PENSION FUNDS´ CONTRIBUTION TO THE ENHANCEMENT OF AGGREGATE PRIVATE SAVING: A PANEL DATA ANALYSIS FOR EMERGING ECONOMIES

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PAPER´S PURPOSES

•To evaluate the impact of individual capitalization regimes upon aggregate private savings in six Latin American countries and, eventually, their contribution to the development and strengthening of domestic capital stock markets.

•To draw, on the basis of fully funded regimes´ performance in the last three decades, possible economic policy implications and recommendations.

THE STYLIZED FACTS

Diagram 1: Pension fund stocks
(in percentage of GDP)

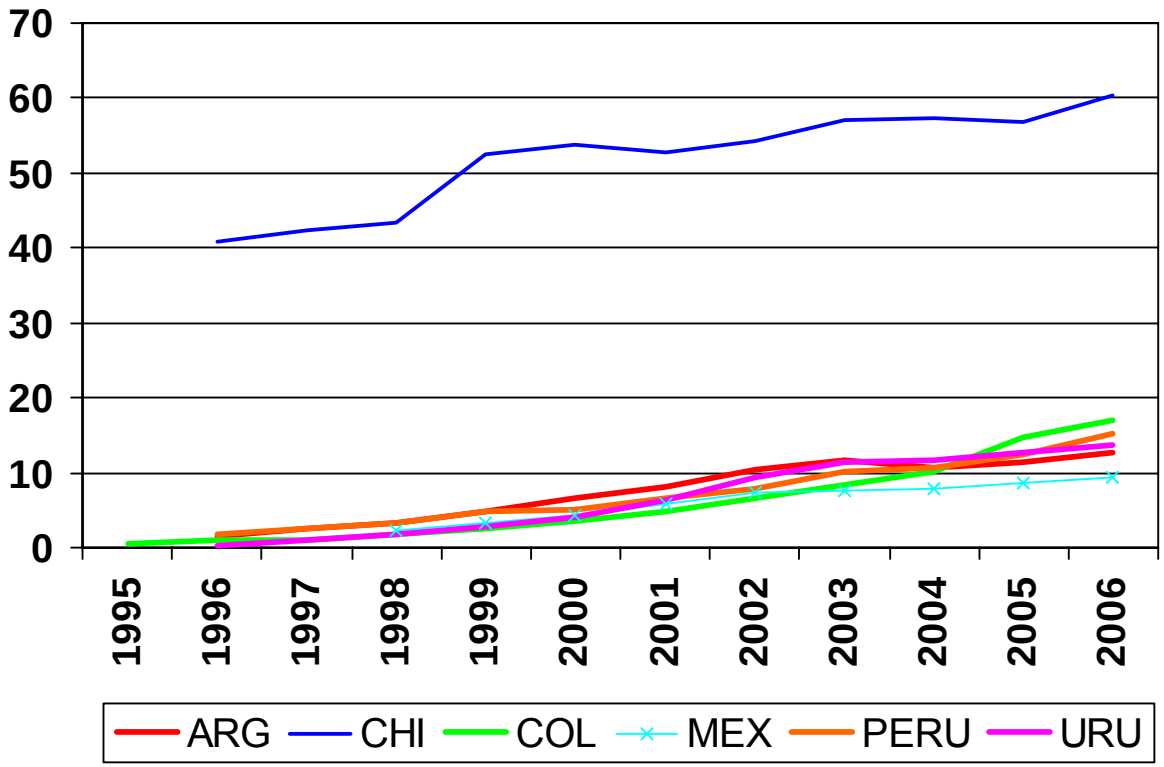

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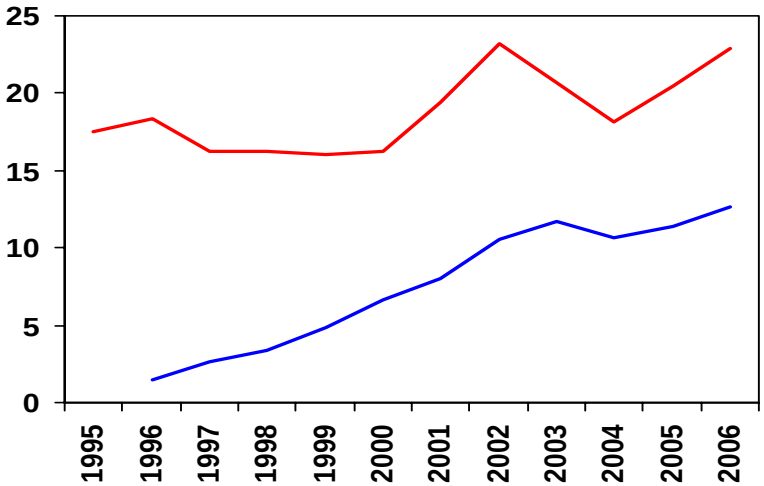
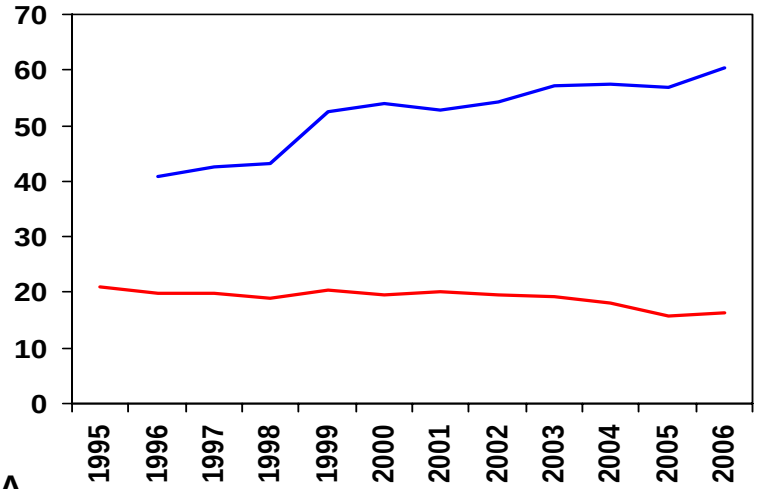
Diagram 2: Pension fund stocks and private savings
(in percentage of GDP)

