

Public Debt Management in Transition Countries: The Case of Armenia

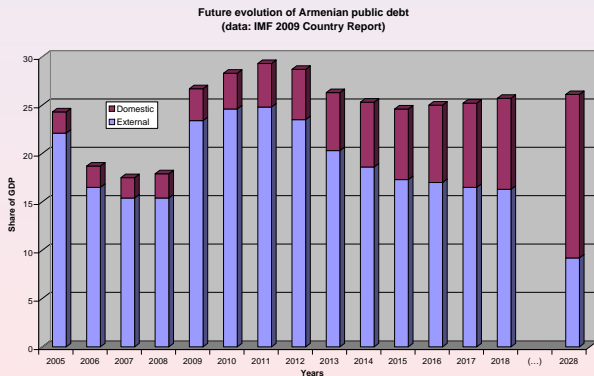
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Italy

AIPRG Conference on
“Impact of the Global Economic and Financial Crisis on Armenia:
Short- and Long-run Perspectives”

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The Issue

Armenian example



Public Debt Management (PDM) in Transition Countries

- PDM Objectives and constraints
 - minimization of fiscal cost and risk
 - macroeconomic (stabilization and monetary) policy support
 - tax smoothing
- PDM Tools
 - debt restructuring
 - debt securitization
 - debt privatization
 - debt regularization
- ...additional PDM objectives and constraints for Emerging (and Transition) Countries
 - affording foreign financial inflows
 - minimizing fiscal instability risk to control default risk

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- PDM Tools
 - public debt issues (e.g. debt-to-GDP ratio)
 - debt maturity structure
 - debt instrument structure
 - debt issuance market structure (primary and secondary)
 - market regulation
- ...additional PDM objectives and constraints for Emerging (and Transition) Countries
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 - tax-smoothing
- PDM Tools
 - public debt level (e.g. debt-to-GDP ratio)
 - financial structure of securities: maturity, indexation, etc.
 - debt issuances: market structure, primary and secondary market, regulation, etc.
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The case of Armenia

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- PDM in Former Soviet Union (FSU) Countries is relatively less explored...
 - ...different regional paths (ERBD areas: Baltic states, Russia and Central Asia, and Western CIS, Caucasian states, Central Asian states)
- Why Armenia?
 - ...the case of Armenia
- Main results
 - In almost any scenario...
 - ...real inflation would be optimal...
 - ...and external public debt (even concessional) is dominant
 - In particular, during current crisis

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 - ...different regional paths (ERBD areas: Baltic states, Russia and Western CIS, Caucasian states, Central Asian states)
- Why Armenia?
 - data availability
 - limited research on public debt in Armenia
 - no studies on optimal public debt in Armenia (other than a country)
- Main results
 - In almost any scenario...
 - real indexation would be optimal
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 - ...different regional paths (ERBD areas: Baltic states, Russia and Western CIS, Caucasian states, Central Asian states)
- Why Armenia?
 - data availability
 - relevant financial risks: small open market economy
 - 2008-2009 crisis: high unemployment, low growth, low quality of institutions
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 - data availability
 - relevant financial risks: small open market economy
 - sound macroeconomic environment (rather unlikely default)
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 - in almost any scenario...
 - real inflation would be optimal
 - would add external public debt (even concessional) a domestic
 - in particular, during current crisis

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- Main results
 - in almost any scenario...
 - real interest rate would be around 10%
 - GDP and external public debt (even concessional) is growing
 - in particular, during current crisis

