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Gábor Kovács
Széchenyi István University Győr, Hungary
Zsuzsa Stion
Széchenyi István University Győr, Hungary

LOCAL INDEBTEDNESS IN HUNGARY: EXPERIENCE OF 20 YEARS

Abstract

Hungary has a unitary government system with 19 counties, 23 "cities with county rank" and about 3200 local (municipal) governments. The financial architecture of local governments is quite complicated and budget constraints are "halfway" between soft and hard. After an early and temporary "municipal bond boom" in the middle of 1990s, the size of indebtedness started to increase considerably, first in 2002. By the end of 2011 the size of financial obligations deriving from local borrowing amounted more than 4.7% of GDP.
The paper is aimed at examining factors that might have been behind indebtedness and tries to separate the effect of internal and external variables for the period between 1990 and 2011. According to the results of the empirical analysis local authorities' borrowing activity cannot be explained only with help of quantitative macro-economical indicators such as total sub-national revenues, expenditures, CPI and GDP. Namely, the formation of debt was mainly determined by behaviour patterns of local governments and by random (unforeseeable) shocks caused by changes in central regulation. The short term patterns in borrowing attitude are due to the four-year long election cycle of local representatives while adapting to random shock happens quickly within one year. Four different time-phases (periods) can be determined, which can be described by different characteristics and makes explanation for the formation of local debt: early development of subnational debt markets (1990–1995), restriction (1996–1997), moderate growth (1998–2006), municipal bond-boom (2007–2010).

Key words: indebtedness, local governments, municipal bond, econometrics model, Hungary

Introduction

Hungary has a unitary government system and the Constitution and the 1990 Law on Local Authorities establish that the basic rights of all local governments, regardless of size, are equal. Thus, the system can be considered as fairly democratic but very fragmented. The average size of Hungary's municipalities (including Budapest) is very low (about 3000 people) and over half of Hungary's

municipalities have a population below 1000. The financial architecture of local governments is quite complicated and budget constraints are "halfway" between soft and hard.[1]

During the process of the transition to a market economy and with the increasing difficulties of the central budget, a greater share of public service provision has been transferred to the local level. The *Act on Local Authorities* assigns responsibility to local governments for providing public services in an extraordinary large range, even by international comparison. Since transfers from the central budget are less and less able to cover the investment needs of local governments, there is an even stronger demand for external funds that can be satisfied first of all, with help of borrowing. The enhancement of the resource-deployment capacity of the local authority sector is a fundamental condition for ensuring the necessary development resources at the local level.

The really drastic increase in volume of local government debt in Hungary started in 2006, caused primarily by the issuance of local government bonds. At the end of 2011 the size of financial obligations deriving from local borrowing amounted more than 4.7% of GDP.

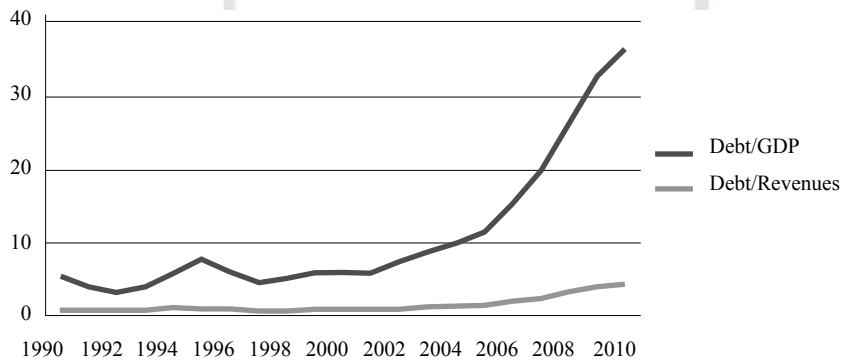

Figure 1. Liabilities (municipal bonds, short and long term loans) of Hungarian local governments in the percentage of GDP and local governments' revenues (1990–2010)
Source: own construction based on Hungarian National Bank's data.

The paper is aimed at examining factors that might have been behind indebtedness, and tries to separate the effect of internal and external variables. As internal factors I mean first of all the circumstances which refer directly to the operation (and financing) of Hungarian local government sector such as central regulation of borrowing and central subsidy policy. As external factors mainly quantitative variables, which reflects macro-economical situation of Hungary, can be taken into account. In the paper I make an attempt to evaluate the role of internal and external factors and to determine their explanatory power as well.

[1] Operating deficit may be financed by selling fixed assets and by borrowing as well.

Accordingly, after summarizing the theoretical background of local borrowing, I try to construct an econometrical model, which can provide sufficient explanation for the changes in local governments' indebtedness in Hungary.

