Long Run Growth Effects of Fiscal Policy - a Case Study of Hungary

ADRIENN ERŐS, Ph.D.
ASSOCIATE PROFESSOR

e-mail: geteros@uni-miskolc.hu

SUMMARY

One of the most debated questions of economics is whether the pace of long run economic growth can be influenced by economic policies. The (long run) steady state growth rate of the economy is determined by two exogenous factors according to neoclassical theory. But Endogenous growth theories support the view that (among other factors) fiscal policy can affect economic growth through several channels, some of which can give positive, while others negative impulses to the rate of growth. The paper deals with the long run growth effects of fiscal policy in Hungary, emphasising that restrictive fiscal policy actions can still have a beneficial effect on the long run growth rate of the economy, founding such growth-oriented actions in the future, which could not have been taken without the earlier stabilisation. An outstanding growth-fastening effect is the lesson we can learn from comparing the fiscal data of the 1994-1996 period with the 2003-2005 data.

THE THEORY OF ECONOMIC GROWTH

One of the most debated questions of economics is whether the pace of long run economic growth can be influenced by economic policies. The (long run) steady state growth rate of the economy is determined by two exogenous factors according to neoclassical theory: the growth rate of the economically active population and the pace of technological progress. As these factors are independent of the decisions of economic actors, fiscal policy can not influence the long run growth rate of the economy. But over the short run, when the economy is on a transition path, even neoclassical theory accepts fiscal policy can determine the rate of growth, by giving incentives to economic actors to make better use of capacities, for instance, by enhanced government expenditures, or state investments (that is, by introducing Keynesian demand-stimulant actions). Governments are able to influence distinct economic factors, though only to a limited extent and only temporarily. Government policies can only affect the level of output, but not the steady state growth rate. It is important to mention that "these temporal beneficial effects can be felt for as long as even twenty years in some cases." (Gemmel, 2001)

"Endogenous growth is long-run growth at a rate determined by forces that are internal to the economic system, particularly those forces governing the opportunities and incentives to create technological change." (Howitt, 2006) This theory is of utmost importance in that it allows fiscal policy to influence economic growth. "According to the endogenous theory of growth the rate of long run economic growth depends on such governmental activities as taxation, the protection of law and order, supplying infrastructure, the defence of immaterial goods, and the regulation of international trade, capital markets and other segments of the economy. That is why governments can have a wide range of possibilities to influence long run economic growth both in positive and negative directions." (Barro, 2005)

In these models, fiscal policy can affect economic growth through several channels, some of which can give positive, while others negative impulses to the rate of growth. Fiscal policy can influence innovation activities, enhancing technological progress and thereby growth. (Howitt, 2006) It can have production externalities, by founding the optimal usage of the private sectors' resources in the fields of education or infrastructure. (Barro, 1988) Fiscal measures can influence both human and physical capital accumulation, as lower tax burdens enable a higher rate of return, and they can change the relative prices of capital and labour as well. "Incentive effects of policy can influence economic activity-taxation, and can readily lead to development traps and growth miracles". (King-Rebelo, 1990) The crowding-out effect must be mentioned too (Barro, 1988), as well as the role of income redistribution, which can have negative and positive effects in parallel. Income redistribution can be an incentive to entrepreneurship, but can also decrease the need for security savings at the same time. (Sinn, 1995)

Lots of variables have been shown by researchers to correlate with economic growth (Doppelhoffer-Miller-

Sala-i-Martin, 2000). Barro, in his 1995 paper, (Barro, 2005) used fourteen, while an OECD study involved 32 variables. There is a wide variety of possible explanatory variables, from the initial level of GDP through to the rate of GDP for the educated population or for distinct branches of industry, to characteristics of government expenditures and the system of taxation. Religious and geographical models must also be considered. As in this paper the growth effects of fiscal policy will be analysed, we will focus on that part of the extensive available literature which deals with this question.

Gemmel [6] divided the policy related literature of economic growth into three groups. He called those studies which were written before the era of endogenous models and which tested ad hoc hypothesises 'first generation studies'. 'Second generation studies' aim to test either neoclassical or endogenous growth models, using more advanced econometric methods. Still, most of these papers can only partly support the tested model. The reason for this is that the relations among fiscal variables are not considered in these studies, and only one (or some) of the relevant variables were included.

