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Evidence on the Fiscal and Macroeconomic Impact of Privatization

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Evidence on the Fiscal and Macroeconomic Impact of Privatization

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Abstract

This paper empirically investigates the relationship between privatization and measures of fiscal and macroeconomic performance. One of the main findings is that privatization proceeds transferred to the budget tend to be saved. Specifically, they are largely used to reduce domestic financing, with little evidence that they are used to finance a larger deficit. However, by construction, this part of the study is restricted to privatization proceeds transferred to the budget, leaving open the question of what happens to those proceeds not transferred to the budget. The other main finding is that total privatization (as opposed to just the proceeds transferred to the budget) is correlated with an improvement in macroeconomic performance as manifested in higher real GDP growth and lower unemployment. However, this result needs to be interpreted cautiously as the evidence is not sufficient to establish causality.

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[1] This research was carried out as part of a study on the fiscal and macroeconomic impact of privatization, and a condensed version appears as an Appendix in Davis, et al. (2000). I am especially grateful to Jeffrey Davis, Rolando Ossowski, and Tom Richardson for their valuable insights and comments, Will Riordan for his research assistance, and Heather Huckstep and Erik Freas for their administrative assistance. The numerous comments from different departments within the Fund are also greatly appreciated. The author takes sole responsibility for any errors.

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I. INTRODUCTION

The objective of this paper is to empirically investigate the impact of privatization on macroeconomic and fiscal variables.[2] In particular, two key questions are examined: first, what is the *contemporaneous* impact of privatization on the budget? In other words, are the proceeds that are transferred to the budget from government divestitures saved or spent? Secondly, what is the *dynamic* or more structural impact of privatization on macroeconomic and fiscal performance?

These are distinct questions, and a different definition of privatization is used to address each one. The first uses privatization proceeds actually transferred to the budget as the definition of privatization, since the question of interest is how does the budget use the proceeds. The second, however, uses a broader definition of privatization that more closely corresponds to the total amount of privatization proceeds paid by purchasers, since the objective here is to examine how the change in the structure of the economy—away from public and toward private ownership—affects macroeconomic and fiscal performance.

In regards to the first question, the empirical evidence strongly suggests that privatization proceeds transferred to the budget are actually saved. For purposes of this study, privatization proceeds are treated as financing; thus privatization proceeds are deemed to be saved if they are used as a substitute for other forms of financing and thus do not affect the size of the deficit. In contrast, they are deemed to be spent if they are used to increase the deficit—either by increasing expenditure, lowering revenue, or some combination thereof. The conclusion that they are saved is based on the empirical evidence indicating that privatization proceeds are used to reduce domestic financing on a roughly one-for-one basis. Consistent with this result, the hypotheses that privatization proceeds are used to either increase the deficit, lower revenue, or increase expenditure are rejected by the data.

The empirical evidence also indicates that privatization is strongly correlated with dynamic or intertemporal improvements in macroeconomic performance. Specifically, increased privatization is associated with improvements in real GDP growth and with declines in the unemployment rate. Based on a sample of non-transition countries, there is also some evidence that tax revenue as a share of GDP permanently increases following an episode of privatization. There is less evidence, however, that privatization has a significant impact on fixed investment or on indicators of fiscal performance other than those noted above.

The findings, especially those suggesting that privatization is associated with an improvement in macroeconomic performance, need to be interpreted carefully. The evidence presented below is not sufficient to imply causality. From the outset, the following caveats and qualifications need to be considered. First, the results are based on a select sample of countries and for a limited number of years for which data are available. Moreover, a majority of the

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[2] An abridged version appears as an appendix in Davis, et al. (2000).

sample observations coincide with years when these countries had a Fund program, which may have skewed the results. Second, this paper addresses a wide range of questions at the expense of pursuing any of the questions in great detail. The study, therefore, is intended to be more provocative and investigative than conclusive, as many of the questions could easily be a paper unto themselves. The approach is somewhat unusual in that objective is to investigate the impact of an 'x' variable on various 'y' variables, rather than the more common approach of trying to explain a 'y' variable.

The subsequent sections describe and discuss the main hypotheses, analytical methodology, sample data, results from the saving and spending hypotheses, and then results from the more structural questions. A conclusion highlights the main findings.

II. Hypotheses

Regarding the contemporaneous impact of privatization proceeds transferred to the budget, there are plausible economic and political arguments supporting both the saving and spending hypotheses. Viewing privatization as a portfolio decision suggests that it is unlikely to have a direct impact on the deficit or other fiscal variables. Privatization proceeds transferred to the budget would simply be converted to another financial asset, and, provided that government net worth is unchanged, there would be no change in the overall balance. Pragmatic considerations also suggest that proceeds could be saved, for example if the timing or magnitude is either uncertain or unknown, the proceeds could be saved until the subsequent budget can allocate them. As for the spending hypothesis, a liquidity constrained government could find it optimal to use privatization to finance a larger deficit. Moreover, political economy considerations suggest that a government could be inclined to spend the proceeds, essentially viewing privatization as it would any other source of revenue.

Turning to the more structural questions, the privatization process could also have a direct impact on the structure of government finances. Total expenditure and net lending could change for several reasons, including a reduction in transfers and subsidies to enterprises that are privatized (although this money could be spent elsewhere); a change in interest payments following from either a reduction or increase in the debt stock; the assumption of any quasi-fiscal activities previously carried out by the privatized enterprise; or institutional arrangements that stipulate the terms for spending the proceeds (although such spending may not be captured in the budget accounts). Regarding revenue, the privatized firms could be subject to different tax regimes and potentially a different level of administrative scrutiny, either of which could produce a permanent change in tax revenue. Since tax revenue is measured as a share of GDP in the empirical exercises, higher profitability under private ownership could be hard to detect since both tax revenue and GDP would increase. Tax revenue could also temporarily increase if privatization included the settlement of any outstanding tax liabilities. Finally, nontax revenue could decline if the privatized firm had previously been transferring profits to the budget.

The overall balance could move either temporarily or permanently due to concomitant changes in either the revenue or expenditure side of the budget. It could also change if the

privatization leads to either an increase or decrease in the government's wealth. For example, a privatization that leads to an increase in government wealth would allow the government to permanently increase the deficit.

The effect of privatization on real GDP growth, unemployment, and investment is also investigated. While the reasons to expect changes in these variables are readily apparent, the dynamic nature of the impact is also of interest. Therefore, it is important to distinguish between transitory (one period) and more persistent (several period) effects. For example, unemployment could temporarily increase if the privatization leads to significant layoffs in the privatized firms. This effect, however, would possibly be overtaken in time as the higher efficiency and profitability of the privatized enterprises begins to generate jobs. Moreover, the broader structural changes in the economy induced by the privatization could also lead to job creation both immediately and over the medium term (Kikeri 1998).

