November 2005
IMF Country Report No. 05/395

## Republic of Estonia: Selected Issues

This Selected Issues paper for the **Republic of Estonia** was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on **October 12, 2005.** The views expressed in this document are those of the staff team and do not necessarily reflect the views of the government of the Republic of Estonia or the Executive Board of the IMF.

The policy of publication of staff reports and other documents by the IMF allows for the deletion of market-sensitive information.

**To assist the IMF in evaluating the publication policy, reader comments are invited and may be sent by e-mail to publicationpolicy@imf.org.**

INTERNATIONAL MONETARY FUND

REPUBLIC OF ESTONIA

**Selected Issues**

Prepared by Mark Lutz and Emil Stavrev (both EUR)

Approved by European Department

October 12, 2005

Contents            Page

# I. INTERNATIONAL INVESTMENT POSITIONS OF NEW EU MEMBER STATES: STYLIZED FACTS AND INFLUENCES[1]

## A. Introduction

1.      **The EU underwent a remarkable expansion in 2004, admitting 10 new member states (NMS)**. Many of these economies have, and continue to undergo, significant changes in their economic structure and relations. Production patterns have often undertaken fundamental realignments, reflecting marked shifts in relative prices of goods and factors of production. International trade patterns have also been sizably altered, with most NMS finding their major trading partners are now other EU members.

2.      **Although financial markets in some NMS were already relatively well developed, those in most other economies have experienced noteworthy increases in sophistication.** While banking systems in Cyprus and Malta were comparatively modern well before EU accession, financial sector evolution in other NMS has been remarkable. Credit has generally grown rapidly, an expected development related to and supporting real economic convergence. In addition to mobilizing domestic savings, financial markets have also facilitated the use of foreign capital to finance high investment ratios. Other domestic reforms, including restructuring of national pension systems, has boosted nonbank financial activity, which for portfolio diversification reasons, has in some cases resulted in increased holdings of foreign assets. In a number of economies, significant foreign ownership of domestic banking and other financial institutions has improved productivity, increased financial sophistication, and spurred international financial integration.

3.      **This paper examines one aspect of these developments, namely those relating to the economies' gross and net international investment positions** (GIIPs and NIIPs, respectively). Official data on these economies' GIIPs and NIIPs are limited, with most series beginning in the mid–1990s; figures for Cyprus are available only for 2002–03.[2] Nevertheless, they show a rich diversity of patterns, both across countries and over time. The influences in these positions are myriad. This paper documents these patterns and analyzes a number of influences that have affected them.

4.      The paper is structured as follows. Section B examines a number of stylized facts relating to gross and net IIPs, and some basic influences on their differences across NMS and over time. Section C provides a disaggregated examination of the various determinants of changes in NIIPs of NMS, including the current account, economic growth, and capital gains

---

[1] Prepared by Mark Lutz.

[2] Lane and Milesi-Ferretti (2001, 2005b) have assiduously compiled estimates of gross asset and liabilities for numerous advanced and developing economies, including most recently for the NMS.

and losses. Section D looks more closely at the relative influence that component parts have on gross stocks (both by institutional sector and financial instrument). Section E concludes.

## B. Gross and Net International Investment Positions and their Influences

5. **International financial integration has occurred in all new member states, but its degree varies widely**. Malta and Cyprus have significant offshore or nonresident-based banking activity, respectively, and their shares of total external assets and liabilities are 400-600 percent of GDP. The shares of GIIPs of other NMS are more moderate, ranging from over 230 percent of GDP in Estonia, to less than 100 percent of GDP in Poland and Lithuania (Figure 1). Broadly speaking, the level of integration is higher in relatively smaller, Baltic economies (except Lithuania) than in larger, central European NMS (except Hungary). Excluding Malta, the increase in GIIPs since the mid–1990s has ranged from 160 percentage points of GDP in Estonia to only 15 percentage points in Poland. On average, the GIIP share (unweighted, excluding Cyprus and Malta) has increased from 102 percent of GDP in 1997 to 136 percent in 2003. The standard deviation has increased as well over this period, from 28 percentage points of GDP to over 32 percentage points, reflecting some divergence in the degree to which financial integration has occurred.

6. **Various factors have been posited as influencing gross international investment positions**. Among those suggested by Lane (2000) as potentially influencing GIIPs are trade openness, per capita income and overall economic size. Trade openness is generally thought to be positively related to higher GIIPs because higher trade may expose an economy more to volatility, which increases the desire for consumption smoothing through larger holdings of foreign assets. Trade openness also generates its own parallel financial flows which agents may wish to hedge against. Alternately, foreign direct investment may result in production not only for the domestic market, but also for export. Lane and Milesi-Feretti (2000) suggest that trade openness generally reflects a liberal policy environment that generally stimulates asset trade. Higher per capita incomes may also be associated with higher GIIPs if the formation of international financial linkages involve fixed setup costs, and/or if FDI tends to flow to economies with high levels of human capital. An economy's size may also influence its GIIP, if small economies "free ride" off of existing deep financial markets in neighboring countries. On the other hand, larger economies may be more attractive to international investors if there are fixed costs in acquiring information about local investment conditions, or if it presents a larger local market for FDI.