'Third generation studies' must consider the government budget constraint by testing fiscal growth effects (at least two effects – those of taxation and government expenditure, or budget balance, must be examined simultaneously). More advanced methods of panel- or time-series econometrics are to be used, including testing endogeneity. These studies deal with the budget as a whole, enabling researchers to give complex explanations of the effects of changes in distinct revenue or expenditure types. The fact that this coherent context of the budget was mishandled caused the misleading results of the first and second generation studies. "It is not meaningful to evaluate the effects of tax or expenditure changes in isolation: both the sources and uses of funds must be considered." (Miller-Russek, 1997)

The works of two groups of researchers can be considered as third generation studies (Miller-Russek, and Bleaney-Gemmel-Kneller), according to Gemmel. (Gemmel, 2001) Miller and Russek were mainly researching samples of a large group of countries, consisting of both developed and developing states, or concentrating on the USA only. Studies of the Bleaney-Gemmel-Kneller trio are more interesting for us, as they used samples of developed OECD (mostly European) countries.

First, we have to become familiar with the definitions these researchers use. Inputs from the public services to the private sector's production are called productive expenditure, "that component of public expenditure an increase in whose share will raise the steady-state growth rate of the economy". (Gemmel, 2001) Expenditures that do not enter the private sector's production function, and affect only households' utility function – thereby having no influence on the growth rate of the economy – Barro defined as government consumption services, while the Bleaney-Gemmel-Kneller trio calls them unproductive expenditure.

Tax revenues can also be divided into two types. One of them is distortionary taxation, "which affects the investment decisions of agents (with respect to physical and/or human capital), creating tax wedges and hence distorting the steady-state rate of growth". (flat-rate income taxes in Barro's models). Non-distortionary taxation "does not affect saving/investment decisions … and hence has no effect on the rate of growth" (lump sum taxes in Barro's models). (Kneller-Bleaney-Gemmel, 1998)

According to the model of Barro, non-distortionary taxes and unproductive expenditure have neutral growth effects. Shifting the revenue stance away from distortionary forms of taxation towards non-distortionary forms has a growth enhancing effect, whereas shifting expenditure from productive towards unproductive forms is growth retarding. (Kneller-Bleaney-Gemmel, 1998; Barro-Sala-i-Martin, 2000)

The Barro model uses a balanced budget, which does not consider the effects of budget deficits or surpluses. Still, as budget balance plays a major role in fiscal policy's growth effects according to second generation studies, Kneller, Bleaney and Gemmel integrated it into the original model of Barro. Their research gave strong support to conditional convergence, stating that a lower original level of GDP induces a higher growth rate. (Bleaney-Gemmel-Kneller, 2000) They found that "when financed by a mixture of non-productive expenditures and non-distortionary taxation, productive expenditures raise the growth rate and distortionary taxes reduce it, in accordance with the predictions of the Barro (1988) model. A budget surplus financed in this way also raises the growth rate." (Bleaney-Gemmel-Kneller, 2000)

METHODS OF EMPIRICAL ANALYSIS

The changing of the Regime in 1990 brought such major changes to the Hungarian economic system that it makes it impossible to use fiscal data from earlier decades. We can only rely on the time-series of data from the last one and a half decades, as earlier trends do not carry relevant information for the present. Fifteen years is a very short time-period when discussing long-run matters in economics. Still, as several empirical studies use similar, ten-fifteen or twenty-year-long time-series, this length can be accepted in our view. In order to avoid short run, political aspects of the discussion, data from after 2006 will not be used either. In order to smooth out the effects of short-run fluctuations in the data, we (being concerned only with long run effects) will use three year period averaging.

