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Abstract:

The paper seeks to add to the existing literature on aggregate and private savings by focusing on transition economies. We use panel data over the period 1989-1998 and estimate a fixed-effects model. In Central Eastern European Countries, aggregate and private savings are driven by almost the same forces – this is the central focus of the paper. The most important factor behind both types of saving is income. Furthermore, it is shown that domestic saving and foreign capital are not operating as substitutes. This is an indicator for the rudimentary integration into the international financial market.

Keywords: Savings, transformation, panel data

JEL-classification: E21, G2

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1. Motivation

The experience of other emerging economies clearly shows that there is a close relationship between national saving, domestic investment and growth. However, if capital was perfectly mobile, changes in domestic investment would be independent from changes in domestic or national saving. Thus the importance of national saving for domestic investment depends on the degree of international integration of financial markets. Up until now, due to specific risks, the degree of international financial integration of the transition countries in Central Eastern Europe (CEE) is comparatively low. Consequently, these countries have to mobilize national saving to finance their catching-up process.

Before starting the transformation process, the CEE Countries had high saving ratios. However, as in the rest of the world, saving ratios differed widely between the members of the so-called Eastern bloc. With the beginning of the transformation process, the forces beyond saving changed dramatically: socialist saving was mainly “involuntary saving” induced by the state and the lack of goods. In contrast, saving in a market economy is based on agents’ decisions. Ten years after the beginning of transformation, gross national saving is expected to depend on nearly the same factors as in industrialized countries. Fundamental motives of private savings in transition economies, in particular, should be similar to those of savers in industrialized countries. One important motivation for private saving is to level out income over time on the basis of anticipated lifetime by taking into account anticipated changes in household resources, as well as the expected rate of return on savings. However, due to the weak institutional framework, uncertainty is much higher than in industrialized countries.

The empirical literature on saving focuses on developing and industrialized countries; it neglects, to a certain degree, the analyses of transition countries. Even the large database on savings, which is provided by the World Bank, (Loayza/Schmidt-Hebbel/Servén 1999) excludes the CEE economies in transition. The objective of the

paper is to close this gap. Up until now, many questions remain open: what drives saving rates in CEE? Why do they differ widely in range within the region? Is there any impact of the transformation strategy or macroeconomic decisions on the saving rates? Is there a strong correlation between savings and microeconomic factors as financial liberalization? What is the role of the interest rate? Is the relationship between savings and growth a one way link? Or are saving rates and growth interdependent? And, last but not least, is there any impact of the demographic development on the saving rate?

The paper examines the determinants of saving in eight transition countries. The countries under consideration are: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia. These are countries now on track to join the European Union. The focus of the study lies on the factors which determined gross national and private savings during the first ten years of transformation. We use data over the period 1989-1998. The paper is organized as follows: first of all we present some stylized facts on savings in CEE (Section 2). Section 3 deals with theoretical aspects of saving behavior and its determinants. The focus of Section 4 lies on the appropriate model specification, before we present the database and the empirical findings in Section 5. The paper concludes with a brief discussion of the results and issues for future research (Section 6).

2. Stylized facts

Saving rates had been exceptionally high in Central Eastern European Countries during the socialist era. In the eighties, in the industrialized world, aggregate saving rates reached about 20 percent of gross domestic product and tended to decline. However, at the end of the eighties, aggregate saving reached a level around 30 percent of gross domestic product in socialist countries. Within the socialist system, gross domestic saving was mainly driven by three factors: first, it reflected “planned” saving which was necessary to fund the “centrally planned”

investment. Second, it was caused by the lack of consumer goods; this kind of saving was called “involuntary” or “forced” saving. In addition, although neglected in most analyses, there was also voluntary private saving, especially to finance durable consumer goods. Although there were similar saving motives in the socialist countries, saving rates differed widely within the socialist bloc. In 1989, highest aggregate saving rates were reported in Poland (42.7 percent of GDP), while aggregate saving reached 13.1 percent in the Kyrgyz Republic (Denizer/Wolf 1998).