7. **Greater economic openness among new member states is associated with larger gross international investment positions**. Data limitations preclude a detailed statistical analysis for the NMS to test these possibilities. However, the Spearman rank correlation of the level of goods and services "openness," measured by the ratio of exports and imports of goods and services to GDP, and international financial integration (the GIIP share) for 2003-04 is 0.38, (on a minus one to plus one scale), suggesting a moderate positive

correlation (Table 1).[3] Estonia and Malta both exhibit high trade and financial integration, while Hungary and Slovakia display middling integration, while relatively large Poland has comparatively low levels of external trade and financial linkages. In contrast to this pattern, Cyprus and Latvia both have large gross financial stocks (from offshore banking and nonresident deposits in the domestic banking system, respectively), while their trade shares are comparatively low. Excluding Cyprus and Malta, the result of their outlier status given their disproportionate banking activities, the coefficient rises to 0.47. Thus, broadly speaking, economies with greater international integration of markets for goods and services appear to also have greater financial integration. These correlations are broadly unchanged when examining foreign assets and foreign liabilities separately.[4]

8.      **However, the influence of levels of economic development on gross international investment positions is mixed, and economic size appears to be negatively related.** The rank correlation coefficient for GIIPs and economic development (proxied by Eurostat's purchasing power parity adjusted per capita income for 2003–04) was 0.39, suggesting a weak positive correlation. However, excluding Cyprus and Malta, the first and third richest NMS and with massive GIIPs, the correlation is eliminated. Slovenia and Poland, the second and ninth richest, both have relatively low GIIPs, while the Czech Republic and Estonia (the fourth and seventh richest, respectively), both had relatively high GIIPs. Economic size itself (using Eurostat's purchasing power parity adjusted GDPs) was moderately to strongly negatively correlated with GIIPs. A number of small economies (Cyprus, Malta, Estonia, Latvia) all have large GIIPs, while Poland's gross external position is relatively low. Again, similar correlations are obtained when looking at foreign assets and liabilities separately.[5]

---

[3] The rank correlation coefficient is a technique used to test the direction and strength of the relationship between two variables. A coefficient of 1 indicates perfect positive correlation, while figures between 0.5 and 1.0 indicate strong positive correlation, between 0 and 0.5 weak positive correlation, and zero no correlation. Values between 0 and -1 indicate similar levels of negative correlation.

[4] Lane (2000) found a significantly positive role for trade openness on gross asset positions for industrial countries in the early 1990s. Lane and Milesi-Ferretti (2000) also found a significantly positive role for openness on total liabilities for both industrial and developing economies using stock data for 1997.

[5] While Lane (2000) found a significantly positive role for country size, he did not find a significant correlation with per capita incomes. Lane and Milesi-Ferretti (2000) found a significant inverse correlation between per capita incomes and total external liabilities among developing countries (consistent with the positive correlation in Table 1), although this was not apparent for industrial economies. They found mixed correlation regarding economic size for industrial economies, and generally negative, but not significant, correlations for developing economies.

9.      **Increased foreign goods and services integration within an economy over time does not appear to have been systematically associated with increased foreign financial integration among the new member states.** Over the last decade, increases in financial integration has far exceeded the increase in trade integration. The former development reflects a growing sophistication of capital market transactions, while the latter masks a dramatic shift in trade patterns to market-based, and increasingly EU-centered, trade flows (although much of this occurred in the early 1990s, a period for which external financial stock data are not available). While GIIPs increased by 90 percentage points of GDP on (an unweighted) average since the mid–1990s (and by 60 percentage points excluding Cyprus and Malta), the trade ratio increased by only 12 percentage points over the same period (by 21 percentage points, again excluding Cyprus and Malta). As already discussed, one might expect a positive correlation within those economies experiencing a large increase in international integration of both financial sectors and goods and services markets. However, somewhat surprisingly, this has not been the case for these economies over the last decade. In fact, the rank correlation coefficient between those economies experiencing the largest increase in financial stocks and those with the largest increase in goods and services flows is in fact strongly negative (-0.78 excluding Cyprus, for whom only one observation is available, and  -0.69 excluding Cyprus and Malta). In general, the Baltic economies have experienced disproportionately large increases in financial integration relative to trade integration, while the Central European economies have experienced the opposite. This may reflect the widespread foreign ownership of the banking systems in the former, resulting in large foreign direct investment and other capital flows. Thus, it would appear that factors other than changes in economies' gross goods and services flows have had more important influences on developments in external financial stocks.

10.      **With few exceptions, the new member states' net international investment positions are negative and have declined in recent years.** While foreign banking-centered Malta's and Cyprus' NIIP positions are positive or close to balance, those for the other NMS have been negative in recent years (Figure 2). Moreover, all NIIP/GDP positions have declined over the past decade, on average by 32 percentage points of GDP (excluding Cyprus), ranging from only 5 percentage points in Malta to an notable 78 percentage points in Estonia. These developments are not unexpected in light of the investment needs associated with real convergence and households' attempts in rapidly growing economies with newly available credit opportunities to "smooth" consumption through borrowing in anticipation of higher future incomes (see Stavrev, 2003). Net saving shortfalls for both investment and increased consumption might be met through foreign capital inflows, thereby increasing gross external liabilities.

