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Achieving Stabilization in Armenia¹

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Abstract

This paper examines the evolution, and impact on stabilization, of macroeconomic policies in Armenia during 1994-96. Fiscal and monetary policies have been effective in stabilizing the Armenian economy and facilitating significant growth, although they have not always worked in cohort. Seigniorage and the inflation tax declined dramatically as inflation fell, while dollarization was reversed but reached a plateau after mid-1995, affecting the demand for dram. The paper also presents quantitative indicators, which are suggestive of the trends discussed.

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Summary

This paper analyzes macroeconomic policies in Armenia during 1994-96 building on quantitative indicators. It shows that during the first phase of stabilization fiscal and monetary policies were tightened sufficiently to stabilize the economy and, aided by structural reforms and improving external factors, to facilitate an early return to growth.

Fiscal adjustment was sizable and rapid, minimizing the output cost and facilitating a favorable composition of adjustment. Growth was also enhanced by the substantial reduction in the overall tax burden, and the fact that much of economic activity that was suppressed as a result of tightening had negligible or even negative value added under the changed set of relative prices. The paper points out the feedback effect of lowering inflation on revenues accruing to the generalized government.

Monetary adjustment during the stabilization period was also substantial and was complemented by fundamental improvements in the central bank's capacity to formulate and implement monetary policy, as well as in banking supervision and accounting. Monetary policy benefited from a de facto exchange rate anchor, which proved efficient in guiding inflationary expectations. Although this approach resulted in a sizable real appreciation during 1995-96, external competitiveness is not likely to have been adversely affected, owing to extremely low dollar wages and incipient improvements in productivity.

The weak spot of the stabilization experience was the external sector. Exports as a share of GDP declined sharply, and their growth in US dollar terms was overtaken by that of imports. The current account deficit was very large in 1995 and 1996, financed to a large extent through a run-up in external debt, albeit much of it on concessional terms. Nevertheless, the stabilization period has successfully laid the groundwork for sustained growth.

I. Introduction

This paper describes the evolution of fiscal and monetary policy during 1994-96, the period during which the Armenian economy was stabilized. The objective is to provide an overview of the stabilization process in a transition economy² and--recognizing the paucity of the available data--provide some quantitative evidence. The paper is organized as follows: this section provides general background, while section II contains a discussion of macroeconomic policies and the constraints faced by the government during the phase of stabilizing Armenia's economy. Section III presents quantitative results suggestive of the trends discussed in the policy section: impulse indicators for the two primary policy instruments, fiscal and monetary policy; an examination of changes in the level of seigniorage and inflation tax extracted from the economy; and an econometric analysis of dollarization. Section IV provides a brief summary. Finally, three appendices contain technical details underlying the quantitative analysis.

On September 21, 1991 Armenia's 3.7 million people almost unanimously voted for independence from the U.S.S.R. Since then, Armenia has faced several political and economic challenges. First, the collapse of regional trade and payments agreements with the Baltics Russia and other countries of the former Soviet Union (BRO) and the resulting terms of trade shock dealt a severe blow to the economy. Second, serious obstacles to trade flows and economic development were caused by the conflict in Nagorno-Karabakh, which led to a crippling trade blockade by Azerbaijan and Turkey, as well as by other regional conflicts. Third, the task of replacing the central planning system with one based on market principles proved more difficult than anticipated, despite substantial early reform measures, including a sweeping land reform implemented in 1991-92. As a result of these challenges, output plummeted by over 60 percent during 1992-93 and inflation increased to over 1,200 percent during 1992 as prices were liberalized, and further to over 10,000 percent in 1993, in part due to the flooding of Armenia with old rubles. The dram, which was introduced in November 1993, depreciated from 14.3 to 60 per U.S. dollar by end-December. The CBA lost most of its reserves in an attempt to defend the initial exchange rate, which was set at an unrealistically appreciated level, and may have been further weakened by the continued parallel circulation of old rubles (the dram was made sole legal tender in Armenia only on March 1, 1994).

Following a cease-fire agreement with Azerbaijan in mid-1994, the government focused its attention on correcting the large macroeconomic imbalances that had developed. These were most evident on the domestic front, since the trade embargo, which had been especially tight during this period, coupled with domestic disturbances in Georgia, blocked transport routes and precluded the running up of a significant current account deficit. Starting in mid-1994, and supported by a succession of mostly concessional IMF and World Bank credits since December 1994, the government implemented tight fiscal and monetary policies accompanied by the initiation of broadly based structural reforms. As a result, end-period inflation dropped sharply to 1,885 percent in 1994 and 32 percent in 1995, while real GDP increased by 5.4 percent in 1994, and 6.9 percent in 1995 (Table 1). This momentum was

²See Begg (1996) for a multi-country survey of the stabilization phase in Central and Eastern European countries, focussing primarily on monetary policy developments.

maintained through 1996, with inflation dropping further to under 6 percent and output growing at around 6 percent.

Table 1. Armenia: Selected Economic Indicators				
	1993	1994	1995	1996
GDP and Inflation				
Real GDP (growth in percent)	-14.5	5.4	6.9	5.8
End-period inflation (CPI, in percent)	10,896	1,885	31.9	5.7
Fiscal Indicators (in percent of GDP)				
Revenues and grants	28.9	27.6	19.9	17.7
Total expenditures and net lending	85.0	44.1	29.8	26.1
of which: subsidies	16.7	12.8	0.9	0.1
Consolidated accrual budget balance	-56.1	-16.5	-9.9	-8.6
Consolidated cash budget balance	-54.3	-10.1	-11.1	-9.3
Financing of deficit (in percent of GDP)	54.3	10.1	11.1	9.3
of which: domestic financing	33.6	3.6	0.6	2.8
external financing	20.7	6.5	10.5	6.5
Monetary Indicators				
Base money (growth in percent)	3,842	833	97.9	40.5
Broad money (growth in percent)	2,303	684	68.7	35.1
Refinance interest rate (end-year, in percent)	210	210	52.0	60.0
External Sector				
Current account balance (in percent of GDP) 1/	-7.9	0.9	-22.1	-15.4
Net international reserves (in mil. US\$)	3.6	8.2	36.6	49.9
Gross international reserves (in mil. US\$)	...	32	107	167
Nominal average exchange rate (dram/US\$)	60	287	406	415
Sources: Armenian authorities; and Fund staff estimates.				
1/ Including humanitarian assistance.				

II. Macroeconomic Policies during Stabilization

The 1994-96 stabilization period can be characterized as having consisted of two phases. During the first, in 1994 through mid-1995, a fundamental shift towards more restrained financial policies occurred (see Table 1 and the quantitative results in Section III). The second phase brought further, albeit at times less consistent policy adjustment, and an increased emphasis on structural reforms, including the liberalization of the trade and

exchange system; a strengthening of the financial sector; restructuring of the enterprise sector, primarily through small privatization; institution building and improvement of the capacity to develop policies in the Ministry of Finance and the CBA; and comprehensive legislative reform.

Despite attempts at adjustment, the overall stance of financial policies in the very first years of independence proved unsustainably loose. However, as part of the first phase of stabilization, policymakers staged a successful assault on inflation by introducing more restrained policies. Fiscal tightening substantially reduced public dissaving and made room for contractionary monetary policy by reducing the need for CBA financing of the deficit, leading to lower inflation. In the event, the across-the-board policy tightening has not precluded a substantial growth rate of GDP. While this phenomenon should not be wholly ascribed to improved financial policies—after all, reversion toward earlier levels of output and exogenous factors³ are likely to have exerted a positive influence on growth—Armenia's experience clearly demonstrates that even drastic policy measures can be compatible with an early return to significant output growth.⁴

In order to achieve a transition to a well-functioning market economy, a wide array of reforms was necessary. Prices were liberalized or raised towards market clearing levels to improve price signals. There was a drastic reduction in the size of the budget, as described in detail below. Enterprise restructuring focussed on small privatization through vouchers, with about 80 percent of small and 60 percent of medium scale enterprises having been privatized by end-1996, and the ground was prepared for the privatization of large scale enterprises. However, since practically no bankruptcies occurred through end-1996, the enterprise sector has still not undergone a shake-out. The exchange system was gradually liberalized while trade was encouraged early on by eliminating export taxes and lowering the average effective tariff to below 5 percent by early 1994, primarily as a result of exempting from tariffs all imports (i) from CIS countries, (ii) associated with humanitarian assistance, (iii) of agricultural products, (iv) of petroleum products, and (v) of selected raw materials.

The level of financial intermediation was at a low level throughout the stabilization period due to the public's lack of trust in banks, evident from the low ratio of broad money to GDP, declining from 12.8 percent in 1994 to under 9 percent in 1995 and 1996.⁵ The economy was dollarized, with a significant part of transactions taking place in cash foreign exchange, and the vast majority of time deposits being denominated in foreign exchange. The banking system was in a fragile state, with a very high level of nonperforming loans which was masked by the lack of accounts prepared according to internationally accepted accounting standards. The high initial level of dollarization had also added to the vulnerability of the banking system. The CBA began consolidating the banking system by strengthening prudential regulation and banking supervision, which by mid-1995 led to the loss of licences by half of

³Including the cessation of open hostilities related to the Nagorno-Karabakh conflict, and a substantial increase in foreign inflows, mostly on concessional terms.

⁴For a recent comprehensive overview of the links between adjustment policies and growth, see Goldsbrough et al (1996).