III. Methodology

The basic methodology is quite straightforward and simply involves testing the statistical significance of privatization proceeds, appropriately defined, in different regressions.

A. Contemporaneous Impact

The hypotheses that privatization proceeds are spent and that they are saved are each directly examined. This not only provides a good robustness check, but also allows for the distinct possibility that neither hypothesis would be supported by the data. In addition, the robustness is also examined by (1) using different dependent variables, (2) systematically including various additional explanatory variables, and (3) employing different samples.

The equation used to estimate a contemporaneous impact is:

$$\Delta y_{i,t} = \mu_i + \delta \Delta p_{i,t} + \beta \Delta x_{i,t} + u_{i,t} \tag{1}$$

where Δ is the first difference operator, $y_{i,t}$, $p_{i,t}$, $x_{i,t}$, $u_{i,t}$ are, respectively, the dependent variable, privatization proceeds, the additional explanatory variable (if included), and the residual; subscripts refer to the value for country i in period t. The parameters to be estimated are μ_i, which is the country-specific or fixed effect, δ, and β. After some basic algebraic manipulations, equation (1) can be rewritten as:

$$y_{i,t} = \mu_i t + \delta p_{i,t} + \beta x_{i,t} + \sum_{j=0}^{t} u_{i,t-j} + \left(y_{i,0} - \delta p_{i,0} - \beta x_{i,0}\right) \tag{2}$$

which shows the dependent variable as a function of essentially four factors: moving left to right, the drift term; the contemporaneous value of privatization and any other explanatory variables; the history of shocks; and the initial conditions (the terms in parentheses) that for

present purposes can be assumed to be zero. Equation (2), therefore, highlights that δ is capturing the contemporaneous impact of privatization on the dependent variable and, moreover, that the contemporaneous value has no impact on future y values.

All of the regressions are run in first differences, where the differences are with respect to the variables defined as a share of GDP. While this specification has several distinct advantages over obvious alternatives, it is important to note that it is more suited to shorter samples (as is the case below). For example, during a period of fiscal adjustment the prediction of a constant drop in the deficit is probably a good approximation. Over longer samples, however, the model would imply that the deficit tends toward either plus or minus infinity.

The hypothesis that privatization proceeds are spent is tested by running a regression with the overall balance as the dependent variable and budgetary privatization proceeds as the explanatory variable. A statistically significant negative estimate would indicate that privatization proceeds are used to decrease the overall balance (for example, to increase the deficit). Moreover, the similar hypotheses that privatization proceeds are used to increase expenditure or decrease revenue are also tested. As noted above, privatization proceeds are recorded as a financing item, thus privatization has no direct impact on the above-the-line data.

To test the hypothesis that privatization proceeds are saved, regressions are run using domestic financing, external financing, and the debt stock as the dependent variable. While on the surface the debt stock would appear to be the best candidate—privatization proceeds are used to retire debt—noise in this series (defined as a share of GDP) suggest that empirically one of the financing variables may be better.[3] In this case the hypothesis is actually more specific: privatization proceeds are used as a substitute for domestic or external financing.

The experimentation with different definitions of the dependent variable is intended to mitigate the impact of excessive noise in any given variable and allow for the possibility that the impact is more pronounced, and thus statistically detectable, on a specific fiscal variable. Different explanatory variables are systematically added to each regression equation to check the robustness of the estimate on privatization, assess whether the overall estimates are sensible, and mitigate against specification problems due to omitted variables. Finally, as discussed below, these equations are also run using different samples, which, inter alia, provides another robustness check.

B. Dynamic and Econometric Considerations

[3] The noise in the debt to GDP series is due to: (1) movements, possibly large, in nominal GDP growth rates that cause significant changes in the debt to GDP ratio; and (2) financing operations, such as the assumption of previously non-budgetary debt, that affect the debt stock without impacting the recorded deficit.

The basic methodology described above is also used to investigate the impact of total privatization proceeds on the macroeconomy and budget.

In order to determine the permanent effects of privatization on fiscal variables, equations of the following form are run:

$$\Delta y_{i,t} = \mu_i + \delta p_{i,t} + \beta \Delta x_{i,t} + u_{i,t} \tag{3}$$

where the notation is the same as before. In equation (3), the first-difference of the dependent variable is run on the level of privatization. As before, the dependent variable is assumed to follow a random walk with drift during the sample period, however, the amount of privatization is now allowed to have a permanent effect on the dependent variable. Similar to equation (2), equation (3) can be rewritten as:

$$y_{i,t} = \mu_i t + \delta \sum_{j=0}^{t} p_{i,t-j} + \beta x_{i,t} + \sum_{j=0}^{t} u_{i,t-j} + \left(y_{i,0} - \beta x_{i,0}\right) \tag{4}$$

which shows that the current value of the dependent variable is affected by the entire history of privatization. Moreover, as privatization in a given period has the same impact on the current value of the dependent variable as it does on the future values—that is, the impact does not fade over time—it is thus said to be permanent. In light of this, if the estimate of δ is statistically significant, it would in all likelihood be rather small.

Timing considerations would suggest that equation (3) could also be run using lagged instead of, or in addition to, contemporaneous privatization as the explanatory variable. Moreover, this would allow for richer dynamics, including the possibility that some of the initial impact is reversed in the subsequent period. In addition, such a specification actually nests the temporary effect specification (equation (1)), allowing the hypothesis that the impact is temporary to be formally tested (for example, the contemporaneous and lagged value of privatization enter with equal magnitude but opposite sign).

The random walk assumption is analytically convenient and has certain econometric advantages. Nonetheless, the dependent variable could be better characterized by an auto-regressive coefficient that is less than one, in which case an alternative specification is preferable. Specifically, the following equation can be estimated:

$$y_{i,t} = \mu_i + \alpha y_{i,t-1} + \delta p_{i,t} + \delta x_{i,t} + u_{i,t} \tag{5}$$

where the notation is as before with α the parameter on the lagged dependent variable. Again, rewriting equation (5) in terms of its historical values reveals that

$$y_{i,t} = \frac{\mu}{1-\alpha_i} + \delta \sum_{j=0}^{t} \alpha^j p_{i,t-j} + \beta \sum_{j=0}^{t} \alpha^j x_{i,t-j} + \sum_{j=0}^{t} \alpha^j u_{i,t-j} \tag{6}$$

the impact of privatization lasts for several periods, but, provided that $|\alpha| < 1$, fades over time.