With the beginning of the transformation process the motives for savings changed; at the same time aggregate saving rates dropped sharply (Table 1). During the initial years of transition, the countries under consideration reported cuts in saving rates from the level above 30 percent to less than 20 percent; saving fell much more than gross domestic product. At a glance, this drop could be interpreted as a reaction to the former consumption constraint and the saving overhang inherited from the past. However, at least one other factor has to be taken into account: the sharp increase in institutional uncertainty with the beginning of the transformation process.

The dynamics of saving have been an issue for many developing countries and emerging markets, namely in Latin America and Asia. Key characteristics of the Central Eastern European Countries such as high inflation rates, chronic fiscal deficits and an only rudimentary developed financial system, are also observed in other emerging economies. However, the transition countries differ from other emerging markets in at least one key aspect. This is the fact that the establishment of new market oriented institutional structures is a part of the overall transformation process itself. Given that the implementation of market-oriented institutions takes time, the incentive structure to save is ambiguous. Beyond this background, it is remarkable that in the first years of transformation, the aggregate saving rate remained not only positive, but it even remained on a level comparable to those in OECD countries.

Transition is a big exogenous shock. While all transition countries experienced the breakdown of the former system in a similar way, they were in different starting positions and conditions to overcome the deep recession. Differences existed, on the one hand, in the development of the private sector and in experiences with liberalization policies. On the other hand, the countries followed different policy approaches to create a well-performing market economy. In this context, a wide range of different therapies was implemented: Poland, for example, tried a so-called “shock-therapy” while Hungary was trying a gradual approach. Consequently, the differences concerning the economic development among the countries of the former Eastern bloc increased. With the first signs of economic recovery, the saving rates began to grow very slowly – and not simultaneously in all countries. The proportion of GDP allocated to capital formation (investment ratio) is one of the key determinants of sustained economic growth. Since domestic investment can be financed only from domestic and foreign saving, the difficult access to international capital markets makes domestic savings the main source of investment in Central Eastern Europe.

Table 1: Saving Rates

Country		1989	1993	1998
CZE	Czech Republic	30.6	28.2	28.5
EST	Estonia	25.9	22.7	19.7
HUN	Hungary	29.9	11.6	28.4
LVA	Latvia	38.0	25.0	9.8
LTU	Lithuania	25.8	11.4	12.3
POL	Poland	42.7	15.5	21.3
SVK	Slovak Republic	28.5	21.8	28.2
SVN	Slovenia	33.0	20.4	23.7
	Average	31.8	19.6	21.5
	Standard deviation	5.5	6.2	7.3

Source: The World Bank: World Development Indicators, CD-ROM; different issues; own calculations.

3. Theoretical considerations

All saving theories are based on inter-temporal utility maximization. While there is a huge theoretical literature on the determinants of private saving, the determinants of governmental saving are mostly neglected. A benchmark for the theoretical investigation of private saving is marked by the life-cycle model originally developed by Modigliani (1970). Broadly speaking, savings are simply the result of the decision between present and future consumption. Within the life-cycle model, saving is motivated by the attempt and desire to level out life-time consumption despite uneven income flows. To do so, the saving rate of the working population is positive, whereas that of the retired population is negative.

Later, the pure life-cycle model of saving was augmented in several ways. A prominent example, by Feldstein (1980), is the integration how savings are affected by social security systems. Other authors focused on the problem whether liquidity constraints have a considerable impact on private saving behavior (Jappelli/Pagano 1994). However, the main idea beyond these approaches can be presented in a simple manner².

Therefore we assume, that the immortal individual maximizes its expected utility, $E(U)$, over time

$$\max \int_0^{\infty} E[U(c_t, g_t)e^{-\rho t}] dt \quad (1)$$

subject to

$$\int_0^{\infty} c_t e^{-rt} dt \leq W \quad (2)$$

² See also Edwards (1995). To get a household utility function the number of family members has to be integrated into the model. That is : $\max \int_0^{\infty} E[U(c_t, g_t)e^{nt} e^{-\rho t}] dt$ with n as the number of family members. For simplicity and without any loss of information we focus on the saving behavior of an individual.