ARGENTINA



CHILE



COLOMBIA

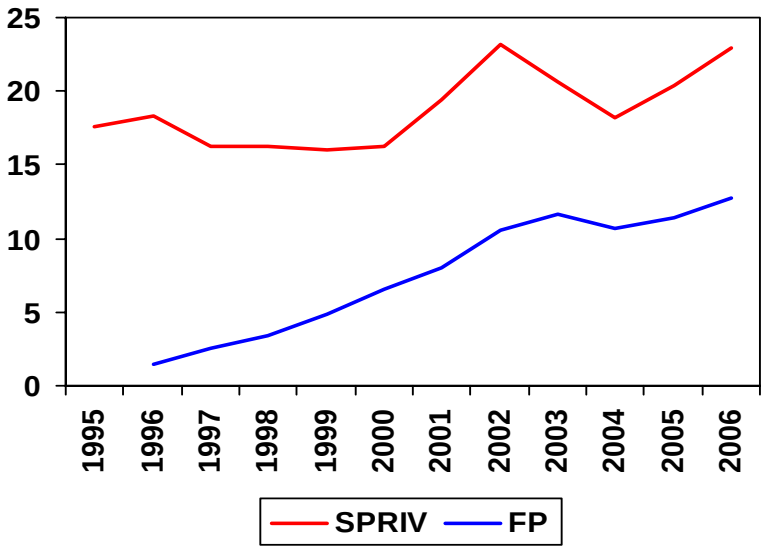


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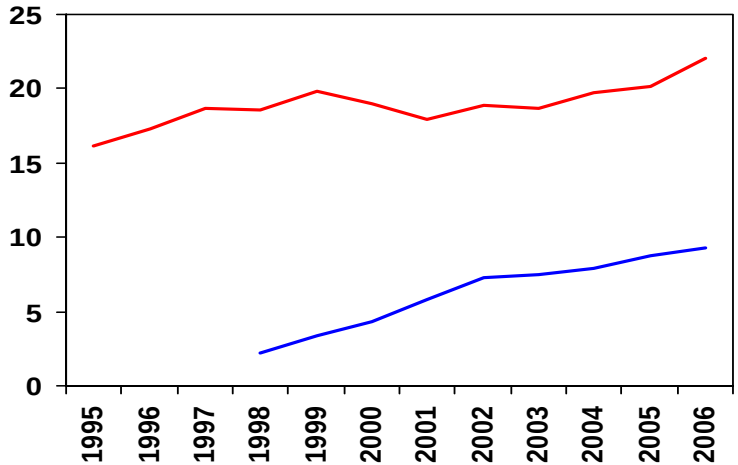
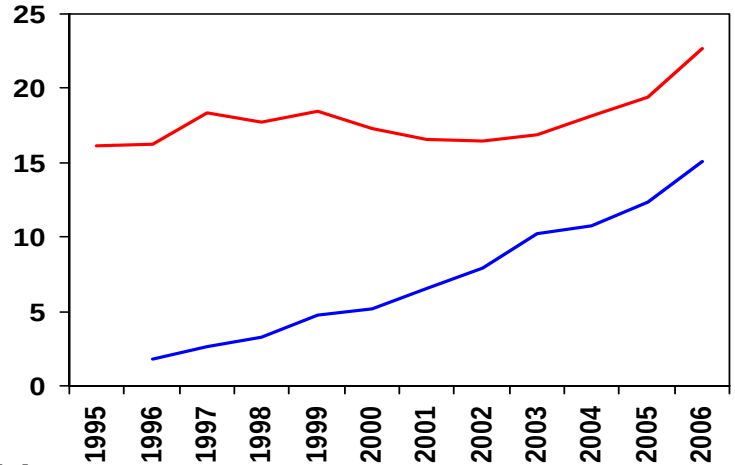
Diagram 2 (cont.): Pension fund stocks and private savings
(in percentage of GDP)

MEXICO



PERU



URUGUAY

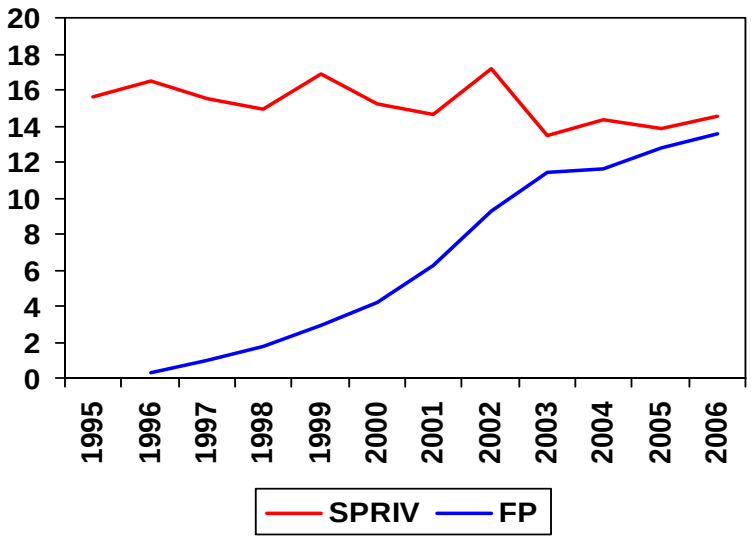


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Diagram 3: Government Budget Surplus/Deficit
(in percentage of GDP)