Theoretical framework for the analyzis

In the first, theoretical part of my paper, I try to summarize the economical advantages and disadvantages of local borrowing and to determine the theoretical framework for the empirical analysis.

Why local borrowing makes sense

Borrowing represents one possible and important way to finance local capital projects. The most important *arguments* for borrowing by local governments and against other forms of financing can be summarized as follows:

Long-term debt allows sub-national governments to acquire or build capital improvements more quickly than they could on a pay-as-you-go basis. Borrowing over time is an effective way to overcome the problem of inequitable burden of costs among tax payers. It allows more equitable payment schemes, since users can be made to pay for the capital cost of facilities as they are used over time. There will be an assurance that the most users will pay for the benefits either through local taxes or directly through user charges and hereby an optimal allocation of resources can be achieved.

Benefits from accelerated local development can overshadow the cost of borrowing. Carrying out the investment as quickly as possible, operational costs (related to the given service) can be reduced [Swianiewicz, 2004]. Borrowing can also stabilize the required budget resources. The volume of capital spending in local government units fluctuates from one year to another. If capital projects are financed from current revenues, the demand for resources changes over time as well. In countries where a large proportion of local revenues is raised through local taxes, an irrational fluctuation of local taxes rates may result.

However, there are also *costs and risks* in case of borrowing. Long-term debt limits a sub-national government's future budget flexibility. Unwisely used, it can burden citizens with high taxes or service charges. Many countries permit long-term debt only for capital spending and not for operating deficits (sometimes called the "Golden Rule") [Musgrave, 1959]. Borrowing to meet short-term financing needs can provide opportunities for banks and subnational governments to develop working relationships and allow bankers to become familiar with the governments' financial affairs. Provided that the financing is repaid within the budget year and that carrying debt beyond the budget year is prohibited, there is no a priori reason to limit such financing to capital spending [Freire, Petersen, 2004].

Management of local government debt

The most common approaches concerning management and regulation of local debt include (1) leaving financial market discipline to operate freely; (2) establishing strict administrative, case-by-case control; and (3) establishing explicit, pre-emptive and legally binding general rules to prevent crises and encourage good market behaviour [Oliveira, Martin-Vazquez, 2001].

Even where restrictions on local borrowing seem to be strict the constraints may in fact be softer than they appear since municipal governments can be accustomed to circumvent such restrictions by borrowing through quasi-fiscal institutions or publicly-owned enterprises which they control [Spahn, 1999].

A principal task of debt management is to design an optimal debt profile that is consistent with the sub-sovereign's overall economic policy and that minimizes the cost given a prudent level of risk. The debt profile refers to the level of debt (total amount outstanding) and the structure of debt (domestic vs. foreign, fixed *vs.* floating interest rate, and long-term *vs.* short-term debts) [de la Torre, Freire, Huertas, 1999]. The most useful key indicators are: (1) the ratio of debt service to recurring revenues; (2) the ratio of total outstanding debt to GDP; (3) the ratio of total debt to the local tax base; (4) the ratio of total debt *per capita*.

Econometrical analysis of Hungarian local governments' borrowing

In order to analyze and explain local government's borrowing first the related quantitative data were collected. Directly quarterly data were available indicating local authorities' net borrowing (new debt issued minus repayments) as the sum of short term and long term loans and short term and long term securities (municipal bonds).

As it can be seen in the chart there was considerable quarterly seasonality present in borrowing activity. This statement could be proofed by testing the significance of autocorrelation coefficients. At 5% level of significance only the simple and partial autocorrelation coefficient related to lag 4 were significant meaning that borrowing patterns are connected to quarters and have been repeating themselves yearly.

Since also the possible explanatory factors for borrowing were available on yearly basis (as flow variables) and they could be interpreted and identified also yearly it was reasonable to transform the original data set to a yearly flow time series. Accordingly, a weighted average of borrowing was computed for each year based on the quarterly data where the first and last observation had a relative weight of 0.5.