11.      **While the level of development appears to be strongly correlated with the level of net external claims, the latter appears to be little correlated with trade openness and economic size.** Even excluding relatively rich Cyprus and Malta, the NIIP/per capita income correlation still exceeds 0.5 However, relatively rich Slovenia and relatively poor Estonia are

both ardent traders; thus, there is almost no correlation between NIIPs and openness.[6]. As regards economic size, tiny Cyprus and Malta are net creditors, while tiny Estonia and Latvia have large negative NIIPs. Excluding the island economies, the correlation becomes weakly positive.[7]

12.    **Levels and changes in gross international investment positions also appear to be related to levels and changes in net positions**. Simply from an accounting standpoint, it is possible that large swings in net positions, possibly the result of cumulative external deficits for example, may overwhelm underlying trend increases in international financial integration, and thus be correlated with levels and changes in gross positions. However, the Spearman rank correlation between levels of GIIPs and the absolute values of NIIP positions is only slightly positive, at 0.27, for all NMS, but rises to a strong 0.64 when Cyprus and Malta are excluded. In addition, the rank correlation for changes is about 0.35 for changes in gross positions and the absolute value of net positions (regardless of including or excluding Malta and Cyprus). Thus, it would appear that despite increasing financial integration of both assets and liabilities, large levels and changes in net positions are associated with large levels and changes in gross positions.

13.    **An alternative measure of gross/net foreign asset linkages supports these patterns as well**. Obstfeld (2004) and Lane and Milesi-Ferretti (2005a) have suggested a modified Grubel-Lloyd (G-L) index relating the magnitude of the absolute value of net international positions to the size of gross asset stocks, given by:

$$1 - |A - L| / (A + L),$$

where A is gross external assets and L is gross external liabilities. The index varies between 1 when the net position is zero—consistent with a balanced NIIP position and only gross cross-border trade taking place—to 0 if changes in NIIP reflect only net financing changes. Thus, the index depends both on the net cumulative stock of external imbalances and gross asset integration. As seen in Figure 3, there is a moderately positive correlation over the period considered among the NMS between the levels of G-L indices and gross asset integration.[8] The two economies with sizable offshore/foreign banking activities, Cyprus and

---

[6] The ranking of NIIPs is from the highest to the lowest. Therefore, the positive correlation suggests that economies with higher per capita incomes were associated with more positive NIIPs.

[7] Lane and Milesi-Ferretti (2000) found a significantly negative coefficient for per capita incomes for developing economies, consistent with our findings, and a significantly positive coefficient for openness for industrial but not for developing economies. Contrarty to the pattern for NMS, size was also found to be significantly positive for both industrial and developing economies.

[8] The Spearman rank coefficient in 2003–04 is 0.41.

Malta, exhibited the highest indices; this also reflected for Cyprus its almost balanced NIIP position. Other economies with large GIIPs, Estonia, Latvia and Hungary, had lower G-L indices, reflecting sizable negative NIIP positions. In contrast, somewhat less financially integrated economies as measured by GIIPs (Slovenia, the Czech Republic, and Slovakia) had relatively higher G-L indices because of more balanced NIIP positions. Lithuania and Poland exhibited both relatively less integrated capital markets and middling NIIPs. Also, with the exception of Cyprus and Malta, G-L indices have generally declined over the past decade, suggesting that gross capital flows may increasingly reflect the financing of current account positions, rather than growing financial sector integration.

### C.  Disaggregated Influences on Net International Investment Position Developments

14.     **While net international investment positions have broadly declined among new member states, the reasons for this are myriad**. Although declining NIIPs are generally a concomitant outcome of real economic convergence, the diversity of patterns experienced among new member states is notable. Table 2 documents the change in NIIPs generally since the mid–1990s. As discussed earlier, the variance is vast, from only 5 to almost 80 percentage points of GDP. These changes can be disaggregated into their major components through the following accounting identities:

$$B_t - B_{t-1} = CA_t + KG_t + E_t$$

where B is the net international investment position, CA the current account balance, KG the capital gains/losses on net foreign assets (defined as the difference between the value of outstanding stocks between two contiguous years and the corresponding balance of payments flow, all valued in national currency), and E includes capital account transfers and net errors and omissions.[9] The current account component can be separated into its goods and services and unrequited transfers portions, BGST, and the balance on factor payments, given by $i^A_t A_{t-1} - i^L_t L_{t-1}$, where A and L are gross external assets and liabilities, respectively, and the i's are the corresponding nominal factor payments implied by balance of payments flows. The above expression can be restated as shares of GDP, using lower-cased letters, as follows:

$$b_t - b_{t-1} = bgst_t + (i^A_t A_{t-1} - i^L_t L_{t-1} + KG_t)/GDP_t - b_{t-1}*(g_t + \pi_t)/[(1 + g_t)(1 + \pi_t)] + \varepsilon_t$$

where g is the growth rate of real GDP, $\pi$ is the inflation rate, and $\varepsilon$ includes the share of errors and omissions and capital transfers in GDP. This is similar to the standard dynamic equation for changes in the domestic public debt ratio, but with a few differences. First, given that "b" is a net external investment ratio, its evolution depends on the differential between returns earned on external assets and paid on external liabilities, both measured in domestic currency terms. Second, this includes capital gains and losses, which are potentially significant, given exchange rate changes and potentially stock market valuation effects for

---

[9] This decomposition follows Lane and Milesi-Ferreti (2005a).

foreign direct investment and portfolio equity positions. Third, the final term capturing errors and omissions could also be sizable given the survey-based nature of both debt stock and flow data.

15.      **Current account flows comprise significant shares of the changes in net international investment positions across new member states, while economic growth has moderated these movements.** Cumulative trade deficits have exceeded 60 percentage points of GDP over the last decade in Latvia, Lithuania, and Malta, and by almost 40 percentage points in Estonia and Slovakia. Cumulative factor payments have also averaged some 30–40 percentage points of GDP in the Czech Republic (somewhat surprisingly, given its moderate NIIP), and in Estonia and Hungary. In fact, cumulative current account flows more than accounted for the entire change in NIIP positions in all NMS except Cyprus, Estonia and Slovenia. However, significant increases in nominal GDP has worked to moderate changes in NIIP shares in many economies, especially in Hungary, Estonia, and Poland. All told, these traditional drivers of change in NIIPs account for most of the observed developments in Cyprus, the Czech Republic, Latvia, Poland and Slovakia.