⁵These ratios are calculated using broad money including foreign exchange deposits.

the banks that had been operating at the beginning of 1994. The CBA steadily improved its capacity throughout the stabilization period to formulate and implement monetary policy, and conduct banking supervision; it also successfully overhauled its accounting system, resulting in a clean assessment of the end-1995 CBA accounts by a leading international accounting firm. Similar audits were required of all major banks, which had been completed by end-1996. Substantial progress was also made in creating a market-oriented legal framework for commercial and central banking.⁶ The CBA also encouraged the entry of foreign banks. As a result, several branches of foreign banks were operating in Armenia by mid-1995, and Midland Armenia Bank, a fully foreign owned bank began operations in March 1996. Finally, from January 1996 the CBA required banks to gradually build up their provisioning levels against nonperforming loans, aiming for appropriate provisioning against such loans that had not been written off over a two year period.

In the fiscal area, structural changes focussed on institution building aimed at (i) setting up a Treasury system and field treasuries during 1996; and (ii) improving tax administration and widening the effective tax base, primarily through the removal of exemptions. In addition, several steps were taken to improve the targeting of the social safety net: the eligibility for child allowances was substantially narrowed, while the revised Pension Law adopted at end-1995 provided for a phased increase in the retirement age. Broad-based energy price subsidies were reduced substantially both as a result of a narrowing of the definition of eligible groups, and of reducing the number of enterprises for which the budget guaranteed the payment of their energy bills.

Given the wide scope of necessary reforms and the limited implementation capacity, structural reforms were not all carried out at the same time. While a clear strategy of moving towards a more flexible economy operating on market principles was pursued, at times policymakers deviated from this approach, mainly due to political constraints. Examples include the following: (i) the government engaged in extensive offset operations, writing down tax arrears against earlier budgetary expenditures, through much of the stabilization period; (ii) in 1996 it decided to bail out the Savings Bank using budgetary funds, (iii) it took over the external obligations of the state enterprise importing gas; (iv) it failed to privatize mills and bakeries, which could have significantly improved resource allocation in this area; and (v) the CBA failed to close any of the major problem banks, some of which were technically insolvent by 1996.

A. Fiscal policy

Prior to the beginning of the stabilization period, Armenia had an expansionary fiscal policy characterized by extremely high budget deficits financed predominantly by CBA credit. Over the course of adjustment, it moved to a tighter fiscal stance resulting in substantially reduced budget deficits. The accrual deficit of the consolidated government budget fell by 40

⁶ The banking laws adopted in June 1996 defined the role of the central bank and provided for its independence, facilitating the CBA's drive towards a sound banking system and the conduct of monetary policy geared towards low inflation. The law on banking, and on bank insolvency created a market oriented environment for banks.

percentage points of GDP in 1994 to 16.5 percent of GDP, with continued declines to 9.9 and 8.8 percent of GDP in 1995 and 1996, respectively. The composition of budgetary financing also changed significantly. While in 1993 financing came mainly from the CBA and from external sources (34 and 21 percent of GDP, respectively), financing in 1994 consisted mainly of domestic expenditure arrears and external financing (about 6 percent of GDP each), while central bank financing fell to 3.5 percent of GDP.

Dramatic changes occurred on the *expenditure side*, with total expenditure plummeting from 85 percent of GDP in 1993 to 44 percent in 1994, falling further to 30 percent in 1995 and 26 percent in 1996, as a result of massive across-the-board reductions in spending. In 1996, the share of current expenditures in GDP stood at one-third its 1993 level; during the same period, the share of capital expenditures and net lending in GDP declined to one-fourth its 1993 level. Capital expenditure fluctuated throughout the stabilization period, reaching almost 10 percent of GDP in 1994 but declining to 7 percent of GDP in 1995 and then to below sustainable levels at around 4 percent of GDP in 1996. Net lending to enterprises--an implicit subsidy to the enterprise sector, given highly negative real interest rates and poor repayment discipline-- fell from 18 percent of GDP in 1993 to negligible levels in 1994-95, and about 2 percent of GDP in 1996. In sum, the bulk of fiscal adjustment occurred on the expenditure side, especially in 1994, when inefficient spending was drastically reduced, including some reorientation of expenditures from defense, given improving prospects for peace in the region.⁷

Reductions in expenditure were accompanied by sizable drops in *revenues and grants*, particularly of the latter. Following a peak of around 12 percent of GDP in 1994, foreign grants accruing to the budget (mainly the domestic counterpart to food aid in the form of flour and grain used for bread) dropped to under 4 percent of GDP in 1995, and remained at that level in 1996. Tax revenues declined from 16 percent of GDP in 1993 to around 13 percent throughout the stabilization period due to administrative difficulties in taxing newly emerging sectors of the economy, the lower level of profitability in the state enterprise sector, persisting tax arrears, and weak performance of the VAT mainly related to widespread exemptions. Despite efforts to broaden the tax base, the state sector remained by far the largest source of tax revenues, accounting for about 90 percent of the total throughout the stabilization period. However, this implied a steadily declining tax base due to privatization and the increasing share of the underground economy. These forces, coupled with a drastic reduction in the inflation tax (see section III) overwhelmed gains from the reverse Tanzi effect as the level of inflation fell. Nontax revenues declined from 8 percent of GDP in 1993 to around 3 percent in part due to lower interest rates, which resulted both in lower interest income on net lending by the budget, and lower profit transfers from the CBA.

During the stabilization period, two instances of temporary fiscal loosening occurred. The increase in the budget deficit at the end of 1995 was mainly due to a surge in tax arrears,

⁷The 1993 total expenditure figure is not comparable to those in subsequent years since it contains all bank credit to state enterprises, included in net lending. Thus the size of adjustment in 1994 is approximately half of that implied by the change in total expenditures -- still a remarkable achievement.

and the failure to lower expenditures in the face of weak revenue performance; the fiscal expansion during the third quarter of 1996 was driven by sharp increases in spending on goods and services and government lending to enterprises mainly financed through CBA credit to government, clearly related to the end-September presidential elections. In both cases the subsequent tightening constituted a return to the earlier stance.

Throughout the stabilization period, tax arrears persisted, and the budget repeatedly incurred expenditure arrears as well. One way the Ministry of Finance attempted to deal with this problem was through netting-out operations, essentially involving the use of promissory notes (IOUs issued by budgetary spending units to enterprises as payment for goods and services bought from them) to pay back tax arrears. These netting-out operations were recorded in the fiscal accounts on both the expenditure side (as expenditure by the spending unit) and the revenue side (as tax revenue when the tax arrears were cleared).

However, these operations posed a number of problems. They gave rise to moral hazard (a clear incentive was created to run up tax arrears, which could be repaid later, and often at a discount in real terms) and were a non-transparent means of dealing with the problem of tax arrears, providing a misleading picture of the underlying revenue performance. Given the promissory notes' degree of substitutability with T-bills, and the active secondary market in promissory notes at the Yerevan stock exchange that developed by early 1996, their existence complicated plans for expanding the T-bill market and the development of an orderly secondary market for them; these notes also added to liquidity in the economy which was outside the control of the CBA. Their use was discontinued from August 1996.

The general trend toward a declining budget deficit during the stabilization period does not necessarily imply that the fiscal stance was uniformly contractionary in 1994-96, or that the revenue and expenditure stance was similar. An analysis of the fiscal stance during the stabilization period based on fiscal impulse calculations is presented in Section III. These indicators were chosen over changes in structural balances which are also used in the literature, because they are parameter-free, i.e. they measure the policy stance without recourse to elasticity estimates.

Section III also provides measures of seigniorage and the inflation tax extracted from the economy and its evolution during 1994-96, which show that inflationary financing of the budget has all but disappeared. As fiscal policy was tightened and the monetary stance became more restrained during 1994-1995, the rapid decline in inflation had the side-effect of sharply curtailing seigniorage and the inflation tax, hitherto very important sources of financing the general government. On an annual basis, general fiscal financing through inflation as measured by seigniorage dropped by a factor of six in 1995, despite a substantial decline in measured dollarization; a further similar decline occurred in 1996. The magnitude of the decline in the inflation tax is comparable over the same period, reinforcing the view that the successful stabilization of the Armenian economy during 1994-95 reduced budgetary financing through inflation to negligible levels.

The primary direction of causality during the stabilization period was from financial tightening to lower inflation. However, as fiscal consolidation contributed to bringing about a sharp drop in inflation, it led to lower indirect budgetary revenues arising as a result of inflation.⁸ Tax revenue also fell, as described above. As a result, the sum of budgetary tax revenue and the inflation tax declined in a dramatic manner--from over 60 percent of GDP in the first quarter of 1994 to under 15 percent in 1996--making further fiscal adjustment inevitable. Thus, the government was forced to proceed with the drastic expenditure cuts that were implemented during the stabilization period. Despite their adverse impact, these developments also had beneficial effects: the sharp reduction in the proportion of GDP channeled through the government budget had a crowding in effect on private sector activity, most notably in the expanding service sector, which underpinned growth throughout the stabilization period. In addition, the substantial decline in the effective tax burden on the economy also facilitated growth.

Pursuing an alternative strategy of allowing a markedly larger fiscal deficit and higher inflation in order to achieve faster growth and increased government financing would have been excessively risky. In particular, little of the past experience with high deficits and expanding credit provided hope that they could improve allocational efficiency. Moreover, volatile exchange rate expectations had to be addressed through decisive policy action, since the emergence of macroeconomic stability owed much to the effectiveness of the de facto nominal exchange rate anchor (see below). Thus, on balance, the tightening of fiscal policy played a positive role by helping to move the economy toward an equilibrium with low inflation and a stable exchange rate, and placing it on a sustained growth path.