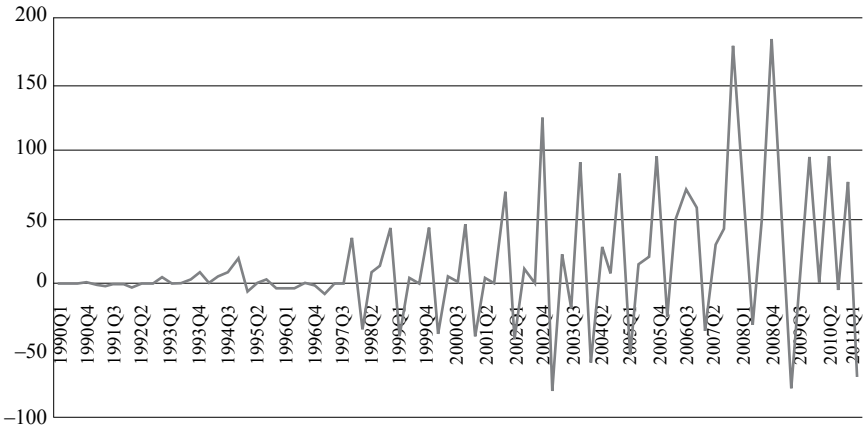

Figure 2. Local governments' borrowing between 1990Q1–2011Q1 (in billion HUF)

Source: own construction based on Hungarian National Bank's data (http://www.mnb.hu/Statisztika/statisztikai-adatok-informaciok/adatok-idosorok/xi-puszam-lak/mnbhu_nemz_modsz_idosorok090107, access: 12.08.2012)

Table 1

Autocorrelation function of borrowing (quarterly data)

LAG	ACF	PACF	Q–stat.	p–value
1	–0,1573	–0,1573	2,1796	0,140
2	–0,0204	–0,0463	2,2168	0,330
3	–0,2067	–0,2233	6,0693	0,108
4	0,6940	0,6717	50,0466	0,000
5	–0,1170	–0,0035	51,3123	0,000
6	0,0539	0,1216	51,5844	0,000
7	–0,1645	0,0942	54,1501	0,000

Source: own construction.

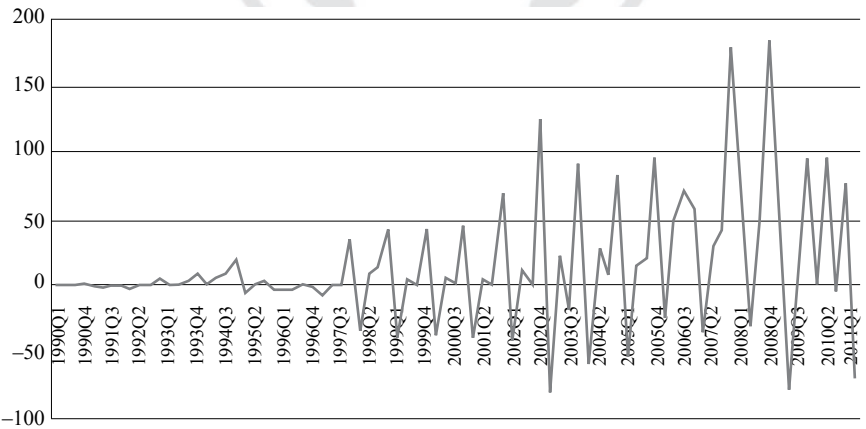

Figure 3. Local governments' yearly borrowing (flow data) between 1990–2010

Source: own construction based on own calculation.

Regression model

As it is obvious according to the chart in case of the yearly data set a clear trend can be identified with a dominant upward tendency which reached a peak of about 250 billion HUF in 2008. In order to determine and explain the changes in borrowing activity a multiple linear regression model was carried out where the explanatory (independent) variables were identified based on the theoretical background discussed in the previous section.

Independent variables (X_{jt})

Local governments' total revenues (Revenues)
Local governments' total expenditures (Expenditures)
Local governments' capital expenditures (Investments)
Central Bank Base Rate (CBBR)[2]
GDP of Hungary (GDP)
Consumer Price Index (CPI)
Dependent variable (Y_t)
Borrowing (yearly)

Using the ordinary least squares method (OLS) the model seemed to be significant (*p*-value for overall *F*-test was 0.0006) and it had a quite good fit to borrowing data ($R^2 = 0.7729$) however at 5% of significance neither explanatory variables were significant.

Table 2

Regression coefficients

	cCoefficient	sStd. error	*t*-ratio	*p*-value
Const.	–750,007	321,218	–2,335	0,0350**
Revenues	0,199922	0,296992	0,6732	0,5118
Expenditures	–0,118335	0,334478	–0,3538	0,7288
Investments	0,137304	0,387849	0,3540	0,7286
Central_Bank_Ba	0,597270	3,77596	0,1582	0,8766
GDP	–3,29367e-06	0,000227268	0,01449	0,9886
CPI	5,31362	2,73173	1,945	0,0721*

Source: own construction.

Testing the theoretical assumption for the linear model also indicated that the model cannot be considered as adequate because among others errors terms followed not a normal distribution and even autocorrelation was present. As a conclusion it could be stated that although borrowing depends on the chosen

[2] It was calculated as a duration-weigthed average for cases where CBBR was not constant for the whole year.

