector in Poland is still undergoing its developmental phase. It has bright prospects due to the local conditions like a large population with its growth potential. The banking sub-sector constitutes the largest share of the entire financial system. Although the capital market is vibrant, the Warsaw Stock Exchange (WSE) has a relatively small capitalisation in relation to the banking sector (Bednarski and Osinki in Thinman 2002 p.172)<sup>92</sup>. Overall, the financial sector's assets have witnessed some rapid increases due to the impact of FDI inflows which were propelled by the country's privatisation programme as well as the increased activity of foreign banks and their subsidiaries. The banking system is dominated by commercial banks with majority

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<sup>92</sup> The capital market has for the most part played a secondary role and while the capitalisation of the Warsaw Stock Exchange (WSE) amounted to only 14% of GDP the banking sector's assets amounted to 66% of GDP.

shareholdings, medium-sized commercial banks, which may be partly locally owned, specialist banks, mortgage banks and small scale banks<sup>93</sup>. The Liberalisation of the Polish financial sector at the beginning of the transition opened it up to competition resulting in its growth and modernisation. This was also translated into the provision of a wide range of products and services to customers in both the corporate and household sectors of the economy.

The financial sector in Estonia is primarily shaped by the country's relatively small size, its fast rate of growth and its membership of the European Union. This has created a situation whereby the money market is closely linked with the foreign exchange market. Estonia possess one of the most competitive and credit-worthy banking systems in the EU. The sector also has a larger portion in private ownership<sup>94</sup>. At the outset of the banking sector restructuring the number of banks were reduced drastically. The Central Bank of Estonia – the Eesti Pank admitted only one bank into the sector in 1999 and the number has remained low since then (Lepik and Tors in Thinman p.86)

Although domestic saving constitutes a major source of finance for the Estonian economy, foreign capital has played an even significant role of the country's monetary reforms in 1992<sup>95</sup>. The inflow of foreign capital after this period had both a negative and positive impact on the Estonian economy in that while relaxing the banking sector's reliance on domestic funds, it also created a situation whereby Estonian firms could not obtain the needed credit-worthiness to access direct loans.

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<sup>93</sup> Some of the banks often have overlapping roles but the classification represents their core operational functions.

<sup>94</sup> Ownership by the private sector reached approximately 96% of the entire banking system at the end of 1997.

<sup>95</sup> From as high as 42 banks in 1992, the number was reduced to 11 at the end of 1997 and further dropped to 4 at the height of the Russian financial crisis.

The Estonian corporate sector obtained about half of the finance from the banking system while the remaining half comes from other segments of the local non-banking financial sector. The household sector in Estonia is mostly financed by the bank loans although the level of penetration of this sector remains rather low. However, household savings have become the most vital source of funding in the country with bank deposits leading as the major channel of financial intermediation.

The deepening of the financial sector in Estonia has been achieved in a number of phases. This depended largely on price level movements, incomes and the flow of foreign capital. The early stage of the process was characterised by a low ratio of the bank assets to GDP. The key factor responsible for this was the spate of financial crises during the period which resulted in the collapse of some state-owned banks<sup>96</sup>.

The Latvian financial has undergone a rapid and significant transformation since the beginning of the transition programme. Like most of the CEE countries, the banking sub-sector plays a lead role in the system. The system was characterised by a high level of concentration and this has continued even into the period of accession (Zubkova, Kauzens, Tillers and Prusis in Thinman p.199, 2002). Early in transition the country adopted the universal banking system which allowed retail and commercial banks to provide a variety of services like asset management, ordinary maintenance of accounts and settlements and credit and leasing among others. As the system matured and became more competitive, some of the banks ventured into specialised products for specific businesses although they largely retained their universal character.

The Lithuanian money market and foreign exchange markets are dominated by both domestic and foreign banks. However, at the end of 2001 the efficiency of the Lithuanian money market was generally regarded as been quite low.

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<sup>96</sup> Notable of these crises are the Asian and the Russian financial crises of the 1990s.

The role of banks in mobilising domestic savings also witnessed remarkable increases after the financial crisis period. As the banking system further developed the cash holdings among the public also fell with more people resorting to the use of payment cards. On the whole, therefore, the Lithuanian banking system is seen as dominating the rest of the financial sector like the securities market. The stock market has not also been able to a very effective financial intermediary in the economy for the most part of the transition period.

Slovakia commenced the process of developing a vibrant financial sector between 1993 and 1997. Generally the banking sector recorded significant growth in the number of banks, staff and bank branches. As the assets of banks grew, there was also an increase in the volume and frequency of lending. Efforts were made to modernise the Slovak banking sector from 1993 with the encouragement of banks to embrace information communication technology (ICT) and also invest in state-of-the-art banking equipment to enhance their competitive positions. This led to the introduction of new products and channels like Automated Teller Machines (ATMs), credit and debit cards and electronic banking. These innovations brought a lot of people into the mainstream of the banking sector as the number of clients increased.

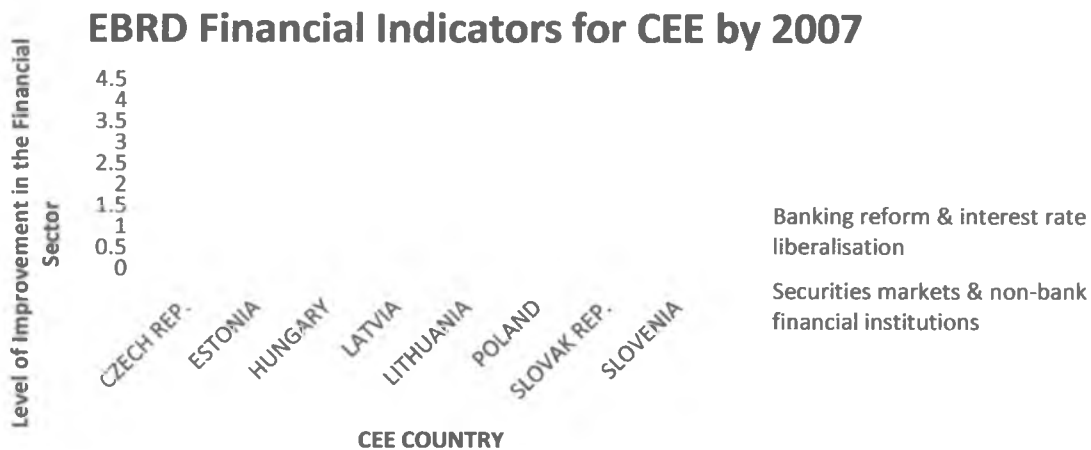
Slovenia's financial sector underwent a remarkable transformation once the banking sector privatisation begun. The financial sector was initially dominated by the banking system which accounts for 62% of assets in the sector. However, at the outset of transition, private business development suffered credit problems in the form of inadequacy and the high cost of loans. The root cause of this problem was an inheritance of non-performing loans and bad debts from the pre-independence era. The second issue was the disincentives created by the policy of the Slovenian government to embark on rehabilitation with the view to promoting safety of lending practises in the economy. This policy emphasised the maintenance of a bigger portion of bank assets in the form of government bonds and to a lesser extent

commercial loans while raising the minimum requirements for all financial institutions including cooperatives and credit institutions.

In sum it can be said that the financial sector in the CEE countries has undergone tremendous deepening and has emerged as very competitive in relation to that of Western Europe. Perhaps the only influence which may cause the saving pattern in these countries to differ from the EU average is habit formation.<sup>97</sup> Even here the period of over 15 plus years since the commencement of the transition process is expected to weaken its effect on private saving.

Current data on the performance of countries of Central and Eastern Europe clearly show a remarkable progress of these economies towards the mainstream of financial activity. The figure below shows the 2007 EBRD report on the level of progress made by the eight countries<sup>98</sup>.

**Figure 1 Financial Sector of CEE Countries**



Source: *Authors computations based on EBRD 2007 data.*

With banking reform and interest rate liberalization and Securities markets and non-bank financial institutions as the two main financial indications, the EBRD puts the best

<sup>97</sup> Alessie, R. and Teppa F (2009): Saving and Habit Formation; Evidence from Dutch Panel Data, Open Access, Springerlink.com.

<sup>98</sup> The Czech Republic has since 2007 been “graduated” from the banks operations in 2007 and indication that the country has made huge advances towards transition.  
<http://www.ebrd.com/about/strategy/country/czechrep/index.htm>

performance on the scale of 4 and the worst at 0. On the whole most all the countries are observed to have made significant strides in banking reform in comparison to the non-bank financial sector. Hungary and the Czech Republic are the only country in the group which has been able to achieve the highest scores for both indicators. While Estonia obtained the highest marks for reforms in the banking sector it is still has some work to do regarding the securities market. Of the 8 countries Slovenia lags behind in terms of both indicators of reforms.

## CHAPTER THREE

### METHODOLOGICAL FRAMEWORK

This chapter is grouped into four parts. The first part deals with the estimation of private savings for all eight countries in the sample as it is the only variable that is not directly available from the databases. The second involves a panel estimation of the variables that influence private savings based on *a priori* formulation. Thirdly, diagnostic checks are conducted on the data for the panel estimation. Finally, the sources of data and the analytical tools employed are spelt out.