$$W = \int_0^{\infty} y_t(1-\tau) e^{-rt} dt \quad (3)$$

$$S_t = [y_t(1-\tau) - p_t c_t] \quad (4)$$

$$-k \leq S_t \leq y_t(1-\tau) \quad (5)$$

The time separable utility function of the individual, $U(\cdot)$, depends on the consumption of private goods (c) and public goods (g). We assume that $U(\cdot)$ is increasing in c and g and is concave – $u'(c) > 0$; $u''(c) < 0$ as well as $u'(g) > 0$; $u''(g) < 0$ ³. In this utility specification, the multiplier ($e^{-\rho t}$) involves the pure rate of time preference (ρ) with $\rho > 0$. A positive ρ reflects the fact that consumption is valued less, the later it is received. W is the total wealth of the individual. It depends on income (y_t), official taxation (τ), which reflects the price of the public goods and the multiplier (e^{-rt}), which involves the exogenous real interest rate. Saving (S_t) is defined by subtracting consumption from net income, whereby p is the price of the consumption good. Saving does not necessarily have to be positive; a negative sign indicates dissaving or consumption financed by credit. First order conditions of this simple model (equations 1-4) are well known: the ratio of marginal utilities at any two moments has to equal the real interest rate.

However, equation 5 leads us to the so-called borrowing constraint (k). It is assumed that savings are less than net income in any period and that there is a certain limit for borrowing. This constraint itself depends on the amount of saving. With a binding borrowing constraint, which reflects a low performing financial sector, motives for saving change; the role of precautionary saving and liquidity preference will increase – which is reflected in a change of the utility function: it turns into a convex one. At the same time, the marginal consumption of present consumption will exceed the expected utility of future consumption.

³ It holds the Inada conditions.

The model sketched above (equation 1-4) gives us a first impression of the expected signs of the determinants of saving:

Income: saving is expected to increase with net income. Empirical studies, which focus on the income level, didn't just find that income is positively correlated to saving, but also that income plays a key role in explaining saving behavior (Masson/Bayoumi/Samiei 1995; Edwards 1995; Loayza/Schmidt-Hebbel/Servén 1999).

Interest rate: there is an ambiguous effect of interest rates on saving. Whether its influence is positive or negative depends on the relative strength of the income (or wealth) and the substitution effect. However, empirical studies usually only find a weak interest rate elasticity of aggregate and private saving (Fry 1995; Bailliu/Reisen 1998, Loayza/Schmidt-Hebbel/Servén 1999). These findings present a strong contrast to many macroeconomic arguments, and even more relevant for our purpose, to the traditional literature on financial repression and financial development which argues that interest rate liberalization forces savings and in turn economic growth.

Demographics: one important implication of the life-cycle model is that the saving rate changes over the individual's lifetime systematically. According to the theory, individuals realize their highest saving rate at the point of their highest earnings, which is during their working phase. Correspondingly, individuals have negative saving rates when they are young and they have only low income during their retirement phase. As a consequence, saving behavior is directly influenced by the age of the individual. On the aggregate level, private savings are influenced by the age structure of the population which is reflected in the so-called dependency ratio. In their famous empirical studies, Leff (1969) and later Modigliani (1970) came to the conclusion that demographics, indeed, deeply influence saving behavior. Much work has had to be done since then. However, the empirical results of more recent studies, using different econometric approaches and different data sets, are ambiguous.

Borrowing constraint: the simple life-cycle approach argues that young as well as old people will dissave to level out their consumption over their own life time. However, for young people, the possibility to dissave depends on the ability to borrow. If there is a binding borrowing constraint, young individuals would like to increase consumption according to their inter-temporal preference structure, although there is no way to do so. In this way savings increase over a life time. In other words, according to this model, a low performing financial sector forces c.p. higher private savings over time. Empirical studies do not confirm this argument. Furthermore, Loayza et al. (1999) and Edwards (1995) discovered a negative impact of the borrowing constraint on saving – an important empirical argument for the financial sector reform programs in emerging economies.

Government: in the model above, fiscal policy is influencing private savings through two channels: the provision of public goods and taxation. Changes in the supply of public goods and official taxation have an effect on the private consumption/saving decision. However, the concrete effect of changes in the supply of public goods depends on the degree of substitutability between private and public goods. The motives beyond the governmental consumption/saving decisions are not addressed in this model. This shortage leads to the problem that the model only explains private saving decisions, and not the aggregate saving behavior. Although this lack of theoretical foundation is well known, empirical studies, focusing on aggregate saving, often conflict within the theoretical framework of the life-cycle model. Up until now, the relationship between government and private saving has been an important issue in the context of fiscal policy.