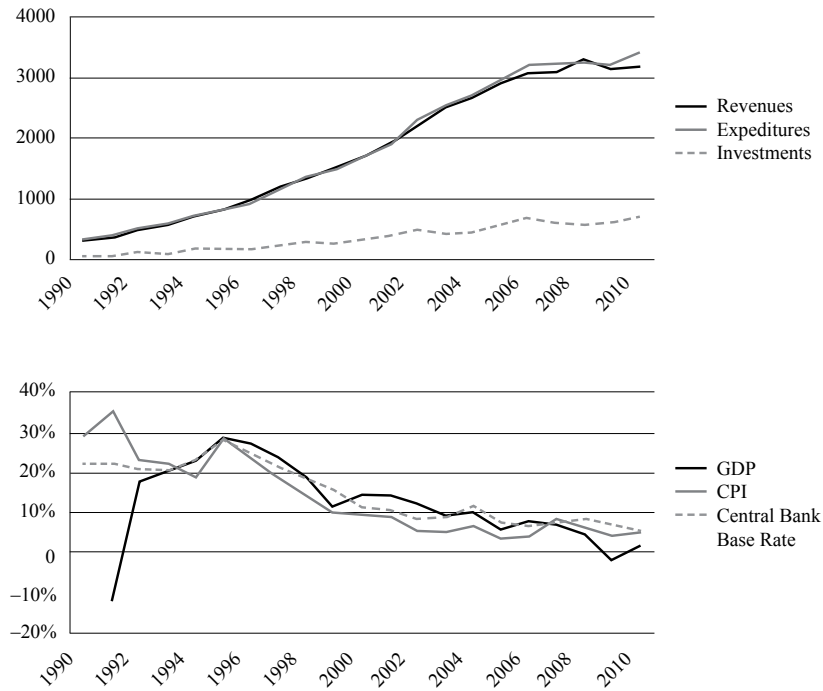

Figure 4. The formation of the value of explanatory variables (1990–2010)
Source: own construction.

explanatory factors (except for GDP) but as a model they are not able to provide sufficient explanation for borrowing in time. As possible reasons the role of random factors and the effect of previous behaviour (behaviour patterns) could be mentioned. In order to test the validity of the previous hypothesis I tried to identify an Autoregressive Moving Average Model (ARIMA) for the time series.

Table 3

Correlation coefficients, using the observations 1990–2010[3]

Borrowing	Revenues	Expendi-tures	Invest-ments	Central_ Bank_ Base Rate	GDP	CPI	
1,0000	0,8288	0,8273	0,8002	–0,6890	0,3785	–0,6212	Borrowing
	1,0000	0,9988	0,9816	–0,9158	0,4374	–0,9045	Revenues
		1,0000	0,9876	–0,9204	0,4635	–0,9017	Expenditures
			1,0000	–0,9267	0,4942	–0,9056	Investments
				1,0000	–0,4272	0,9110	Central_ Bank_ Base_Rate
					1,00000	–0,3379	GDP
						1,0000	CPI

Source: own construction.

[3] At 5% level of significance critical value (two-tailed) = 0.4329 for n = 21.

Autoregressive Moving Average Model

The ARIMA procedure can help with analyzing and forecasting our data on borrowing by predicting a value in the response time series as a linear combination of its own past values, past errors (also called shocks or innovations), and current and past values of other time series:

$$Y_t = \varepsilon_t + \varphi_1 \cdot \varepsilon_{t-1} + \varphi_2 \cdot \varepsilon_{t-2} + ... + \varphi_q \cdot \varepsilon_{t-q} + \Theta_1 \cdot Y_{t-1} + \Theta_2 \cdot Y_{t-2} + ... + \Theta_p \cdot Y_{t-p}$$

The input series for ARIMA needs to be **stationary**, that is, it should have a constant mean, variance, and autocorrelation through time. However based on the line-chart (see: Figure 3) a clear upward trend was identified in our time series and the same conclusion could be drawn according to the autocorrelogram as well.