Unlike equations (1) and (3), running ordinary least squares (OLS)—often referred to as least squares dummy variable (LSDV)—on equation (5) results in estimates that are biased, which follows from the combination of a lagged dependent variables and country specific dummy (fixed effect). While this issue can be overcome, the techniques may not be amenable to the relatively small panels employed below, in which case the alternative estimators for β could actually perform worse than LSDV (Judson and Owen 1996).[4] The strategy adopted below, therefore, is to rely on the unit root assumption unless the data or theory strongly suggest otherwise, in which case both the LSDV and Anderson-Hsiao (1982) estimators are used.

C. Data

The starting point for the sample is a collection of 18 countries that are the focus of Davis, et al. (2000).[5] The sample for each country is chosen to coincide with the period of active privatization for which the necessary data are available; the sample, therefore, varies between regressions due to data availability. All variables are expressed as a percent of GDP, with the exceptions of real GDP growth and the unemployment rate. Unless otherwise noted, the data are from the corresponding country authorities and staff estimates; the unemployment rate is taken from the IMF *World Economic Outlook* data base. Finally, the country data are pooled to form the unbalanced panels that are used in the regressions.

Two definitions of privatization are used: (1) privatization proceeds that accrued to the budget, and (2) total privatization proceeds. Note that in the budgetary definition of privatization, the proceeds are recorded in the year that they went to the budget, which is not always the same as the year they were received by the privatization agency. Estonia, Mozambique, and Uganda are excluded from the regressions using this definition, since none of the proceeds went to the budget; likewise, Vietnam is excluded from all of the regressions as there are no identified privatization proceeds.

IV. Results

A. Proceeds Transferred to the Budget: Saved or Spent?

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[4] Sevestre and Trognon (1996) discuss the general econometric difficulties and potential solutions. Judson and Owen (1996) address issues pertinent to macroeconomic panels and recommend the use of the Anderson-Hsiao (1982) instrumental variable technique that is employed below.

[5] These are: Argentina, Bolivia, Cote d'Ivoire, Czech Republic, Egypt, Estonia, Hungary, Kazakhstan, Mexico, Mongolia, Morocco, Mozambique, Peru, Philippines, Russia, Uganda, Ukraine, and Vietnam.

As noted in the introduction, the empirical evidence strongly supports the hypothesis that privatization proceeds transferred to the budget are saved; specifically, they substitute one-for-one with domestic financing. Notwithstanding the risks associated with running so many regressions, this conclusion is extremely robust and is not fundamentally altered by changing the sample or adding explanatory variables. Moreover, it is further supported by the finding that privatization proceeds are not used to either increase the deficit, increase spending, or lower revenue. These results, however, should be interpreted carefully as the regressions are based on a limited sample, which is largely comprised of observations that coincide with periods that the country had a Fund program;[6] and by design, only budgetary privatization proceeds are included, leaving open the question of what happens to amounts not transferred to the budget.

The robustness of the results is examined by using multiple samples and including different explanatory variables. Three different samples are used for each regression: (1) the full sample; (2) a sample of non-transition countries; and (3) a short sample comprised of the observations corresponding to the two largest movements in privatization proceeds for each country, where the size of the movement is measured as the absolute value of the first difference.[7] Each regression is then repeated, systematically adding additional explanatory variables one at a time.

Saving hypothesis

The strongest results are obtained by using domestic financing as the dependent variable. The coefficient on privatization is always statistically significant and with only one exception (column 5) not statistically different from minus one (Table 1a).[8] Moreover, the point

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[6] A formal test of the proposition that budgetary privatization proceeds are only used to reduce domestic financing when there is a Fund program is rejected. However, there are limited observations without a Fund program, and in some such cases a program may have been under discussion.

[7] The intuition behind this sample is that the contemporaneous impact of privatization proceeds is likely to be most pronounced when there has been a significant change in their magnitude.

[8] Unless otherwise noted, statistical significance refers to a two-sided t-test evaluated at the 10 percent significance level.

Table 1. Contemporaneous Impact of Budgetary Privatization: Saving Hypothesis

Table 1a. Dependent Variable: Domestic Financing (First difference)

	Full Sample			Non-Transition			Short Sample 1/		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Privatization(t)	-1.14*	-.97*	-1.19*	-.85*	-.79*	-1.03*	-1.20*	-1.12*	-1.21*
	(.19)	(.13)	(.19)	(.13)	(.12)	(.11)	(.23)	(.15)	(.23)
Δ Overall balance(t)		-.74*			-.90*			-.46*	
	...	(.15)	...	...	(.22)	...	...	(.17)	...
Δ Real GDP Growth(t)			-.65*			-0.96*			-.10
	...	...	(.20)	...	...	(.19)	...	...	(.26)
Observations:	83	83	82	52	52	52	26	26	25
R-Squared	0.19	0.54	0.39	0.17	0.50	0.58	0.41	0.64	0.46

Table 1b. Dependent Variable: External Financing (First difference)

	Full Sample			Non-Transition			Short Sample 1/		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Privatization(t)	-.08	.02	.52*	-.19***	-.19***	-.63***	.03	.15	.12
	(.12)	(.145)	(.15)	(.11)	(.11)	(.14)	(.16)	(.15)	(.38)
Δ Overall Balances(t)		-.12**			-.11			-.58*	
	...	(.05)	...	...	(.20)	...	...	(.15)	...
Δ Domestic Financing(t)			.39*			-.52*			-.13
	...	...	(.10)	...	...	(.11)	...	...	(.38)
Observations:	82	81	82	52	52	52	25	25	25
R-Squared	.09	.18	.32	.08	.09	.54	.00	.53	.01

Table 1c. Dependent Variable: Debt (First difference)

	Full Sample			Non-Transition			Short Sample 1/		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Privatization(t)	.72	.76	93	.58	.53	.86	.72	1.12	.83
	(1.21)	(1.22)	(1.17)	(1.66)	(1.59)	(1.57)	(1.61)	(1.74)	(1.76)
Δ Overall balance(t)		-.29			.86			1.45***	
	...	(1.22)	...	...	(1.94)	...	...	(.80)	...
Δ Real GDP Growth(t)			-.26			.38**			-.10
	...	...	(.16)	...	...	(.17)	...	...	(.47)
Observations:	68	67	68	44	44	44	22	22	22
R-Squared	.15	.13	.16	.06	.07	.09	.01	.07	.01

Sources: Country authorities and Fund staff estimates.

Notes: Standard errors are in parentheses and based on White's (1980) Heterskedasticity-consistent covariance matrix. Asterisks indicate significance levels: * is 1 percent level; ** is 5 percent level; *** is 10 percent level. The full and non-transition sample regressions include a complete set of country specific dummies for which the estimates are not reported; the short sample regressions include only a constant. Data are annual, and all variables, except for real GDP growth and unemployment, are expressed as a share of GDP.