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 - real indexation would be optimal
 - ...and external public debt (even concessional) is non-optimal
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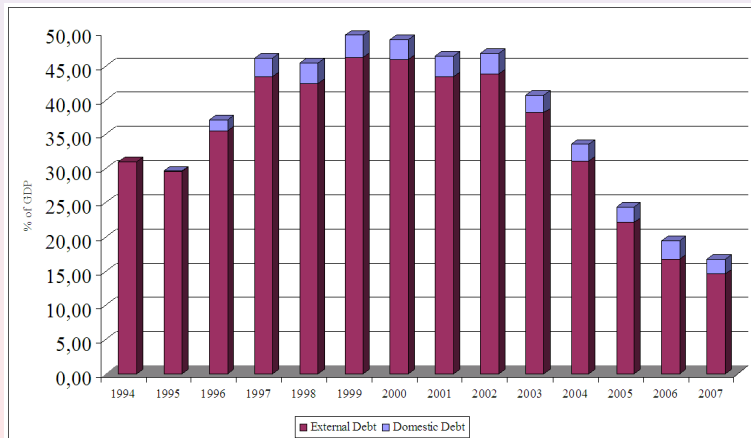
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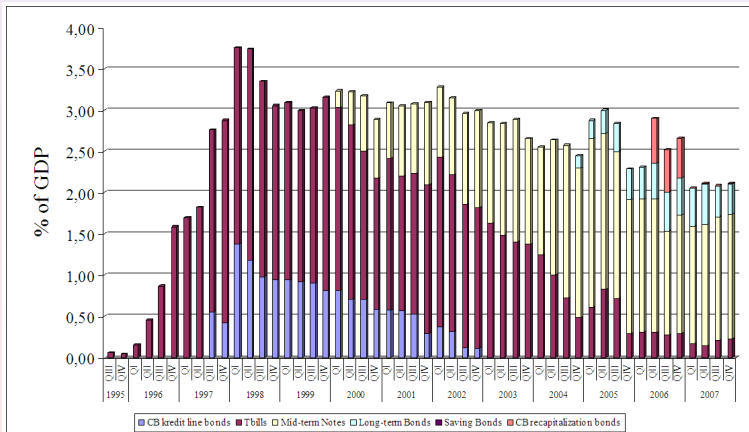
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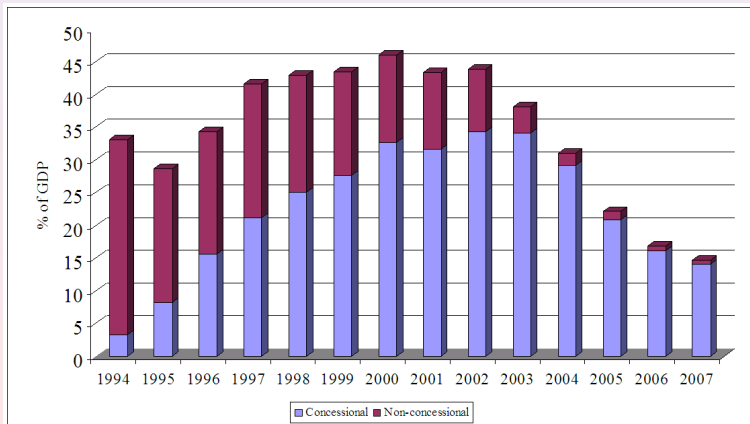
Armenian public debt: domestic and external



Domestic public debt



External public debt



Stylized public debt structure

Total debt shared in four representative types of securities depending on currency denomination, maturity (at issuing date), indexation (short vs long term, real vs nominal)

s T-bills: all T-bills

q External debt: all external public debt, independently of currency denomination, and loans terms

h R-bonds: not existing yet

$1 - s - q - h$ T-bonds: all securities currently issued with more than one year maturity (Medium Term Coupon Notes, Long Term Coupon Bonds, Savings Coupon Bonds)

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Optimal Portfolio Model

Minimization of fiscal instability risk

- Approach by Giavazzi and Missale (2004):

$$\min_{s,q,h} E_t \text{Prob}[X > Z]$$

where

- $Z = A_{t+1} - \Delta B_{t+1}^T$ planned debt-to-GDP ratio path

$$\Delta B_{t+1}^T = \underbrace{[R_{t+1} \cdot s + (R_t^{US} + RP_t) \cdot q + (R_t^G + \pi_{t+1}) \cdot h + R_t \cdot (1 - s - q - h)] \cdot B_t}_{\text{interest cost}} + \underbrace{- [E_t S_{t+1}^T + \eta_V \cdot (Y_{t+1} - E_t Y_{t+1}) + \eta_W \cdot (\pi_{t+1} - E_t \pi_{t+1})]}_{\text{bond primary surplus}} + \underbrace{[\Delta \pi_{t+1} \cdot q - (\Delta Y_{t+1} + \pi_{t+1}) \cdot B_t]}_{\text{stock effect}}$$

- $\text{Prob}[X > Z] = \int_Z^{\infty} \frac{X}{X^2} \cdot dX = \frac{X - Z}{X^2}$
- $\bar{X} = \frac{Z}{1 - \sqrt{1 - 2P}}$ default, with perceived probability P