#### 3.1 Measuring Private Savings

In defining the variable of interest, which is saving, we follow in the stead of Loayza, Lopez, Schmidt-Hebbel and Serven (1998b)<sup>99</sup> and Loayza, Schmidt-Hebbel and Serven (2000)<sup>100</sup>. Gross national saving (GDS) is derived from subtracting consumption expenditure which is measured at current prices from public saving which has government balance as its proxy. With this background, private saving is obtained by implementing any one of the four alternative measures<sup>101</sup>. These are labelled respectively as CU (unadjusted data corresponding to the central government definition), CA (central government, adjusted for inflationary capital gains and losses, PU (public sector, unadjusted and PA (PU data adjusted for inflation). As it is observed from their formulations CA and CU measures put together the

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<sup>99</sup> For a given country, the basic measure of income is the Gross National Disposable Income (GNDI) which includes all current and capital transfers from abroad.

<sup>100</sup> Loayza, Schmidt-Hebbel and Serven ( May 2000), p. 168.

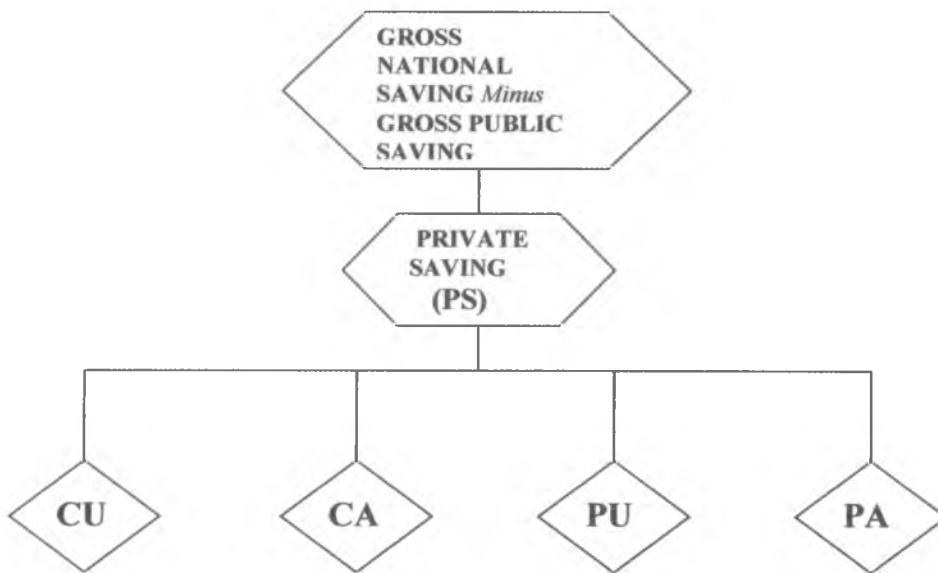
<sup>101</sup> These measures correspond to the two alternative government definitions, namely, consolidated central government and public sector and alternative statistical measures which are unadjusted and adjusted capital gains and losses from inflation.



public sector, the local government component and the private sector. On the other hand, the PA and PU measures are in line with either the general government or the consolidated non-financial public sector which also includes public enterprises<sup>102</sup>.

In terms of analytical content therefore, the most preferred of the four measures is the PA method as it better captures the saving effort of the economic unit of interest. In spite of the above conclusions most empirical studies use the CU measure for which data is often readily available but which also proves analytically problematic<sup>103</sup>.

The whole conceptual framework is demonstrated in the diagram below:



**Figure 2: Measurement process for the derivation of Private Saving.**

Source: *Author's survey of existing literature.*

Most databases hardly provided specific data on private saving and so at best this is derived. Following Laoyza et al (2003), savings data is obtained from the "World Development Indicators" from time series on domestic saving as published by the World Bank. Private saving is calculated indirectly by deducting public savings from domestic savings. Although

<sup>102</sup> Loayza, Schmidt-hebbel and Serven (2000) p.4.

<sup>103</sup> Ibid.

based on very simplified assumptions, this method has been in quite popular usage in the literature. Proceeding in the stead of Loayza, Schmidt-Hebbel and Serven 2000 and Schrooten 2003, the private saving is computed as:

$$PSav_{it} = GDSav_{it} - PubSav_{it} \dots\dots\dots 12$$

Where Psav represents Private Saving, GDSav is Domestic Saving and PubSav stands for public saving and where the overall government deficit/surplus is used as a proxy for public saving<sup>104</sup>.

**3.2 Limitations of the Measure**

Lacking access to the World Savings database by the World Bank we follow the stead of other researchers by constructing the variable (See Loayza et al 2000). The World Development Indicators which was used in this study does not provide a direct measure of government deficit but uses the general cash balance/deficit as a proxy. Individual country databases were also consulted in cases the World Bank data had gaps. As a major drawback therefore, the values obtained here may conflict in some respect with those obtained in earlier studies. The inability to stick to one particular source of data for this work also reduces the quality of the data to some extent.

**3.3 Model**

**Ordinary Least Estimation**

The simplified OLS Model can be expressed as:

$$Psav\_gdp = f(PubSav, GDPPGR, IR, FDEV, INF, TOT, DEPR, TRANS) \dots\dots\dots 13$$

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<sup>104</sup> In the World Development Indicators (WDI) dataset, the closest variable to the government deficit is the net cash balance/deficit.

Where Psav is private saving, PubSav represents Public Sector Savings, GDPPGR is the growth rate of Gross Domestic Product, the level of Inflation is denoted by INF, FDEV represents the level of Financial Development, IR is the interest rate and TOT stands for the terms of trade. Econometrically this is written as:

$$PSav_{it} = \beta_0 + \beta_1 GDPPGR_{it} + \beta_2 IR_{it} + \beta_3 FDev_{it} + \beta_4 INF_{it} + \beta_5 TOT_{it} + \beta_6 DEPr_{it} + \beta_7 PubSav_{it} + \beta_8 TRANS_{it} + \mu_{it} \dots \dots \dots 14$$

Where  $\beta_i$  (I=0, 1, 2, ..., 8) and i is from the first country to the j<sup>th</sup> country.

$\mu$  is the error term and it is assumed to be white noise.

**Fixed Effects Estimation**

The Fixed Effects equation will take the form below

$$PSav_{it} = \beta_0 + \beta_1 GDPPGR_{it} + \beta_2 IR_{it} + \beta_3 FDev_{it} + \beta_4 INF_{it} + \beta_5 TOT_{it} + \beta_6 DEPr_{it} + \beta_7 PubSav_{it} + \beta_8 TRANS_{it} + [CONDITIONS]_{it} + \mu_{it} \dots \dots \dots 15$$

The model basically incorporates the time and country specific features for estimation fixed effects.

**3.4 Expectations from the Independent Variables**

*Growth Rate of GDP*

The growth rate of GDP while affording people the opportunity to put a bigger proportion of the income into savings also causes people to increase their consumption as current incomes are increased. As such the expectation from the impact of an increased growth rate of per capita income on the savings behaviour of private agents can be said to be ambiguous. That is

$$\frac{\partial PSav\_gdp}{\partial GDPGR} >< 0.$$

### *Public Savings*

Although a full Ricardian Equivalence is hardly achieved in most empirical works, the negative relationship between public sector savings and private saving is a common result. The outcome for this group of new EU member states is not expected to be very different. As

a result, we expect to have;  $\frac{\partial PSav\_gdp}{\partial PubSav} < 0$ .

### *Financial Development (FDEV)*

The development of the financial sector has a double-edged effect on the level of private saving. This is because increased access to credit facilities and other financial products causes private agents and individuals to cut down on saving as it now relatively easier to obtain funds to meet medium to long term purchases. Financial development also brings banking services to the doorstep of the public and facilitates the savings culture in areas where they are made available. For the purpose of this study the World Bank's measure of Domestic Credit to the Private Sector is used. Therefore, the relationship private saving and financial development is ambiguous and is algebraically as;

$\frac{\partial Psav\_gdp}{\partial FDEV} > < 0$ .

### *Domestic Inflation (INF)*

Rising inflation leads to an erosion in the rate of return on private savings thus eliminating the incentive to set aside money in the form of saving. Private agents try to spend a bigger proportion on current consumption to maximise the utility from the incomes. Private Saving

is thus expected to respond negatively to an increase in domestic inflation. This is

mathematically expressed as:  $\frac{\partial PSav\_gdp}{\partial INF} < 0$ .

#### *Interest Rate (IR)*

A rise in interest rate is expected to lead to a rise in private savings as it becomes profitable to increase the proportion of income that goes into saving. Expected higher returns of saved income move individuals to save more. Additionally, an increased cost of borrowing causes agent to hold on to a bigger share of the income for future spending, if there is no anticipation

of a future fall in the interest rate. The relationship is thus expressed as  $\frac{\partial PSav\_gdp}{\partial IR} > 0$ .

#### *The Age Dependency Ratio*

All things being equal, a rise in the age dependency ratio is expected to increase the burden on current income earners and this reduces the amount of money set aside as saving. Therefore, the a priori expectation is a significant inverse relationship between the dependency ratio and private saving. This is thus, expressed as  $\frac{\partial PSav}{\partial DEPr} < 0$ .

#### *The Terms of Trade (TOT)*

Private agents in transition face tight credit constraints and as shocks in the term of trade are expected to have a tremendous impact on private saving rates. An adverse shock in the terms of trade is expected to cause agents to cut back on saving This is because agents in these economies tend to rely to a large extent on imported commodities during the process of

transition (Chowdhury 2004)<sup>105</sup>. The relationship between private saving and the terms of trade is therefore a positive one and can be expressed as:  $\frac{\partial PSav}{\partial TOT} > 0$ .

