

Effects of Prolonged Use on Growth: Details of the Econometric Results

This annex provides details of the econometric results discussed in Chapter 5.

Based on empirical analysis of a panel data set spanning five five-year periods (1975–99) for 130 countries, Barro and Lee (2002) found that when they did not control for endogeneity, their results suggested that participation in IMF arrangements was associated with contemporaneously lower per capita growth. However, after controlling for endogeneity of participation in IMF arrangements and for other determinants of growth, IMF arrangements had no statistically significant contemporaneous impact on per capita GDP growth, but rather a lagged negative effect. The authors employed an instrumental variables approach to control for endogeneity of participation in IMF arrangements.¹ Specifically, they used the following as instruments for participation: (i) size of quota; (ii) political and economic proximity to IMF major shareholders (the United States, France, and the United Kingdom);² and (iii) national staff (economists) at the IMF.

For the purposes of this evaluation, one of the coauthors of Barro and Lee (2002), Professor Jong-Wha Lee, extended the analysis in that study to consider whether “prolonged use” has an effect on growth that is distinguishable from that associated with “temporary use.” The rest of this section reports on the findings of several exercises undertaken by Professor Lee, using panel data for 82 users of IMF resources (GRA and concessional) over five five-year periods (1975–79, 1980–84, 1985–89, 1990–94, and 1995–99). The determinants of long-

run per capita income growth used encompassed: (i) initial income; (ii) human resources (educational attainment, life expectancy, and fertility); (iii) investment rate; (iv) exogenous shocks (changes in the terms of trade); and (v) policy and institutional variables (government consumption, rule of law, openness, and inflation). Participation in IMF arrangements was measured by loan size.³

A first set of exercises estimated the effects of participation in IMF arrangements, without controlling for the endogeneity of such participation. The results suggested that after controlling for other determinants of growth, IMF arrangements were associated with lower growth contemporaneously and with a lag (equation 1, Annex Table 4.1). Incorporation of contemporaneous and lagged interactive terms to distinguish between “temporary” and prolonged participants in IMF arrangements yielded statistically significant coefficients on the interactive terms, suggesting significantly more adverse effects on growth for prolonged users than for “temporary” users (equation 2, Annex Table 4.1).⁴

A second set of exercises controlled for the endogeneity of participation in IMF arrangements, using the set of instrumental variables employed in Barro and Lee (2002). There was little difference in results when no distinction was made between prolonged and “temporary” users (compare equations 3 and 1 in Annex Table 4.1); the effects of IMF lending on growth were found to be still negative and signifi-

¹The authors argue that the generalized evaluation estimator approach, characterized by Haque and Khan (1998) as the “estimator of choice” for evaluating the effects of IMF-supported programs, does not adequately correct for selection bias (e.g., by reliance on fragile assumptions about the distribution of error terms for identification). They propose a set of political and institutional variables for use as instruments to control for the endogeneity of participation in IMF arrangements.

²Political proximity is measured by voting record at the United Nations, and economic proximity by the ratio of bilateral trade to GDP.

³In the broader sample used by Barro and Lee (2002), other measures such as program approval, or program participation (the fraction of time that a country operated under an IMF program during the five-year period) do not seem to have a significant impact on growth independently of loan size.

⁴The definition of “prolonged users” was the same as that used in the “dynamic” definition in Annex 3, section on “Econometric Evidence on the Characteristics of Prolonged Users.” An alternative approach to exploring distinctions between prolonged and “temporary” users would have been to separate the data into two samples and estimate separate regressions for each group. The sample size for prolonged users was too small to implement this approach.