B. Monetary policy

Monetary policy in Armenia was successful during the stabilization period, as demonstrated by the attainment of ambitious inflation and output objectives. Since these variables were not directly controllable and also because of the lags in the effect of financial policies on prices and output, the CBA focused on *intermediate targets*, including the exchange rate, NIR, and bank liquidity. These were more immediately controllable, with data available on a timely basis. In addition, exchange rate developments were widely followed as a highly visible indicator of policy commitment. The CBA had a limited set of *instruments* to attain desired levels for its intermediate targets. While the CBA argued that large disbursements of official loans accruing to the government should be kept in the government account at the CBA and spent (i.e. released into the banking system) only gradually in order to avoid a surge in dram liquidity, in practice such disbursements were always promptly spent. The main--in fact, until 1996, practically the only--instrument for withdrawing substantial liquidity in these circumstances was the massive sales of foreign exchange. These sales took place in different segments of the foreign exchange market in different periods: in the regular foreign exchange auctions during 1994-95, when these auctions were the main determinants of the exchange rate; and in the emerging interbank market subsequently, when it took over

⁸Defined as the amount of inflation tax, or alternatively, as the amount of seigniorage accruing to the CBA, the bulk of which was eventually received by the budget in the form of profit transfers from the CBA as non-tax revenue.

this role from mid-1996. The CBA was an important--often dominant--participant in the foreign exchange market throughout the stabilization period, balancing the conflicting objectives of limiting the liquidity impact of lump-sum inflows of official external grants and loans, and maintaining a stable exchange rate, without formally fixing it. Given the relatively low level of reserves and the volatile external environment, the CBA viewed this approach as preferable to a formal fixing of the exchange rate, which could have proven costly in terms of credibility if unforeseen shocks forced an abandonment of the fixed rate.

The CBA's primary instrument for injecting dram liquidity was the provision of central bank credit to banks. Following a period when direct allocation of CBA credit to banks prevailed in 1994, the procedures for central bank credit auctions were overhauled in February 1995 and these gradually became the main means of managing liquidity⁹ through end-1995. However, following the introduction in September 1995 of Treasury bill auctions, the CBA decided to impose a collateral requirement on all auctioned credit from January 1 1996 in order to reduce the repayment risk of auctioned credit and to facilitate the emergence of an interbank credit market. Unfortunately, the immediate effect of this measure was to effectively eliminate credit auctions as an instrument from that time due to the insufficient stock of outstanding T-bills available for this purpose,¹⁰ with the resulting credit crunch being felt throughout the first half of 1996. The liquidity impact was partly offset by the effective lowering of the reserve requirement in May 1996; in the event, the use of this blunt and rigid instrument for short term liquidity management proved inefficient, and was subsequently reversed. The CBA also introduced repurchase agreements (repos), reverse repos and a Lombard facility in early 1996; however, their role remained insignificant through the end of the year.

While the interbank market in dram credit registered noticeable gains from the second half of 1996, it did not open up significant new transmission mechanisms for monetary policy during the stabilization period (e.g. through interest rate policy). The CBA set the refinance rate, but it was not used in any significant transaction in the economy (see the discussion of advance profit transfers by the CBA). The decision to auction the right to banks to place remunerated deposits at the CBA from August 1996 may over time increase the role of interest rates in the economy. However, auctioned deposits remained a marginal instrument in 1996, in part due to the desire not to interfere excessively with the primary market in short term T-bills, for which they are a close substitute. The interbank credit market lacked sufficient depth and remained segmented due to the high perceived payment risk of many banks, including major ones, and to the less-than-transparent collateral legislation. An additional problem was that no secondary market in T-bills emerged, due to the discriminatory taxation of secondary transactions in T-bills, and their short average maturity. Such a

⁹Since the auctioned credits had a maturity of under one month, withholding the supply of credits on the auctions was an effective method of lowering dram liquidity with a short lag.

¹⁰The stock of T-bills reached dram 5 billion at the beginning of 1996, growing to dram 10 billion, or 1.5 percent of GDP at end-1996. Much of this was held by banks, and some by nonresidents for investment purposes; thus they had no intention to utilize it as collateral, holding it to maturity instead. Finally, the very short average maturity of T-bills also acted against their use as collateral.

secondary market could have facilitated a faster expansion of non-inflationary budget financing through T-bills, enhanced liquidity management by the CBA and a more rapid development of the interbank credit market.

An *important leakage* in restricting CBA financing to the budget was the system of advance profit transfers, whereby until end-1996 the CBA automatically covered the quarterly payments of interest due on CBA credit by a transfer to the budget which was referred to as advance profit transfers. These advance transfers were substantial in 1994 (around 8 percent of GDP), and declined substantially by 1996. It is noteworthy that they are roughly of the same magnitude as the calculated amounts of quarterly seigniorage accruing to the CBA during 1994-96 (see Section III).

By late 1993, Armenia had no significant monetary overhang due to the high level of inflation in the preceding period.¹¹ Thus, the subsequent monetary tightening played a major and immediate role in lowering inflation during the initial stabilization phase. The rate of growth of both base and broad money was under one-thirtieth in 1995 of what they were in 1993 (Table 1), and this fundamental shift toward tighter monetary policy coincided with a sharp drop in inflation.¹² However, from late 1995, monetary policy exhibited features of a stop-go cycle. Serious monetary policy relaxations occurred in the fourth quarter of 1995 and the third quarter of 1996, driven primarily by the fiscal lapses described above. The fact that inflation did not flare up was due to the prompt correction applied in both instances, and other, specific factors. At end-1995, the sudden increase in NIR which pushed up base money was rapidly reversed; in addition, there was an increase in the demand for drams as suggested by the downward drift in the share of foreign exchange deposits in broad money from a peak of 63 percent in May 1994 to 20 percent by the fourth quarter of 1995 (Figure 4). In the second case, the effect of the surge in monetary aggregates on measured inflation fed through with an unexpectedly long lag (inflation did pick up during 1997). In addition, inflationary pressures may have partly found an outlet on the external side: the current account deficit, although declining, remained high as a percentage of GDP, while the nominal exchange rate depreciated substantially during the last quarter of the year. The stop-go cycle in financial policies did not represent an optimal response to changing domestic macroeconomic circumstances and may have complicated the task of permanently altering the expectations of economic agents by exacting a toll on policy credibility.

The *interaction between fiscal and monetary policy* has also evolved over time. Until 1993, the CBA just financed the fiscal deficit that emerged, without much regard to inflationary consequences. From 1994, it began sharply curtailing its financing to the budget, and over time bank financing was also reduced. However, this component remained substantial due to the fact that banks were the main purchasers of T-bills, in effect providing bank financing to the budget. As the description of monetary policy instruments shows,

¹¹ However, some persistence in the inflation process was likely to have been introduced by the resulting inflationary expectations, as well as by continuing massive relative price changes and further price liberalization.

¹² A somewhat more sophisticated analysis in section III based on monetary impulse measures shows a similar overall picture.

monetary stability throughout the stabilization period hinged largely on continued fiscal restraint and the success of sterilization operations through sales of foreign exchange. It was therefore not surprising that the sharp increase in credit to government related to upcoming elections in September 1996 was followed by a substantial loss of CBA reserves, and subsequently, by exchange rate depreciation. This episode of loose financial policies was captured by both impulse indicators presented in section III.

After careful consideration the authorities did not formally commit to a fixed exchange rate system at the outset of the stabilization process. However, the exchange rate vis-a-vis the US dollar remained practically constant without substantial CBA intervention for almost two years through mid-1996, facilitated by the dram's initial undervaluation in early 1994. This in turn was due to (i) the dram's sharp initial depreciation in the months after its introduction; and (ii) the reversal of the initially high demand for foreign exchange which had been regarded as a superior store of value before stabilization took hold, given the negative real interest rates and high risk on domestic savings instruments. The resulting *de facto nominal exchange rate anchor* has played an important role in lowering inflation. As the public's confidence in the dram grew, reverse currency substitution occurred, driving up the demand for drams and facilitating the stability of the nominal exchange rate, causing a strong real appreciation of the dram during much of the stabilization period due to the significant inflation differential with most partner countries. The stable nominal exchange rate helped limit inflation both through its effect on expectations, and by effectively limiting the rate of price increases of imported goods to foreign inflation. The latter effect was strengthened by the gradual reduction in traded goods prices due to increasing price arbitrage as the trade blockade became more porous over time. The stability of the exchange rate also provided a highly visible signal of the overall appropriate stance of financial policies and thus helped guide expectations towards a low inflation equilibrium.

III. Empirical Indicators

This section uses a variety of methodological approaches. It constructs quantifiable measures of the stance of fiscal and monetary policy, of the inflation tax and seigniorage, and utilizes time-series regression techniques to analyze dollarization. While the limited availability and quality of macroeconomic data have constrained our ability to correct for continuing structural changes, and have added noise to the results, we found no reason to expect a systematic bias. The shortness of available time series also precluded an econometric study of simultaneity among the macroeconomic variables utilized and of the time lags between causes and effects. Despite these caveats, the quantitative results are suggestive of the trends, and support the description of stabilization and early recovery presented in the previous section.