We use consolidated data from the general government level as fiscal variables in our analysis. Revenue data are taken from the OECD database.[1] Functional classification of the government expenditure can either not be found in international databases (Source OECD), or contains data only for 2003 and 2004 (Eurostat). These data can only be

found in the PM ÁPMSO - ÁHIR database; still, the aggregate expenditure of this time-series is different from that of international databases.[2] To make things even more difficult, the difference between the distinct years' data is not systematic. In some periods it can reach even 4-5 percentage points (as a share of GDP), while in others barely more than half a percentage point. We chose to use inner scaling to solve this problem, and secure the comparability of expenditure and revenue data. Concerning budget balances, international statistical databases have only published time-series for Hungary since 1997, and even these are not consistent with the data of the Hungarian Central Statistical Office (KSH), which is complete since 1990. To solve this problem, we chose to use the difference between the distinct year's revenues and expenditures (both from the OECD database) as budget deficit. We had two reasons for choosing this solution: firstly, to secure comparability of the time-series, and, secondly, the model we will use requires it.

To judge whether fiscal policy contributed to the long growth of the Hungarian economy, we need a reliable model. Unfortunately, we couldn't construct our own model, as we do not have enough data. We worked with only one country, while in most empirical studies panel data of at least 10-12 states are used. So, we had to use an existing model's parameter estimates and standard errors. We discovered this approach when studying the literature. (Kneller, 2000; Gemmel-Kneller, 2003) Which studies could be used for this purpose? We need a reliable, complex, third generation study, as that kind of study is the most developed today, considering the budget constraint. On the other hand, we would like to use parameters, calculated for developed, possibly EU member, states as there can be huge differences in parameter estimates for developed, developing or mixed groups of countries.[3]

We chose the parameter estimates of the Bleaney-Gemmel-Kneller group.[4] Their approach is based on the model of Barro (1988), but as mentioned above, it integrates the budget balance into it as follows:[5]

$$ng + C + b = L + \tau ny \qquad (1)$$

The implications of the budget constraint for empirical testing growth rate γ_t at time t is a function of conditioning – non-fiscal (Y_{it}) and the fiscal variables (X_{jt}) from equation (1): (Bleaney-Gemmel-Kneller, 2000)

$$\gamma_{it} = \alpha + \sum_{i=1}^{k}\beta_i Y_{it} + \sum_{j=1}^{m}\delta_j X_{jt} + \mu_{it} \qquad (2)$$

Assuming all elements of the budget, involving the deficit/surplus are included in equation (1) so the sum of all the fiscal variables have to equal zero: (Kneller-Bleaney-Gemmel, 1998)

$$\sum_{j=1}^{m} X_{jt} = 0 \qquad (3)$$

$$X_{mt} = -\sum_{j=1}^{m-1} X_{jt} \qquad (4)$$

So one element of the equation (2) must be omitted in order to avoid perfect collinearity. The omitted fiscal element will be the implicit financing element, the source of compensating any changes within the budget constraint.

$$\gamma_{it} = \alpha + \sum_{i=1}^{k}\beta_i Y_{it} + \sum_{j=1}^{m-1}\delta_j X_{jt} + \delta_m X_{mt} + \mu_{it} \qquad (5)$$

After rearranging the equation (5) we will get: (Bleaney-Gemmel-Kneller, 2000)

$$\gamma_{it} = \alpha + \sum_{i=1}^{k}\beta_i Y_{it} + \sum_{j=1}^{m-1}(\delta_j - \delta_m) X_{jt} + \mu_{it} \qquad (6)$$

Only those fiscal variables can be omitted from the equation, whose growth effect is neutral. According to Barro's model, (1988) these are non-distortionary (lump-sum) taxes and unproductive (consumption services) expenditures. After testing for the neutrality of both factors, the empirical study showed the smallest standard errors when both were omitted, so we will use parameter estimates from that method (Kneller-Bleaney-Gemmel, 1998).

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[1] *OECD Economic Outlook 79 database. Annex Table 26. General Government total tax and non-tax receipts*

[2] *OECD Economic Outlook 79 database. Annex Table 25. General Government total outlays*

[3] *Why do we think that parameter estimates of developed countries would fit Hungary, having reached only 65% of the average GDP per capita on PPS of the EU in 2006? Hungary, as a member state of the OECD and the EU belongs to the developed countries rather than to any other groups of states for which empirical studies are available.*

[4] *Bleaney, Gemmel and Kneller published their model and the empirical study based on it first in 1998[10], then a revised version in 2000 [4], which was further improved in 2003 [7].*