### *Transition Indicators*

All this being equal, advancement in the stabilisation and liberalisation processes are expected to lead to the elimination of involuntary saving which occurred as a result of absence of the market mechanism prior to the start of reforms in the transition economies<sup>106</sup>. With this comes a reduction in the rate of private saving, at least in the short to medium term. The EBRD Transition Index which measures the progress of transition countries towards the market system is employed for this purpose. From the entire set of data made up of 14 indicators, we selected 8 which have a direct impact on the saving decisions of households. These are; Large Scale Privatisation, Small Scale Privatisation, Price Liberalisation, Trade and Forex System, Banking Reform & Interest Rate Liberalisation, Securities Markets & Non-bank Financial Institutions and Overall Infrastructure Reform.<sup>107</sup> The scale of the indicators ranges from 1 to 4+, whereby a score of 1 indicates little or no change from the rigid command economic system and 4+ indicate the standards of a market economy.

### **3.5 Hypotheses**

- 1) H<sub>0</sub>: There is no negative significant relationship between Public Sector Saving and Private savings.

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<sup>105</sup> In this study the focus on wider cross-section of Eastern European countries as well as some Post-soviet Republics, whose major exports, have to a very large extent been primary commodities and natural resources. These countries are also characteristically reliant on the industrialized Western Europe.

<sup>106</sup> Using the difference between the actual rates and the hypothetical equilibrium rates of as the measure of involuntary saving, Denizer and Wolf (2000) and other studies validated the existence of pretransition saving in the economies of Central and Eastern Europe.

<sup>107</sup> See <http://www.ebrd.com/country/sector/econo/stats/index.htm>.

H<sub>1</sub>: There is a negatively significant relationship between Public Sector Saving and Private Saving.

2) H<sub>0</sub>: There is no positive significant relationship between GDP growth and Private Saving.

H<sub>1</sub>: There exist a positive significant relationship between GDP growth rate and Private Saving.

3) H<sub>0</sub>: There is no significant relationship between interest rate and private saving.

H<sub>1</sub>: There is a significant relationship between interest rate and private saving.

4) H<sub>0</sub>: There is no positive significant relationship between Financial Development and Private savings.

H<sub>1</sub>: There is a positive significant relationship between Financial Development and Private Saving.

5) H<sub>0</sub>: There is no negative significant relationship between the level of Inflation and the level of Private Saving.

H<sub>1</sub>: There exist a negative significant relationship between the level of Inflation and Private Saving.

6) H<sub>0</sub>: There is no positively significant relationship between the terms of trade improvements and private saving.

H<sub>1</sub>: There is a positively significant relationship between the terms of trade improvements and private saving.

7) H<sub>0</sub>: There is no inverse and significant relationship between the dependency ratio and private saving.

H<sub>1</sub>: There exists a negative significant relationship between the dependency ratio and private saving.

8) H<sub>0</sub>: There is no significant relationship between the rate of progress in transition process and private saving.







Where  $u_{it} = u_{it} + v_{it}$ , with  $u_{it} \sim IID(O, \sigma_u^2)$ . That is to say, each is identically and independently determined. To arrive at a more consistent estimate of  $\delta$  as N approaches infinity and with T fixed, we take the first difference to remove the individual effects.

$$PSav_{it} - PSav_{i,t-1} = \delta(PSav_{i,t-1} - PSav_{i,t-2}) + \lambda(K_{i,t-1} - K_{i,t-2}) + (v_{it} - v_{i,t-1}) \dots\dots\dots 22$$

It should be noted that  $(v_{it} - v_{i,t-1})$  is MA (1) with unit root. For the first period, that is,  $t=3$ , we have the following relationship;

$$PSav_{i3} - PSav_{i2} = \delta(PSav_{i2} - PSav_{i1}) + \lambda(K_{i3} - K_{i2}) + (v_{i3} - v_{i2}) \dots\dots\dots 23$$

More valid instruments can be added to this basic model in a similar fashion with each forward period and the set of instruments will take the form;

$$(PSav_{i1}, PSav_{i2}, \dots, PSav_{i,T-2}) = (K_{i1}, K_{i2}, \dots, K_{i,T-2}) \dots\dots\dots 24$$

Achieving consistency in the GMM estimator largely depends on the validity of the lagged values of the independent variables as instruments in the regression and the specification tests suggested by Arellano and Bond (1991) seeks to address. The first of these is the Sargan test for over-identification restrictions is a chi-test for checking the general validity of the used instruments through the analysis of the sample sequence of the moments. Using the chi distribution we test the null hypothesis of a valid over-identifying restriction and the alternative hypothesis ( $H_1$ ).

It may also become necessary to embark on “difference-sargan” test, which deals with testing the hypothesis as to whether the lagged differences of the independent variables are uncorrelated with the residuals or not. Another test is one which ascertains whether there is the presence of serial correlation and also follows a finite and or random order. The idea is to test whether the difference error term is serially correlated in the first, second or third order. Failure to reject the null hypothesis of the absence of higher order leads us to the conclusion

that is not serially correlated and this allows for the use of the corresponding moment conditions.

### 3.8 Other Relevant Tests

For a collection of data drawn from different sources for countries with similar characteristics but also with quite different features, it is essential to test for the presence of heteroskedasticity. The basic assumption for the OLS estimation is that the variances of the errors of the variables are normally distributed but in a panel study of this nature this is tested in order for the appropriate remedial steps to be taken. The STATA statistical package which was used for this study provides appropriate tests for heteroskedasticity. The other important issue to address is to test for the presence or otherwise of residual serial correlation in the model. In the case where the  $\varepsilon_{it}$  are serially independent, we have:

$$E[\Delta\varepsilon_{it}\Delta\varepsilon_{it-1}] = E[(\varepsilon_{it} - \varepsilon_{it-1})(\varepsilon_{it-1} - \varepsilon_{it-2})] = -E[\varepsilon_{it-1}^2] = -\sigma_\varepsilon^2 \dots\dots\dots 25$$

$$\text{Also } \text{var}(\varepsilon_{it} - \varepsilon_{it-1}) = \text{var}(\varepsilon_{it-1} - \varepsilon_{it-2}) = 2\sigma_\varepsilon^2$$

Therefore, the first order serial correlation coefficient is expressed as:

$$r_1 = E[\Delta\varepsilon_{it}\Delta\varepsilon_{it-1}] / [\sqrt{\text{var}(\Delta\varepsilon_{it})}\sqrt{\text{var}(\Delta\varepsilon_{it-1})}] = 0.5 \dots\dots\dots 26$$

But if, then the second order serial correlation coefficient  $r_2=0$ . This outcome would require that a second order correlation test be conducted.

### 3.9 Data

Data collection for this group of countries requires more effort especially when it is being gathered for the purpose of cross-country comparison. In spite of the fact that very simple macroeconomic indicators are needed for an exercise of this nature, it is clear that no single source provides the totality of all the variables and the time span that this study has sought to cover<sup>109</sup>. Among the major sources used are the World Bank's World Development Indicators (WDI, 2008), Global Development Finance (GDF, 2008), The IMF's International Financial Statistics (IFS 2008) and Eurostat New Cronos Database 2008 and the various National Databases. However, priority is given to the WDI dataset because it has the widest coverage which is the WDI. In total the whole sample has 120 observations for all the explanatory variables as we observe eight countries over a 15 year transition and post-transition period.

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<sup>109</sup> However to a large extent these sources display a good amount of consistency.

## CHAPTER FOUR

### ANALYSIS OF RESULTS

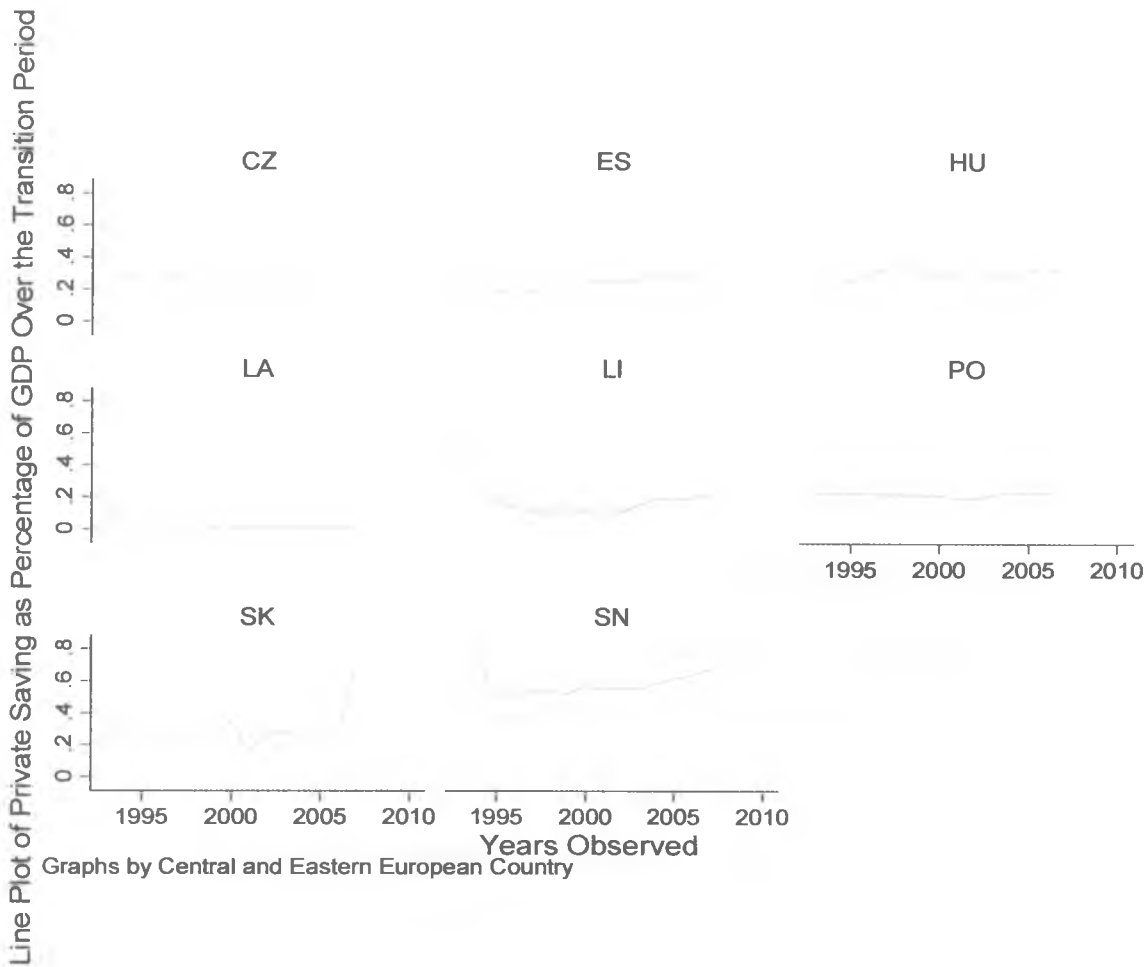
#### 4.0 Introduction

This fourth chapter has 3 major parts namely, a graphical illustration of the patterns of private savings of the individual countries of the CEE region together analysis of estimated results and diagnostic tests for like econometric problems and their remediation. The policy implications of the results obtained from the sample are also discussed.