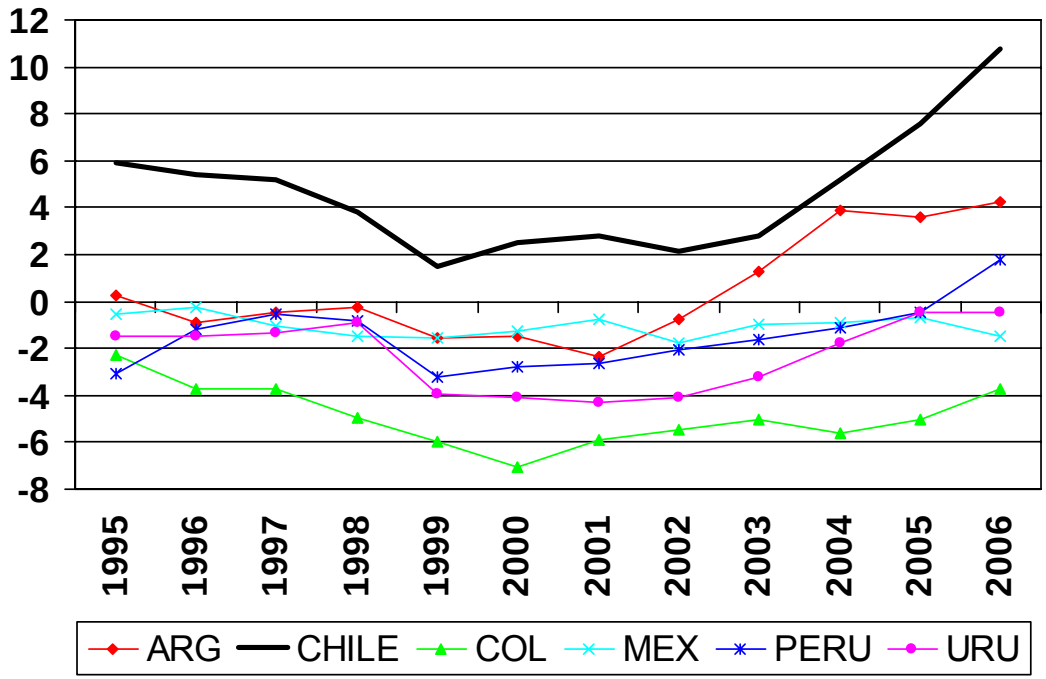

Diagram 4: Pension funds´ portfolio structure

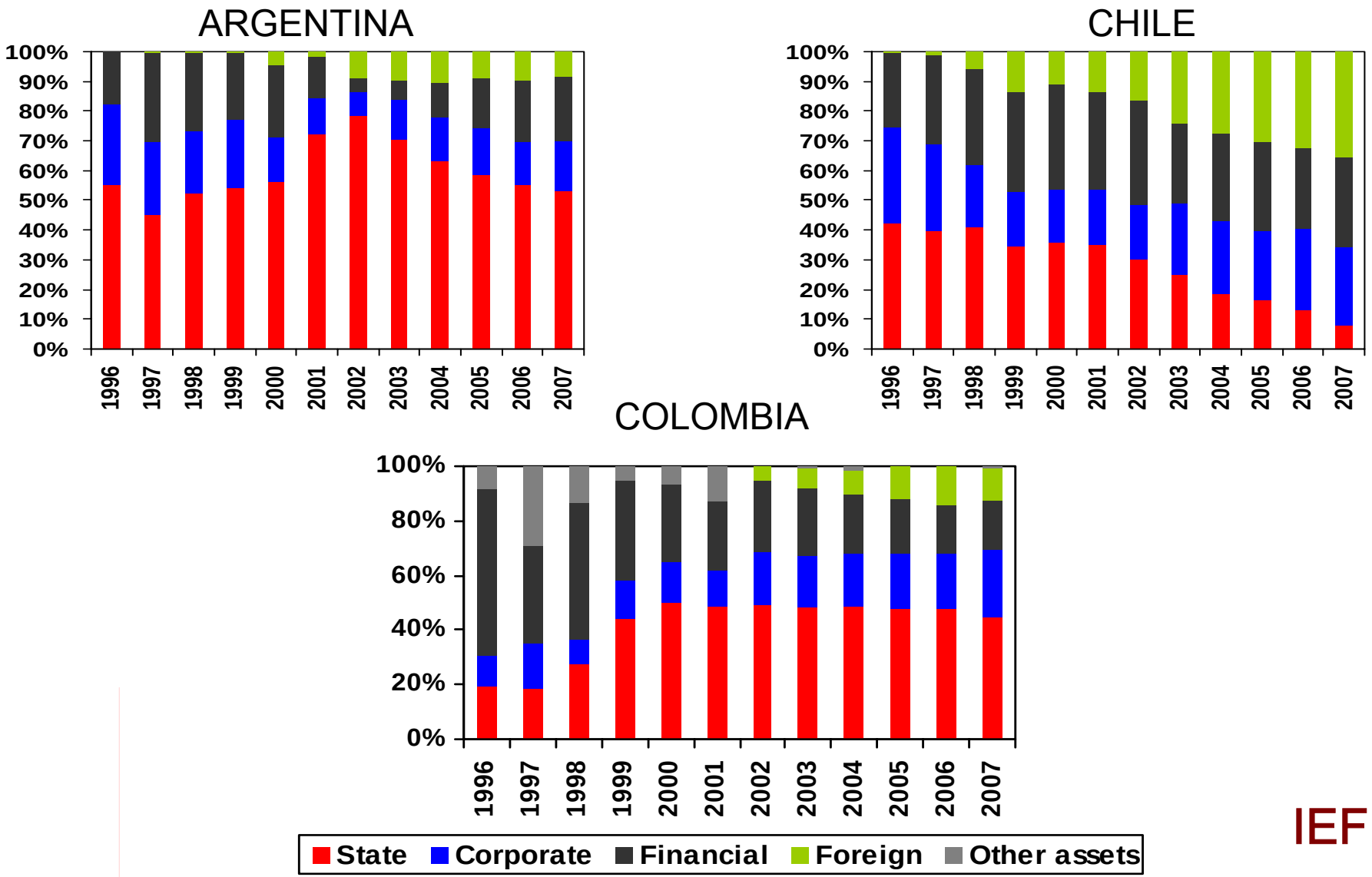

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Diagram 4 (cont.): Pension funds´ portfolio structure