1/ Comprises observations corresponding to the two largest movements in privatization proceeds for each country.

estimate is usually quite close to minus one and robust to the inclusion of additional explanatory variables, which are also often statistically significant and of the expected sign. The results are consistent with the hypothesis that privatization proceeds transferred to the budget are used on a one-for-one basis to offset domestic financing, with some evidence of a less than one-for-one effect in the non-transition sample.

Regressions using external financing as the dependent variable produce results that are consistent with the above findings (Table 1b). For the non-transition sample (columns 4 and 5) the coefficient on the privatization term is significant, and combined with the above results would suggest that around 20 percent of privatization proceeds transferred to the budget are used to offset external financing with the remaining 80 percent used to offset domestic financing. For the other samples, the results suggest that privatization proceeds transferred to the budget are not used to reduce external financing. The regressions including domestic financing as an explanatory variable (columns 3, 6, and 9), which might appear to be exceptions to the above findings, are difficult to interpret in light of the strong correlation between domestic financing and privatization. To the extent that privatization proceeds transferred to the budget are used (in a causal sense) to reduce domestic financing, the parameter estimates in the regressions using domestic financing as an explanatory variable are not well identified.

The regressions using the debt stock as the dependent variable suggest that it is independent of the amount of privatization proceeds transferred to the budget (Table 1c). The point estimates on privatization move around a fair amount and are always highly insignificant. As noted above, this probably reflects the inherent noise in the debt to GDP ratio. Underscoring this point is the fact that even the overall balance is only statistically significant in one of the three regressions, and then only marginally so.

Spending hypothesis

The regressions using the overall balance as the dependent variable do not support the hypothesis that privatization proceeds transferred to the budget are used to increase the deficit. The coefficient on privatization is not statistically significant and is always estimated to be positive (Table 2a). Notwithstanding the statistical insignificance, the positive point estimate is opposite of what might be expected since it would indicate that, if anything, privatization is correlated with an improvement in the overall balance. Changes in the overall balance, however, are not explained very well by the included variables, as few of the coefficient estimates are statistically significant. Unemployment, for example, while always of the expected sign is only significant in the full sample. External financing, which is significant and of the expected sign in two out of three regression, is included to allow for the possibility that the overall balance is directly influenced by the availability of official foreign financing.

The evidence, reinforcing the above findings, also rejects the hypothesis that privatization proceeds transferred to the budget are used to increase spending. The coefficient on privatization is not statistically significant in any of the regressions (Table 2b). For these

Table 2. Contemporaneous Impact of Budgetary Privatization: Spending Hypothesis

Table 2a. Dependent Variable: Overall Balance (First difference)

	Full Sample				Non-Transition				Short Sample 1/			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Δ Privatization(t)	.25	.22	.31	.20	.09	.10	.09	.04	.22	.15	.32	.22
	(.19)	(.20)	(.20)	(.18)	(.11)	(.11)	(.12)	(.11)	(.25)	(.36)	(.26)	(.22)
Δ Real GDP Growth(t)		.03				-.02				.09		
	...	(.04)	...	...	...	(.02)	...	...	...	(.25)	...	...
Δ Unemployment(t)			-.24***				-.20				-.44	
	...	...	(.12)	...	...	...	(.14)	...	...	...	(.46)	...
Δ External Financing(t)				-.37***				-.09				-.91*
	...	...	...	(.20)	...	...	...	(.19)	...	...	...	(.34)
Observations:	89	88	81	82	58	57	51	52	28	28	24	25
R-Squared	.12	.12	.16	.20	.13	.14	.15	.14	.01	.03	.09	.53

Table 2b. Dependent Variable: Total Expenditure and Net Lending (First difference)

	Full Sample				Non-Transition				Short Sample 1/			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Δ Privatization(t)	-.02	.05	-.05	.03	.16	.20	.18	.18	-.00	.10	-.11	-.01
	(.22)	(.23)	(.23)	(.20)	(.13)	(.14)	(.12)	(.14)	(.29)	(.43)	(.25)	(.26)
Δ Real GDP Growth(t)		-.10**				-.06				-.13		
	...	(.05)	...	...	...	(.04)	...	...	...	(.29)	...	...
Δ Unemployment(t)			.34*				.02				.07	
	...	...	(.11)	...	...	...	(.14)	...	...	...	(.29)	...
Δ External Financing(t)				.59*				.10				1.02*
	...	...	...	(.21)	...	...		(.15)				(.30)
Observations:	89	88	81	82	58	57	51	52	28	28	24	25
R-Squared	.17	.21	.25	.32	0.20	.20	.28	.19	.00	.03	.01	.57

Table 2. Contemporaneous Impact of Budgetary Privatization: Spending Hypothesis (concluded)

Table 2c. Dependent Variable: Total Revenue (First difference)

	Full Sample			Non-Transition			Short Sample 1/		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Privatization(t)	.25*	.26*	.26*	.27*	.27*	.27*	.21	.22	.20
	(.09)	(.10)	(.09)	(.08)	(.08)	(.07)	(.16)	(.17)	(.13)
Δ Real GDP Growth(t)		-.02*			-.01			-.02	
	...	(.02)	...	...	(.02)	...	...	(.08)	...
Δ Unemployment(t)			.11			-.18***			-.39
	...	...	(.18)	...	...	(.10)	...	...	(.30)
Observations:	89	88	81	58	57	51	28	28	24
R-Squared	.26	.27	.28	.19	.18	.28	.06	.06	.18

Table 2d. Dependent Variable: Tax Revenue (First difference)

	Full Sample			Non-Transition			Short Sample 1/		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Privatization(t)	.40**	.40*	.42**	.55***	.42	.48***	.19**	.19**	.22**
	(.18)	(.18)	(.18)	(.34)	(.26)	(.35)	(.09)	(.10)	(.07)
Δ Real GDP growth(t)		.01			.04			-.01	
	...	(.03)	...	...	(.11)	...	...	(.03)	...
Δ Unemployment (t)			-.07			-.13			-.24**
	...	...	(.07)	...	...	(.19)	...	...	(.10)
Observations:	89	88	81	28	28	24	58	57	51
R-Squared	.29	.29	.31	0.16	0.17	0.24	.11	.12	.27

Sources: Country authorities and Fund staff estimates.

Notes: Standard errors are in parentheses and based on White's (1980) Heterskedasticity-consistent covariance matrix. Asterisks indicate significance levels: * is 1 percent level; ** is 5 percent level; *** is 10 percent level. The regressions include a complete set of country specific dummies for which the estimates are not reported. Data are annual and all variables, except for real GDP growth and unemployment, are expressed as a share of GDP.

1/ Comprises observations corresponding to the two largest movements in privatization proceeds for each country.

regressions, the additional explanatory variables perform best in the full sample, where each is statistically significant and of the expected sign.