#### 4.1 Private Savings Behaviour in the CEE Countries

As indicated in the introductory chapter the behaviour of private saving in the countries of Central and Eastern Europe which was high during the pre-transition period is expected to converge to that of the foremost countries of the EU. Below is graphical illustration of the trends in private saving for the group of eight countries.

Figure 1 below shows the panel plot of the dependent variable (Private Saving as ratio of GDP). Generally the variable has been fairly stable over the 15 year-transition that the study sought to analyse. A careful observation of the trends shows that the private saving has seen a slight downward movement in period after 2005, which also gives an indication of a gradual convergence of the level of saving towards the general level in Western Europe.



**Figure 3. Line Plot of Private Saving as a Ratio of GDP in the Eight CEE Countries**

Source: Authors illustration based computations derived from the World Bank Data.

Generally the private saving rates in the group of eight are somewhat similar. On average rate of private saving is between 0.2% and 0.4% of GDP. The figures for Slovenia appear to be only country outlying result. That of the Slovak Republic also exhibits an upward trend towards the later years of the transition period cover under this study.<sup>110</sup> The Baltic States clearly show a trend of decline in private saving from the period of the start of the reform to the end of the observed period. The Czech Republic, Poland and Hungary have a fairly

<sup>110</sup> This is a surprising observation due to the general view is that with transition comes a convergence of private saving in the CEE economies to that of the EU-15. The Slovakia Republic also represents one of the countries that have made impressive progress in reform with the country joining the European Monetary Zone January 2009.

similar pattern of private saving behaviour with the rate hovering between 0.2% and 0.4% of GDP which is seen as quite stable.

#### **4.1 Diagnostic Checks**

The essential point here is that the test results are analysed against the null hypotheses. Consequently, if they are found to be significant at the chosen level of significance, the hypotheses are not rejected. On the other hand, if they are found to be insignificant at the acceptable level the null hypothesis is rejected. The results of the relevant tests are discussed as follows: To test for the severity of multicollinearity in the data, the spearman rank method was used. Generally, the level of correlation among the independent variables was quite low. With the exception of the expected strong relationship between inflation and interest rates and also public savings and the dependency ratio, all the other variables have fairly low coefficients. This outcome did not necessitate the elimination of any of the independent variables (see Appendix II).

#### **4.2 Estimation Results**

Five sets of results from the pooled OLS, fixed effects (comprising country effects, time effects and a combination of time and country effects) and the Generalised Method of Moments (GMM) estimates are analysed in this section. The results from all five estimations are accordingly discussed and compared in the light of a priori expectations in regard to the explanatory variables as well as earlier studies on the region of interest.

### *Pooled OLS*

The adjusted R-square for the pooled OLS estimation is 0.527 which implies that approximately 53% of the variation in private saving as a percentage of GDP in the group of eight independent variables together. A high F-ratio of 9.85 enabled us to reject the null hypothesis of no linear relationship between the dependent variable and independent variables in the model. Three variables stand out as very prominently in the estimation and these are the terms of trade (TOT), the age dependency ratio (DEPR) and price liberalisation (PL) which is one of the transition variables. The details of the results are presented in the table below. A percentage point increase in the terms of trade leads to a 0.00068% rise in the private saving over GDP. The relationship is significant at the conventional 5% error level. This outcome has some similarity with earlier studies by Chodhury (2004) which also focuses on the same region.

The Aged dependency ratio is observed to be negatively related to private saving and the relationship is also significant at even 1% error level. A percentage point drop in the aged dependency ratio leads to a 2.385% rise in private saving over GDP. This result is in consonance with basic life cycle models and supports earlier empirical studies like Callen and Thinman (1997) and Loayza, Schmidt-Hebbel and Serven (2000).

Among all the eight transition indicators it is only the price liberalisation (PL) dummy which yielded a significant outcome. In addition the variable bore a negative sign which lends support to the earlier finding by Conway (1995)<sup>111</sup> and Denizer, Wolf and Ying (2000). This also reflects the effect of the elimination of involuntary saving resulting from the introduction of a hard budget constraint.

Whereas the public sector saving is observed to be negatively related to private saving the variable was not significant at the conventional statistical level. The other macroeconomic

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<sup>111</sup> As already stated Conway's explanation was that the initial process of price liberalisation leads to higher inflation rates which reduce real disposable income leading to a corresponding fall in private saving.



variables of interest rate and inflation did not meet a priori expectation whilst the former was negatively related to private saving the latter bore the positive sign they were not significant at any of conventional level. The growth rate of GDP is observed to be negatively related to private saving which defies theoretical expectation and the relationship is not significant. The financial development variable (FDEV) was found to be positively related to private saving although a significantly linear relationship could not be established. The remaining transition variables which were included in the estimation were not seen as having any strong impact on private saving.

#### *Fixed Effects Result*

Results from fixed effects estimations controlling for country, time and both country and time effects are analysed and discussed below. The existence of the significant joint time fixed effects could not be established from the analysis. However, we found the existence of a joint significant country effects from the data. The detailed results of the fixed effects estimation is found in Appendix II. With regard to the estimates in which country effects were controlled an R-squared of 0.9179 and this gives an indication that almost 92% of variations in private saving as a percentage of GDP is explained by the changes in the explanatory variables altogether. When time effects were controlled the overall R-squared reduced to 0.4759. However, after controlling for both country and time effect an overall R-squared of 0.9242 was obtained. Generally the high F-statistics obtained also demonstrate the overall goodness of fit of these regression results.

In terms of the behaviour of the regressors, public sector saving met the a priori criterion with the variable having a significant negative relationship with private saving. A percentage point

fall in public sector savings over GDP results in a 0.00446% rise in private saving as a percentage of GDP<sup>112</sup>.

The growth rate of GDP (GDPGR) is observed to be significant and positively related to private saving in country effect regression. A similar result was obtained when we controlled for both time and country effects. For the former the coefficient of GDPGR is 0.0023301 and that of the latter is 0.0039375 respectively and this show the impact of a percentage point increase in the growth rate of GDP on private saving. This outcome supports the positive wealth effect on private saving and is in line with earlier works of by Masson, Bayoumi, and Samiei (1995) and Loayza, Schmidt-Hebbel and Serven (2000). However, the variable was not significant when we controlled for time effects alone.<sup>113</sup>

The rate of inflation is observed to be positively related to private saving, an outcome which is not line with the theoretical criterion although the relationship statistically significant at 1% error level. The coefficient for the country effect estimation and combined entity (time and country effect) regressions were 0.0012487 and 0.001201 respectively which show the impact of percentage increase in the rate of inflation on private saving as a percentage of GDP.

In regard to the terms of trade as percentage of GDP, the variable had a significant positive relationship with private saving only in the time effects regression. A percentage point improvement in the terms of trade as a percentage of GDP results in a 0.0006203 increase in private saving over GDP.

Similarly, the aged dependency ratio (DEPR) was observed to have a significant relationship with private saving. At 99% confidence level a strong negative correlation is established between the two variables. A percentage point drop in the age dependency ratio leads to a 2.882% rise in private saving over GDP. Interestingly enough, no significant relationship is

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<sup>112</sup> Although a strong relationship is established, the outcome fell short of a full Ricardian equivalence.

<sup>113</sup> Additionally the variable was observed with a negative sign indicating a negative wealth effect of increases income.

established between private saving and the transition variables for all three fixed effects regressions. Additionally, changes in the interest rates as well as financial sector developments were not seen as exerting significant influences on private saving. The rest of the results are spelt out below.