The sample period is the last quarter of 1993 to the end of 1996. Quarterly data are used for all quantitative measures, with the exception of the dollarization equation, which is estimated using monthly data starting from January 1994. Fiscal and monetary impulse

measures are obtained only from the first and second quarter of 1994 onwards due to differencing and, in the latter case, the use of lags.¹³

A. Fiscal Impulse Indicators

It has long been recognized that for many countries the actual budgetary position of the government may be a misleading indicator of the thrust of fiscal policy, because it is not clear whether changes in that position are the cause or the result of changes in economic activity (cf. Heller et al, 1986). In addition, when analyzing fiscal policy it is important to distinguish between factors that have a transitory effect on the actual budget balance, and the effects of policy or structural changes that have a more durable impact on the budget balance. These concerns, which also apply to the Armenian economy during the period analyzed, led to the development of the fiscal impulse measure for adjusting the fiscal accounts to yield a more accurate measure of the fiscal policy stance. This section presents such quantitative fiscal impulse indicators for Armenia, which characterize the effect of fiscal policy on overall aggregate demand in the economy during 1994-96.

The quantified measures can be interpreted as follows (technical details are presented in Appendix I). The *revenue impulse* considers the impact of government revenues neutral if revenues and *actual* GDP grow proportionally; if revenues grow more than proportionally the effect is contractionary, and if they grow less than proportionally, the impact is expansionary. On the other hand, the *expenditure impulse* considers the impact of government expenditures on the economy neutral if they grow proportionally to *potential* output. If expenditures grow more than proportionally to potential output, the impact is considered expansionary, and if they grow less than proportionally, the impact is contractionary. The fiscal impulse, i.e., the sum of the revenue and the expenditure impulses, measures the net effect of the revenue and expenditure policies of the government on aggregate demand. Both annual and quarterly impulse indicators were calculated, although the emphasis in the analysis is on the annual ones. For the quarterly impulse indicators, year-on-year differences were used so that the quarterly impulse indicators add up to the annual indicators. Total revenues include tax and nontax revenues and humanitarian assistance counterpart funds accruing to the budget,¹⁴ while government expenditures include net lending.

The fourth quarter of 1995 was chosen as the base period for the expenditure impulse measures described above. The first implication of this choice is that the revenue/GDP and expenditure/GDP ratios of that quarter are used to define the cyclically neutral budget (see Appendix I). Thus, the fiscal stance in each period is compared to the stance of this quarter. It is important to keep in mind that fiscal policy in period "t" can be expansionary—compared to the base period—even if strong fiscal adjustment occurred, i.e., the deficit declined sharply

¹³It is important to note that the two quarterly impulse measures are not directly comparable. The fiscal impulse measure is based on changes relative to the same quarter in the previous year, in effect imposing a seasonal adjustment, while the monetary impulse is calculated using changes relative to the previous quarter.

¹⁴The latter is included because it closely reflects the extent of the government's efforts to collect such proceeds.

compared to period "t-1". As Appendix I indicates, the sign of the revenue impulse is determined not only by the change of revenue in relation to the change of GDP, but also by its relative magnitude compared to the revenue/GDP ratio at the base period, t_0 . It is easy to show that the revenue impulse would be positive (expansionary), if the revenue/GDP ratio declined from period "t-1" to period "t" to a level below t_0 ; or alternatively, negative (contractionary), if the revenue/GDP ratio increased from period "t-1" to period "t" to a level above t_0 . A similar analysis can be applied to determine the sign of the expenditure impulse. In sum, the choice of the base ratios affect the size, and possibly even the sign of the fiscal impulse indicators. However, their relative magnitude is essentially unaffected: periods with a high or low impulse compared to other periods remain such even if different base ratios are selected.

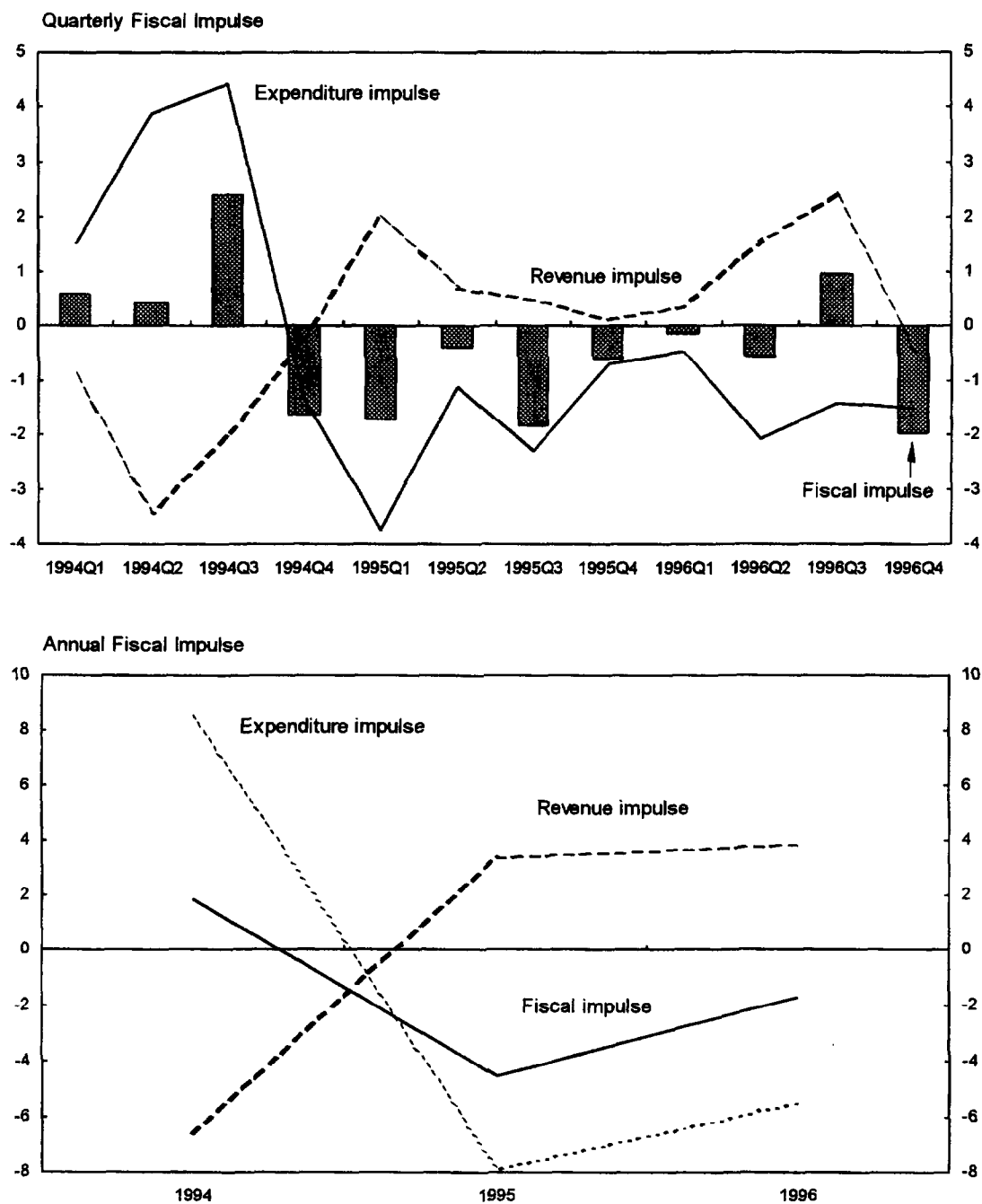
The second implication of the choice of the fourth quarter of 1995 as the base period is that the level of real GDP in this quarter was used as a measure of potential GDP.¹⁵ In the absence of capacity measures and lacking a general equilibrium model for the economy, this choice is necessarily arbitrary. It is based on the local peak in output achieved in this quarter, which appeared to exceed the level implied by seasonality; the fact that this was the last quarter for which Fund programs aimed primarily at stabilization (STF, SBA) were in effect; and that high levels of inflation, together with rapidly changing relative prices ruled out quarters at the beginning of the sample period as suitable candidates. In order to ensure that this choice for potential GDP did not unduly distort the results, a *sensitivity analysis* was performed to check for its impact. This analysis is also presented in Appendix I, and essentially implies that the major conclusions of the exercise are robust to the choice of the period providing the level of potential GDP.

Turning to the results, it is readily apparent that during the period analyzed, the *expenditure impulse dominated the revenue impulse*, and hence determined the overall stance of fiscal policy. This was particularly noteworthy in 1994, when despite considerable contractionary effects on the revenue side, the overall fiscal impulse shows a marginally expansionary stance due to a strongly expansionary expenditure effect. The contractionary revenue impulse was a result of the sharp slow-down in inflation, the introduction or amendment of a number of new taxes including VAT and land taxes, and significant reductions in exemptions. The major reasons for the strong expansionary expenditure effect were the high level of subsidies—12.8 percent of GDP, compared to 0.6 percent in Q4 1995, the base period, and of capital expenditures—9.8 percent of GDP, compared to 6.4 percent in Q4 1995.

As Table 2 and Figure 1 show, the overall fiscal stance in all but two quarters arose as a result of revenue and expenditure impulses of opposite signs, reflecting an uneven approach to fiscal policy. Following a strong expansion in 1994, drastic expenditure cuts dominated the scene in 1995-96, especially in the subsidies, transfers, and other goods and services items, reducing expenditures to levels from which further reductions of similar magnitude were no

¹⁵Implying a constant level of potential GDP in real terms over the sample period. Since the period analyzed is short, this is not an overly restrictive assumption.

Figure 1. Armenia: Fiscal Impulse, 1994-96
(In percent of GDP)



Sources: Armenian authorities; and Fund staff estimates.