[5] *n is the number of producers in the private sector, each of them producing y amount of output, using g public services (productive expenditure). C stands for public consumption services (unproductive expenditure), b is the balance of the budget (which is surplus, if the sign is positive, and deficit, if it is negative), L is lump-sum (non-distortionary) taxation, τ is the rate of income tax (distortionary tax). [4] In their studies, the writers applied two other fiscal variables, other revenues and other expenditures, whose growth effect is ambiguous. In order to maintain balance across the government budget constraint after averaging the data, it is necessary to classify one of the variables as the balancing item. Kneller, Bleaney and Gemmel – after testing for several others – chose the budget balance for this purpose, so we will follow their practice to maintain comparability with their results, and to solve the problem of having no reliable time-series of data for budget balance, as mentioned above. [10]*

The interpretation of the coefficient on each element of the government budget is the effect of a unit change in the relevant variable offset by a unit change in the element omitted from the regression (or some mix of the omitted elements in our case).

Bleaney, Gemmel and Kneller used the standard method of five-year averaging first. (1998) Later they established that the best results come from using eight year lags (Bleaney-Gemmel-Kneller, 2000), so we will use these parameter estimates. The parameter estimates, standard errors and t-statistics taken over are shown in table 1. From the t-statistics, we can see that other expenditures and other revenues are not significant in the regression.[6] Non-distortionary taxes and unproductive expenditures were omitted to avoid collinearity, so we only have to use the other three variables during the analysis, which are distortionary taxes, productive expenditures and budget balance as a share of the GDP.

Following the originators' example (Kneller, 2000; Gemmel-Kneller, 2003) we will show the effects of fiscal policy changes on long run growth by comparing three-year period averages of fiscal variables as a share of GDP. We will calculate the difference between two three-year periods, with eight-year lags between them, then calculate the most probable effects by using the parameter estimates. We will also define a confidence interval using the standard errors (and t-statistics).

Table 1. Parameter estimates of fiscal variables

Fiscal variable	Parameter estimates - (standard errors) - t-statistics
Budget balance	0,105 – (0,06) – 2,07
Distortionary taxation	-0,411 – (0,05) – -6,18
Productive expenditures	0,387 – (0,07) – 4,88
Other expenditures	0,040 – (0,07) – 0,59
Other revenues	0,040 – (0,07) – 0,63
Adj. R^2	0,723

Source: parameter estimates and t-statistics (Gemmel-Kneller, 2003); standard errors (Gemmel-Kneller, 2003)

DETERMINING THE LONG RUN GROWTH EFFECTS OF FISCAL POLICY IN HUNGARY

Using the Bleaney–Gemmel–Kneller model, an unequivocally beneficial growth effect can be attributed to the changes in Hungarian fiscal policy. Table 2. shows the results of calculations for Hungary, using three-year periods and an eight-year lag. The difference in the average of the fiscal variables' share of GDP between the first three years following the changing of the Regime and the three years around the Millennium (after the eight year lag) probably contributed 0.85 percentage points to the long run growth rate of the economy, according to the parameter estimates. With 95% certainty, the lower boundary of the confidence interval should be -0.07%, while the upper should be 1.77%. This is the only period in which there is a small level of uncertainty about the sign of the aggregate growth effect. Still, as only such a small part of the confidence interval goes to the negative domain, we can conclude Hungarian fiscal policy has enhanced the growth rate of the economy in the period since the changing of the Regime.

In the first row, the 1.83 percentage point improvement in the budget balance and the 5.61 percentage point decrease in distortionary taxation as a share of GDP would jointly contribute to the rate of economic growth by adding 2.5 percentage points to it. However, during the same period productive expenditures were limited to 4.26 percentage points as a share of GDP, which retarded growth (according to the point estimate, by 1.65 percentage points). Adding together the single effects of these three significant factors, we arrive at the 0.85 percentage point estimate for the aggregate growth effect of fiscal policy changes in the first time period.

Applying the method to the time-series of data smoothed by using moving averages (filtering the effects of short run fluctuations) we can see that the long run effects of the changes in Hungarian fiscal policy can be regarded as having raised the growth rate. The results of parameter estimates show a smoothed effect on fiscal policy in influencing growth performance. Point estimates for growth performance move between 0.75 and 1.06 percentage points, with only one exception.