16.      **However, the influence of other factors have also been sizable for a number of economies**. Cumulative capital transfers and errors and omissions have had significant positive influences on Lithuania's and Malta's NIIPs (Table 3). These have been almost entirely accounted for by errors and omissions, and uncategorized capital inflows have exceeded 5 percent of GDP in Malta in recent years. Capital gains have also been exceptionally beneficial to Malta's external position, but have significantly worsened Estonia's NIIP, and to a lesser degree positions in Hungary and Slovenia. Portfolio investments have yielded large capital gains in Malta, while increased market values of negative net foreign direct investment and net portfolio equity positions have sizably worsened Estonian and Hungarian NIIPs.[10] This is a somewhat paradoxical result in that improved domestic economic conditions, evidenced by higher market valuations of largely foreign-owned enterprises, resulted in a worsening of these economies' NIIPs.[11]

---

[10] It is possible that the large uncategorized capital inflows reflected in Malta's errors and omissions are the counterparts of its sizable capital gains.

[11] This was recently most evident in Finland, whose NIIP slid from a negative 40 percent of GDP in 1997 to almost -170 percent in 1999, the result of the run-up in the market value of largely foreign-owned telecommunications firm, Nokia. The subsequent stock market collapse, combined with Finland's sizable external current account surpluses, have reduced the negative NIIP to only 12 percent of GDP by end–2004.

## D. Institutional Sector and Financial Instrument Influences on Gross and Net International Investment Positions

17.     **In examining the economic and institutional composition of gross international investment positions, the differences between those in Cyprus and Malta, and in the other new member states is stark.** In the former two economies "other" assets and liabilities dominate. These largely comprise loans and currency and deposits by the banking system (Figures 4 and 5). While this pattern is taking on increasing importance in Latvia as well, other components, including inward foreign direct investment and "other" sector liabilities (largely borrowing by the nonbank private sector) remain relatively prominent.

18.     **The composition among other new member states reflects, *inter alia*, competing influences of financial structure, government indebtedness and privatization experiences.** Foreign direct investment assets and liabilities vary widely among NMS. FDI assets are all but negligible except in Estonia, where claims on banking institutions in other Baltic states predominate. FDI liabilities are also most prominent in Estonia, exceeding 80 percent of GDP in 2004, and are also sizable—at about 50 percent of GDP—in the Czech Republic and Hungary. Hungary's persistently large share reflects its initial decision to privatize state-owned assets to strategic foreign investors as a means to import technical and managerial know how as well as foreign financing. Estonia's large increase, in addition to privatization, reflects sizable greenfield investments. As noted before, capital gains in the market value of inward FDI has been significant in Estonia and Hungary. The influence of fiscal policy is also reflected in general government assets and liabilities, with Hungary's persistently large deficits resulting in large negative gross external liabilities (predominantly bonds), while Estonia's persistent surpluses have been generally held as foreign debt securities. Monetary authority assets are notably sizable in Slovakia and Slovenia (at about 30 percent of GDP), reflecting large foreign exchange reserves; they are also a very large share of GDP in Malta, but a much smaller share of total external assets. Bank's external assets are relatively large in Latvia and the Czech Republic, both as a share of GDP and in relation to total assets. In fact, the banks' net external assets are positive only in the Czech Republic and Malta, both of which have large holdings of foreign portfolio debt. Aside from Latvia, banking sector liabilities have grown rapidly in Estonia, where highly ranked domestically-owned offspring of Nordic parent institutions have issued securities internationally to fund domestic credit demand. The "other" sectors' external assets are relatively inconsequential except in Slovenia and Estonia, where in the latter case they have been rapidly growing in recent years. The former reflects large overseas loans, while Estonia's growing holdings reflect asset claims by nonbank financial intermediaries following the widespread adoption of a funded second pension pillar by the overwhelming majority of the working population. The other sectors' external liabilities have been generally larger than external assets across NMS, comprising largely direct bank borrowing and loans from abroad, foreign holdings of domestic portfolio equities, and trade credits.

19.     **A mixed pattern also emerges when examining the influences of openness, development and economic size on international investment components.** Trade openness tends to be positively correlated with most investment components, strongly so in

many cases. It was also associated positively with a preference for equity over debt instruments, especially when banking-centered Cyprus and Malta were excluded. Both of these findings are in accord with those of Lane and Milesi-Ferretti (2000). Economic development was also positively related to international asset accumulation, again in concert with Lane and Milesi-Ferretti's findings, although less so when relatively prosperous Cyprus and Malta were excluded. However, the linkages with international liabilities was more mixed, reflecting relatively poor Latvia's and Estonia's large obligations, in contrast to wealthier Slovenia's lower liabilities. Economic size was often negatively associated with various investment components, reflecting Poland's and the Czech Republic's small international positions in contrast to large Baltic and Mediterranean gross positions.

### E.   Summary and Conclusions

20.     **While international financial integration has occurred in all new member states, the degree to which this has occurred has varied widely.** Greater financial integration is associated with greater economic openness, but the influence of levels of economic development is mixed, and economic size appears to have been negatively related. Most NMS have experienced a worsening in their NIIPs, the bulk of which is accounted for by current account flows, although errors and omissions and capital gains were important in a number of economies. Finally, asset and liability composition result from a myriad complex of influences, both economic and political.