Table 2. Armenia: Indicators of Fiscal Impulse 1/
(In percent of GDP)

Time	Fiscal Impulse	Revenue Impulse	Expenditure Impulse
1994	1.79	-6.64	8.44
Q1	0.59	-0.91	1.49
Q2	0.44	-3.44	3.88
Q3	2.40	-2.01	4.41
Q4	-1.63	-0.28	-1.35
1995	-4.53	3.36	-7.90
Q1	-1.72	2.04	-3.75
Q2	-0.40	0.73	-1.13
Q3	-1.83	0.49	-2.32
Q4	-0.59	0.11	-0.70
1996	-1.70	3.82	-5.52
Q1	-0.13	0.34	-0.47
Q2	-0.56	1.53	-2.09
Q3	0.97	2.41	-1.44
Q4	-1.97	-0.45	-1.52

1/ A positive (negative) quantity denotes an expansionary (contractionary) impact.

longer feasible. The path of the revenue impulse is the mirror image: while it held the overall fiscal impulse at a relatively low level in 1994, it showed an expansionary stance (i.e., weaker revenue effort) in 1995-96. Overall, the fiscal impulse results characterize fiscal policy as having been somewhat expansionary in 1994, with a reversal already apparent in the final quarter, strongly contractionary in 1995 and mildly contractionary in 1996. Of the two components of the fiscal impulse, the expenditure impulse dominated the revenue impulse in magnitude in all three years. The same holds for the quarterly measures, with the exception of the third quarter of 1996. In sum, *fiscal policies have been substantially tightened over the period analyzed*, primarily on the revenue side in 1994 and predominantly the expenditure side in 1995-96.

As prices were liberalized and subsidies fell, expenditure policy became contractionary, and remained consistently so throughout 1995 with total expenditures declining from 44.1 percent of GDP in 1994 to 29.8 percent, leading to an overall contractionary fiscal stance in that year. This occurred despite a revenue policy that was expansionary, especially in the first quarter of 1995 due to a drop in tax revenues to only 9.3 percent of GDP from 15 percent in the preceding quarter. By end-1995, excise tax measures reversed the decline in tax revenues and thus made the end-year revenue impulse close to neutral. Fiscal policy was also uneven in

1996: it was essentially neutral during the first half, followed by a strongly expansionary stance in the third quarter¹⁶ and a reversal to contraction in the final quarter. The reversal was facilitated by a sharp increase in tax arrears payments following a presidential decree threatening state enterprise managers with firing if tax arrears were not paid by end-1996.

B. Seigniorage and Inflation Tax

Armenia experienced very high rates of base money expansion and inflation in 1993 and early 1994. This resulted in high levels of seigniorage¹⁷ and inflation tax, which are quantified using a simple approach in this section, based on the methodology in Buiter (1996). For the purposes of this paper, *seigniorage* is defined as the amount of resources appropriated during a period by the government¹⁸ as a result of expanding nominal base money:

$$S_t = (M_t - M_{t-1})/Y_t$$

where M_t is nominal base money in dram at end of period t and Y_t is nominal GDP in dram in period t . The *inflation tax* is defined as the reduction in the real value of the outstanding stock of base money due to inflation over a specified period:

$$IT_t = - (M_{t-1}/P_t - M_{t-1}/P_{t-1})/(Y/P_t)$$

where P_t is end-period consumer price base index for period t . Both seigniorage and inflation tax are measured as a percentage of GDP, and provide measures of the magnitude of resources appropriated by the government as a result of expanding the public's holding of base money, and of inflation, respectively. They will differ if there is real growth in GDP, if real base money expands (the former raises seigniorage relative to the inflation tax, while the latter has the opposite effect, *ceteris paribus*), or if base money velocity changes.

The results (Table 3 and Figure 2) highlight an important aspect of stabilization: *following very high levels, both seigniorage and the inflation tax declined to low, at times even negative, levels by mid-1995*, as stabilization took hold in the economy. However, the results should be interpreted as broad indicators of trends only, due to the limitations of the data base and the lack of adjustment for possible changes in demand for base money. For the fourth quarter of 1993, data inconsistencies precluded the calculation of a reliable inflation tax

¹⁶Arising entirely on the revenue side due to a sharp increase in tax arrears. Owing to the heavy reliance of the Armenian social safety net on support provided by enterprises, the temporary drop in the effective tax burden facilitated a pre-election increase in such support.

¹⁷Kun (1996) contains various definitions of seigniorage and a historical overview.

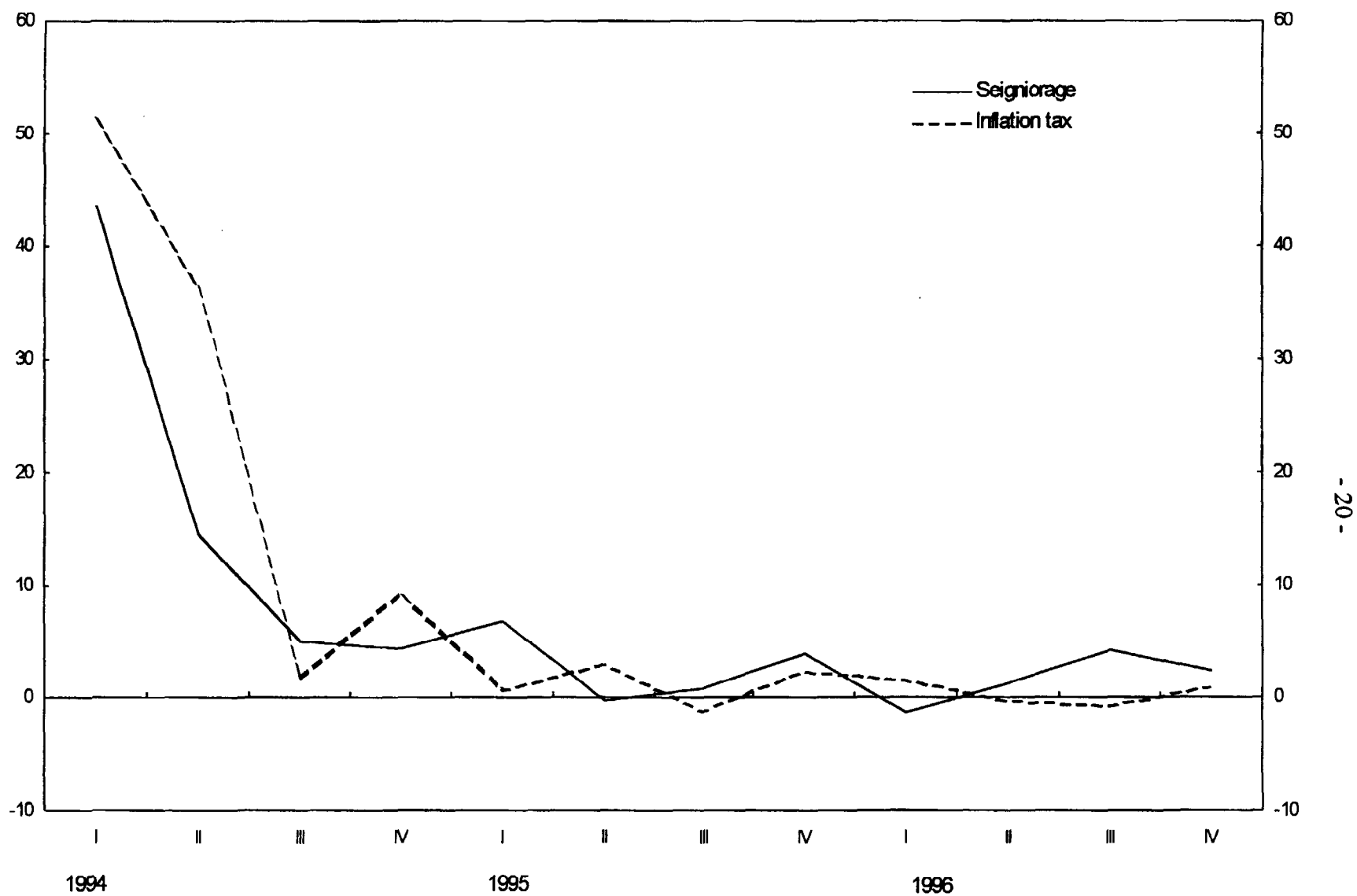
¹⁸In this section, government is used in a generalized sense, and is understood to include the CBA. See Catsambas (1995) for a description of asymmetries in the accounting treatment of the government and the central bank.

figure, while seigniorage is omitted because it accrued to the Central Bank of Russia during part of this period before the dram was introduced.

Table 3. Armenia: Seigniorage and Inflation Tax			
	<u>CPI</u> 1994 Jan=100	<u>Seigniorage</u> (in percent of GDP)	<u>Inflation Tax</u> (in percent of GDP)
1993			
Q4	55
1994			
Q1	171	43.5	51.2
Q2	489	14.5	36.4
Q3	530	4.9	1.5
Q4	1,087	4.3	9.1
1995			
Q1	1,152	6.7	0.7
Q2	1,338	-0.3	3.0
Q3	1,248	0.8	-1.2
Q4	1,435	3.9	2.4
1996			
Q1	1,540	-1.3	1.5
Q2	1,514	1.3	-0.3
Q3	1,453	4.2	-0.7
Q4	1,518	2.4	0.9
Source: Armenian authorities; and Fund staff estimates.			