Finally, there is also not any evidence to support the hypothesis that privatization proceeds transferred to the budget coincide with a decline in either total or tax revenue. The results actually suggest the contrary, that privatization coincides with an improvement in revenue performance (Tables 2c and 2d). The tax revenue regressions yield the most pronounced results, where the privatization coefficient is always positive and significant in all but one of the regressions. The increase in tax revenue could be explained by privatization coinciding with lump sum tax payments related to the clearance of outstanding tax arrears. However, as opposed to being directly related to privatization, it is also possible that privatization coincides with a general improvement in macroeconomic management, including tax policy and administration measures, that actually underlie the observed revenue increase.

B. Structural Impact of Privatization

The purpose of the following regressions is to investigate the more structural nature of the relationship between privatization and general macroeconomic and fiscal variables. Compared with the previous section, the focus—with a few exceptions—switches from privatization proceeds transferred to the budget to the total amount of privatization, which provides a better measure of the change from public to private ownership. In addition, whereas the previous section focused on the contemporaneous correlation, the dynamic nature of the relationships are also now explored.

Since the dependent variables (with the exception of real GDP growth) are expressed as first differences, the impact of privatization is restricted to being either permanent (level of privatization is included) or completely transitory (first difference of privatization is included). Given the relatively short time-dimension in the data, the permanent impact need not be interpreted too literally and could be viewed more as an approximation to a sustained multi-period impact.

Fiscal variables

Privatization proceeds transferred to the budget

While the previous evidence supporting the saving hypothesis is quite strong, this could still be consistent with the proceeds being 'spent' in subsequent periods. By construction, the previous regressions restricted the impact of privatization to be instantaneous and temporary, that is lasting only one period. Therefore, before switching definitions of privatization, the following regressions examine whether there is evidence of a sustained (permanent) impact of privatization proceeds transferred to the budget on fiscal variables.

While the answer to this question is less clear cut, on balance, the evidence does not support the hypothesis that the privatization proceeds transferred to the budget are used to finance a larger deficit in subsequent periods. With the overall balance as the dependent variable, the

coefficients on contemporaneous and lagged privatization are never statistically significant (Table 3a). The evidence from the total expenditure (Table 3b) and total revenue (Table 3c) regressions is mixed. While there is evidence that the transfer of privatization proceeds to the budget leads to a sustained increase in spending for the non-transition sample, this result could be driven by the fact that total revenue could also be characterized as permanently increasing with the transfer of privatization proceeds to the budget.[9] The point estimates of the contemporaneous privatization coefficient are also quite similar in the total revenue and spending regressions, which is consistent with the finding that the overall balance is not affected by privatization.

The results for the total and tax revenue regressions are somewhat ambiguous as to whether the impact is better characterized as temporary or permanent. Essentially, this boils down to determining the validity of the restriction that the sum of the contemporaneous and lagged privatization coefficients is zero. While this test cannot be formally rejected, this may be due to the fact that the coefficient on lagged privatization is imprecisely estimated (Table 3c, even numbered columns)—as the hypothesis that the coefficient on lagged privatization is zero can also not be rejected. The results are somewhat less ambiguous for the tax revenue regressions. For the full sample, it would appear that the impact is temporary (Table 2d is preferable) as the restriction that contemporaneous and lagged privatization coefficients sum to zero cannot be rejected and, moreover, the corresponding point estimates are of roughly the same size but opposite sign. For the non-transition sample, the effects appear to be permanent as the restriction that the privatization terms sum to zero is rejected in two of the three cases, and in the third (column 10) it can be rejected at the 15 but not the 10 percent level.

Total privatization

The question of interest now changes from how privatization proceeds transferred to the budget affect the budget to how the structural change from public to private ownership affects fiscal performance. As these are fundamentally different questions, a different definition of privatization is used, such that the remaining regressions define privatization as the total amount of privatization proceeds.

The tax revenue regressions using total privatization yield results that are broadly consistent with those using privatization transferred to the budget (Table 4d). For the non-transition sample, the coefficient on contemporaneous privatization is statistically significant and

[9] It would be difficult to formally establish the direction(s) of causality between privatization, total revenue, and expenditure. Repeating the expenditure regression with total revenue included as an explanatory variable wipes out the significance of the coefficients on privatization, whereas the reverse (including expenditure in the total revenue regression) does not. While this may provide some indication that it is revenue and not privatization fueling the change in expenditure, it falls well short of formally settling the issue.

Table 3. Structural Relationship Between Privatization Transferred to Budget and Selected Variables

Table 3a. Overall Balance (First difference)

	Full Sample						Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.14	.20	.06	.16	.05	.11	.04	.04	-.07	-.07	-.09	-.09
	(.31)	(.29)	(.32)	(.30)	(.31)	(.29)	(.19)	(.19)	(.19)	(.20)	(.18)	(.18)
Privatization (t-1)	...	-.31	...	-.49	...	-.30	...	-.15	...	-.29	...	-.19
		(.31)		(.31)		(.32)		(.19)		(.19)		(.21)
Δ Unemployment(t)	...	...	-.24***	-.26***	...	...	...	...	-.21	-.22	...	...
			(.12)	(.15)					(.14)	(.19)		
Δ External financing(t)	...	...	...	...	-.38***	-.37***	...	...	...	...	-.10	-.10
					(.20)	(.20)					(.18)	(.18)
Observations:	89	89	81	81	82	82	58	58	51	51	52	52
R-Squared	.11	.12	.15	.17	.19	.20	.12	.13	.14	.16	.14	.14
P-val from F test 1/	...	.82	...	.48	...	.71	...	.72	...	.28	...	.41

Table 3b. Dependent Variable: Total Expenditure and Net Lending (First difference)

	Full Sample						Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.26	.20	.38	.29	.32	.26	.34**	.34**	.42*	.42*	.38**	.38**
	(.31)	(.31)	(.30)	(.31)	(.30)	(.29)	(.16)	(.16)	(.14)	(.15)	(.16)	(.16)
Privatization (t-1)	...	.27	...	.45***	...	.24	...	.05	...	.10	...	.04
		(.30)		(.26)		(.31)		(.18)		(.14)		(.18)
Δ Unemployment(t)	...	...	.37*	.39*	...	...	...	...	.04	.04	...	...
			(.11)	(.10)					(.14)	(.14)		
Δ External financing(t)	...	...	...	...	.59*	.59*	...	...	...	...	.11	.11
					(.21)	(.21)					(.16)	(.16)
Observations:	89	89	81	81	82	82	58	58	51	51	52	52
R-Squared	.17	.18	.26	.28	.32	.33	.21	.21	.31	.31	.21	.21
P-val from F test 1/	...	0.27	...	.04	...	.25	...	.11	...	.02	...	.11

Table 3. Structural Relationship Between Privatization Transferred to Budget and Selected Variables (concluded)