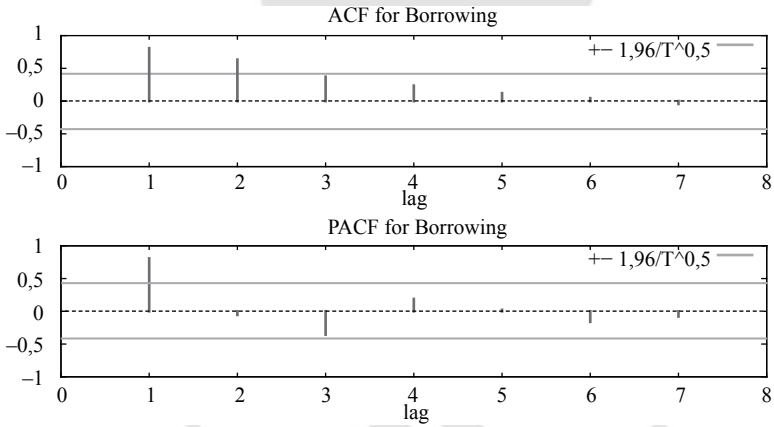

Figure 5. Autocorrelogram for Borrowing
Source: own construction.

Therefore, the series first needs to be differenced until it is **stationary**. The number of times the series needs to be differenced to achieve stationarity is reflected in the *d* parameter. According to the plot of borrowing and the autocorrelogram our time series requires only first order non seasonal (lag=1) differencing.

As it can be seen above the *p*-values of Ljung-Box Q test and the autocorrelogram supported that the first-difference series of borrowing (d_Borrowing) becomes stationary. At this stage we are already be able to decide how many autoregressive (*p*) and moving average (*q*) parameters are necessary to yield an effective but still *parsimonious* model of the process.[4] Since in practice the numbers of the *p* or *q* parameters very rarely need to be greater than 2 as the firs step only four possible combinations of the models (*p*=0, *q*=0; *p*=0, *q*=1; *p*=1, *q*=0;

[4] *Parsimonious* means that it has the fewest parameters and greatest number of degrees of freedom among all models that fit the data.

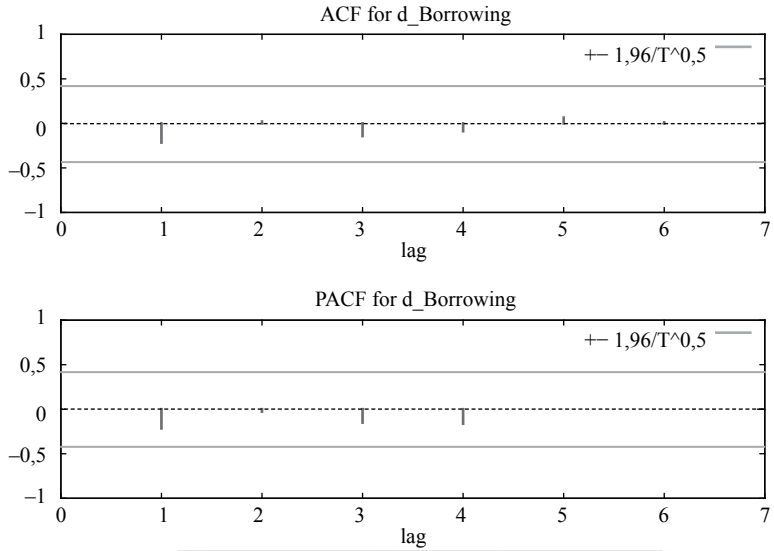

Figure 6. Autocorrelogram for first order differencing of Borrowing
Source: own construction.

Table 4

Autocorrelation function for d_Borrowing

LAG	ACF	PACF	Q-stat.	p-value
1	–0,2156	–0,2156	1,0761	0,300
2	0,0206	–0,0271	1,0865	0,581
3	–0,1419	–0,1503	1,6080	0,658
4	–0,0882	–0,1626	1,8220	0,768
5	0,0648	0,0017	1,9451	0,857
6	0,0117	–0,0012	1,9494	0,924
7	–0,0978	–0,1436	2,2731	0,943

Source: own construction.

p=1, q=1) were compared. Among the examined models the following mixed model – ARIMA (1,1,1) – seemed to be suitable:

$$Y_t = 8.37884 + Y_{t-1} + 0.625454 \cdot (Y_{t-1} - Y_{t-2}) - 0.99999 \cdot \varepsilon_{t-1}$$

As Table 5 shows all the coefficients of the model are significant at a very low level of significance and since the variance estimate, AIC (Akaike information criterion), and SBC (Schwarz's Bayesian criterion) are all smaller than they were for the other models indicated that the ARIMA(1,1,1) model fits the data better without over-parameterizing.