As in the case of the fiscal impulse, and the monetary impulse presented below, the seigniorage measures are relatively large in the final quarter of 1995 and the third quarter of 1996. However, this reflects the side-effects of financial loosening, rather than policy objectives. The short term respite brought about by the temporary increase in seigniorage was likely to have been offset by the damage to the credibility of future policies caused by the policy reversals. Moreover, while both the seigniorage and inflation tax measures indicated a greater extraction of resources from the economy at the end of 1995, this was only the case for seigniorage in the third quarter or 1996, reflecting the continued subdued level of inflation during this period.

Figure 2. Armenia: Seigniorage and Inflation Tax, 1994-96
(In percent of GDP)



Sources: Armenian authorities; and Fund staff estimates.

C. Monetary Impulse Indicators

The monetary impulse measures presented here seek to capture the medium term inflationary implications of the stance of monetary policy in a simple measure. The main macroeconomic variables used are GDP and base money, the latter because it closely reflects actions taken by the monetary authority itself. Since the multiplier has been relatively stable during the sample period, the behavior of broad money was rather similar to that of base money. Thus, broad money-based calculations would have not yielded qualitatively different results for the period analyzed.

Following the approach in McCallum and Hargraves (1996), three different monetary impulse indicators were calculated. They are defined as quarterly rates of base money growth adjusted by three alternative measures of smoothed base money velocity (see Appendix II). They closely resemble a rearranging of the identity defining base money velocity, with the growth rate of GDP on the left hand side. Therefore, they represent growth rates of nominal GDP implied by the current stance of monetary policy as measured by changes in base money. Assuming that monetary policy should aim for very low inflation, these measures should be contrasted with levels of nominal GDP growth with approximate price stability. In order to account for (i) uncertainty about the precise level to be chosen, (ii) feedback effects of GDP growth on changes in base money, and (iii) the potential lack of stability in the demand for dram, a range, rather than a single level of stable-price GDP growth is chosen to represent a neutral monetary stance.¹⁹

To determine this range, a 5 percent annual real growth rate was chosen as a reasonable growth rate to aim for during the stabilization period, which followed a sharp drop in output. Approximate price stability in the Armenian context was taken to mean 6 percent annual inflation—corresponding to the actual 1996 level of end-period inflation in Armenia. These figures imply a nominal GDP growth rate of around 11 percent. Based on these considerations, a range of 3 percentage points above and below 11 percent was taken to be the range of noninflationary growth rates for nominal GDP.

Against this background, the results can be interpreted as follows. If the monetary impulse measures for a given quarter tend to fall within the 8-14 percent range described above, the monetary stance is considered neutral in that period; if above, it is considered expansionary, and if below, contractionary.

The *limitations* of these measures include the failure to capture changes in policy instruments and macroeconomic variables that act as substitutes for domestic credit, such as interenterprise arrears, informal credits extended outside the banking system and promissory notes. The monetary impulse measures are less likely to reflect the true monetary stance if progress on the stabilization front leads to autonomous capital inflows reflecting increases in

¹⁹As already mentioned, the extent of dollarization, an important source of volatility in the demand for dram, stabilized by early 1995.

the demand for dram.²⁰ In addition, to the extent that a central bank targets the exchange rate during 1994-96, the monetary impulse does not measure the intent of monetary policy, although it still provides a specific quantitative measure of its effect. Finally, changes in data definitions (including in the method of compiling GDP statistics, and their coverage), in the regulatory system, and structural changes in the banking system may have made data from different time periods less comparable.

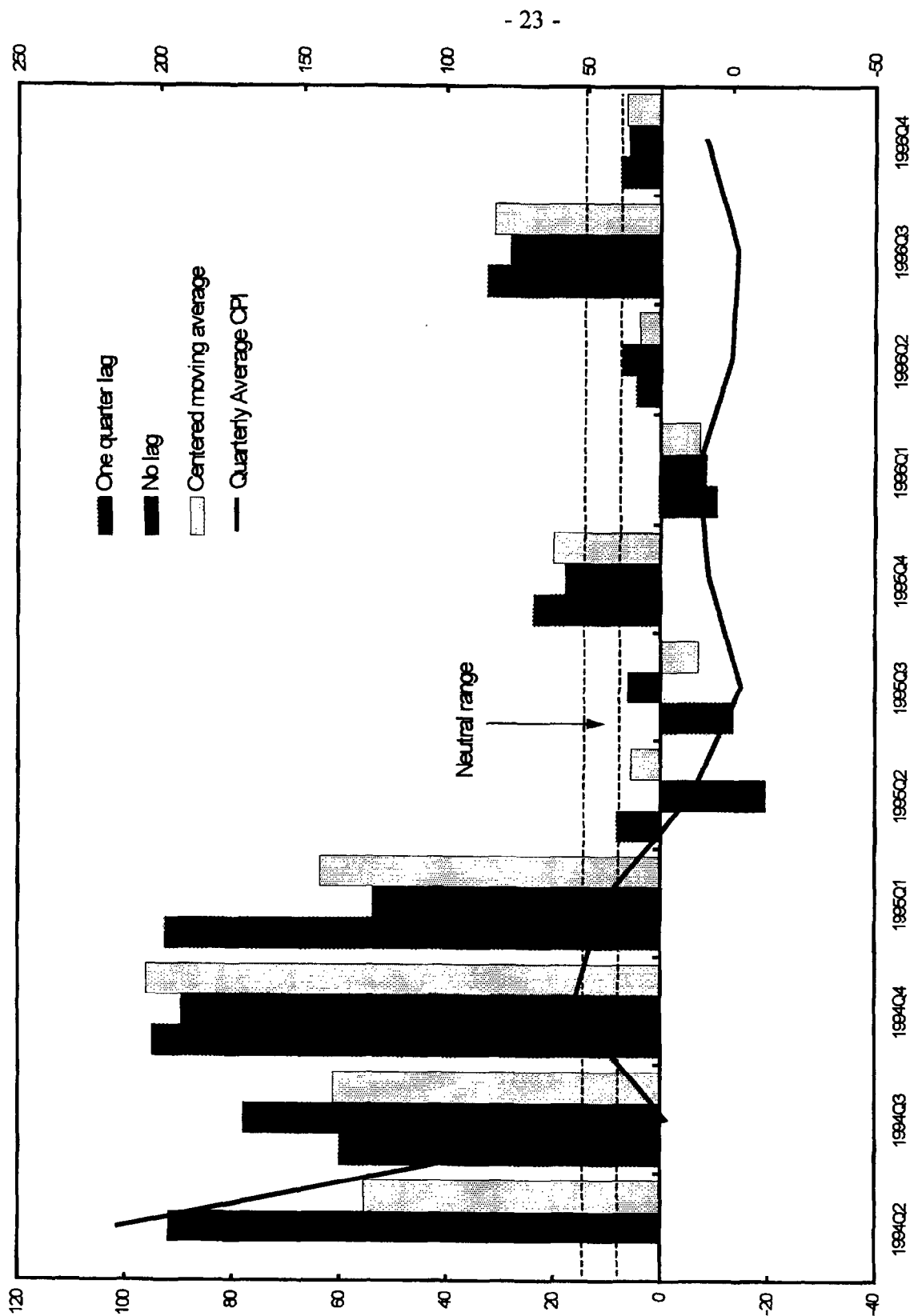
The quantitative results are summarized in Figure 3 and Table 4 below. The interpretation is based on the overall picture emerging from the three monetary impulse indicators. While they yield somewhat different results for specific quarters, they are sufficiently similar to draw the following conclusions.

First, a *regime shift* occurred between the period through the first quarter of 1995 and thereafter.²¹ Following a strongly expansionary monetary stance, the CBA imposed a drastic tightening of monetary policy from mid-1995, with two of the three measures showing contractionary effects by the second quarter. From that time onwards, monetary policy was contractionary, albeit with two significant let-ups in the final quarter of 1995 and the third quarter of 1996. Thus, the second conclusion is that *the stance of monetary policy was practically never neutral* during the period analyzed. In fact, monetary policy displayed a *stop-go cycle*, with tight stance followed in a seemingly regular fashion by a loosening. Finally, as is evident from Figure 3, the *monetary impulse measures are correlated with inflation*. Although base money expansion in part reflects the rise in prices, this is interpreted as evidence that changes in the monetary stance drove changes in the price level during the stabilization period.

²⁰This effect appears negligible during most of the sample period.

²¹Monetary policy was somewhat tighter in the second quarter of 1994, but the measures fail to capture this due to influences from neighboring quarters and to start-up problems.

Figure 3. Armenia: Quarterly Monetary Impulse Measures and Inflation, 1994-96
(In percent)



Sources: Armenia authorities; and Fund staff estimates.

Table 4. Armenia: Monetary Impulse Measures ^{1/} (in percent)			
	<u>Backward-looking MA</u>		<u>Centered MA</u>
	No lag MI ₁	1-quarter lag MI ₂	MI ₃
1994			
Q2	91.9	...	55.5
Q3	77.9	60.1	61.3
Q4	89.4	94.9	96.0
1995			
Q1	53.8	92.4	63.7
Q2	-19.5	8.1	5.5
Q3	6.1	-13.4	-7.0
Q4	17.9	23.7	20.0
1996			
Q1	-8.5	-10.4	-7.3
Q2	7.1	4.5	3.8
Q3	28.0	32.6	31.1
Q4	5.9	7.3	6.3
^{1/} See Appendix II for definitions. As indicated above, a measure exceeding 14 percent is considered expansionary; below 8 percent, contractionary; and in between, neutral.			