Within the life-cycle model, any increase in taxation reduces savings. However, in the case of transition economies, it is necessary to distinguish between "official taxation" and "unofficial taxation", whereby the latter is anything that benefits the government and imposes costs on the private sector without showing up on the budget. Typical forms of "unofficial taxation" are off-budget activities, opaque systems of indirect subsidies and payments mostly on a non-cash basis. These phenomena

occurred, in particular, during the early stages of transition. Usually, the “unofficial taxation” increases the overall tax burden to be paid by private participants.

Institutions: institutions are not explicitly modeled within the theoretical framework mentioned above. However, institutions are implicitly registered by the supply of public goods. Institutions are simply defined rules of the economic game in a society. From a theoretical point of view, it can easily be shown that the quality of the “institutional and legal framework” and the design of “property rights” affect the performance of the economy as a whole. Seeing as investment is necessary for economic development and is eased by credit financing, the quality of the creditor protection as a part of the “institutional framework” has an important impact on the performance of the domestic financial market and, therefore, on the growth prospects. In order to analyze savings during the transformation process, it makes sense to construct a transformation indicator which reflects the status of liberalization and privatization.

4. Model specification

In order to examine what drives domestic and private saving in the CEE Countries during the transformation process we conducted an econometric analysis, using our panel data set to take advantage of the variations both across countries and over time. In general, a model that combines time series and cross-sectional data can be written as

$$y_{it} = \beta_{1it} + \sum_{k=2}^K \beta_{kit} x_{kit} + e_{it} \quad (6)$$

where $i=1,2, \dots, N$ refers to a cross-sectional unit (here it refers to a country) and $t=1,2, \dots, T$ refers to a given time period. y_{it} denotes the dependent variable for country i at time t and x_{kit} stands for the k th non-stochastic regressor for country i at time t . The stochastic error term e_{it} is assumed to have mean zero, $E[e_{it}] = 0$, and a constant variance, $E[e_{it}^2] = \sigma_e^2$. The β_{kit} are the values of the unknown response

coefficients. For the most general case, they are varied for different countries and different time periods (Judge/Griffith/Hill/Lütkepohl/Lee 1985).

The problem, when using panel data for estimation, is to choose a model specification that adequately allows for differences in behavior over cross-sectional units, as well as for changes in behavior of a given cross-sectional unit over time. In the following we restrict the general model to a specification, where a varying intercept term is assumed to capture differences in behavior over countries (country-specific effects) and where the slope coefficients are assumed to be constant. This model can be written as

$$y_{it} = \beta_{1i} + \sum_{k=2}^K \beta_k x_{kit} + e_{it} \quad (7)$$

where $\beta_{1i} = \bar{\beta} + \mu_i$ is the intercept for the i th country, $\bar{\beta}_1$ denotes the „mean intercept“, and μ_i represents the deviation from this mean for the i th country. The appropriate estimation procedure for the above equation, depends upon whether the country's specific effects (μ_i) are assumed to be fixed or random.

Before we set up our econometric analysis, we have to find out whether we should model a fixed or random-effects model. This is an important point because the reliability of our estimations depends on the right model specification. The important assumption to be noticed for the two models is that the random-effects model assumes $E(x_{it}\beta_{1i}) = 0$ for all i , whereas in a fixed-effects model, the individual country effect (β_{1i}) may be correlated with the regressors. If we estimate a random-effects model, and the individual country effect is correlated with the regressors, the model is similar to an omitted variable mis-specification and its estimator will be biased.

For this reason we estimated both models and checked the results of the random-effects model with the Hausman specification tests. The test indicates that there is evidence the individual country effect and the explaining variables are not correlated. On the other hand, we have to bear in mind, that our sample is quite small and that the test may have low power because of this small sample size. We compared the

advantage (more efficient estimator) of a random-effects estimation – given that the underlying assumptions are correct – with its disadvantage (mis-specified model) and we decided to estimate the fixed-effects model given the rather weak data situation.