Annex Table 4.1. Effects of “Prolonged Use” of IMF Programs on Economic Growth

Instruments for IMF loan	Actual values of IMF loan size		IMF quotas and staff, political and economic proximity to the United States and Europe	
	(1)	(2)	(3)	(4)
Log (per capita GDP)	-0.0271 (5.988)***	-0.0260 (6.037)***	-0.0269 (6.042)***	-0.0279 (6.469)***
Male upper-level schooling	0.0036 (1.875)*	0.0030 (1.653)*	0.0035 (1.877)*	0.0034 (1.896)*
Log (life expectancy)	0.036 (1.841)*	0.040 (2.148)**	0.042 (2.171)**	0.054 (2.807)***
Log (total fertility rate)	-0.0281 (4.372)***	-0.0300 (4.891)***	-0.0273 (4.300)***	-0.0303 (4.918)***
Investment/GDP	0.0001 (0.004)	0.0128 (0.406)	0.0084 (0.260)	0.0122 (0.398)
Government consumption/GDP	-0.092 (3.528)***	-0.069 (2.735)***	-0.068 (2.655)***	-0.049 (2.057)**
Rule-of-law index	0.0111 (1.374)	0.0023 (0.300)	0.0130 (1.638)	0.0064 (0.822)
Openness measure	0.0136 (3.046)***	0.0149 (3.500)***	0.0141 (3.266)***	0.0159 (3.771)***
Inflation rate	-0.0212 (2.644)***	-0.0263 (3.641)***	-0.0191 (2.838)***	-0.0192 (3.406)***
Growth rate of terms of trade	0.069 (2.594)***	0.052 (1.998)**	0.072 (2.706)***	0.062 (2.410)**
Contemporaneous IMF loan	-0.185 (3.000)***	-0.183 (2.846)***	-0.178 (2.008)**	-0.071 (0.789)
Lagged IMF loan	-0.117 (1.715)*	0.099 (1.323)	-0.214 (2.027)**	0.074 (0.818)
Contemporaneous IMF loan* prolonged user		-0.328 (2.899)***		-0.390 (3.062)***
Lagged IMF loan* prolonged user	—	-0.528 (4.663)***		-0.517 (4.416)***
p-value				
(a)	0.002	0.011	0.007	0.536
(b)	—	0.000	—	0.000

Sources: IMF, WEO database; ICGR database; World Bank, WDR database; and IEO calculations.

*, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

cant.⁵ This result contrasts with the finding in Barro and Lee (2002) that after controlling for endogeneity of participation in IMF arrangements, the contemporaneous effect on growth becomes insignificant. A likely source of the difference in results is the difference in coverage of IMF arrangements, demonstrating the sensitivity of findings of such cross-country regression exercises to sample coverage and size.

⁵Barro and Lee (2002) considered only Stand-By (SBA) and Extended Fund Facility (EFF) arrangements, while the current exercise also includes arrangements under the IMF's concessional facilities (i.e., Structural Adjustment Facility (SAF), Enhanced Structural Adjustment Facility (ESAF), and Poverty Reduction and Growth Facility (PRGF) arrangements).

When a distinction was made between prolonged and “temporary” users, the main change in results was with respect to the estimated coefficient on the contemporaneous IMF loan size. The estimated coefficient was no longer significantly different from zero. The coefficients on lagged IMF lending and the interactive terms between IMF lending and the prolonged use dummy did not change much.

A third set of exercises examined whether the effects of IMF arrangements on growth differed between arrangements supported by general resources (i.e., SBAs and EFFs) and those supported by concessional resources (SAF/ESAF/PRGF). The results indicate significant differences (Annex Table 4.2). When the sample was limited to only SBAs and EFFs, strongly negative contemporaneous and

Annex Table 4.2. Alternative Specifications of Equation (4) in Annex Table 4.1

	SBA and EFFs (1)	SAFs, ESAFs, and PRGFs (2)
Contemporaneous IMF loan	0.043 (0.326)	-0.043 (0.415)
Lagged IMF loan	0.082 (0.888)	0.328 (1.116)
Contemporaneous IMF loan * prolonged user	-0.542 (3.250)***	-0.677 (1.913)*
Lagged IMF loan *	-0.584	0.853
Prolonged user	(4.761)***	(1.760)*
p-value		
(a)	0.856	0.497
(b)	0.000	0.086

Sources: IMF, WEO database; ICGR database; World Bank, WDR database; and IEO calculations.

Note: The estimation is based on the basic specification of equation (4) of Annex Table 4.1 with the specific change indicated in each column.

*, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

lagged effects on growth were found in prolonged users but not in “temporary” users. When only concessional facility arrangements were considered, there was a negative contemporaneous effect on growth which was more than offset by a positive lagged effect in prolonged users, and no significant effect on “temporary” users.

Sample size limitations imposed by available data constrained the scope of the exercises undertaken by Professor Lee. As noted above, the results from such cross-country regression exercises can be sensitive to changes in the composition and size of the sample being studied. Bearing in mind these inevitable limitations the main findings were:

- After controlling for endogeneity of participation in IMF arrangements, IMF lending was found to have negative effects on growth, over the contemporaneous as well as subsequent five-year period, in prolonged users.
- For “temporary” users, the effects on growth of contemporaneous and lagged IMF lending are statistically insignificant.
- The adverse consequences for growth of prolonged use appear to be concentrated in programs supported under general resources, and not in those under concessional facilities.