**TABLE 2. - PRIVATE SAVING: 5 RELATED ESTIMATORS, DEPENDENT VARIABLE - PRIVATE SAVING/GDP (PSav\_gdp).**

Explanatory Variables	(1)	(2)	(3)	(4)
PubSav	-.0014078 .0044416	-.0017115 .0019815	-.0008983 .0049274	-.0044563** .0022509
GDPGR	-.0068942* .0037675	.0039576** .001831	-.0055067 .0045356	.0039375** .0019431
IR	-.0031725 .0030214	.0023301 .001402	-.0044556 .0035038	.0017166 .0016779
FDEV	.0011816* .0006823	.0005603 .0003419	.001152 .0008761	-.0002162 .0005013
INF	.0006758 .0004289	.0012487*** .0001993	.000598 .0005098	.001201*** .0002449
TOT	.0006157*** .0001511	.0000287 .0000723	.0006203*** .0001804	.0000701 .0000815
DEPR	-2.38591*** .3627979	-.3227973 .2902371	-2.881722*** .5022157	.6607329 .4404473
LSP	-.0685951 .026399	-.0186845 .0171065	-.0643599* .0333606	-.0119958 .0198039
SSP	.1180589 .0725537	.0366486 .0378672	.1558261 .0854784	.0085543 .0415165
ENTR	-.0234603 .0492231	-.0165896 .0230994	-.0400309 .0577663	-.0374175 .026662
PL	-.100445** .0361202	.030419 .0243094	-.0610626 .0450742	.0059353 .0259986
TFX	.008111 .0953791	.002418 .0450823	-.0470714 .112337	.0432724 .0500567
CP	-.0500943 .0438232	-.0140767 .0221316	-.0356266 .0501663	-.0035503 .0236199
BFILIB	-.0535914 .0445578	-.0152965 .0246288	-.0425661 .0521175	-.036508 .026191
NBFILIB	.0120955 1.790937	.0314638* .0162504	.0114622 .0332976	.0189895 .0165279
Country Effects	NO	YES	NO	YES
Time Effects	NO	NO	YES	YES
No of Observations	120	120	120	120
R-Squared (Adj.)	0.5273	0.9179	0.4759	0.9242

The estimation methods are described as follows: (1) Pooled OLS estimation, (2) Fixed Effects controlling for country effects (3) Fixed Effects controlling for time effects and (4) Combined Country and Time Effects Estimation. Dummies are not displayed here so as to save space.

### *Generalised Method of Moments (GMM) Estimation Results*

The Arellano and Bond (1991) GMM estimator used in dynamic panel data analysis which is employed for this private saving also yielded some interesting outcomes.<sup>114</sup> This method also provides a means of capturing unobservable country-specific effects which may be correlated the explanatory variables. In doing, so use the first lag of the dependent variable and the lagged values of the explanatory variables. The Wald test has clearly demonstrated the joint significance of all the instruments used in the estimation. The test result for first-order serial correlation which was -3.1142 leads us to the rejection of the null hypothesis. For the AR (2) test we could not reject the null hypothesis after obtain a z-value of -0.00686 and a p-value of 0.9945.

The Sargan test yielded a chi-squared value of 87.98693 and a p-value of 0.1115 which provided the basis for not rejecting the null hypothesis of the validity of the over-identifying restrictions.

With these basic conditions fulfilled the performance of the explanatory variables are discussed. A summary of the GMM-IV results are discussed in Table 2 below and the details are provided in Appendix III.

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<sup>114</sup> This method makes it possible to use the lags of the independent variables as instruments. In doing so, we relax the strict endogeneity assumption in regard to these variables which means that they can be affected by present and past changes in the dependent variables. See Loayza, Schmidt-Hebbel and Serven (2000) p. 169.

**Table 3: GMM-IV Estimation**

**Dependent Variable: Private Savings as a % of GDP**

Variable	Coefficient
Psav_gdp (1 <sup>st</sup> Lag)	0.2134943** 0.0989159
PubSav	-0.0042024* 0.0021939
GDPGR	0.003234 0.0023089
IR	0.0007108 0.0027757
FDEV	-0.0003483 0.0004961
INF	0.0008609 0.0008697
TOT	0.000108 0.0000727
DEPR	1.027847** 0.4579562
LSP	-0.0015664 0.0213687
SSP	-0.0180771 0.039805
ENTR	-0.0475293 0.0299834
PL	-0.0118869 0.0264699
TFX	0.0548368 0.0471699
CP	0.0034535 0.0238103
BFILIB	-0.0239949 0.0251684
NBFILIB	0.0123555 0.0166836
Wald $\chi^2$ (31)	70.27***
Number of Observations	104
Number of groups	8
Sargan test	87.98693 (0.1115)
AR (1)	-3.1142***
AR (2)	-.00686 (0.9945)

Where \*\*\*, \*\*, \* represent 1%, 5% and 10% error levels respectively.  
Time dummies are not shown here to save space.

As was observed in the pooled OLS and fixed effects estimation the aged dependency ratio stands out as the most prominent over all the explanatory variables in the GMM-IV result. While it is significant at the conventional level, DEPR bears a positive sign which runs contrary to the theoretical expectations. A percentage point drop in the aged dependency results in a 1.03% rise in private saving. This outcome may reflect the role of private and public social security schemes and how these augment lifetime of the aged population in the countries of Central and Eastern Europe. The first lag of private saving which was also an instrument is also observed to be positively and significant related to the current level of private saving. With a coefficient of 0.21349 this shows a high degree of persistence. Public sector saving also emerged with the expected negative sign in the estimation but the variable was only significant at the 10% error level. The five other macroeconomic variables, namely the growth rate of GDP, the interest rate IR, financial development (FDEV), inflation rate (INF) and the terms of trade (TOT) did meet the expected a priori expectation. Likewise, the transition variables were not significant in the regression in regard to the signs and magnitude.

#### **4.3 Policy Implications**

In view of the dramatic changes in the demographic situation in these countries, the results obtained brings to the fore the importance of governments ageing policy in the CEE countries<sup>115</sup>. Given the significant impact of the aged dependency ratio in all the estimations, a strengthening pension system as well as other interventions like broadening the coverage of public and private health insurance will secure the life time incomes of the ageing population.

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<sup>115</sup> Population ageing has been recognized as a problem of demographic origin for several decades. It first surfaced in Western European countries and later in Central and Eastern Europe. United Nations: Major Trends Affecting Families, Economic and Social Affairs (2003) p. 37.

Governments' policy would therefore serve a good purpose by creating a stable macroeconomic environment which will reduce the level of risk, increase the level of productive investments thereby raising the GDP. A sustainable GDP growth translates ultimately generate the necessary wealth effects and also promote the level of private saving in these transitional economies. As indicated earlier the impact of transition may have translated into improvement in the macroeconomic variables of domestic inflation and interest rates with their effect on wealth in these countries. Particularly, price liberalisation programme embarked on by these countries is also seen as yielding the desired impact on private saving. As a means of promoting stability the programmes in these countries have been geared towards targeting the several benchmarks set out under the Maastricht Criteria. Already, Slovenia<sup>116</sup> and Slovakia have successfully satisfied the terms which has resulted in the entry into the eurozone. The continuous pursuit of the goals in this benchmark through a well-guided macroeconomic management will ensure even greater stability for the rest of the countries in the region.

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<sup>116</sup> Slovenia's performance in terms of financial sector reform has not been very impressive in relation to the other CEE countries, but the country managed to satisfy the conditions for Eurozone entry.



## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATION

This chapter gives a summary of the main findings of the study and the policy recommendations. The practical limitations of the study in terms measurement and estimation are outlined while the focus of future research into this topic is also spelt out in the concluding remarks.

#### 5.1 Summary

The continuous stabilisation of these economies from the beginning of the market reforms in the early 1990s is also observed to be a key factor resulting in the convergence of private savings in the CEE countries to that of Western Europe. Of all the transition variables used in the analysis, price liberalisation stands out as the most potent correlate of private saving. This is not a surprise as transition eliminated the soft budget constraint which was faced by agents in the economy during the pre-transition period<sup>117</sup>. As such the practice of voluntary saving can be said to have been also reduced if not completely eliminated.

Related to the above argument is the impact of prudent macroeconomic discipline on the behaviour in the CEE countries. Generally, private saving is seen as responding strongly to improvements in key macroeconomic indicators like GDP growth, terms of trade and inflation stabilisation.

As observed in all the regression results, the age dependency ratio in these countries impacts on the level of private savings and as such needs to be addressed. In the period after their accession, these countries have been battling with the reforms in pensions and other social security schemes. Pension reforms remain a challenge as current pensions constitute a

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<sup>117</sup> Kornai J., Maskin E., and Roland G.: Understanding the Soft Budget Constraint, *Journal of Economic Literature*, Vol. 41, No. 4, 200, pp. 1096.

massive drain on government expenditure. Most of the countries continue to record high pension-related deficits in the absence of the needed reforms and this partly the reason why some have but not met the Maastricht fiscal criteria.<sup>118</sup>

## 5.2 Recommendations

As means of dealing with the adverse effects of ageing population on saving patterns, it is essential for governments in the CEE countries to put in place measures to make room for the input of older workers. Closely linked to this will be labour market policies which give older workers the incentive to stay a little longer in the labour force. With the privatisation process, has come a drastic expansion in the informal sectors in these economies. This initially resulted in the reduction in the contributions to the formal state pension scheme.<sup>119</sup> Although governments in the region have undertaken a wide range of reforms in the social security systems during the transition pensions reform remains a challenge. Attempts have been made to modify the pay-as-you-go system as well as the funded schemes to meet the specific demographic settings of the countries. Government policy aimed at increasing participation through the expansion of total coverage will ensure that the ageing population is well catered for with its attendant positive impact on the current incomes of the working population. In the wake of the global financial crisis, CEE countries face the risk of having a drastic fall in domestic private saving. As countries consider the need for stimulus programmes aimed at boost domestic demand, similar consideration should also be geared towards the keeping private savings at the desirable levels.

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<sup>118</sup>Holzmann, R., Palacios R., and Zviene A.,: Implicit Pension Debt: Issues, Measurement and Scope in International Perspective, Social Protection Discussion Paper Series, 2004, p. 10.