5. Database and empirical findings

A lot of work has already been done on the empirical determinants of saving. However, the analysis of saving behavior is traditionally plagued by data problems. National or aggregate savings are usually calculated by subtracting foreign saving from gross domestic investment. In this paper we use time series for aggregate (domestic) saving, which are published by the World Bank in the „World Development Indicators“. However, household savings and corporate sector savings are unavailable for most countries. Consequently, there is no other choice than to calculate private savings indirectly. We decided to construct private saving by subtracting general government deficit and gross fixed capital formation from aggregate saving.

Given that we are going to explain domestic and private saving, we estimated two different equations. In the first regression the dependent variable is the ratio of gross domestic saving to GDP, in the second it is the ratio of private saving⁴ to GDP. The explanatory variables are the following:

- annual growth rate of real GDP as a proxy for income
- the nominal GDP per capita measured in USD as a proxy for the income level
- inflation rates measured as annual growth rates of the consumer price index and interpreted as a proxy for uncertainty
- real interest rates
- unemployment rates
- current account balance as a percentage of GDP as a proxy for the international borrowing constraint of an economy

⁴ Private saving includes that of households and enterprises.

- youth and old-age dependency ratio defined as people aged 0-14 and 65 and over to the working age population
- an index that reflects the progress in the transformation process. This index is calculated on the basis of the set of transformation indicators (1994-1998), published in the Transition Report of the EBRD. For the first few years of transformation, this index is supplemented with information offered by national organizations for the progress of the legal transformation process in the countries under consideration
- in the case of testing the determinants of private saving public saving as an additional variable.

The countries included in the data set are the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia. The yearly data covers the period 1989-1998 and is taken from the World Bank „World Development Indicators“, the EBRD Transition Report, IMF International Financial Statistics and national statistics (see Table 4 (Appendix) for details). The data went under extensive checks not just to make them comparable and compatible, but also to identify econometric problems. However, it is likely that our database still contains some problems related to the data quality and measurement issues and the small sample size may also influence the results. For that reason, we cross-checked our results in estimating a random-effects model (which is also appropriate according to test statistics) and a feasible generalized least squares estimation, for which we controlled heteroscedasticity across panels. The results of the three different estimations are very similar. In the following, we only present the results for the fixed-effects model. The coefficients of the country-specific intercept term are significant and are not reported in the tables.

Table 2: Results of the fixed-effects model*Dependent variable: gross domestic saving as a share of GDP*

	Coefficient	t-Statistic
Growth	0.263	2.095
Inflation	0.016	3.827
Current account balance	0.334	2.308
Youth dependency ratio	-1.489	-2.543
Old-age dependency ratio	-5.246	-2.359
Transformation D_1	5.858	2.105
Transformation D_2	-7.606	-3.197
Obs	59	
R ²	0.77	

Table 3: Results of the fixed-effects model*Dependent variable: private saving as a share of GDP*

	Coefficient	t-Statistic
Growth	0.231	1.944
Inflation	0.016	4.449
Public saving	-1.243	-5.133
Current account balance	0.435	3.263
Youth dependency ratio	-1.747	-3.220
Old-age dependency ratio	-4.160	-2.042
Transformation D_1	5.653	2.167
Transformation D_2	-6.127	-2.794
Obs	58	
R ²	0.80	

It is striking that both gross domestic and private saving are determined by the same variables and that even the coefficients are very similar. As expected from theory, the growth rate, here used as proxy for income, positively effects saving. Additionally, the importance of income is reflected in the sign of the demographic variables. Seeing as, both the youth and the old-age dependency ratio show negative signs, the

transition countries, under consideration, behave in the expected manner: on an aggregate level a higher proportion of people, not belonging to the work force, and therefore, with no or low income, reduces domestic saving. All in all, these findings underpin the hypothesis that income is positively related to saving. In contrast, according to our estimation, income level only has a weak effect on saving.

At the same time, inflation is highly significant in both estimations and has a positive sign. Given that we consider inflation as a proxy for uncertainty, this result is in line with the idea that precautionary saving rises in times of greater uncertainty. This argument gains power from the fact that, in periods of high inflation rates and uncertainty, precautionary saving leads to dollarization and capital flight; phenomena, which are well known in transition countries.