D. Dollarization²²

This section deals with dollarization—the substitution of foreign money for domestic money—and its evolution during the transition phase in Armenia. Dollarization encompasses currency substitution, the replacement of domestic currency in its means of payments function, and asset substitution, i.e. the replacement of domestic currency in its store of value, and unit of account functions. As stabilization took hold, the extent of both these declined. However, there is a serious measurement problem, since at least three important components of foreign currency holdings of residents should be taken into account: cash foreign exchange holdings, offshore foreign currency deposits of residents, and foreign exchange deposits in the banking system. It should be kept in mind that since only the third component is directly observed, the following analysis does not cover all aspects of the evolution of dollarization.

²²This expression is used to describe the use of any foreign currency, not only the US dollar, in domestic transactions.

As documented in several studies on the subject, dollarization is most prevalent in economies with high levels of inflation and expectations of exchange rate depreciation as residents try to protect the real value of their wealth by holding a more stable foreign currency. As the severity of the macroeconomic imbalances diminish, it is expected that people switch back to the domestic currency. However, evidence on this second hypothesis is more mixed, as explained below. For example, in some Latin American economies, most notably Bolivia, the economy has continued to be dollarized even after the economy has enjoyed stability for several years.

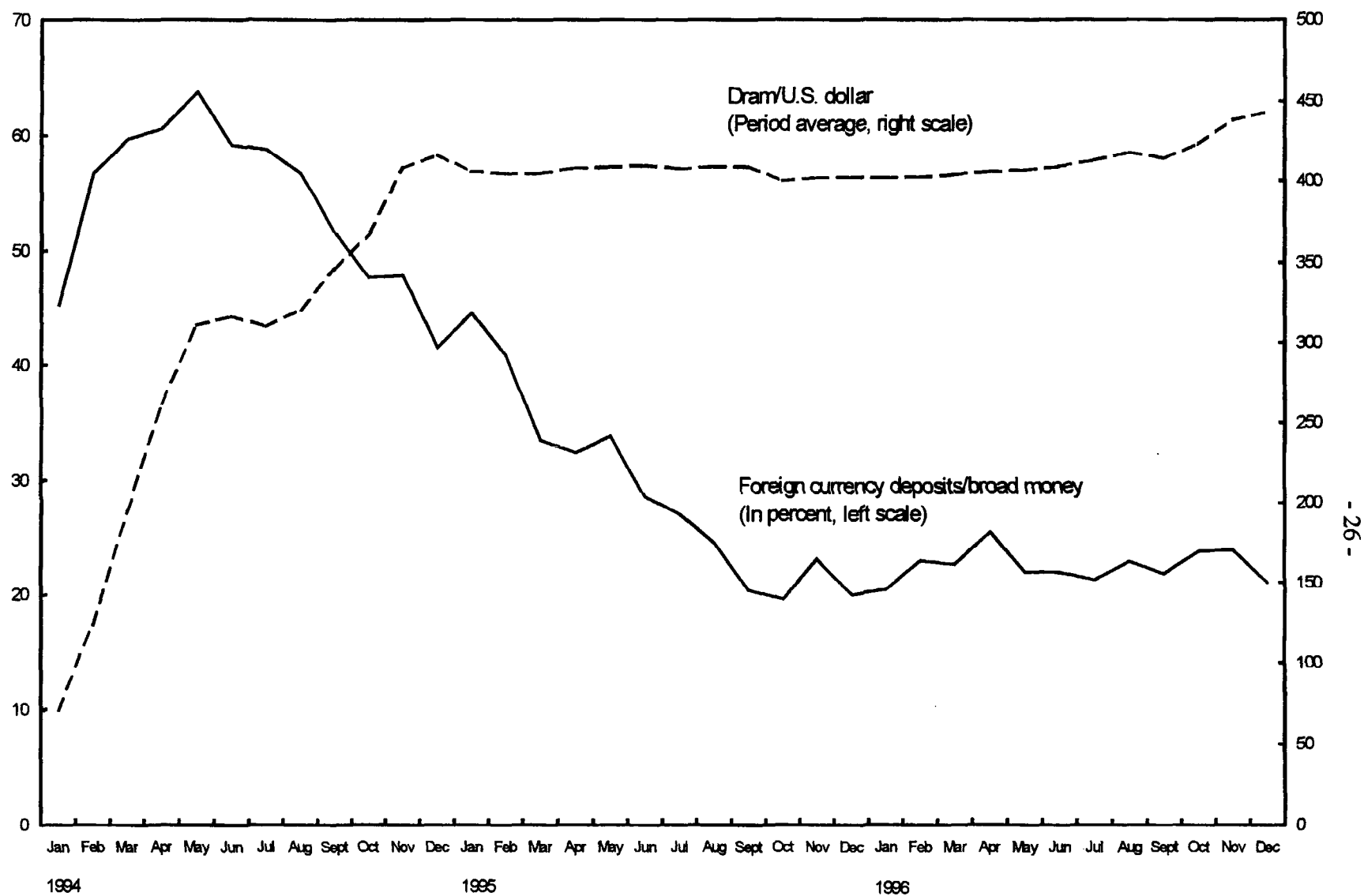
The ratio of foreign currency deposits in broad money declined to around a fifth by late 1995 and stayed at this level through end-1996. While this level is substantial, it is not excessive in a small, open economy at Armenia's stage of development. It is similar to the 15 percent level experienced in Georgia, and compares favorably with Bolivia and Vietnam, where over 80 percent of broad money is held as foreign currency deposits in spite of a stable economy. In the Armenian context, the level of this ratio reflects the risk averse behavior of individuals in a situation characterized by regional tensions and a trade blockade; the stability of the ratio may actually mask a continued decline in dollarization concurrent with remonetization due to an improving perception by the public of the health of the banking system, part of which is occurring in foreign exchange. Finally, some repatriation of deposits previously held off-shore may have also occurred, in part boosting foreign exchange deposits.

The approximate constancy of the foreign currency ratio during the second part of the stabilization period at non-negligible levels has two important implications. First, it gives rise to "network effects": the public gets used to foreign currency substituting for the domestic currency in all its functions. The process of erosion and partial replacement of the domestic currency-based system is hard to reverse even after the economy achieves stability. Although no survey data exists, there is anecdotal evidence to support this view for Armenia: dollars can be used for transactions quite easily, especially in the rapidly expanding informal economy. A second implication is that with persistent dollarization, the CBA loses a significant portion of the noninflationary component of seigniorage, that associated with the growth of the economy. Also, if inflation is viewed as a tax on domestic money, to the extent that dollarization is present, it limits the ability of the government to raise that tax.

In addition to the negative implications mentioned so far, dollarization may also carry benefits, especially in countries like Armenia during the period analyzed, which are emerging from high inflation and unstable macroeconomic conditions. Allowing foreign currency deposits under these circumstances may speed up the process of reintermediation since agents may be more willing to return their assets to domestic banks if they can eliminate exchange rate risk by keeping them in foreign exchange. Moreover, foreign currency deposits can help achieve the desired distribution of risks and returns for domestic agents, which is particularly important for a small, relatively open economy which is at an initial stage of developing its financial markets.²³

²³See Section III in Baliño, et al for a description of the costs and benefits of dollarization.

Figure 4. Armenia: Foreign Currency Deposits and Exchange Rate, 1994-96



Sources: Central Bank of Armenia; and Fund staff estimates.

Following Ramirez-Rojas (1985) and Rojas-Suarez (1992) we estimate the following simple econometric model to determine the factors explaining dollarization in Armenia:

$$FC_t = \alpha + \beta trend + \gamma FC_{t-1} + \delta E_{pt} + u_t$$

where FC_t denotes the ratio of foreign currency deposits to broad money (used as a measure of dollarization); 'trend' represents a deterministic time trend, FC_{t-1} denotes the stock adjustment variable; E_{pt} denotes the expected change in the domestic currency in period 't' vis-à-vis the dollar and u_t is a white noise error term.

In order to avoid simultaneous equation bias, the change in the exchange rate in period 't-1' is used to proxy the expected change in the exchange rate in period 't', and instrumental variables estimation is used to estimate the model. The dollarization and exchange rate variables were tested for non-stationarity, and the null hypothesis of a unit root was rejected for both series (see Appendix III). Since both the ratio of foreign currency to domestic broad money and the rate of change of the exchange rate are stationary processes, traditional critical values can be used to test the significance of the parameters.

Using monthly observations from January 1994 to December 1996, the following estimates for the parameters were obtained:

$$FC_t = -0.142^* - 0.003 \text{ trend} + 0.86^* FC_{t-1} + 0.34^* E_{pt}$$

(-2.9) (-0.7) (9.2) (2.9)

$$R^2 = 0.96; \text{ Durbin's } h = -0.91$$

The figures in parentheses are the t-statistics, and the '*' indicates that the coefficient is significant at the 95 percent level of confidence. Consistent with our expectations (and also with studies for other countries), the results show a positive relation between dollarization and exchange rate expectations. The coefficient of the variable representing exchange rate expectations is both positive and significant. The value of the coefficient at 0.34 suggests that if the expected rate of depreciation falls by one percent, people decrease their foreign currency holdings by one-third of one percent. The stock adjustment variable, which describes the speed at which people adjust their foreign currency holdings in each period, is also significant. The value of the coefficient indicates that people adjust their holdings of foreign currency with considerable inertia. Finally, the trend variable is not significant.