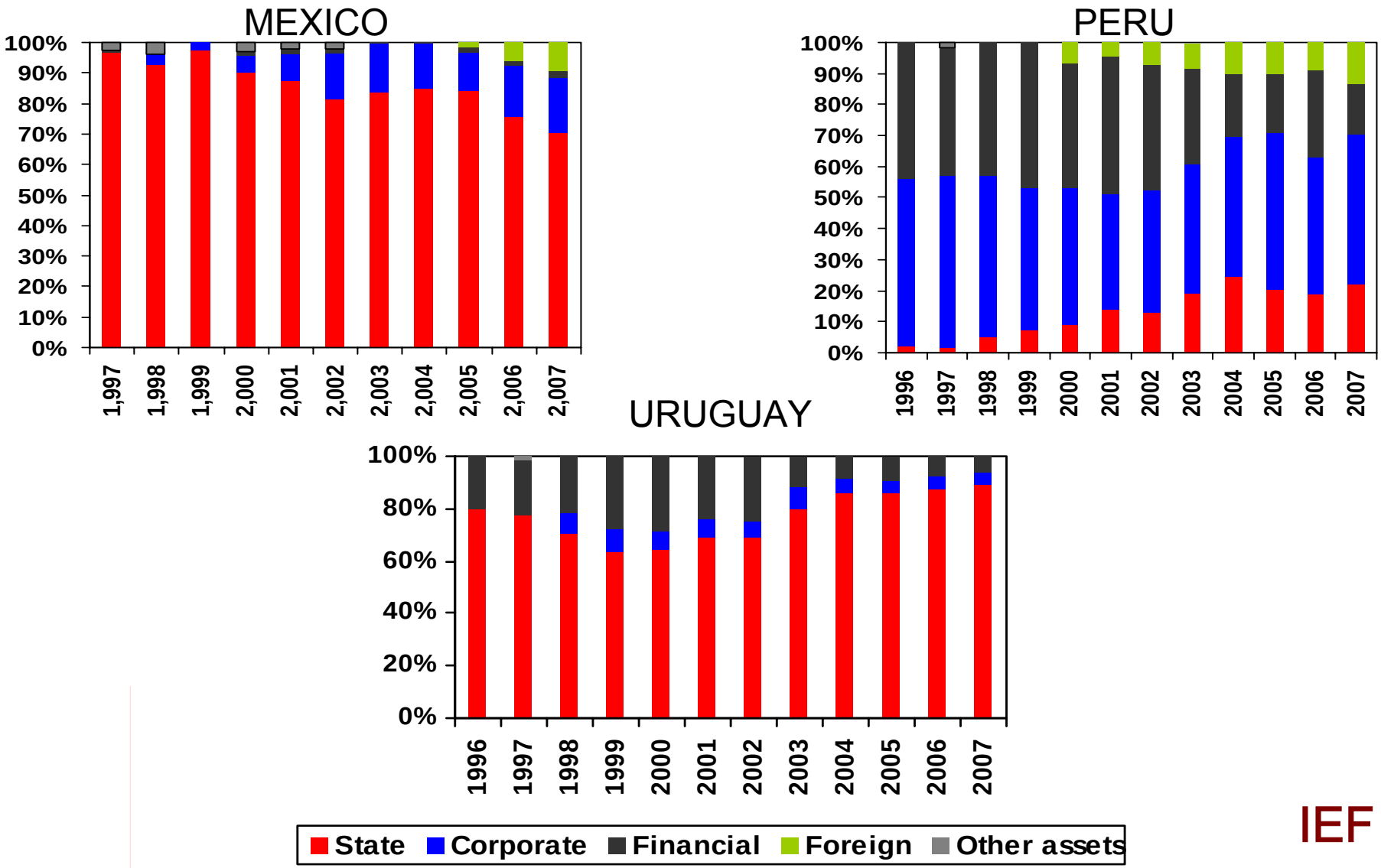

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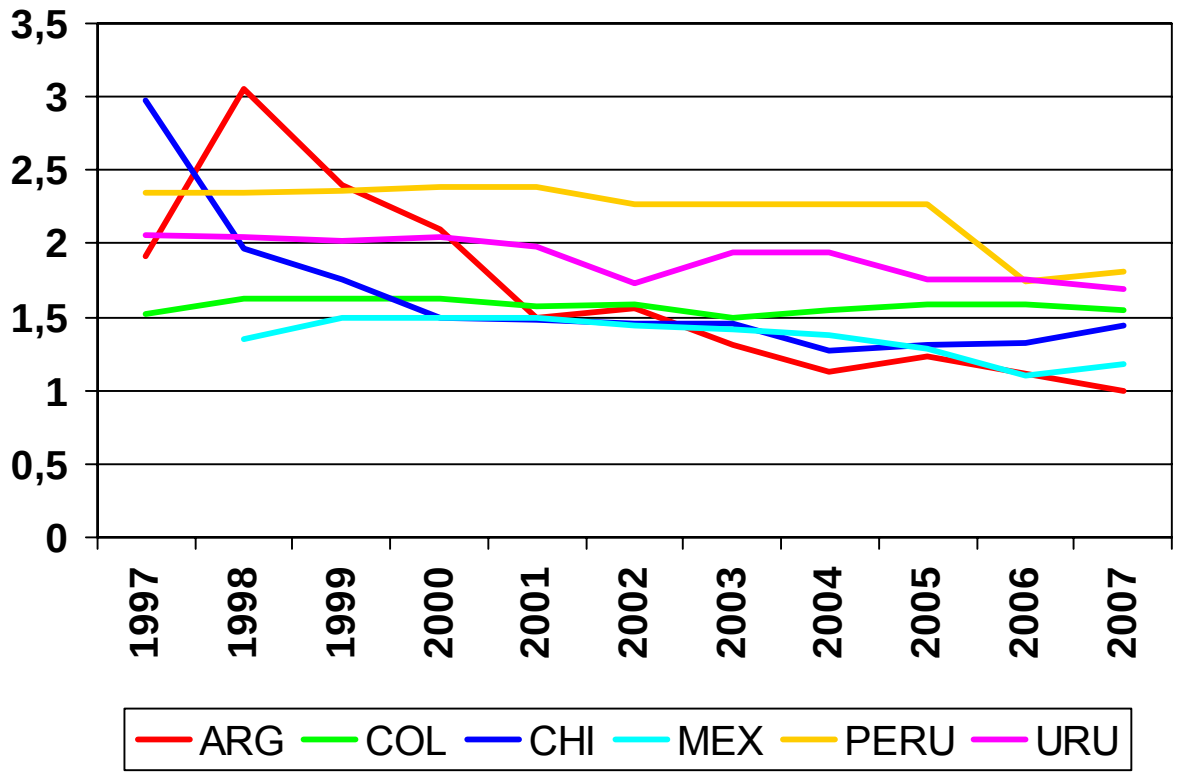
Diagram 5: Evolution of the level of fees perceived