In our estimations we used the current account balance as a proxy for some kind of international borrowing constraint. A current account deficit implies that a country gets credit from foreign countries. We assumed that domestic saving and foreign capital might be substitutes and, therefore, we expected a negative sign or, in other words, that a higher current account deficit is linked to reductions in domestic saving. This expectation is not supported by the estimation results. However, this finding supports the idea that a borrowing constraint does not increase saving – even in the international context.

An important determinant of private saving is public saving. As shown in Table 3, public saving crowds out private saving. Higher public savings may be reached through expenditure cuts or higher taxation. According to the life-cycle model, both factors cause a decrease in private saving. However, this is not a one-to-one relationship, as the Ricardian equivalence theory suggests.

The interpretation of the coefficients of the transformation index requires some explanation. The transformation index we used characterizes the progress in the transformation process with three different states. We decomposed this index into three dummy variables and took the state, that is reflected as the most advanced in

the transformation process, as our reference. Thus, our estimation indicates that compared to now, the saving rates were higher at the beginning of the transformation process and dramatically lower during the following transformation period. This result is very much in line with the fact that the countries under consideration exhibited very high saving rates at the end of the eighties. In the following years the saving rates sharply declined and are now recovering gradually.

In Table 2 and Table 3 we only present the determinants, which have a significant influence on saving. We also checked the influence of further variables, often used in empirical analyses, but insignificant in our case, and they are, therefore, omitted from the estimation equations. In contrast to many empirical studies, the real interest rate (real lending and real deposit rate) is not at all significant. Furthermore, the credit to the private sector, which is usually taken to model the budget constraint of the private household, did not show any influence on the saving behavior. Many empirical analyses use M2/GDP as a proxy for the performance of the financial sector. In our case this variable is completely insignificant.

6. Conclusion

In Central Eastern European Countries, aggregate and private savings are driven by almost the same forces – this is the central focus of the paper. The most important factor behind both types of saving is income. This explains the big differences in saving ratios across the region. With regard to the relationship between private and public saving, there is strong evidence for crowding out of the private sector. The role of the domestic interest rate is negligible. Furthermore, it is shown that domestic saving and foreign capital are not operating as substitutes. This is an indicator for the rudimentary integration into the international financial market. Additionally, the transformation indicator shows that, in the case of the countries under consideration, institutions have a direct influence on domestic saving. The

better the institutional framework, the lower the savings caused by the precautionary motive.

The empirical analysis, presented in this paper, is only a first step with regard to a larger project to analyze domestic and private saving in the CEE Countries under transition. First of all, we concentrated on the countries which provide an almost complete database for the years 1989-1998 in order to get an idea of what the fundamental determinants of saving in these countries are. Nevertheless, we must bear in mind that the database is still weak and, for that reason, we are going to improve our data set in collecting further information from the national organizations. Secondly we are going to enlarge our sample in order analyze the determinants of saving of those CEE Countries that are still very much in transition.

Appendix

Abbreviations

CEE	Central Eastern Europe
CZE	Czech Republic
EBRD	European Bank for Reconstruction and Development
EST	Estonia
GDP	Gross Domestic Product
HUN	Hungary
LTU	Lithuania
LVA	Latvia
POL	Poland
SVK	Slovak Republic
SVN	Slovenia
USD	US Dollar

Table 4

Data	Source
Demographic Structure	
Dependency ratios	World Bank, World Development Indicators
Youth dependency ratio	World Bank, World Development Indicators; own calculations
Old-age-dependency ratio	World Bank, World Development Indicators; own calculations
Urbanization ratio	World Bank, World Development Indicators
Economic Development	
GDP per capita	World Bank, World Development Indicators; own calculations
GDP growth	World Bank, World Development Indicators; National Statistics
Aggregate saving	World Bank, World Development Indicators
Unemployment	National Statistics
Current account balance	World Bank, World Development Indicators; International Monetary Fund, International Financial Statistics
Monetary and Financial Market Indicators	
CPI	National Statistics
Private or domestic credit	International Monetary Fund, International Financial Statistics
Interest rates	International Monetary Fund, International Financial Statistics
Real interest rate	Own calculations
M2/GDP	International Monetary Fund, International Financial Statistics; own calculations
Government	
Deficit (Government)	National Statistics
Government fixed investment	National Statistics
Transformation indicator	Own calculations

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