21.     **This topic provides a number of interesting areas for further investigation**. Among these, the following issues appear to be most interesting. Once more observations become available, more sophisticated statistical analysis could be brought to bear. Relative rates of returns in various assets and liabilities could be analyzed, including both income payments as well as capital gains and losses. Using recently available data on portfolio investment by countries of both origin and destination, combined with similar data on foreign direct investment, one can examine in more detail geographic correlations between trade and investment patterns.

Table 1. EU New Member States: GIIPs and their Influences, 2003-04

|  | GIIP | Foreign Assets | Foreign Liabilities | NIIP |
|---|---|---|---|---|
| | | Spearman Rank Correlation Coefficients | | |
| Trade openness | | | | |
| All NMS | 0.38 | 0.38 | 0.41 | -0.01 |
| Excluding Cyprus and Malta | 0.47 | 0.52 | 0.54 | 0.05 |
| Per capita income | | | | |
| All NMS | 0.39 | 0.51 | 0.45 | 0.71 |
| Excluding Cyprus and Malta | -0.01 | 0.15 | 0.11 | 0.51 |
| Economic size | | | | |
| All NMS | -0.72 | -0.87 | -0.67 | -0.36 |
| Excluding Cyprus and Malta | -0.46 | -0.76 | -0.36 | 0.25 |

Sources: IFS; and staff calculations.

Table 2. EU New Member States: Changes in NIIPs and Component Contributions, 1994-2004
(percent of GDP)

| | Period covered | Initial NIIP position 1994 | Change in NIIP | Cumulative current account and growth factors | | | | Cumulative other factors | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Cumulative trade and transfer balance | Cumulative factor payments | Growth effect | Total | Capital account and errors & omissions | Capital gains/losses |
| Cyprus | 2002-2003 | 9.2 1/ | -8.1 | -3.9 | -0.4 | -2.9 | -0.6 | -4.1 | 0.5 | -4.6 |
| Czech Republic | 1994-2004 | 5.7 | -35.6 | -44.7 | -20.3 | -27.6 | 3.2 | 9.0 | 1.5 | 7.5 |
| Estonia | 1996-2004 | -14.0 2/ | -78.4 | -33.6 | -39.8 | -31.6 | 37.8 | -44.8 | 1.2 | -46.0 |
| Hungary | 1997-2004 | -66.8 3/ | -17.0 | 2.9 | -14.5 | -40.1 | 57.5 | -19.8 | 1.0 | -20.9 |
| Latvia | 1996-2004 | -6.3 2/ | -48.4 | -42.3 | -64.7 | 0.7 | 21.7 | -6.1 | 5.0 | -11.1 |
| Lithuania | 1994-2004 | -2.8 | -32.2 | -62.8 | -63.6 | -17.5 | 18.4 | 30.6 | 15.8 | 14.8 |
| Malta | 1994-2003 | 48.4 | -5.2 | -76.2 | -60.6 | -0.6 | -15.0 | 71.0 | 24.7 | 46.3 |
| Poland | 1994-2003 | -32.0 | -10.3 | -0.2 | -22.0 | -8.6 | 30.4 | -10.1 | 3.5 | -13.6 |
| Slovakia | 1994-2004 | 14.4 | -34.6 | -36.9 | -39.5 | -9.2 | 11.7 | 8.0 | 4.7 | 3.2 |
| Slovenia | 1994-2003 | 5.0 | -20.4 | -2.2 | -6.9 | 1.7 | 3.0 | -18.2 | -1.8 | -16.4 |

Sources: IFS; national sources; and staff calculations.
1/ 2002
2/ 1996
3/ 1997

Table 3. EU New Member States: Capital Transfers, Errors and Omissions, and Capital Gains and Losses, 1995-2004
(Percent of GDP)

