WP/00/130
Correction 1

IMF Working Paper

May 23, 2001

Subject: **Evidence on the Fiscal and Macroeconomic Impact of Privatization**

CORRIGENDUM

The following corrections have been made in WP/00/130 (July 2000):

Page 12, Table 2b, title: for "Dependent Variable: Overall Balance (First difference)" read "Dependent Variable: Total Expenditure and Net Lending (First difference)

Page 13, Table 2d, title: for "Dependent Variable: Total Revenue (First difference) read "Dependent Variable: Tax Revenue (First difference)

Page 21, Table 5a, stub Real GDP growth (t-l), last two columns: for ".25*   .26*" read "-.25*   -.26*"

Corrected pages are attached.

Att: (3)

Other Distribution:
Department Heads
Division Chiefs

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

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 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. 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: $(0.55*0.13) + .35$.