<sup>119</sup>This was further aggravated by underreported wages which also led to a reduction in contribution. Fultz E. Recent Trends in Pension Reform and Implementation in the EU Accession Countries, International Labour Organisation (ILO) 2003, p.12.

### **5.3 Practical Limitations**

Although data was largely drawn from the World Banks World Development Indicators, it proved inadequate, due to the fact that for most years that data was empty, particularly in regard to variables like the budget deficits and the terms of trade. As such references had to be made to other datasets like the Eurostat cronos, the European Bank for Reconstruction and Development (EBRD) transition Report and individual country datasets.

Ideally, for a study of this nature the use of quarterly data, or data spanning a longer period of time would have afforded the needed large degrees of freedom which also enable the use of more sophisticated methods of analysing the behaviour of private savings in these countries. This would have revealed more interesting trends in the transition process that this work sought to capture.

### **5.4 Concluding Remarks**

In conclusion it can be said that the factors that drive private savings in Central and Eastern Europe have tended towards that of the Western Europe. Significantly wealth-related variables have the impact on private savings on the savings behaviour on the group of countries in the CEE regions.

There is no unanimity in regard to the measure of private savings. As such the chosen measure which subtracts public savings from domestic saving can be contested by other empirical works as most datasets seldom provide specific data on public saving but rather use the government's cash balance as proxy.

The key novelty of this study is the inclusion of the later transition period, that is, the post-accession period to the earlier period in the analysis. This was done with the use of the

transition index to capture the impact of reforms on saving. The outcome is rather surprising due to the visible changes in the structure of the economies of these countries over the period. An interesting study for the future would focus on a comparative study of the economies of Central and Eastern Europe (CEE) and those of the post-Soviet area where the impact of transition on private saving in the two regions could be analysed and compared.

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## APPENDIX I

### Details of Variable

NOTATION	EXPLANATION
Psav_gdp	Private Saving as a Percentage of GDP
PubSav	Public Sector as a Percentage of GDP
GDPGR	Growth Rate of GDP
IR	Real Interest Rate
FDEV	Credit to the Private Sector (Financial Development)
INF	The Rate of Inflation
TOT	The Terms of Trade
DEPR	The Aged Dependency Ratio
LSP	Large scale privatisation
SSP	Small Scale Privatization
ENTR	Enterprise Restructuring
PL	Price Liberalisation
TFX	Trade and Forex System Restructuring
CP	Competition Policy
BFILIB	Bank Reform and Interest Rate Liberalisation
NBFILIB	Securities market and Non-bank Financial Liberalisation

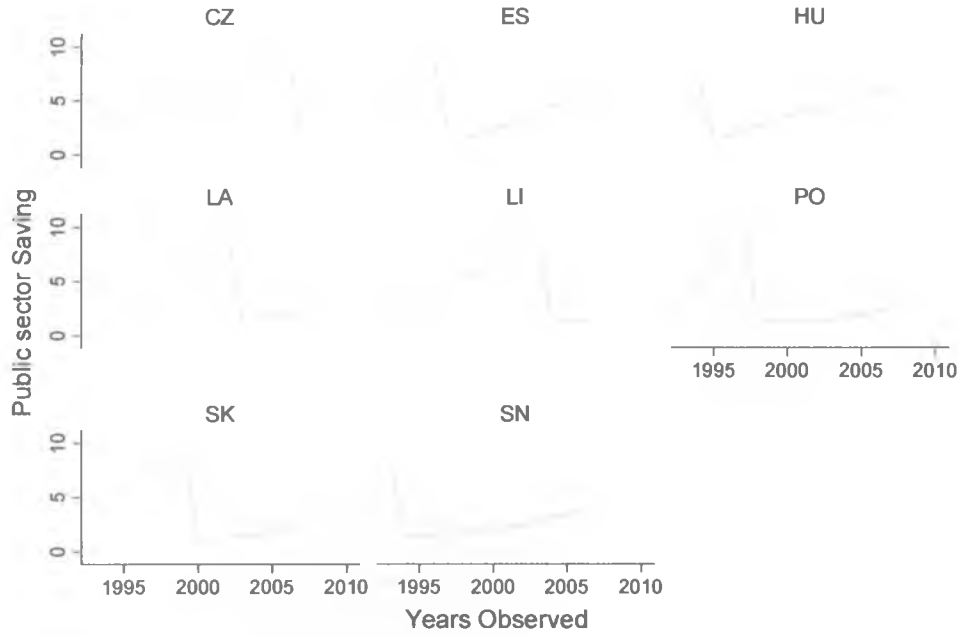
### List of Abbreviated Countries

gen cz	Czech Rep.
gen es	Estonia
gen hu	Hungary
gen la	Latvia
gen li	Lithuania
gen pl	Poland
gen sk	Slovakia
gen sn	Slovenia



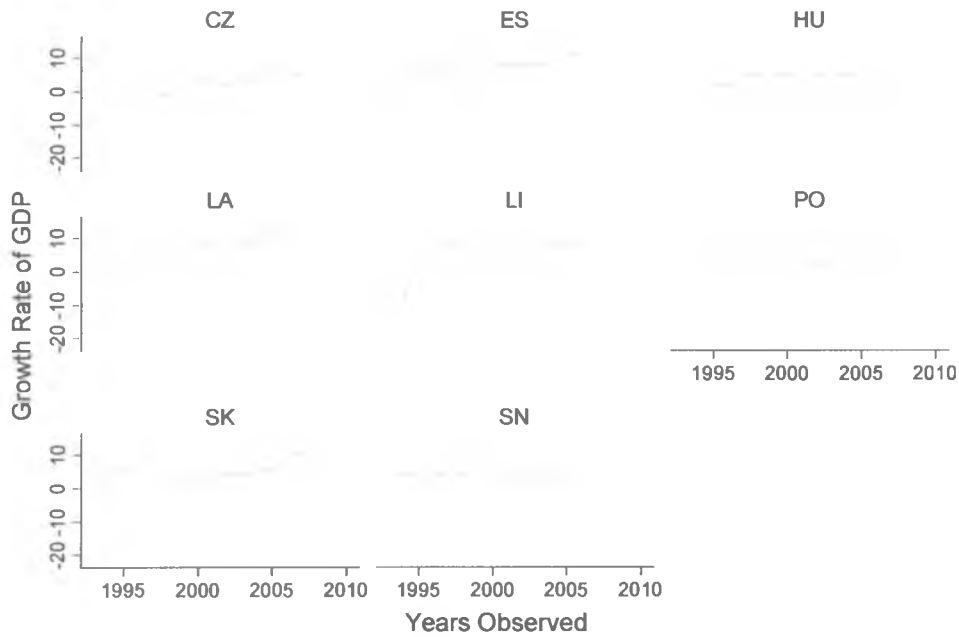
### Panel Plot of Selected

#### Public Sector Saving as Percentage of GDP



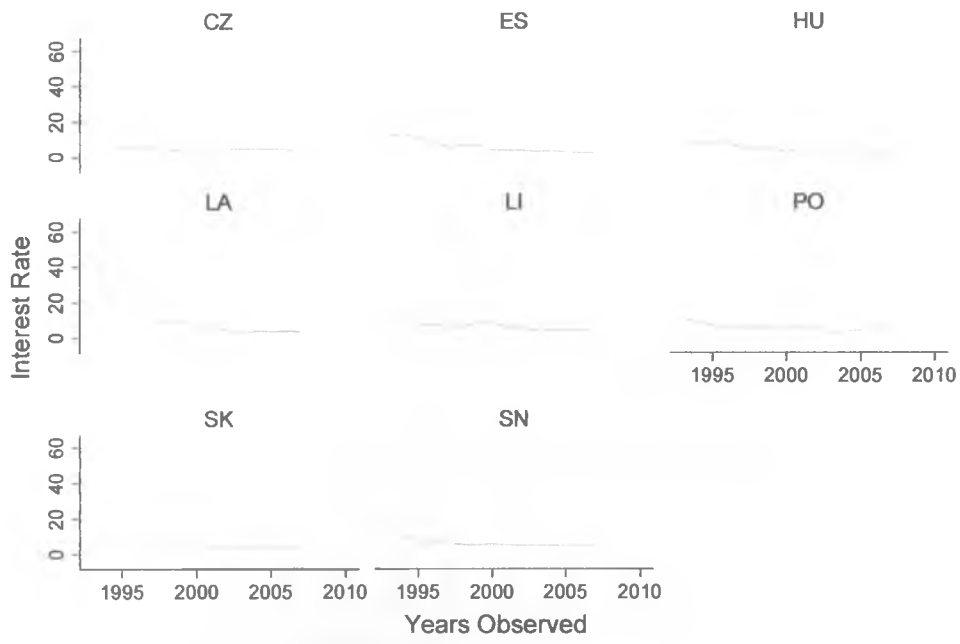
Graphs by Central and Eastern European Country