Minimization of fiscal instability risk

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- $\text{Prob}[X > Z] = \int_Z^{\bar{X}} \frac{\bar{X} - X}{\bar{X}^2} \cdot dX = \frac{(\bar{X} - Z)^2}{2 \cdot \bar{X}^2}$
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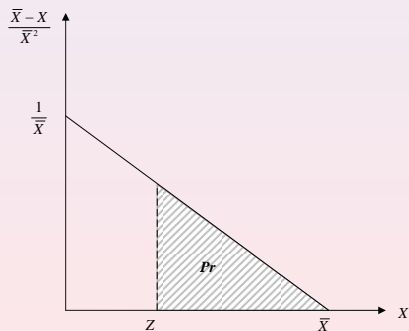
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Fiscal instability risk



Optimal Debt Structure

$$\begin{aligned}
 s^* &= \underbrace{\frac{\eta_y + B_t}{B_t} \cdot \frac{\text{Cov}(y_{t+1}, i_{t+1})}{\text{Var}(i_{t+1})}}_{\text{surplus risk}} + \underbrace{\frac{\eta_\pi + B_t}{B_t} \cdot \frac{\text{Cov}(\pi_{t+1}, i_{t+1})}{\text{Var}(i_{t+1})}}_{\text{risk}} - \underbrace{q^* \cdot \frac{\text{Cov}(e_{t+1}, i_{t+1})}{\text{Var}(i_{t+1})}}_{\text{portfolio risk}} - \underbrace{h^* \cdot \frac{\text{Cov}(\pi_{t+1}, i_{t+1})}{\text{Var}(i_{t+1})}}_{\text{risk}} + \\
 &\quad + TP_t \cdot \underbrace{\frac{\sqrt{2 \cdot Pr}}{1 - \sqrt{2 \cdot Pr}} \cdot \frac{E_t(A_{t+1} - \Delta B_{t+1}^T)}{B_t \cdot \text{Var}(i_{t+1})}}_{\text{cost minimization}} \\
 q^* &= \frac{\eta_y + B_t}{B_t} \cdot \frac{\text{Cov}(y_{t+1}, e_{t+1})}{\text{Var}(e_{t+1})} + \frac{\eta_\pi + B_t}{B_t} \cdot \frac{\text{Cov}(\pi_{t+1}, e_{t+1})}{\text{Var}(e_{t+1})} - s^* \cdot \frac{\text{Cov}(e_{t+1}, i_{t+1})}{\text{Var}(e_{t+1})} - h^* \cdot \frac{\text{Cov}(\pi_{t+1}, e_{t+1})}{\text{Var}(e_{t+1})} + \\
 &\quad + FP_t \cdot \frac{\sqrt{2 \cdot Pr}}{1 - \sqrt{2 \cdot Pr}} \cdot \frac{E_t(A_{t+1} - \Delta B_{t+1}^T)}{B_t \cdot \text{Var}(e_{t+1})} \\
 h^* &= \frac{\eta_y + B_t}{B_t} \cdot \frac{\text{Cov}(y_{t+1}, \pi_{t+1})}{\text{Var}(\pi_{t+1})} + \frac{\eta_\pi + B_t}{B_t} - q^* \cdot \frac{\text{Cov}(e_{t+1}, \pi_{t+1})}{\text{Var}(\pi_{t+1})} - s^* \cdot \frac{\text{Cov}(\pi_{t+1}, i_{t+1})}{\text{Var}(\pi_{t+1})} + \\
 &\quad + IP_t \cdot \frac{\sqrt{2 \cdot Pr}}{1 - \sqrt{2 \cdot Pr}} \cdot \frac{E_t(A_{t+1} - \Delta B_{t+1}^T)}{B_t \cdot \text{Var}(\pi_{t+1})}
 \end{aligned}$$

Armenian Economy

Public budget and financial data

- Public budget evolution
 - surplus-to-GDP ratio semielasticity to the real interest rate
 - $\beta = 0.5$ (for the 1995-2008 period)
- Financial premia: return differentials with respect to long-term fixed rate
 - exchange rate premium
 - nonconcessional debt: $FP = 1.0\%$
 - concessional debt: $FP = 5.2\%$
 - inflation premium: $FP = 3.5\%$

Public budget and financial data

- Public budget evolution
 - surplus-to-GDP ratio semielasticity to
 - inflation: $\eta_{\pi} = 20\%$ (our estimation)
 - output: $\eta_{y} = 23\%$ (our estimation)
 - $E_t(A_{t+1} - \Delta B_{t+1}^T) = 1.1\%$ (for 2008, from official data)
 - Financial premia: return differentials with respect to long-term fixed rate
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Public debt management