by Pension Fund Administrators



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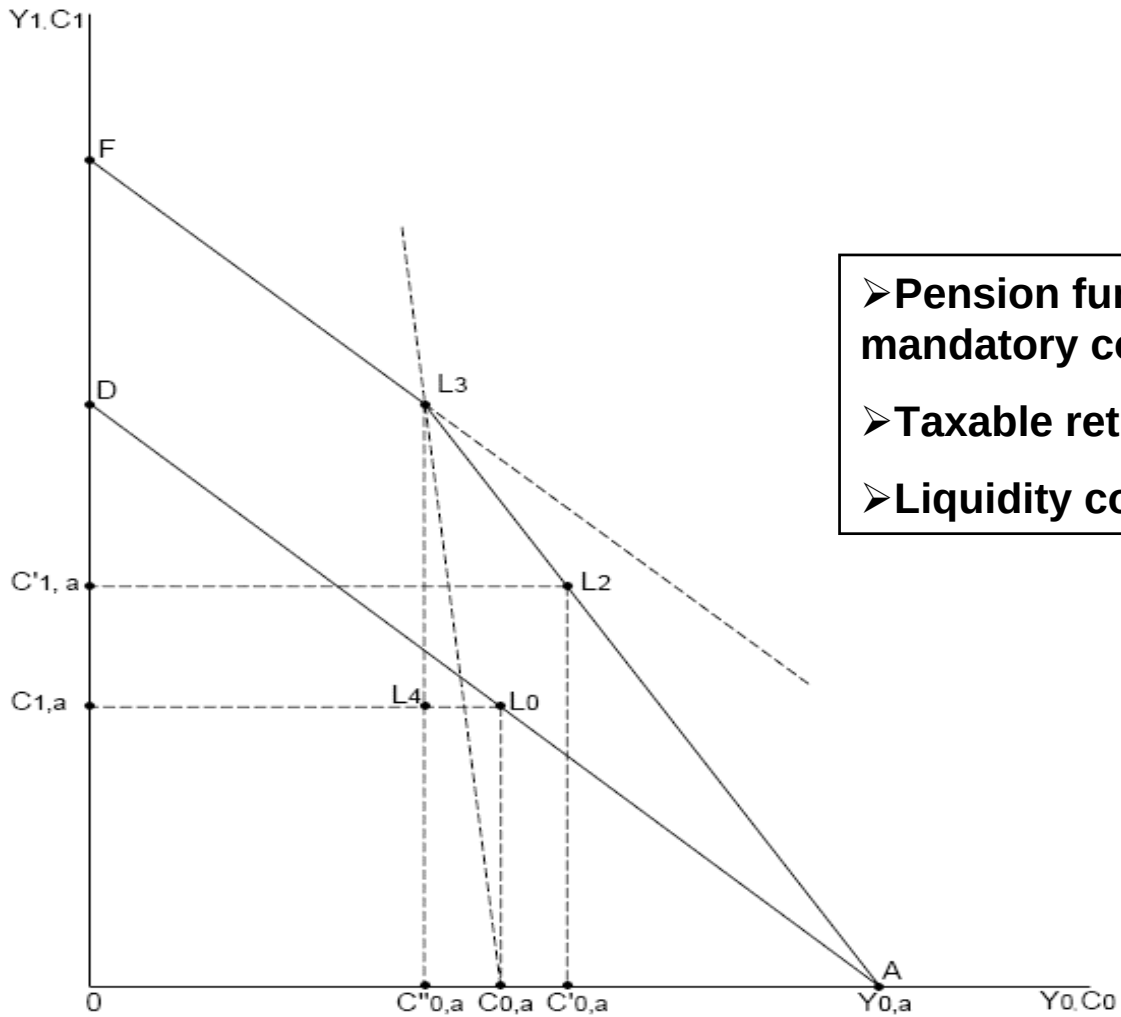
THE THEORETICAL FRAMEWORK BASED ON THE LIFE-CYCLE MODEL