Table 3c. Dependent Variable: Total Revenue

	Full Sample						Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.40**	.42**	.45**	.46**	.40**	.42**	.36**	.36*	.34**	.33**	.37**	.37*
	(.19)	(.17)	(.21)	(.18)	(.19)	(.17)	(.14)	(.14)	(.14)	(.14)	(.15)	(.14)
Privatization (t-1)	...	-.06	...	-.02	...	-.08	...	-.17	...	-.19	...	-.16
		(.18)		(.21)		(.19)		(.15)		(.14)		(.16)
Δ Unemployment(t)	...	...	.14	.14	...	...	...	...	-.17***	-.17***	...	...
			(.41)	(.18)					(.09)	(.10)		
Δ Real GDP growth(t)	...	...	...	...	-.01	-.01	...	...	...	...	-.01	-.01
					(.02)	(.02)					(.02)	(.02)
Observations:	89	89	81	81	88	88	58	58	51	51	57	57
R-Squared	.27	.27	.30	.30	.28	.28	.18	.19	.27	.28	.18	.19
P-val from F test 1/	...	.24	...	.21	...	.26	...	.44	...	.57	...	.41

Table 3d. Dependent Variable: Tax Revenue

	Full Sample						Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.28	.37	.27	.36	.29	.37	.38*	.38*	.35*	.35*	.35*	.38*
	(.28)	(.26)	(.29)	(.26)	(.28)	(.25)	(.13)	(.13)	(.12)	(.12)	(.13)	(.13)
Privatization (t-1)	...	-.43**	...	-.49**	...	-.43***	...	.04	...	-.06	...	.02
		(.23)		(.24)		(.23)		(.13)		(.12)		(.14)
Δ Unemployment(t)	...	...	-.05	-.08	...	...	...	...	-.22**	-.22**	...	...
			(.06)	(.07)					(.10)	(.10)		
Δ Real GDP growth(t)	...	...	...	...	.01	.00	...	...	...	...	-.00	-.00
					(.03)	(.03)					(.03)	(.03)
Observations:	89	89	81	81	88	88	58	58	51	51	57	57
R-Squared	.26	.29	.27	.32	.26	.29	.15	.15	.30	.30	.16	.16
P-val from F test 1/	...	.88	...	.70	...	.87	...	.03	...	.14	...	.04

Sources: Country authorities; staff estimates.

Notes: Standard errors are in parentheses and based on White's (1980) Heterskedasticity-consistent covariance matrix. Asterisks indicate significance levels: * is 1 percent level; ** is 5 percent level; *** is 10 percent level. The regressions include a complete set of country specific dummies for which the estimates are not reported. Data are annual and all variables, except for real GDP growth and unemployment, are expressed as a share of GDP.

1/ The probability value from an F test of the hypothesis that the coefficients on privatization(t) and privatization(t-1) sum to zero. A value less than 0.10 indicates that the hypothesis can be rejected at the 10 percent level.

Table 4. Structural Relationship Between Total Privatization and Selected Variables

Table 4a. Dependent Variable: Overall Balance (First difference)

	Full Sample						Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.15		.10		.20		.16		.09		.00	
	(.20)	...	(.19)	...	(.24)	...	(.19)	...	(.19)	...	(.20)	...
Privatization (t-1)	-.09		-.26		-.11		-.21		-.25		-.13	
	(.29)	...	(.30)	...	(.29)	...	(.17)	...	(.16)	...	(.17)	...
Δ Privatization (t)		.12		.17		.16		.19		.17		.07
	...	(.17)	...	(.17)	...	(.19)	...	(.12)	...	(.12)	...	(.10)
Δ Unemployment(t)			-.32**	-.30**					-.23	-.23		
	...	...	(.14)	(.12)	...	...	...	...	(.15)	(.15)	...	...
Δ External financing(t)					-.47*	-.47*					-.36***	-.36***
	...	...	...	...	(.16)	(.16)	...	...	...	...	(.19)	(.19)
Observations:	104	104	83	83	95	95	69	69	49	49	62	62
R-Squared	.09	.09	.17	.17	.24	.24	.10	.10	.18	.18	.22	.22
P-val from F test 1/	.85	...	.64	...	.81	...	.87	...	.57	...	.67	...

Table 4b. Dependent Variable: Total Expenditure and Net Lending (First difference)

	Full Sample							Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.01		.07		-.05			.08		.10		.17	
	(.21)	...	(.20)	...	(.26)	...	...	(.24)	...	(.25)	...	(.27)	...
Privatization (t-1)	.01		.22		.02			.11		.12		.02	
	(.19)	...	(.16)	...	(.21)	...	...	(.18)	...	(.16)	...	(.18)	...
Δ Privatization (t)		-.00		-.06		-.04			-.01		-.01		.02
	...	(.13)	...	(.11)	...	(.14)	...	...	(.17)	...	(.16)	...	(.18)
Δ Unemployment(t)			.41*	.38*						.04	.04		
	...	...	(.12)	(.11)	...	...	...	...	...	(.15)	(.15)	...	...
Δ External financing(t)					.65*	.65*						.40***	.39***
	...	...	...	...	(.18)	(.18)	...	...	...	...	...	(.22)	(.22)
Observations:	104	104	83	83	95	95		69	69	49	49	62	62
R-Squared	.14	.14	.27	.26	.34	.34		.13	.13	.26	.25	.23	.23
P-val from F test 1/	.93	...	.28	...	.94	...		.49	...	.39	...	.56	...

Table 4. Structural Relationship Between Total Privatization and Selected Variables (concluded)

Table 4c. Dependent Variable: Total Revenue (First difference)

	Full Sample						Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.18***	.18		.19	.19		.25***	.27**		.20	.22***	
	(.11)	(.11)	...	(.12)	(.22)	...	(.15)	(.14)	...	(.14)	(.13)	...
Privatization (t-1)		-.09			-.04			-.17			-.14	
	...	(.22)	...	...	(.22)	...	...	(.11)	...	...	(.10)	...
Δ Privatization (t)			.14			.12			.22**			.18**
	...	...	(.14)	...	...	(.14)	...	...	(.09)	...	...	(.08)
Δ Unemployment(t)				.10	.09	.07				-.18***	-.18***	-.18***
	...	...	...	(.18)	(.62)	(.18)	...	...	...	(.10)	(.10)	(.10)
Observations:	104	104	104	83	83	83	69	69	69	49	49	49
R-Squared	.22	.23	.22	.26	.26	.26	.16	.17	.17	.20	.21	.21
P-val from F test 1/	...	.62	...	...	.52	...	...	.58	...	...	.68	...