This one and only mentioned exception is the growth effect of 1.32 percentage points, based on the fiscal policy changes between the periods 1995-1997 and 2003-2005, which is much higher than the other point estimates in the table. The possible reason for this exceptional performance is worth elaborating on. Taking a closer look, this outstanding value can be attributed to the increase in productive expenditure as a share of GDP. Though the other two significant factors (budget balance and distortionary taxation as a share of GDP) added a bit less to the growth rate than in the previous period, so the larger scale increase in productive expenditures has to be the cause of the higher level aggregated growth effect of fiscal policy. Their share of the GDP rose by 1.56 percentage points, contributing 0.6 percentage points to the growth rate. The effects of this tendency could be felt in the next period as well, even though the growth in productive expenditures as a share of GDP was only 0.96 percentage points.

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[6] Based on the t-statistics only three of the five variables left in the regression equation proved to be significant, as Bleaney-Gemmel-Kneller used a sample of 237 objections. With this high number of sample elements, t- and z-statistics are the same, and absolute values above 1.96 can be accepted as significant.

Table 2. Long run growth effects of fiscal policy in Hungary

Change between three year averages, Eight year lag		*Budget balance*	*Distortionary taxation*	*Productive expenditure*	*Aggregated growth effect*		
					Parameter estimate	*Confidence interval*	
						Lower	*upper*
(1991-1993)-(1999-2001)	Change, as a share of GDP	1,83	-5,61	-4,26	**0,85**	-0,07	1,77
	Growth effect	**0,19**	**2,30**	**-1,65**			
(1992-1994)-(2000-2002)	Change, as a share of GDP	3,69	-4,31	-3,64	**0,75**	0,26	1,24
	Growth effect	**0,39**	**1,77**	**-1,41**			
(1993-1995)-(2001-2003)	Change, as a share of GDP	2,74	-3,04	-1,83	**0,83**	0,60	1,05
	Growth effect	0,29	1,25	-0,71			
(1994-1996)-(2002-2004)	Change, as a share of GDP	1,89	-1,97	0,13	**1,06**	1,01	1,11
	Growth effect	**0,20**	**0,81**	**0,05**			
(1995-1997)-(2003-2005)	Change, as a share of GDP	1,30	-1,40	1,56	**1,32**	1,08	1,55
	Growth effect	**0,14**	**0,57**	**0,60**			
(1996-1998)-(2004-2006)	Change, as a share of GDP	1,76	-1,21	0,96	**1,05**	0,84	1,27
	Growth effect	**0,18**	**0,50**	**0,37**			

Source: own calculation

Of course, it is also true that the growth in productive expenditure as a share of the GDP, beginning in 2003, can partly be attributed to the fact that the basis of comparison is the period between 1995 and 1997. This was the period of restrictive fiscal policy associated with Lajos Bokros, Minister of Finance. Taking a look at the time-series of the data we can see that the share of productive expenditure was not increased to an unusually high level between 2003 and 2005, only a part of the restriction imposed earlier was restored. The share of productive expenditure in GDP was 24.17% in 1994, which was decreased to 19.34% of GDP, but increased to 22% in 2003. In 2006, its share reached 20.07% again. This level is similar to that of Ireland (a country which has been famous for its unusual growth performance in the last two decades), but as a share of aggregate government expenditure, the weight of productive expenditures is only about 42% in Hungary, while it reaches 56% in Ireland Expenditures had to be cut in order to improve the balance of the budget in 1995. This improvement took place over a two-year period. In 1994, the deficit was an unsustainable 11.6% of GDP, and by 1996 it had been decreased by 5.4 percentage points. To make thing even more serious, this decrease in the deficit occurred simultaneously with a 4.94 percentage-point decrease in revenues as a share of GDP (the share of distortionary taxation to GDP was decreased by 1.37 percentage points). Expenditures were limited to 5.56 percentage points as a share of GDP. The very strict 7.18 percentage-point decrease in unproductive expenditures was not enough to cope with this level of deficit. A 4.85 percentage-point decrease of productive expenditure as a share of GDP was also needed in order to accomplish this improvement of the budget deficit.