Figure 1



- **Pension fund systems with mandatory contributions**
- **Taxable returns**
- **Liquidity constraints**

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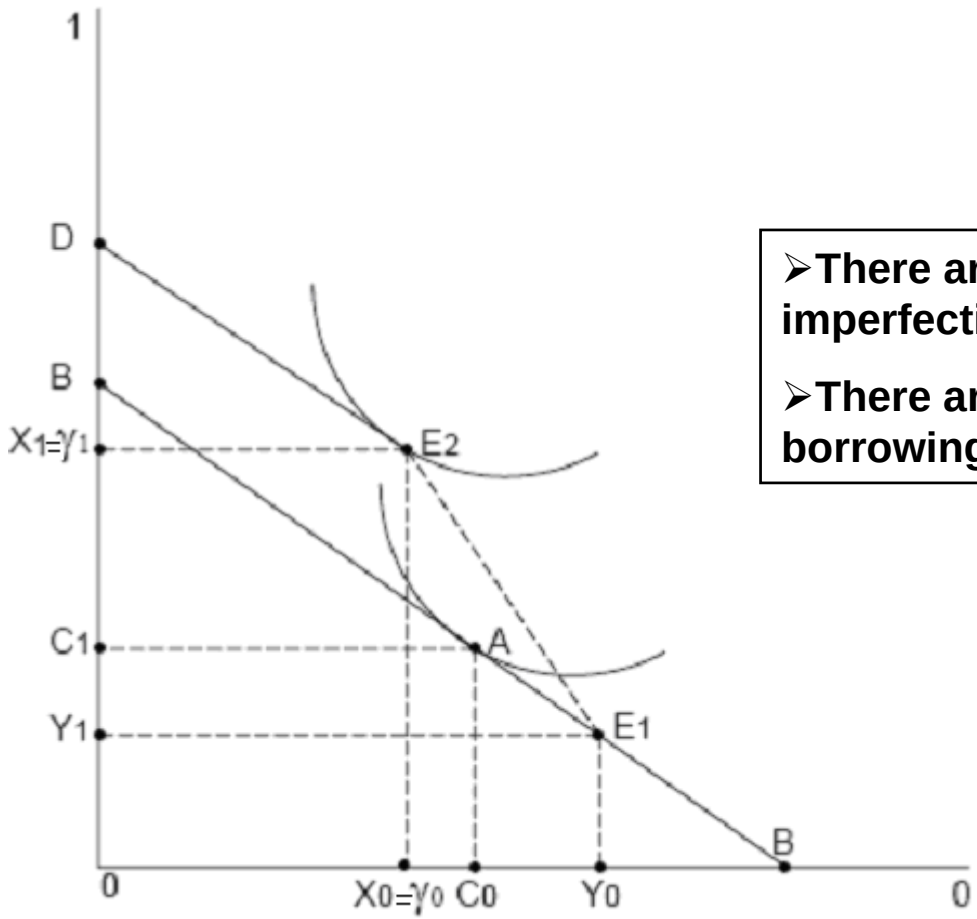
Figure 2



- There are capital market imperfections
- There are restrictions for borrowing

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ECONOMETRIC ESTIMATIONS

ECONOMETRIC ESTIMATION OF THE MODEL

•A fixed effect panel data model was used in order to estimate the impact of pension fund assets upon aggregate private savings (both in terms of GDP). Other control variables, suggested by the underlying theoretical model, were also included

•Countries included: Argentina, Peru, Chile, Colombia, Mexico and Uruguay. Period of analysis: 1995 - 2006