Table 4d. Dependent Variable: Tax Revenue (First difference)

	Full Sample						Non-transition					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Privatization (t)	.16	.16		.15	.15		.28**	.27**		.26**	.26**	
	(.17)	(.17)	...	(.17)	(.17)	...	(.12)	(.13)	...	(.11)	(.11)	...
Privatization (t-1)		-.16			-.23			.05			-.02	
	...	(.15)	...	...	(.16)	...	...	(.11)	...	...	(.09)	...
Δ Privatization (t)			.16			.18			.11			.14***
	...	...	(.11)	...	...	(.12)	...	...	(.10)	...	...	(.08)
Δ Unemployment(t)				-.07	-.11	-.10				-.24**	-.24**	-.24**
	...	...	...	(.06)	(.07)	(.06)	...	...	...	(.10)	(.10)	(.10)
Observations:	104	104	104	83	83	83	69	69	69	49	49	49
R-Squared	.26	.27	.27	.26	.28	.28	.17	.18	.14	.27	.27	.24
P-val from F test 1/	...	.98	...	...	.43	...	...	.03	...	...	.08	...

Sources: Country authorities; staff estimates.

Notes: Standard errors are in parentheses and based on White's (1980) Heterskedasticity-consistent covariance matrix. Asterisks indicate significance levels: * is 1 percent level; ** is 5 percent level; *** is 10 percent level. The regressions include a complete set of country specific dummies for which the estimates are not reported. Data are annual and all variables, except for real GDP growth and unemployment, are expressed as a share of GDP.

1/ The probability value from an F test of the hypothesis that the coefficients on privatization(t) and privatization(t-1) sum to zero. A value less than 0.10 indicates that the hypothesis can be rejected at the 10 percent level.

positive in each of the regressions. Moreover, the effects would appear to be better characterized as permanent, since the null hypothesis of temporary effects is rejected (columns 8 and 11). For the full sample, there is little evidence of a relationship between total privatization and tax revenue. The total revenue regressions (Table 4c) yield broadly the same result, although whether the impact for the non-transition sample is temporary or permanent is not as clear.

There are several possible explanations for the observed relationship between privatization and tax revenue in the non-transition sample. Since tax revenue is measured as a share of GDP, higher output or profitability in the privatized firm would not necessarily translate into a higher ratio of tax revenue to GDP, as GDP would also be growing. The lasting impact found in the non-transition sample could be due to (1) higher collection rates from the privatized firms, either from improved compliance or enhanced administrative scrutiny; (2) privatization leading to a shift in the structure of GDP toward sectors paying more taxes; or (3) the privatization process coinciding with a general improvement in macroeconomic management, including tax policy and administration. (The inclusion of unemployment and real GDP terms is intended to control for the impact of a general improvement in macroeconomic performance.) The magnitude of the point estimate, however, is quite large and implies that a privatization equivalent to 1 percent of GDP would yield a permanent increase in tax revenue around ¼ percent of GDP. Even using generous assumptions, this would seem to be larger than plausible, which suggests that (3) above is partly, if not completely, underlying the result.[10]

Turning to the overall balance and total expenditure, there is little evidence of a statistically significant relationship between total privatization and these variables (Tables 4a and 4b).

Growth, unemployment, and investment

The empirical evidence strongly supports the hypothesis that privatization is positively correlated with real GDP growth (Table 5a). Moreover, when included together, both contemporaneous and lagged privatization are positive and statistically significant. These result are quite robust and are qualitatively the same for both samples and both of the different estimation procedures (the 8 columns in Table 5a, therefore, represent two underlying equations estimated on two samples using two procedures for each sample).[11]

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[10] To illustrate this point, suppose the public firm paid no taxes, the purchase price was 1 percent of GDP and the private owner earns an annual taxable return of 10 percent (of the purchase price). With a corporate tax rate of 50 percent, this would yield additional corporate tax revenue of only 0.05 percent of GDP.

[11] Given possible shortcomings in each of these techniques, both estimation methods are used. Specifically, the least squares dummy variable (LSDV) estimates are biased. However, the bias on the coefficients for privatization could be quite small, and the Anderson-Hsiao (1982) technique may not perform well when the time-dimension is short (see Judson and Owen, 1996). It is reassuring, therefore, that the LSDV and Anderson-Hsiao (1982) estimates yield the same qualitative results.

Table 5. Structural Impact of Total Privatization on Selected Variables

Table 5a. Dependent Variable: Real GDP Growth (In percent) 1/

	Full sample				Non-transition			
	LSDV		Anderson-Hsiao		LSDV		Anderson-Hsiao	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Privatization (t)	1.07**	1.01**	.37*	.55*	1.96*	1.82*	.72*	1.11*
	(.49)	(.46)	(.13)	(.12)	(.53)	(.57)	(.21)	(.20)
Privatization (t-1)	...	.71**	...	.35*	...	1.09**	...	1.12*
		(.36)		(.12)		(.50)		(.20)
Real GDP growth (t-1)	.05	.01	.15*	.13*	-.35*	-.41*	-.25*	-.26*
	(.11)	(.11)	(.03)	(.03)	(.14)	(.14)	(.04)	(.04)
Observations:	107	107	90	90	70	70	60	60

Table 5b. Dependent Variable: Unemployment Rate (First difference)

	Full sample					Non-transition				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Privatization (t)	-.27***	-.25***	-.21**			-.12	-.28**	-.27**		
	(.15)	(.13)	(.10)	...	...	(.10)	(.14)	(.13)	...	...
Privatization (t-1)	...	...	-.50*	...	...	...	...	-.16	...	...
			(.19)					(.18)		
Δ Privatization (t)	...	...	...	.14	.13	...	...	...	-.08	-.06
				(.12)	(.11)				(.07)	(.10)
Real GDP growth (t-1)	...	-.03	.02	...	-.04	...	.13**	.14**	...	.10***
		(.06)	(.05)		(.06)		(.06)	(.07)		(.06)
Observations:	86	86	86	86	86	50	50	50	50	50
R-Squared	.15	.16	.24	.14	.15	.18	.25	.26	.17	.23

Table 5c. Dependent Variable: Fixed Investment (First difference)

	Full sample					Non-transition				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Privatization (t)	-.03	-.04		-.04		.06	.07		.23	
	(.23)	(.23)	...	(.20)	...	(.41)	(.41)	...	(.21)	...
Privatization (t-1)	...	.06	...	.03	...	...	-.10	...	.16	...
		(.18)		(.17)			(.28)		(.16)	
Δ Privatization (t)	...	...	-.05	...	-.03	...	...	.08	...	.04
			(.16)		(.14)			(.25)		(.17)
Δ Unemployment (t)	...	...	...	-.29**	-.29**	...	...	...	-.48*	-.48*
				(.11)	(.10)				(.13)	(.14)
Observations:	96	96	96	76	76	67	67	67	48	48
R-Squared	.09	.09	.09	.33	.33	.03	.03	.03	.37	.34

Sources: Data provided by country authorities; and IMF staff estimates.