Table 5

Statistical output for ARIMA(1,1,1)

	Coefficient	Std. error	*z*	*p*-value
Const.	8,37884	2,64271	3,1706	0,00152
phi_1	0,625454	0,198704	3,1477	0,00165
theta_1	–0,999999	0,151614	–6,5957	<0,00001
Akaike criterion (AIC) 206,7956				
Schwarz criterion (SBC) 210,7786				

		Real	Imaginary	Modulus	Frequency
AR					
	Root 1	1,5988	0,0000	1,5988	0,0000
MA					
	Root 1	1,0000	0,0000	1,0000	0,0000

Source: own calculation.[5]

Although the hypothesis that error terms follow a normal distribution had to be rejected at a level of 5% of significance (*p*-value=0.00004), the second important group of assumption of ARIMA model was met that is no significant autocorrelations and partial autocorrelations could be detected for the residuals. That is there is a strong evidence that the ARIMA(1,1,1) is suitable for our time series.

Table 6

Residual autocorrelation function

LAG	ACF	PACF	Q-stat.	p-value
1	–0,0430	–0,0430	0,0427	0,836
2	0,0922	0,0905	0,2506	0,882
3	–0,0850	–0,0783	0,4378	0,932
4	–0,0652	–0,0807	0,5548	0,968
5	0,0480	0,0588	0,6222	0,987
6	–0,0109	–0,0004	0,6260	0,996

Source: own construction.

As the practical extrapolation of the time series model to the borrowing of Hungarian local governments the following conclusion can be drawn: Local au-

[5] Using Kalman-filter (linear quadratic estimation, LQE), standard errors estimated based on Hessian matrix.

thorities' borrowing activity cannot be explained only with help of quantitative macro-economical indicators such as total subnational revenues, expenditures, CPI, GDP, etc. Namely, the formation of debt was mainly determined by behaviour patterns of local governments and by random (unforeseeable) shocks caused by changes in central regulation. The short term patterns in borrowing attitude are due to the four-year long election cycle of local representatives while adapting to random shock happens quickly within one year (and this is the reason for using lag 1 in model for error terms). It also means that in order to understand debt policy of the Hungarian local government sector the so called "shocks" need to be identified and analyzed. Accordingly, in what follows I try to determine different time-phases (periods), which can be described by different characteristics and makes explanation for the formation of local debt.

Local borrowing in Hungary: Stages of development and restriction

Early development of subnational debt markets (1990–1995)

The *Act on Local Self-Government (1990/LXV)* allowed the free borrowing – hereby also the issuance of bonds – of municipalities without the permission of Central Government. Nonetheless, in the early 1990s Hungarian local governments were reluctant to use loan resources because of the over-indebtedness of the previous socialism regime, and they considered indebtedness as a sign of weakness. Indebtedness started to increase only in 1993 rapidly firstly due to the investment needs of local infrastructure and to maintenance costs of assets privatized from the central government.

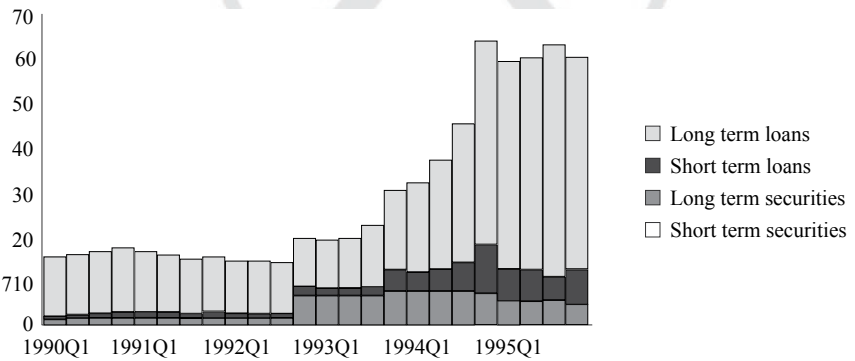

Figure 7. Local debt between 1990–1995 (in billion HUF)

Source: own construction based on Hungarian National Bank's data (http://www.mnb.hu/Statisztika/statisztikai-adatok-informaciok/adatok-idosorok/xi-puszamlak/mnbhu_hazt5, access: 10.08.2012).

Restriction (1996–1997)

Because of the national economic recession and high inflation rate as well as insolvency situation of a few local governments (Bakonszeg, Nágocs, Páty, Bátorliget) strict restrictive measure took effect concerning local borrowing in 1995. Amending the *Act on Local Self-Government (1990/LXV)* legal restrictions came into force and according to these, municipalities are not permitted to meet their debt service obligations from Personal Income Tax Revenues, Normative State Contribution, Central Subsidies or sales of Core Assets and total debt[6] cannot exceed the Corrected Current Own Revenues, which is 70 per cent of the positive difference between Current Own Revenue and Short Term Liabilities. Nonetheless, regulation – though unintentionally – left a loophole: the debt limit doesn't apply to liquid loans.