•The Wooldridge Test was used in order to detect the likely presence of autocorrelation: under the null hypothesis, there is no autocorrelation

•The Wald Test was resorted to for contrasting the hypothesis of homogeneity of the error´s variance (homoskedasticity)

•In regards to income per capita and interest rate, a number of variants were used in the estimation: 1) Per capita GDP in current dollars and in parity purchasing power. 2) The nominal and real active interest rate

Existing retirement regimes in the six countries considered

Country	Starting in	Single system	Integrated mixed system	Mixed system with competing regimes
Chile	1981	X		
México	1997	X		
Argentina	1994 2008		X	X
Uruguay	1995		X	
Perú	1993			X
Colombia	1994			X

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TYPES

Single System: Affiliation to the individual capitalization regime is mandatory for workers. Pension fund assets are administered by private entities. PAYG regimes are completely replaced

Integrated Mixed System: Individual capitalization coexists with PAYG. Contributions are distributed between both regimes

Mixed system with competing regimes: individual capitalization and PAYG compete with each other. Contributions entirely go to the chosen regime

The specified model is thus represented by the ensuing equation:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \mu_{it}$$

in which Xj_{it} stands for the value of variable j for country i during period t.

Variable	Definition	Expected Sign
Y	Aggregate private savings in % of GDP (PASV)	+
X_2	Pension fund assets in % of GDP (PFS)	+
X_3	Government budget surplus in % of GDP (GOVS)	-
X_4	Domestic loans to private sector in % of GDP (PRICR)	-
X_5	Short run active interest rate (NIR - RIR)	+ -
X_6	Dependence Index (DI)	-
X_7	Per capita income (GDP - PGDP)	+
X_8	Rate of growth of per capita income (GDPGR - PGDPGR)	+

Econometric estimation of coefficients

Equation 1: Nominal active interest rate and GDP in current dollars				
Modified Wald test for groupwise heteroskedasticity in fixed effect regression model χ(6) = 30.51 p-value = 0.0000 Wooldridge test for autocorrelation in panel data F(1, 5) = 75.425 p-value = 0.0003				
Dependent variable: PASV *Sample: 1995 – 2006* *Included observations: 62* *Coefficients: generalized least squares* *Panels: heteroskedastic* *Correlation: common AR(1) coefficient for all panels (0.4789)*				
Variable	**Coefficient**	**Std. Error**	**t-statistics**	**p-value**
PFS	.1621637	.0628633	2.58	0.01
GOVS	-.2781099	.1356909	-2.05	0.04
PRICR	-.0568928	.0329231	-1.73	0.084
NIR	.0816378	.0156141	5.23	0.000
DI	-.033106	.2806352	-0.12	0.906
GDP	.000666	.0002607	2.56	0.011
GDPGR	.055313	.0308271	1.79	0.073
CONSTANT	12.63047	2.133257	5.92	0.000

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Equation 2: Real active interest rate and GDP in current dollars				
Modified Wald test for groupwise heteroskedasticity in fixed effect regression model χ(6) = 12.81 p-value = 0.0461 Wooldridge test for autocorrelation in panel data F(1, 5) = 56.009 p-value = 0.0007				
Dependent variable: PASV *Sample: 1995 – 2006* *Included observations: 62* *Coefficients: generalized least squares* *Panels: heteroskedastic* *Correlation: common AR(1) coefficient for all panels (0.4694)*				
Variable	**Coefficient**	**Std. Error**	**t-statistics**	**p-value**
PFS	.1230335	.0620584	1.98	0.047
GOVS	-.2333545	.1390807	-1.68	0.093
PRICR	-.0465444	.0326164	-1.43	0.154
RIR	.0725106	.0176939	4.10	0.000
DI	.0471230	.3244887	0.15	0.885
GDP	.0004358	.0002981	1.46	0.144
GDPGR	.0550942	.0365475	1.51	0.132
CONSTANT	14.89972	2.474182	6.02	0.000

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Equation 3: Nominal active interest rate and PPP GDP				
Modified Wald test for groupwise heteroskedasticity in fixed effect regression model χ(6) = 20.86 p-value = 0.0019 Wooldridge test for autocorrelation in panel data F(1, 5) = 44.892 p-value = 0.0011				
Dependent variable: PASV *Sample: 1995 – 2006* *Included observations: 62* *Coefficients: generalized least squares* *Panels: heteroskedastic* *Correlation: common AR(1) coefficient for all panels (0.5237)*				
Variable	**Coefficient**	**Std. Error**	**t-statistics**	**p-value**
PFS	.0844234	.0770657	1.10	0.273
GOVS	-.4672454	.1496016	-3.12	0.002
PRICR	-.0618667	.0335561	-1.84	0.065
NIR	.0933493	.0163286	5.72	0.000
DI	.0441775	.3054554	0.14	0.885
PGDP	.0009155	.0002773	3.30	0.001
PGDPGR	.0720348	.0478833	1.50	0.132
CONSTANT	9.386582	2.521955	3.72	0.000