Notes: Standard errors are in parentheses and based on White's (1980) Heteroskedasticity-consistent covariance matrix. Asterisks indicatesignificance levels: * is 1 percent level; ** is 5 percent level; *** is 10 percent level. The regressions include a complete set of country specific dummies for which the estimates are not reported. The Anderson-Hsiao estimator, however, takes first differences to remove the country dummies prior to estimation. Except for real GDP growth and the the unemployment rate, all variables are expressed as a share of GDP.

1/ The combination of a lagged dependent variable and country-specific dummy (fixed effect) may lead to estimates that are biased using ordinary least squares (LSDV). Although the Anderson-Hsiao estimator avoids this problem, such alternative estimators may not provide better estimates of the coefficients on the privatization terms, and thus both results are reported (Judson and Owen, 1996).

Concentrating on column 4, the point estimates suggest that privatization of 1 percent of GDP in period *t* would be associated with an increase in the real growth rate by 0.5 percentage points in period *t* and a further 0.4 percentage points in period *t+1*.[12] For the non-transition sample, the effect would be a 1.1 percentage point increase in real GDP growth for period *t* and a further 0.8 percentage points for period *t+1* (column 8).

Given the simple specification that is used, the results should be interpreted cautiously and not construed to imply causation. As argued above, in all likelihood the privatization variable is capturing the positive impact of a general regime change toward better economic policies. This would be consistent with the findings of Berg, et al. (1999) and Havrylyshyn, Izvorski, and van Rooden (1998), in which structural variables, including privatization based ones, are found to be positively correlated with growth in the transition economies. In both cases, however, other non-privatization based variables also performed well, suggesting that it is difficult to isolate the precise structural factors—especially since many of the reforms are happening at once. Moreover, as highlighted in Sala-i-Martin (1997), the problem of identifying which variables actually explain growth permeates the growth literature.

Consistent with the above result for real GDP growth, privatization is also found to be negatively correlated with the unemployment rate (Table 5b). Moreover, since it is the level of privatization (columns 1-3 and 6-8) and not the first difference that is statistically significant, the results suggest that privatization has a long lasting (technically permanent) negative impact on the unemployment rate. Concentrating on the full sample (column 3), the point estimates indicate that a one percent of GDP privatization in period *t* is associated with just less than ¼ of a percentage point drop in the unemployment rate in period *t* and a further decrease of ½ a percentage point in period *t+1*, with the total impact being a sustained reduction of around ¾ of a percentage point. The results for the non-transition countries are qualitatively similar, although the coefficient on lagged privatization is not statistically significant. As with the real GDP regressions, these results should be interpreted cautiously and not considered to imply causality.

Finally, privatization does not appear to have a statistically significant relationship with fixed investment. The coefficient on the privatization terms is not statistically significant in any of the regressions (Table 5c).

V. Conclusions

While the empirical exercises explored the relationship between privatization and a variety of different fiscal and macroeconomic variables, two results stand out as being the most robust and interesting. In particular, these are that (1) privatization proceeds transferred to the

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[12] The impact in *t+1* is calculated as: *(0.55*0.13) + .35*.

budget are saved, and (2) the privatization process is strongly correlated with an improvement in macroeconomic performance.

There is strong and robust evidence that budgetary privatization proceeds are used as a substitute for domestic financing. The point estimates suggest that this relationship is one-for-one, with an increase in privatization proceeds transferred to the budget being used entirely to reduce domestic financing. The possible exception is for the non-transition sample, where there is some evidence that around 80 percent of the proceeds are used to reduce domestic financing and the other 20 percent to reduce external financing. Moreover, the empirical evidence does not support the hypotheses that privatization proceeds transferred to the budget are used to finance a larger deficit, increase total expenditure, or decrease total revenue. The following considerations, however, qualify these results: (1) the regressions are based on a limited sample; (2) the sample is largely comprised of observations that coincide with periods that the country had a Fund program; and (3) by design, only privatization proceeds transferred to the budget are examined, leaving open the question of what happens to privatization proceeds not transferred to the budget.

The second major finding is that the privatization process is strongly correlated with an improvement in macroeconomic performance, as manifested in higher real GDP growth and lower unemployment rates. The point estimates suggest that a one percent of GDP privatization corresponds to a 0.5 percentage point increase in contemporaneous real GDP growth and a further 0.4 percentage point increase in the following year. Regarding unemployment, the point estimates suggest that a one percent of GDP privatization is associated with a decline in the unemployment rate of just less than ¼ of a percentage point in the year of privatization and a further ½ percentage point in the following year; the total impact, therefore, is a permanent (or long lasting) decline of around ¾ of a percentage point. While these qualitative results are robust, it is quite possible, and even likely, that privatization is actually proxying for an omitted variable measuring the soundness of a government's macroeconomic policies. Under this interpretation, the improvement in macroeconomic policies would underlie both the increase in privatization and the improvement in macroeconomic performance.

References

Anderson, T.W., and Cheng Hsiao, 1982, "Formulation and Estimation of Dynamic Models Using Panel Data," in *Journal of Econometrics*, No. 18, pp. 47-82.

Berg, Andrew, Eduardo Borensztein, Sahay Ratna, and Joromin Zettelmeyer, 1999 "The Evolution of Output in Transition Economies: Explaining the Differences," IMF Working Paper 99/73 (Washington: International Monetary Fund).

Havrylyshyn Oleh, Ivailo Izvorski, and Ron van Rooden, 1998, "Recovery and Growth in Transition Economies 1990-97: A Stylized Regression Analysis," IMF Working Paper 98/141 (Washington: International Monetary Fund).

Judson, Ruth A. and Ann L. Owen, 1996 "Estimating Dynamic Panel Data Models: A Practical Guide for Macroeconomists," Federal Reserve Board of Governors (January).

Kikeri, Sunita, 1998, "Privatization and Labor: What Happens to Workers When Governments Divest?," World Bank Technical Paper No. 396 (Washington: World Bank).

Sevestre, Patrick, and Alain Trognon, 1996, "Dynamic Linear Models," in *The Econometrics of Panel Data: A Handbook of the Theory with Applications*, edited by Mátyás and Sevestre (Dordrecht: Kluwer Academic Publishers).

Sala-I-Martin, Xavier X., 1997, "I Just Ran Two Million Regressions," *The American Economic Review*, Vol. 87 (May), pp. 178-83.

White, Halbert J., 1980, "A Heteroskedasticity-Consistent Covariance Matrix Estimator and A Direct Test for Heteroskedasticity," in *Econometrica*, 48:4, pp. 817-838 (May).