#### GDP Growth as a Percentage of GDP



Graphs by Central and Eastern European Country

**Interest Rate**



Graphs by Central and Eastern European Country

**APPENDIX II**  
**SPEARMAN CORRELATION TEST**

	psav_gdp	PubSav	GDPGR	IR	FDEV	INF	TOT	DEPR	LSP	SSP	ENTR	PL	TFX	CP	BFILIB	NBF
psav_gdp	1.0000															
PubSav	-0.0476	1.0000														
GDPGR	-0.3205	0.0815	1.0000													
IR	-0.2595	0.1186	-0.3401	1.0000												
FDEV	0.4000	-0.1058	-0.0451	-0.4767	1.0000											
INF	-0.0238	-0.1133	-0.2938	0.5952	-0.1479	1.0000										
TOT	0.2374	0.0292	0.0333	-0.1719	0.1931	-0.0345	1.0000									
DEPR	-0.5637	0.2259	0.0399	0.5561	-0.4216	0.4486	-0.1735	1.0000								
LSP	0.1386	0.0091	0.1371	-0.5956	0.4140	-0.3774	0.1914	-0.3386	1.0000							
SSP	-0.0062	-0.2285	0.3484	-0.5052	0.2240	-0.4943	0.0816	-0.3633	0.2830	1.0000						
ENTR	0.1447	-0.1145	0.0862	-0.6041	0.4099	-0.3876	0.3335	-0.4259	0.6212	0.3121	1.0000					
PL	-0.4634	-0.2183	0.3791	-0.2721	-0.0185	-0.3112	0.1323	0.0848	0.2308	0.3668	0.3716	1.0000				
TFX	0.0838	-0.2505	0.2807	-0.4946	0.3863	-0.4594	0.0951	-0.4579	0.2400	0.7886	0.3693	0.4243	1.0000			
CP	0.1440	-0.0196	0.1555	-0.6086	0.5227	-0.4755	0.1033	-0.4777	0.6810	0.3541	0.7428	0.2287	0.4740	1.0000		
BFILIB	0.1816	-0.0999	0.2589	-0.6953	0.2984	-0.5513	0.3720	-0.5268	0.5826	0.4679	0.6798	0.4221	0.4655	0.5967	1.0000	
NBFILIB	0.143	-0.0555	0.1852	-0.6039	0.2650	-0.5498	0.2368	-0.4197	0.5598	0.4366	0.6639	0.2801	0.4303	0.6639	0.7516	1.0000

\*The level of multicollinearity among the main variables are not so severe to warrant the dropping of any of them. However, it is relatively higher among the transition variables as the transition variables as they move together over time

## HETEROSKEDASTICITY TESTS

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of psav\_gdp

chi2(1)	0.50
Prob > chi2	0.4798

White's test for Ho: homoskedasticity

against Ha: unrestricted heteroskedasticity

chi2(119)	120.00
Prob > chi2	0.4571

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	120.00	119	0.4571
Skewness	54.17	15	0.0000
Kurtosis	0.00	1	0.9569
Total	174.18	135	0.0130

## APPENDIX II

### *Pooled OLS Results*

Number of obs = 120  
 F( 15, 104) = 9.85  
 Prob > F = 0.0000  
 R-squared = 0.5869  
 Adj R-squared = 0.5273  
 Root MSE = .10838

psav_gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
PubSav	-.001407	.0044416	-0.32	0.752	-.0102157	.0074002
GDPGR	-.0068942	.0037675	-1.83	0.070	-.0143653	.0005768
IR	-.0031725	.0030214	-1.05	0.296	-.0091641	.0028192
FDEV	.0011816	.0006823	1.73	0.086	-.0001714	.0025346
INF	.0006758	.0004289	1.58	0.118	-.0001748	0.0015264
TOT	.0006157	.0001511	4.07	0.000	.0003161	.0009153
DEPR	-2.38591	.3627979	-6.58	0.000	-3.105352	-1.666468
LSP	-.0685951	.026399	-2.60	0.011	-.1209452	-.016245
SSP	.1180589	.0725537	1.63	0.107	-.0258178	.2619356
ENTR	-.0234603	.0492231	-0.48	0.635	-.1210715	.0741509
PL	-.100445	.0361202	-2.78	0.006	-.1720728	-.0288172
TFX	.008111	.0953791	0.09	0.932	-.1810292	.1972513
CP	-.0500943	.0438232	-1.14	0.256	-.1369973	.0368087
BFILIB	-.0535914	.0445578	-1.20	0.232	-.1419512	.0347685
NBFILIB	.0120955	.030952	0.39	0.697	-.0492835	.0734744
cons	1.790937	.4083754	4.39	0.000	.9811133	2.600761

*Fixed Effects Controlling for Country Effects*

Number of obs = 120  
 F( 22, 97) = 61.50  
 Prob > F = 0.0000  
 R-squared = 0.9331  
 Adj R-squared = 0.9179  
 Root MSE = .04516

Psav_gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
PubSav	-.0017115	.0019815	-0.86	0.390	-.0056442	.0022212
GDPGR	.0039576	.001831	2.16	0.033	.0003236	.0075916
IR	.0023301	.001402	1.66	0.100	-.0004526	.0051128
FDEV	.0005603	.0003419	1.64	0.104	-.0001182	.0012388
INF	.0012487	.0001993	6.26	0.000	.0008531	.0016444
TOT	.0000287	.0000723	0.40	0.692	-.0001147	.0001721
DEPR	-.3227973	.2902371	-1.11	0.269	-.8988377	.253243
LSP	-.0186845	.0171065	-1.09	0.277	-.0526363	.0152672
SSP	.0366486	.0378672	0.97	0.336	-.0385074	.1118046
ENTR	-.0165896	.0230994	-0.72	0.474	-.0624355	.0292563
PL	.030419	.0243094	1.25	0.214	-.0178285	.0786665
TFX	.002418	.0450823	0.05	0.957	-.0870579	.0918939
CP	-.0140767	.0221316	-0.64	0.526	-.0580019	.0298484
BFILIB	-.0152965	.0246288	-0.62	0.536	-.0641779	.0335849
NBFILIB	.0314638	.0162504	1.94	0.056	-.0007886	.0637163
Gen cz	(dropped)					
Gen es	-.1260899	.0367955	-3.43	0.001	-.1991188	-.0530609
Gen hu	-.0493081	.0337377	-1.46	0.147	-.1162681	.0176519
Gen la	-.3533632	.037933	-9.32	0.000	-.4286496	-.2780767
Gen li	-.1746874	.0353495	-4.94	0.000	-.2448464	-.1045284
Gen pl	-.1477629	.0351793	-4.20	0.000	-.217584	-.0779417
Gen sk	-.074197	.0310524	-2.39	0.019	-.1358274	-.0125666
Gen sl	.2054935	.0342779	5.99	0.000	.1374613	.2735256
Cons	.2582144	.2631176	0.98	0.329	-.2640012	.7804301

( 1) gen cz = 0
( 2) gen es = 0
( 3) gen hu = 0
( 4) gen la = 0
( 5) gen li = 0
( 6) gen pl = 0
( 7) gen sk = 0
( 8) gen sn = 0

F( 7, 97) = 71.72  
 Prob > F = 0.0000

*Fixed Effects Controlling for Time Effects*

Number of obs = 120  
 F( 30, 89) = 4.60  
 Prob > F = 0.0000  
 R-squared = 0.6080  
 Adj R-squared = 0.4759  
 Root MSE = .11412

psav_gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
PubSav	-.0008983	.0049274	-0.18	0.856	-.010689	.0088924
GDPGR	-.0055067	.0045356	-1.21	0.228	-.0145188	.0035055
IR	-.0044556	.0035038	-1.27	0.207	-.0114177	.0025064
FDEV	.001152	.0008761	1.31	0.192	-.0005887	.0028927
INF	.000598	.0005098	1.17	0.244	-.0004149	.001611
TOT	.0006203	.0001804	3.44	0.001	.0002618	.0009789
DEPR	-2.881722	.5022157	-5.74	0.000	-3.879614	-1.88383
LSP	-.0643599	.0333606	-1.93	0.057	-.1306468	.0019269
SSP	.1558261	.0854784	1.82	0.072	-.0140178	.3256699
ENTR	-.0400309	.0577663	-0.69	0.490	-.1548114	.0747495
PL	-.0610626	.0450742	-1.35	0.179	-.1506241	.0284989
TFX	-.0470714	.112337	-0.42	0.676	-.2702827	.1761398
CP	-.0356266	.0501663	-0.71	0.479	-.1353058	.0640527
BFILIB	-.0425661	.0521175	-0.82	0.416	-.1461225	.0609902
NBFILIB	.0114622	.0332976	0.34	0.731	-.0546995	.0776238
gen_93	.0720995	.0854089	0.84	0.401	-.0976061	.2418051
gen_94	.0883722	.0918918	0.96	0.339	-.0942148	.2709592
gen_95	.0439217	.0920452	0.48	0.634	-.1389701	.2268135
gen_96	.0605217	.0929172	0.65	0.516	-.1241028	.2451462
gen_97	.0610959	.0929213	0.66	0.513	-.1235369	.2457286
gen_98	.0271242	.0918719	0.30	0.768	-.1554233	.2096717
gen_99	-.0031276	.0918057	-0.03	0.973	-.1855435	.1792883
gen_00	.0367034	.0918149	0.40	0.690	-.1457307	.2191376
gen_01	.0439041	.0909755	0.48	0.631	-.1368623	.2246705

gen_02	-.0028642	.0923781	-0.03	0.975	-.1864175	.1806891
gen_03	-.0153904	.0917182	-0.17	0.867	-.1976324	.1668517
gen_04	-.0225087	.0900952	-0.25	0.803	-.2015259	.1565085
gen_05	.000932	.088939	0.01	0.992	-.1757878	.1776519
gen_06	-.0299242	.0877877	-0.34	0.734	-.2043564	.144508
gen_07	-.0459745	.0869896	-0.53	0.598	-.2188209	.126872
_cons	1.874372	.4859469	3.86	0.000	.9088059	2.839938

(1) gen 93 = 0
(2) gen 94 = 0
(3) gen 95 = 0
(4) gen 96 = 0
(5) gen 97 = 0
(6) gen 98 = 0
(7) gen 99 = 0
(8) gen 00 = 0
(9) gen 01 = 0
(10) gen 02 = 0
(11) gen 03 = 0
(12) gen 04 = 0
(13) gen 05 = 0
(14) gen 06 = 0
(15) gen 07 = 0