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- concessional debt: $FP = 5.2\%$
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 - bond premium: $AP = 1.5\%$
 - exchange rate premium
 - government debt: $AP = 1.5\%$
 - concessional debt: $AP = 2.2\%$
 - inflation premium: $AP = 1.5\%$

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- Financial premia: return differentials with respect to long-term fixed rate
 - term premium: $TP = 4.8\%$
 - exchange rate premium
 - nonresidential debt: $TP = 1.5\%$
 - residential debt: $TP = 3.3\%$
 - inflation premium: $IP = 1.5\%$

Public budget and financial data

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- Estimation of macroeconometric model of Armenian economy relying on quarterly data from 2000 : Q1 to 2007 : Q4

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Results

LIBOR Shock

	Risk no hedge	Risk	Risk+Cost	Risk+Cost ≥ 0	Concess	Concess ≥ 0
Short (s)	0,09	-0,05	0,14	0	-0,04	0
Foreign (q)	0,17	0,17	-1,16	0	-0,50	0
Inflation (h)	1,21	0,42	9,93	1,00	6,69	1,00
Fixed (f)	-0,47	0,46	-7,92	0	-5,15	0

Supply Shock

	Risk no hedge	Risk	Risk+Cost	Risk+Cost ≥ 0	Concess	Concess ≥ 0
Short (s)	0,15	-0,03	-0,17	0	-0,13	0
Foreign (q)	0,25	0,06	-0,26	0	-0,15	0
Inflation (h)	2,09	1,77	5,06	1,00	4,03	1,00
Fixed (f)	-1,49	-0,80	-3,63	0	-2,75	0

Demand Shock

	Risk no hedge	Risk	Risk+Cost	Risk+Cost ≥ 0	Concess	Concess ≥ 0
Short (s)	0,30	0,23	-0,21	0	-0,19	0
Foreign (q)	0,19	0,02	-0,70	0	-0,42	0
Inflation (h)	1,90	0,44	10,69	1,00	8,63	1,00
Fixed (f)	-1,38	0,30	-8,78	0	-7,02	0

Exchange Rate Shock

	Risk no hedge	Risk	Risk+Cost	Risk+Cost $q=f=0$	Concess	Concess $q=f=0$
Short (s)	0,15	0,08	0,11	0	0,05	0
Foreign (q)	0,34	-1,00	-0,87	0	-0,43	0
Inflation (h)	2,09	7,62	4,65	1,00	2,30	1,00
Fixed (f)	-1,58	-5,70	-2,89	0	-0,92	0

Short-Term Interest Rate Shock

	Risk no hedge	Risk	Risk+Cost	Risk+Cost ≥ 0	Concess	Concess ≥ 0
Short (s)	-0,01	-0,01	-0,61	0	-0,26	0
Foreign (q)	0,43	-0,22	3,75	0,47	1,54	0,45
Inflation (h)	2,26	3,38	-15,30	0	-4,44	0
Fixed (f)	-1,68	-2,15	13,16	0,53	4,15	0,55

2008 Shock

	Risk no hedge	Risk	Risk+Cost	Risk+Cost ≥ 0	Concess	Concess ≥ 0
Short (s)	0,12	-0,08	0,23	0	0,24	0
Foreign (q)	0,37	0,12	-1,07	0	-1,31	0
Inflation (h)	1,98	1,77	4,28	1,00	7,11	1,00
Fixed (f)	-1,48	-0,82	-3,24	0	-5,04	0

Concluding Remarks

Lessons from our investigation

- Real-indexation would be optimal to hedge against almost any macroeconomic shock
 - result of sound macroeconomic policy: inflation good hedging tool; above all, successful inflation targeting affords full exploitation of inflation risk premium
- except for short-term interest rate shock (here check needed)...
- ...of course: out of the model, liquidity (and financial option) issues along this strategy
- External public debt (even concessional) should be reduced
 - cost advantage fades out when compared with exchange rate riskiness
- About effects of global crisis

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Limits and work in progress

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- ★ How to treat current crisis data? Structural break, outlier data
- ★ How to model scenarios? Approach improving on our simplistic exercise: exploit full modelization of randomness of the model...

- Other issues

- ★ sensitivity of the model to the choice of the parameters (especially the growth rate)
- ★ robustness check of macroeconomic model (Russian GDP, more technical issues)

- Future research

- ★ address these problems
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