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Equation 4: Real active interest rate and PPP GDP				
Modified Wald Test for groupwise heteroskedasticity in fixed effect regression model X(6) = 8.83 p-value = 0.1833 Wooldridge Test for autocorrelation in panel data F(1, 5) = 53.594 p-value = 0.0007				
Dependent variable: PASV Sample: 1995 – 2006 Included observations: 62 Fixed effects regression with AR(1) disturbances				
Variable	**Coefficient**	**Std. Error**	**t-statistics**	**p-value**
PFS	.2980042	.1264246	2.36	0.023
GOVS	-.3792299	.2071593	-1.83	0.074
PRICR	-.0579133	.0529605	-1.09	0.280
RIR	.072066	.0275331	2.62	0.012
DI	-.5128899	.3215314	-1.60	0.118
PGDP	.0007609	.0004911	1.55	0.129
PGDPGR	-.0366699	.0608567	-0.60	0.550
CONSTANT	8.290232	1.509061	5.49	0.000
F(7,43) = 3.45		p - value = 0.0051		

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CONCLUSIONS

•In general, estimations show a positive and significant impact (at 5% level) of pension fund assets upon aggregate private saving. As these results differ from those found by other authors, the explanation has to be sought at the predominant mandatory feature of individual capitalization regimes in Latin American countries

•With respect to the other explanatory variables, and save for a couple of exceptions, results show that coefficients bear the expected signs, in line with the hypotheses of the used version of the life-cycle approach

•The effect of the interest rate upon aggregate private savings, independent of the used variant (nominal or real), was positive and significantly different from zero, indicating thus that substitution effects prevail over income effects and that liquidity constraints matter

•The negative impact of the government surplus upon private savings falls in line with the Bailey´s hypothesis of individuals´ ultrarationality between private and public savings

CONCLUSIONS

- Coefficients for loans to the private sector and income per capita result in general different from 0 at significance levels of 10% or 15%
- The rate of growth of per capita income and the demographic variable “dependence index” yield poorer results and not significant coefficients in most of cases. A possible explanation for the latter´s performance may be the sample size and the method used to compute the ratio

Theoretical and empirical research work (already under way) to evaluating the impact of pension fund assets upon the development of a domestic capital stock market

One of individual capitalization regimes´ most stressed effect is its impact upon economic growth via the stimulus to financial development. According to Reisen (1997), the mentioned sequence implies the:

- Increase of the long run supply of funds
- Increase in the efficiency of funds´ allocation
- Stimulus to financial infrastructure

PRELIMINARY RESULTS

Positive correlation was found between pension fund assets and the degree of financial depth (furthering), the latter measured by the ensuing variables:

- Bank deposits to gross domestic product ratio
- Domestic credit to the private sector
- Stock exchange capitalization as a proportion of GDP

PRELIMINARY RESULTS

Estimated coefficients of pension fund assets (in percentage of GDP) upon the following variables:

Stock Exchange Capitalization (in % of GDP): 1,49 (p – value: 0,000) (POSITIVE)

Current account deposits (in % of GDP): 0,071 (p – value: 0,000) (POSITIVE)

Domestic credit (in % of GDP): 0,006 (p – value: 0,965) (NO RELATION)

BIBLIOGRAPHIC REFERENCES

- ANDO, A. and F. MODIGLIANI (1963), "*The ´Life Cycle´ Hypothesis of Saving: Aggregate Implications and Tests",* American Economic Review 53, March, pp. 55-84.
- BAILLIU, J. and H. REISIN (1997), "*Do Funded Pensions Contribute to Higher Aggregate Savings: A Cross-Country Analysis*", Working Paper No. 130, OECD Development Centre, Paris.
- BLINDER, A. S. (1982), "*Private Pensions and Public Pensions: Theory and Fact*", Working Paper No. 902, National Bureau of Economic Research, Cambridge, Ma.
- BOADWAY, R. and KATHERINE CUFF (2005), "Evaluating Public Pensions", in "*Public Expenditure Analysis*", A. Shah Ed., The World Bank, Washington, pp. 69-133.
- CAGAN, P. (1965), "*The Effect of Pension Plans on Aggregate Savings",* NBER, New York.
- CORSETTI, G. and K. SCHMIDT-HEBBEL (1996), "Pension Reform and Growth", (in *"Pensions: Funding, Privatization and Macroeconomic Policy*", S. Valdés-Prieto Ed., Cambridge University Press.
- DAVID, P. A. and J. L. SCADDING (1974), "*Private Savings: Ultrarationality, Aggregation and ´Denison´s Law*", Journal of Political Economy, March/April, pp. 225-249.

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REFERENCIAS BIBLIOGRAFICAS

- FARUQEE, H. and A. M. HUSAIN (1994), *"Determinants of Private Saving in Southeast Asia: A Cross-Country Analysis",* South East Asia and Pacific Department, International Monetary Fund, Washington, D.C.
- FELDSTEIN, M (1974), "*Social Security, Induced Retirement, and Aggregate Capital Accumulation*", Journal of Political Economy, Vol. 82, No. 5, pp. 905-925.
- GREENE, W. H. (2007), "*Econometric Analysis",* Prentice Hall, USA, Cap. 9.
- KATONA, G. (1964), *"Private Pensions and Individual Savings"*, Ann Arbor: Survey Research Center, Institute for Social Research, University of Michigan.
- MORANDE, F. (1996), *"Savings in Chile: What Went Right?"*, Inter-American Development Bank Working Paper No. 322, Washington, D.C.
- RADDATZ, C. and S. SCHMUKLER (2008), "*Pension Funds and Capital Market Development: How much bang for the buck",* Policy Research Working Paper 4787, The World Bank, Washington D.C.
- REISIN, H. (1997), "L*iberalizing Foreign Investments by Pension Funds: Positive and Normative Aspects*", Working Paper No. 120, OECD Development Centre, Paris.

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