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Capital transfers/errors & omissions** | | | | | | | | | | |
| Cyprus | -0.8 | -0.4 | -1.9 | 0.5 | -0.4 | -0.6 | -0.3 | -0.9 | 0.5 | 0.9 |
| Czech Republic | 1.1 | -1.5 | 1.3 | 0.5 | 0.0 | -0.5 | 0.8 | 0.4 | 0.7 | -1.2 |
| Estonia | 0.2 | -0.8 | -0.5 | 0.1 | -0.1 | 0.5 | 0.5 | 0.5 | 0.1 | 0.0 |
| Hungary | 3.0 | 2.1 | -0.4 | -0.2 | -0.7 | 0.2 | 0.7 | 0.5 | 0.3 | 0.3 |
| Latvia | ... | ... | 1.6 | 1.7 | 0.7 | -0.7 | 0.5 | -0.6 | 0.9 | 0.8 |
| Lithuania | 3.9 | 0.9 | 2.0 | 2.5 | -0.4 | 1.1 | 1.3 | 1.0 | 1.4 | 2.1 |
| Malta | 0.9 | 3.4 | 3.1 | 3.4 | -1.8 | 1.0 | 7.4 | 2.0 | 5.3 | 5.7 |
| Poland | -0.2 | 0.3 | 0.9 | -0.3 | 1.3 | 0.2 | 1.0 | -0.8 | 1.1 | 1.6 |
| Slovakia | 1.0 | 0.9 | 1.3 | -1.2 | 0.7 | 0.7 | 0.9 | 1.7 | 0.4 | 0.2 |
| Slovenia | -1.0 | 0.0 | 0.4 | 0.3 | 0.2 | 0.2 | 0.3 | -1.6 | -0.5 | -1.3 |
| | | | | | | | | | | |
| **Capital gains/losses** | | | | | | | | | | |
| Cyprus | ... | ... | ... | ... | ... | ... | ... | ... | -4.6 | ... |
| Czech Republic | 0.9 | 0.5 | 3.0 | 1.1 | 2.8 | 1.6 | 2.3 | -0.9 | 0.6 | -4.4 |
| Estonia | ... | ... | -12.5 | 3.0 | -12.3 | 1.2 | -2.6 | 0.2 | -7.2 | -15.8 |
| of which: net FDI and portfolio equity securities | ... | ... | -12.1 | 4.8 | -11.4 | -0.3 | -1.0 | -3.2 | -8.6 | -16.4 |
| Hungary | ... | ... | ... | -3.0 | -7.5 | 1.4 | 2.0 | -0.1 | -10.7 | -3.0 |
| of which: net FDI and portfolio equity securities | ... | ... | ... | -0.7 | -7.4 | 1.9 | 0.2 | 1.0 | -9.6 | -3.6 |
| Latvia | ... | 0.3 | 1.8 | -5.6 | -0.3 | 0.6 | -5.7 | 0.0 | 0.8 | -2.7 |
| Lithuania | -0.6 | 0.6 | 0.9 | 3.4 | 0.3 | 1.7 | 1.9 | 3.7 | 2.2 | 0.7 |
| Malta | 2.3 | 1.2 | 0.6 | 3.8 | 4.1 | 0.8 | 4.5 | 21.2 | 7.9 | ... |
| of which: net portfolio securities | -6.2 | 0.5 | -1.9 | 1.1 | 2.7 | 1.0 | 0.3 | 12.0 | 4.1 | ... |
| Poland | 1.0 | -2.5 | -1.5 | -2.3 | -2.5 | 2.3 | 1.8 | -3.2 | -6.6 | ... |
| Slovakia | -0.8 | -1.3 | -0.4 | -4.4 | 1.1 | 1.6 | 2.5 | 9.0 | -4.0 | -1.4 |
| Slovenia | -0.1 | -5.1 | -0.5 | -2.4 | -2.8 | -0.9 | 4.1 | 0.1 | -8.9 | ... |

Sources: IFS; and staff calculations.

Table 4. EU New Member States: International Investment Components and their Influences, 2003-04

| | FDI Assets | FDI Liabilities | Net FDI | Port. Eq. Assets | Port. Eq. Liabilities | Net Port. Equities | Debt Assets | Debt Liabilities | Net Debt | Eq./Debt Liab. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Spearman Rank Correlation Coefficients | | | | | |
| **Trade openness** | | | | | | | | | | |
| All NMS | 0.29 | 0.65 | -0.66 | 0.58 | 0.26 | -0.11 | 0.29 | 0.14 | 0.38 | 0.40 |
| Excluding Cyprus and Malta | 0.61 | 0.66 | -0.59 | 0.82 | 0.33 | -0.16 | 0.35 | 0.10 | 0.54 | 0.71 |
| **Per capita income** | | | | | | | | | | |
| All NMS | 0.72 | 0.26 | -0.19 | 0.51 | -0.05 | 0.47 | 0.46 | 0.29 | 0.54 | -0.21 |
| Excluding Cyprus and Malta | 0.58 | 0.11 | -0.06 | 0.25 | -0.06 | 0.06 | 0.08 | -0.24 | 0.27 | 0.44 |
| **Economic size** | | | | | | | | | | |
| All NMS | -0.66 | -0.44 | 0.33 | -0.61 | 0.16 | -0.49 | -0.80 | -0.83 | -0.53 | 0.62 |
| Excluding Cyprus and Malta | -0.50 | -0.13 | 0.06 | -0.24 | 0.11 | -0.01 | -0.62 | -0.67 | -0.08 | 0.25 |

Sources: IFS; and staff calculations.