F( 15, 89) = 0.32  
 Prob > F = 0.9920



### Fixed Effects Controlling for Both Time and Country Effects

Number of obs = 120  
 F( 37, 82) = 40.22  
 Prob > F = 0.0000  
 R-squared = 0.9478  
 Adj R-squared = 0.9242  
 Root MSE = .0434

psav_gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
PubSav	-.0044563	.0022509	-1.98	0.051	-.008934	.0000215
GDPGR	.0039375	.0019431	2.03	0.046	.000072	.007803
IR	.0017166	.0016779	1.02	0.309	-.0016213	.0050546
FDEV	-.0002162	.0005013	-0.43	0.667	-.0012135	.0007811
INF	.001201	.0002449	4.90	0.000	.0007138	.0016882
TOT	.0000701	.0000815	0.86	0.392	-.0000921	.0002323
DEPR	.6607329	.4404473	1.50	0.137	-.215457	1.536923
LSP	-.0119958	.0198039	-0.61	0.546	-.051392	.0274004
SSP	.0085543	.0415165	0.21	0.837	-.0740351	.0911438
ENTR	-.0374175	.026662	-1.40	0.164	-.0904566	.0156216
PL	.0059353	.0259986	0.23	0.820	-.0457842	.0576548
TFX	.0432724	.0500567	0.86	0.390	-.0563062	.1428511
CP	-.0035503	.0236199	-0.15	0.881	-.0505379	.0434373
BFILIB	-.036508	.026191	-1.39	0.167	-.0886102	.0155942
NBFILIB	.0189895	.0165279	1.15	0.254	-.0138898	.0518688
gen cz	(dropped)					
gen es	-.1713424	.0452978	-3.78	0.000	-.2614542	-.0812307
gen hu	-.0463911	.0389667	-1.19	0.237	-.1239083	.0311261
gen la	-.404401	.0449624	-8.99	0.000	-.4938455	-.3149566
gen li	-.2560391	.0433976	-5.90	0.000	-.3423706	-.1697075
gen pl	-.1671049	.039911	-4.19	0.000	-.2465006	-.0877092
gen sk	-.0876772	.0316915	-2.77	0.007	-.1507216	-.0246327
gen sn	.2082738	.0363629	5.73	0.000	.1359365	.2806112
gen 93	-.0149723	.0408682	-0.37	0.715	-.0962722	.0663276
gen 94	-.0094077	.0426583	-0.22	0.826	-.0942686	.0754533
gen 95	-.0444534	.0425689	-1.04	0.299	-.1291365	.0402297
gen 96	-.0362475	.0415814	-0.87	0.386	-.1189662	.0464712
gen 97	-.0228811	.0409715	-0.56	0.578	-.1043864	.0586243
gen 98	-.0156311	.0402462	-0.39	0.699	-.0956937	.0644315
gen 99	-.0026125	.0384219	-0.07	0.946	-.079046	.073821
gen 00	.0084622	.037707	0.22	0.823	-.066549	.0834735
gen 01	.032306	.0370564	0.87	0.386	-.0414109	.106023
gen 02	.0231554	.0365299	0.63	0.528	-.0495141	.095825
gen 03	.0392646	.0362669	1.08	0.282	-.0328819	.111411
gen 04	.0559828	.0352656	1.59	0.116	-.0141718	.1261374
gen 05	.078982	.034281	2.30	0.024	.0107861	.1471778
gen 06	.0896321	.034157	2.62	0.010	.0216829	.1575812
gen 07	.10929	.0347302	3.15	0.002	.0402005	.1783794
cons	.0174889	.3078344	0.06	0.955	-.5948917	.6298696

( 1) gen cz = 0
( 2) gen es = 0
( 3) gen hu = 0
( 4) gen la = 0
( 5) gen li = 0
( 6) gen pl = 0
( 7) gen sk = 0
( 8) gen sn = 0
( 9) gen 93 = 0
(10) gen 94 = 0
(11) gen 95 = 0
(12) gen 96 = 0
(13) gen 97 = 0
(14) gen 98 = 0
(15) gen 99 = 0
(16) gen 00 = 0
(17) gen 01 = 0
(18) gen 02 = 0
(19) gen 03 = 0
(20) gen 04 = 0
(21) gen 05 = 0
(22) gen 06 = 0
(23) gen 07 = 0

F( 22, 82) = 25.76  
Prob > F = 0.0000

### APPENDIX III

#### ARELLANO-BOND DYNAMIC PANEL-DATA ESTIMATION

Number of obs = 104

<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Psav_gdp	0.2562669	0.1539105	0.00512	0.6798
Psav_gdp(L)	0.2567506	0.1542881	0.00512	0.7548
PubSav	4.040415	2.608518	1.03398	10.0508
GDPGR	5.505594	2.893058	-1.02755	12.8508
IR	5.332155	2.519763	-1.37232	19.7692
FDEV	44.40918	18.67502	11.4259	88.9594
INF	6.557875	6.695346	-1.37232	39.6568
TOT	83.63256	72.08824	-94.5289	254.343
DEPR	0.4605738	0.03567	0.38604	0.52138
LSP	3.570096	0.4838529	2	4.3
SSP	4.234231	0.1634143	3.67	4.33
ENTR	3.06	0.3357761	2	4
PL	4.1225	0.3496038	3	4.33
TFX	4.233942	0.1497598	4	4.33
CP	2.804615	0.4087535	2	3.67
BFILIB	3.385	0.3999952	2.67	4
NBFILIB	2.937212	0.5377506	1.67	4

Arellano-Bond test for zero autocorrelation in first-differenced errors

Order	z	Prob > z
1	-3.1142	0.0018
2	-0.00686	0.9945

Sargan test of over-identifying restrictions  
H0: over-identifying restrictions are valid

chi2(73)	87.98693
Prob > chi2	0.1115

### Regression Result

Number of obs = 104  
 Number of groups = 8  
 Obs per group: min = 13  
 avg = 13  
 max = 13  
 Number of instruments = 104  
 Wald chi2(31) = 70.27  
 Prob > chi2 = 0.0001

One-step results

psav_gdp	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
psav_gdp L1.	.2134943	.0989159	2.16	0.031	.0196228	.4073658
PubSav	-.0042024	.0021939	-1.92	0.055	-.0085023	.0000976
GDPGR	.003234	.0023089	1.40	0.161	-.0012914	.0077594
IR	.0007108	.0027757	0.26	0.798	-.0047294	.0061511
FDEV	-.0003483	.0004961	-0.70	0.483	-.0013206	.000624
INF	.0008609	.0008697	0.99	0.322	-.0008438	.0025655
TOT	.000108	.0000727	1.48	0.138	-.0000346	.0002505
DEPR	1.027847	.4579562	2.24	0.025	.1302694	1.925425
LSP	-.0015664	.0213687	-0.07	0.942	-.0434482	.0403154
SSP	-.0180771	.039805	-0.45	0.650	-.0960935	.0599394
ENTR	-.0475293	.0299834	-1.59	0.113	-.1062957	.011237
PL	-.0118869	.0264699	-0.45	0.653	-.0637669	.0399931
TFX	.0548368	.0471699	1.16	0.245	-.0376145	.1472882
CP	.0034535	.0238103	0.15	0.885	-.0432137	.0501208
BFILIB	-.0239949	.0251684	-0.95	0.340	-.0733242	.0253343
NBFILIB	.0123555	.0166836	0.74	0.459	-.0203437	.0450547
gen_93	.0662462	.0509837	1.30	0.194	-.03368	.1661724
gen_94	-.0469368	.05984	-0.78	0.43	-.1642211	.0703475
gen_95	-.0801682	.0562911	-1.42	0.154	-.1904967	.0301603
gen_96	-.0596431	.0516379	-1.16	0.248	-.1608516	.0415653
gen_97	-.0488234	.0493871	-0.99	0.323	-.1456204	.0479736
gen_98	-.0398763	.0474092	-0.84	0.400	-.1327965	.053044
gen_99	-.0283382	.0437934	-0.65	0.518	-.1141718	.0574953
gen_00	-.0090461	.0425995	-0.21	0.832	-.0925396	.0744474

gen_01	.0109358	.0405366	0.27	0.787	-.0685144	.090386
gen_02	.0026823	.0369322	0.07	0.942	-.0697034	.0750681
gen_03	.0241346	.0362699	0.67	0.506	-.0469532	.0952223
gen_04	.0396515	.0348595	1.14	0.255	-.028672	.1079749
gen_05	.0620033	.0324888	1.91	0.056	-.0016735	.1256801
gen_06	.0721092	.0317776	2.27	0.023	.0098263	.1343922
gen_07	.083726	.0332553	2.52	0.012	.0185469	.1489051

**Instruments for differenced equation**

**GMM-type:** L(2/.)psav\_gdp

**Standard:** D.PubSav D.GDPGR D.IR D.FDEV D.INF D.TOT D.DEPR D.LSP D.SSP D.ENTR D.PL D.TFX  
D.CP

D.BFILIB D.NBFILIB D.gen\_93 D.gen\_94 D.gen\_95 D.gen\_96 D.gen\_97 D.gen\_98 D.gen\_99

D.gen\_00 D.gen\_01 D.gen\_02 D.gen\_03 D.gen\_04 D.gen\_05 D.gen\_06 D.gen\_07 PUBSAV\_1

GDPGR\_1 IR\_1 FDEV\_1 INF\_1 TOT\_1 DEPR\_1