Another important instrument for regulation restricting loan financing of local governments was the Act on debt settlement procedure of local governments, in other words the local government bankruptcy act. In 1996 the Bankruptcy Law for municipalities *(Municipal Debt Adjustment Act, Law XXV)* had been prepared and come into force. The law defines a debt adjustment process whose objective is to allow local governments to regain their financial health while at the same time protecting the rights of creditors. The Municipal Debt Adjustment Law defines and restricts the risk of investing in local debt by imposing a definite financial and moral cost on local governments who default on debt or other payments [Makay, 2004]. Consequently the local government bankruptcy act provides excellent basis and background for the assessment of credit risks of bonds but it cannot solve problems originating from the non-transparent financial report system alone and cannot substitute the deficiencies of other, alternate institutional solutions of risk management.

Moderate Growth (1998–2006)

After the early and temporal "debt-boom" in the middle of 90s the size of indebtedness started to increase considerably, first in 2002. One of the reasons was the favourable macroeconomic environment (low inflation rate, moderate interest rates). The increase was also due to the decrease of revenues deriving from privatized asset sale and the increasing investment demand could not be met by central government support. Since the EU accession in 2004 – insuring their own part in tenders – indebtedness has been increasing, though it has not exceeded 2.5 percent of the GDP yet.

On the 1st January 2002 the law on the "Capital Market" took effect and the decree on "Bonds" is of legal force also from the same date. Both measures indicated considerable changes within the regulation on local government bond issues. A very important argument for bonds in Hungary is that this way of

[6] Bank loans, municipal bonds, lease, third-party obligations and commitments.

financing does not require the local authority to announce public procurement, which decreases the administrative burden on the one hand and the issuer's responsibility on the other. Regulation prefers unintentionally bonds to bank loans since public procurement process requirements do not apply to the issuance of bonds.

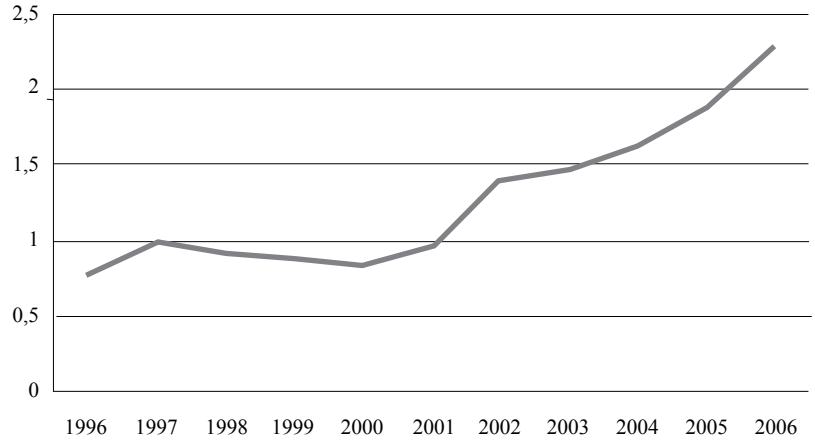

Figure 8. Borrowing of local governments in Hungary in the percentage of GDP (1995–2006)
Source: own calcultation based on Hungarian National Bank's data.

Examining the features of municipal bonds issued by local governments in Hungary it can be stated that almost all bonds were placed privately and the buyers were only commercial banks. Municipal bond therefore could be considered as *bank loans in disguise*. One possible explanation for it can be that in Hungary the method of capital market financing is a less accepted and widespread solution than borrowing from a bank. That is the issuer local governments – in case this alternative have been considered at all– have not taken the risk of remaining without buyers even if the public issue is of much higher administrative burden.

Municipal bond-boom (2007–2010)

Compared to the mid-2000s substantial changes have occurred in the scale of indebtedness of Hungarian local governments in the middle of the first decade of 2000s. The extremely high volume of local government debt started at the end of 2006, caused primarily by the issuance of local government bonds. While up to 8 billion HUF worth of bonds were issued in 2006, the bond issuance value in 2007 nearly reached the HUF 200 billion and in 2008 exceeded this amount. Consequently the portfolio of bonds issued in HUF reached 50 billion HUF, while the value of those denominated in foreign currencies increased above 350

billion HUF[7]. According to the report made by the Public Expenditure Survey Committee, 20% of municipalities issued bonds in 2007 (among local governments that were audited by the Committee). At the end of 2010 the size of financial obligations deriving from local borrowing amounted more than 4% of GDP.