Figure 1. EU New Member States: Financial and Trade Integration, 1994-2004



(Foreign Assets + Liabilities)/GDP

(Exports + Imports)/GDP

(Foreign Assets + Liabilities)/GDP

(Exports + Imports)/GDP
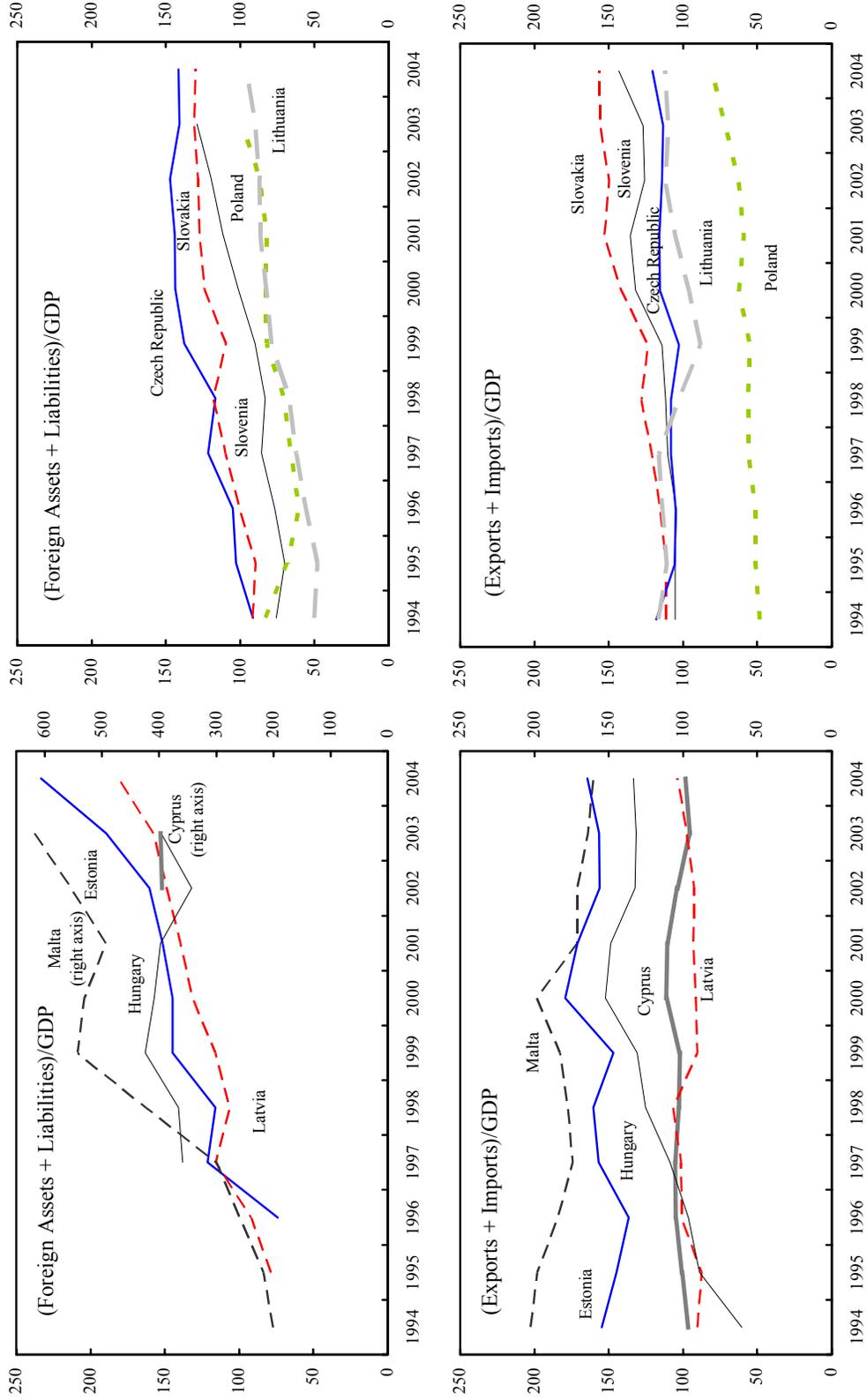
Source: IFS.

Figure 2. EU New Member States: Financial Integration and Net International Positions, 1994-2004

(Foreign Assets + Liabilities)/GDP

(Foreign Assets + Liabilities)/GDP

Net International Investment Position (Percent of GDP)

Net International Investment Position (Percent of GDP)
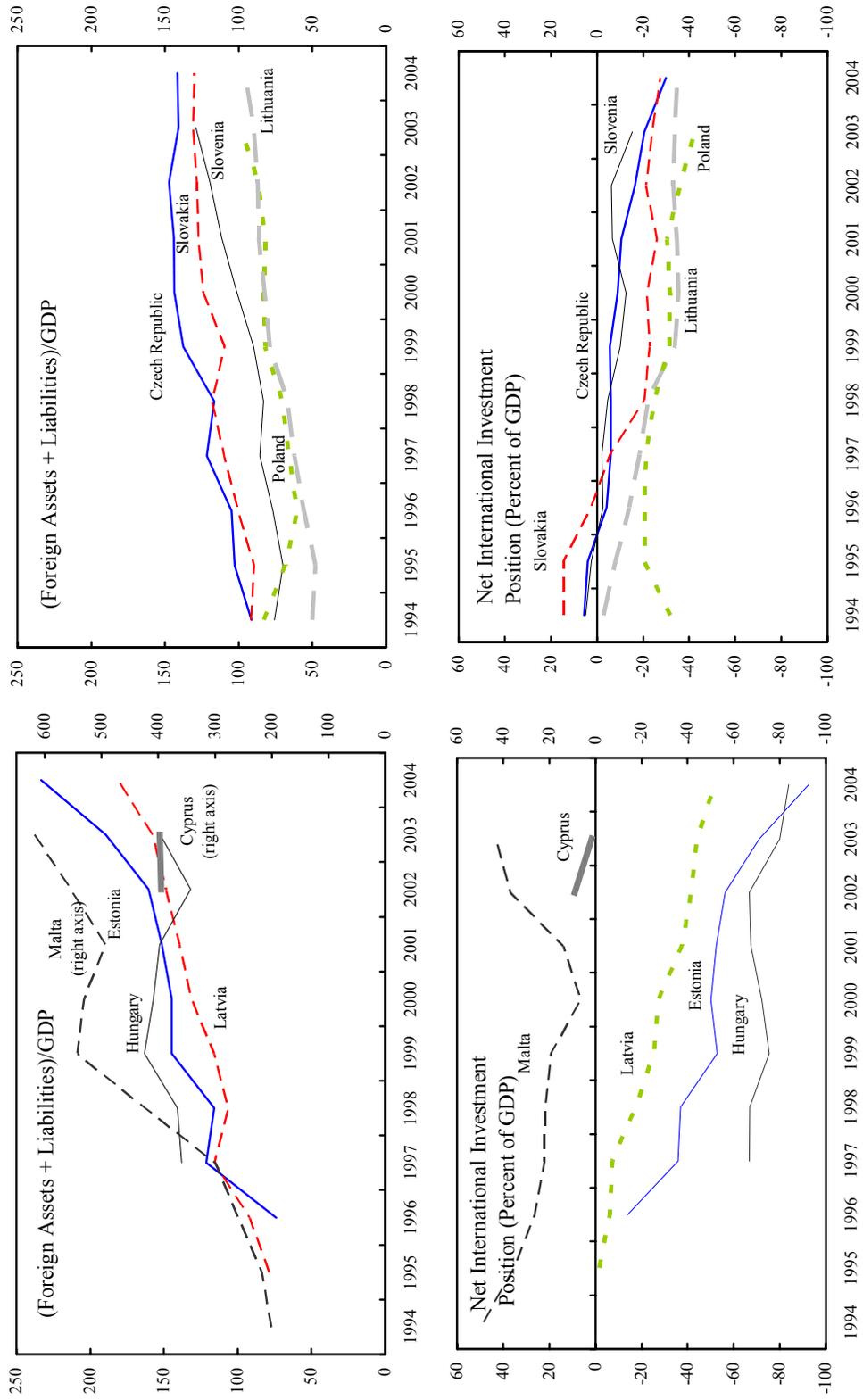
Source: IFS.