According to the Bleaney-Gemmel-Kneller model, because of this same contiguity, the Bokros-Package did not contribute directly to growth.[7] The improvement of the budget balance by 4.5 percentage points added 0.47 percentage points to the growth rate of the economy (based on the point estimate), while a 1.37 percentage-point decrease in distortionary taxation contributed 0.56 percentage points to the growth rate. Still, as productive expenditures were decreased by 4.58 percentage points, retarding growth by 1.88 percentage points, aggregate growth effect, as a sum of the three significant factors mentioned above, was 0.74 percentage points. This had the effect of slowing the rate of economic growth.

We always have to remember though that the major aim of these stabilisation packages (following the economic situation they are needed in) can never be to contribute to economic growth directly. In these times, the restoration of budgetary balance is more important than any other economic goals. This requirement was met by the actions resulting from the Bokros-Package. By stabilizing the economy, it was able to pave the way for the later, growth-oriented actions, which could not have been taken without the normalisation of the budget balance first. In this way, these actions contributed to economic growth by making it possible to take the steps needed for enhancing growth, founding the economic situation.

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[7] *Kneller [11] in his study used the same point estimates to evaluate the effects of a distinct fiscal policy action. Following in his footsteps, we will use this method to analyze the effects of the fiscal policy measures, known as the Bokros-Package in Hungary.*

When evaluating distinct fiscal policy programs we can not lose sight of the extent to which they founded actions taken later. If the Bokros-Package had not succeeded in stabilising the overall state of the budget, the growth-enhancing actions could not have been successfully taken later. Without the restoration of the budget balance, not only would the deficit and state debt have risen to unsustainable levels, but later growth-oriented policy action could not have been accomplished.

CONCLUSIONS

The values calculated for fiscal policy's contribution to long run economic growth can be regarded as being very high when compared internationally (particularly in the 1990s). Compared to the results of other international empirical studies, even the modest estimates in our tables are quite large. These results could be seen as surprising, as several researchers and politicians stick to the principle that fiscal, and general economic, policy can have no influence on the long run growth rate of the economy.

In the empirical study we used as an example, the writers (Bleaney, Gemmel and Kneller) found about a +/-0.2-0.3 percentage-point general (beneficial, or unbeneficial) effect of the changes in fiscal policy directions in the examined time period (1987-1997) for a sample of eleven OECD countries. The only exception was Finland, where they calculated a +1.41 percentage-point growth improvement effect for fiscal policy actions. (Gemmel-Kneller, 2003)[8]

Still, we have to remember that fiscal policy is much more balanced in these OECD countries than in Hungary, where major changes had to be made to the general system of the economy, after the changing of the Regime. Changes in fiscal variables as a share of GDP could only be measured as some tenth of the percentage in the case of those countries (even though the method of comparing two three-year periods, with eight-year lags between them, was the same as the one we followed). The amplitude of fiscal policy changes (as a share of GDP) is one order of magnitude larger, as some fiscal factors changed by even 6-7 percentage points as a share of GDP. This is what our unusually large effects can be attributed to.

The relevance of our results concerning the relationship between fiscal policy actions and economic growth is also supported by the fact that confidence intervals rarely cross zero. So, the model gives unambiguous positive or negative growth effects for distinct changes in fiscal policy directions. The sign of the effects seems to be sure, even if one would doubt the amplitude of the changes.

We would not dare to give an explicit, numerical answer to the question: to what extent did fiscal policy contribute to Hungary's growth performance in the last one and a half decades? However, we are sure no reader familiar with the question would expect us to do so.

Both the theoretical and empirical literature of economic growth suggests decreasing the government sector's size. Moreover, endogenous theory states that it is not only the rate of expenditures to GDP that matters for growth, but that the mixture of expenditures has a major role to play as well. Examples of the Bokros-Package and the present restrictive policy actions in Hungary support the idea that a decrease in productive expenditure can have growth retarding effects even if an improved budget balance (and a possible decrease in distortionary taxes) are beneficial to the rate of economic growth.

Restrictive fiscal policy actions can still have a beneficial effect on the long run growth rate of the economy, founding such growth-oriented actions in the future which could not have been taken without the earlier stabilisation. An outstanding growth-fastening effect is the lesson we can learn from comparing the fiscal data of the 1994-1996 period with the 2003-2005 data.

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[8] The countries examined in the sample were: Austria, Denmark, Finland, France, Germany, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United Stated of America.

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