Although the relatively large size of the stock adjustment variable indicates that people adjust their holdings of foreign currency slowly, the significance of the exchange rate variable suggests that sound policies achieving sustained stability of the exchange rate can contribute to lowering the degree of dollarization. On the other hand, exchange rate volatility is likely to be interpreted as a negative signal, making it harder to reduce dollarization in the economy.

Computation of Fiscal Impulse Indicators

The fiscal impulse indicator is computed using the methodology of the IMF's *World Economic Outlook* as described in IMF (1993) and Chand (1993). First, the cyclically neutral budget (CNB, a standardized deficit without cyclical effects), is calculated as:

$$CNB_t = t_0 Y_t - g_0 \bar{Y}_t$$

where Y_t and \bar{Y}_t are the actual and potential GDP in period 't', respectively; and t_0 and g_0 are the ratios of total revenue and expenditure to GDP in a base period. The actual deficit in any period 't' will be equal to the sum of the CNB and of a residual term which is interpreted as the fiscal stance (FIS):

$$T_t - G_t = CNB_t - FIS_t,$$

whose first difference is the fiscal impulse, FI_t . A positive magnitude for the fiscal impulse implies that fiscal policy was expansionary during period 't', and vice versa when the magnitude is negative.

Finally, the fiscal impulse indicator can be decomposed into two parts: a revenue impulse (FI^T) and an expenditure impulse (FI^G):

$$FI_t \equiv FI_t^T + FI_t^G = (t_0 - \Delta T_t / \Delta Y_t) \Delta Y_t + (\Delta G_t / \Delta \bar{Y}_t - g_0) \Delta \bar{Y}_t.$$

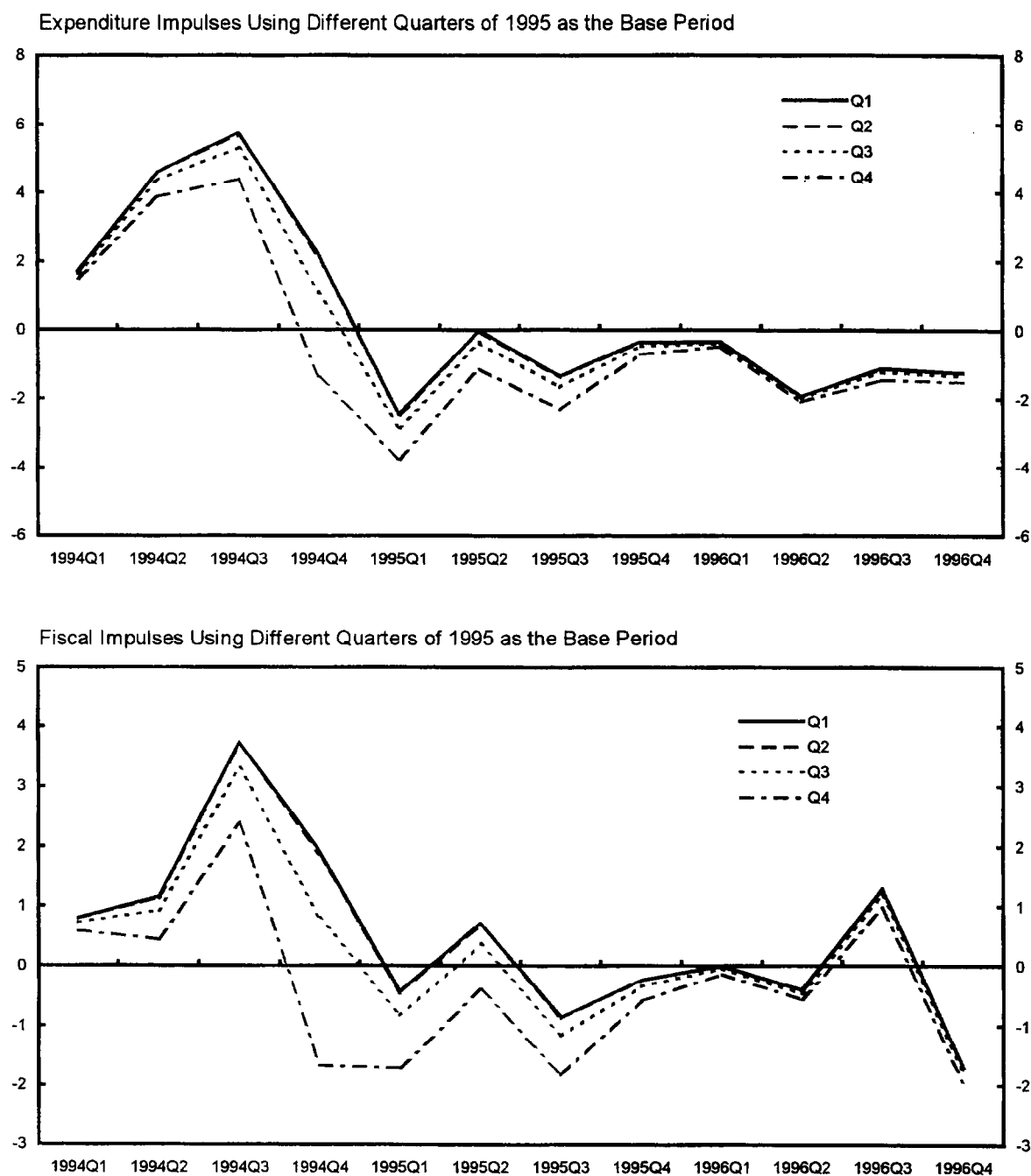
Sensitivity Analysis for the Fiscal Impulse Calculations

Section III uses the GDP of the fourth quarter of 1995 as potential output to calculate one component of the fiscal impulse, the expenditure impulse.²⁴ In order to test the robustness of the results, we carried out a sensitivity analysis by using the GDP of alternative quarters as potential output. In addition to the fourth quarter of 1995, we also calculated the fiscal impulse using the GDP of the first, the second and the third quarter of 1995 to estimate potential GDP. Figure 5 illustrates the calculated quarterly fiscal and expenditure impulses under these alternative assumptions. The results show that the conclusions are not sensitive to the selection of potential output. All the three cases yield results which are very similar to those reported in Section III. Specifically, all four versions imply that

- fiscal policy was expansionary in 1994 but contractionary in 1995-96;
- fiscal policy was more contractionary in 1995 than in 1996; and
- within 1996, fiscal policy was contractionary except in the third quarter when it was very expansionary both because of an expansionary revenue policy (revenue declined sharply) and a less contractionary expenditure policy.

²⁴Since the revenue impulse is calculated using actual, not potential GDP, it is not affected by the selection of potential GDP.

Figure 5. Armenia: Sensitivity Analysis of Fiscal Impulse, 1994-96
(In percent of GDP)



Sources: Armenian authorities; and Fund staff estimates.

The Computation of Monetary Impulse Indicators

The methodology broadly follows that in McCallum and Hargraves (1996). Denoting by Δy_t and Δbm_t the first difference of log GDP and of log base money, the rate of change in base money velocity can be defined as

$$\Delta V_t = \Delta y_t - \Delta bm_t .$$

The next step is to calculate two different moving averages of ΔV_t . The first is an average of the current and past quarter, denoted by ΔVB_t (backward-looking moving average of base money velocity); the second is a three quarter moving average, centered on the current period, denoted by ΔVC_t (centered moving average).

We define three monetary impulse (MI) measures as follows. The first and the second use the backward-looking moving average of base money velocity at time t and $t-1$, respectively. The third uses the centered moving average at time t .

$$MI_1 = \Delta bm_t + \Delta VB_t;$$

$$MI_2 = \Delta bm_t + \Delta VB_{t-1};$$

$$MI_3 = \Delta bm_t + \Delta VC_t.$$

Three alternative measures are considered, because the inflationary impact of an expansion in base money depends on expected changes in velocity, and these expectations can be formed in various ways. The measures presented assume different methods of forming expectations, with MI_3 representing partially forward looking, and MI_1 fully backward looking expectations. The averaging of base money velocity also attempts to smooth the effect of regulatory changes and the emergence of new financial instruments, as well as the effects of dollarization.

The measures for the third quarter of 1996 are adjusted for the change in the effective reserve requirement. Through May 1996 the reserve requirement varied little and was essentially uniform. However at that time several differential reserve requirements were introduced and their average level fell by 3 percentage points, to around 12 percent. Since this change is a one-time step decline, the expansionary impact of this change is reflected in the third quarter measures. Without this adjustment the measures in this quarter would have been 9.9, 7.6 and 9.1 percent, respectively, i.e., would have fallen in the neutral range.

Unit Root Tests for Time Series used in the Dollarization Model

There is now a substantial body of documented evidence that most time series, especially financial time series, are nonstationary. The usual asymptotic results for hypothesis testing do not apply to such series so that it is important to first determine whether the series are stationary or not. For series that are non-stationary, differencing the data may help in obtaining stationary series. This Appendix gives the results of the Augmented Dickey-Fuller (ADF) test with and without a trend.

Table 5. Armenia: Augmented Dickey-Fuller Tests of Variables in the Dollarization Equation

Time Series	ADF1 1/	ADF2 1/
FC_t	-11.9*	-4.14*
E_{pt}	-16.2*	-16.8*
1/ ADF1 includes a constant and lagged values; ADF2 includes a trend term also. 2/ For ADF1, the critical values at the 5 percent and 1 percent level of significance are -3.12 and -3.43, respectively, and for ADF2 these are -3.66 and -3.96, respectively. "*" denotes significance at the 5 percent level.		

As Table 5 indicates, both series reject the null hypothesis of a unit root. Thus they are both stationary, and the standard asymptotic results apply.

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