The wave of debt which started at the end of 2006 can be traced back the joint effect of various external factors. The government's bill restraining local governments' borrowing and the fear of restrictions were of primary importance among effective causes.[8] The intent to counteract the stresses originated from the resource oriented system also had an effect on borrowing proclivity but it could not be only reason for bond boom. At the same time the GFS deficit situation is clearly not the only reason for debt. No firm correlation could be established between the deficit and the development of outstanding total debt in the years studied. In addition, the accelerated increase in debt cannot be attributed to the increasingly absorbent quality of EU funds either.

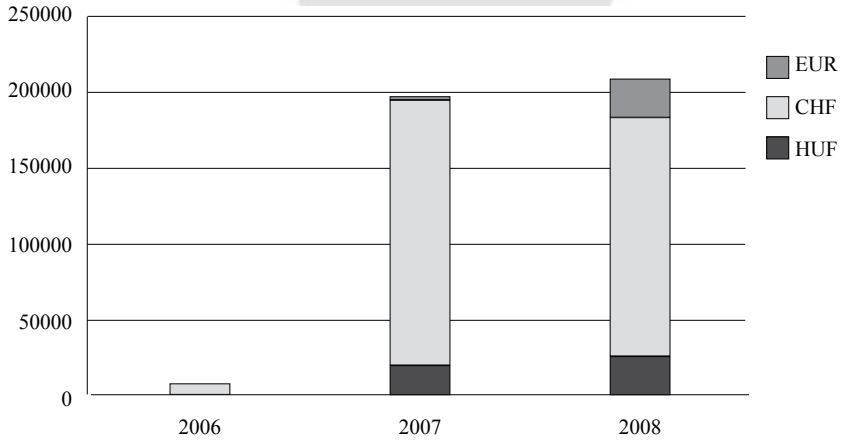

Figure 9. Bonds issued by local government sector between 2006 and 2008 (in million HUF)
Source: own construction based on Financial Supervisory Authorities data.[9]

The principal repayment of municipal bonds starts after passing of the *grace period* in almost every case. The investigation of the length of the term of the issued bonds also shows an interesting result. The shortest term was 4 years while the longest was 25 years in the examined period, between 2006 and 2008. It is unequivocally clear that the terms of bonds increased compared to before and this increase was continuous between 2006 and 2008. While the average term of bonds was 16.73 years in 2006, it was 17.2 years in 2007 and 19.3 in 2008. According to the examination of the terms of each issue we can state that we

[7] Calculated at 176 HUF/CHF and 266 HUF/EUR.
[8] Bill No. T/4320. for the modification of Act No. LXV of 1990, 9th November 2007.
[9] Note: calculated at 176 HUF/CHF and 266 HUF/EUR.

cannot find bonds with terms shorter than 10 years. The term is 20 years for the most part. Nearly half the issues had such term in 2006 while the rate increased to roughly 60 percent in 2007 and in 2008. The appearance of the extremely long term issues is an important characteristic. 6 bonds with a term longer than 20 years were issued in 2007 while 16 were issued in 2008.

Conclusion

In the early 1990s local governments were reluctant to use loan resources because of the over-indebtedness of the previous socialism regime, and they considered indebtedness as a sign of weakness. After an early and temporary "bond boom" in the middle of 1990s, the size of indebtedness started to increase considerably, first in 2002, where one of the reasons was the favourable macroeconomic environment (low inflation rate, moderate interest rates). The increase was also due to the decrease of revenues deriving from privatized asset sale and the increasing investment demand could not be met by central government support. Since the EU accession in 2004 – insuring their own part in tenders – indebtedness has been increasing. The really drastic increase in volume of local government debt in Hungary started in 2006, caused primarily by the issuance of local government bonds. While up to 8 billion HUF worth of bonds were issued in 2006, the bond issuance value in 2007 nearly reached the HUF 200 billion and in 2008 exceeded this amount. From 2006 to 2009 the value of municipal bonds issued increased sevenfold and exceeded USD 1 billion. At the end of 2010 the size of financial obligations deriving from local borrowing amounted more than 4.6% of GDP.

According to the results of the empirical analysis local authorities' borrowing activity cannot be explained only with help of quantitative macro-economic indicators such as total sub-national revenues, expenditures, CPI and GDP. Namely, the formation of debt was mainly determined by behaviour patterns of local governments and by random (unforeseeable) shocks caused by changes in central regulation. The short term patterns in borrowing attitude are due to the four-year long election cycle of local representatives while adapting to random shock happens quickly within one year. Four different time-phases (periods) can be determined, which can be described by different characteristics and makes explanation for the formation of local debt: Early development of subnational debt markets (1990–1995); restriction (1996–1997); moderate growth (1998–2006) and municipal bond-boom (2007–2010).

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