Figure 3. EU New Member States: Financial Integration and Grubel-Lloyd Indices, 1994-2004
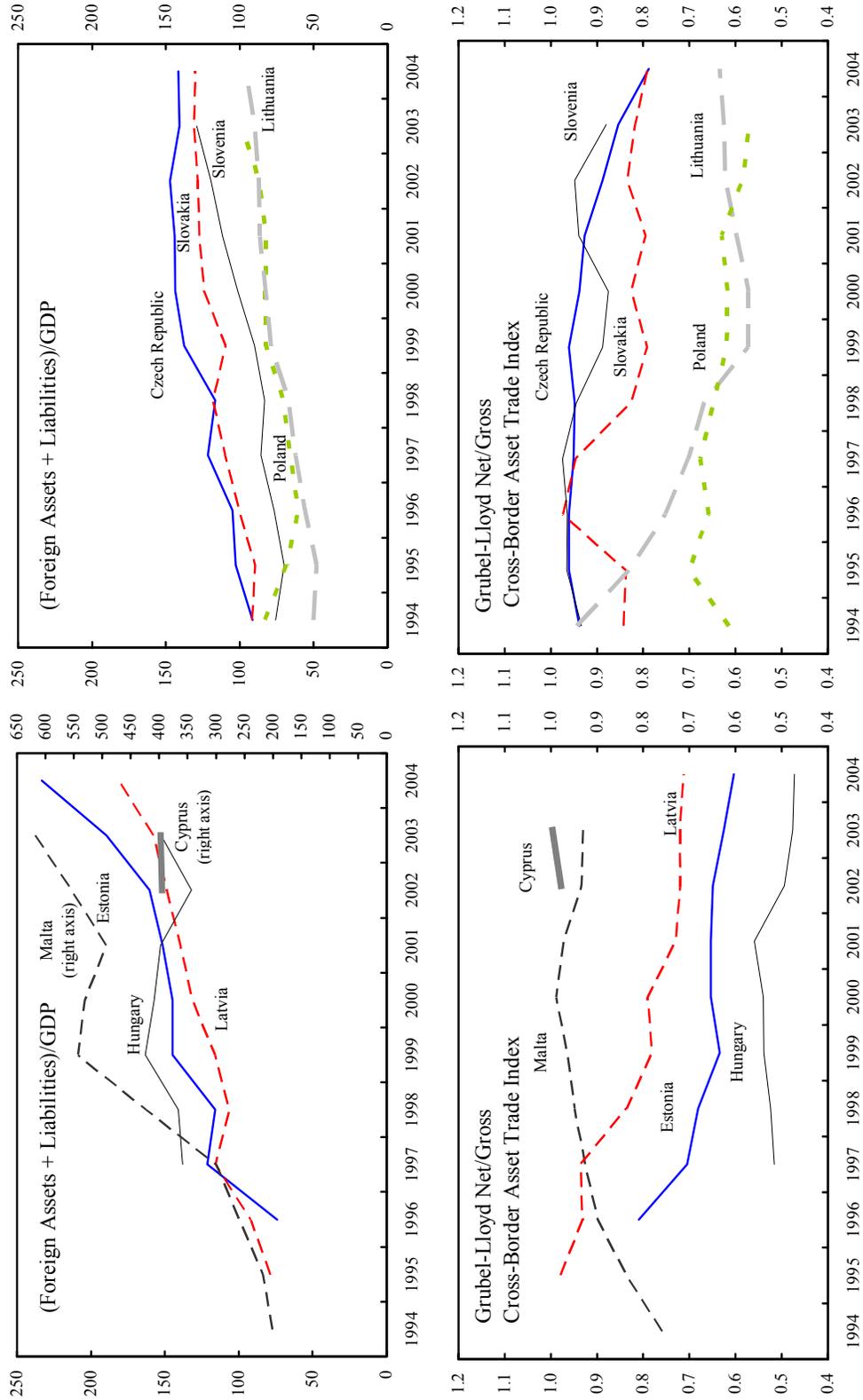


Sources: IFS; and Fund staff calculations.

Figure 4. EU New Member States: Foreign Assets and Liabilities by Economic Component,
1993-2004 (Percent of GDP)
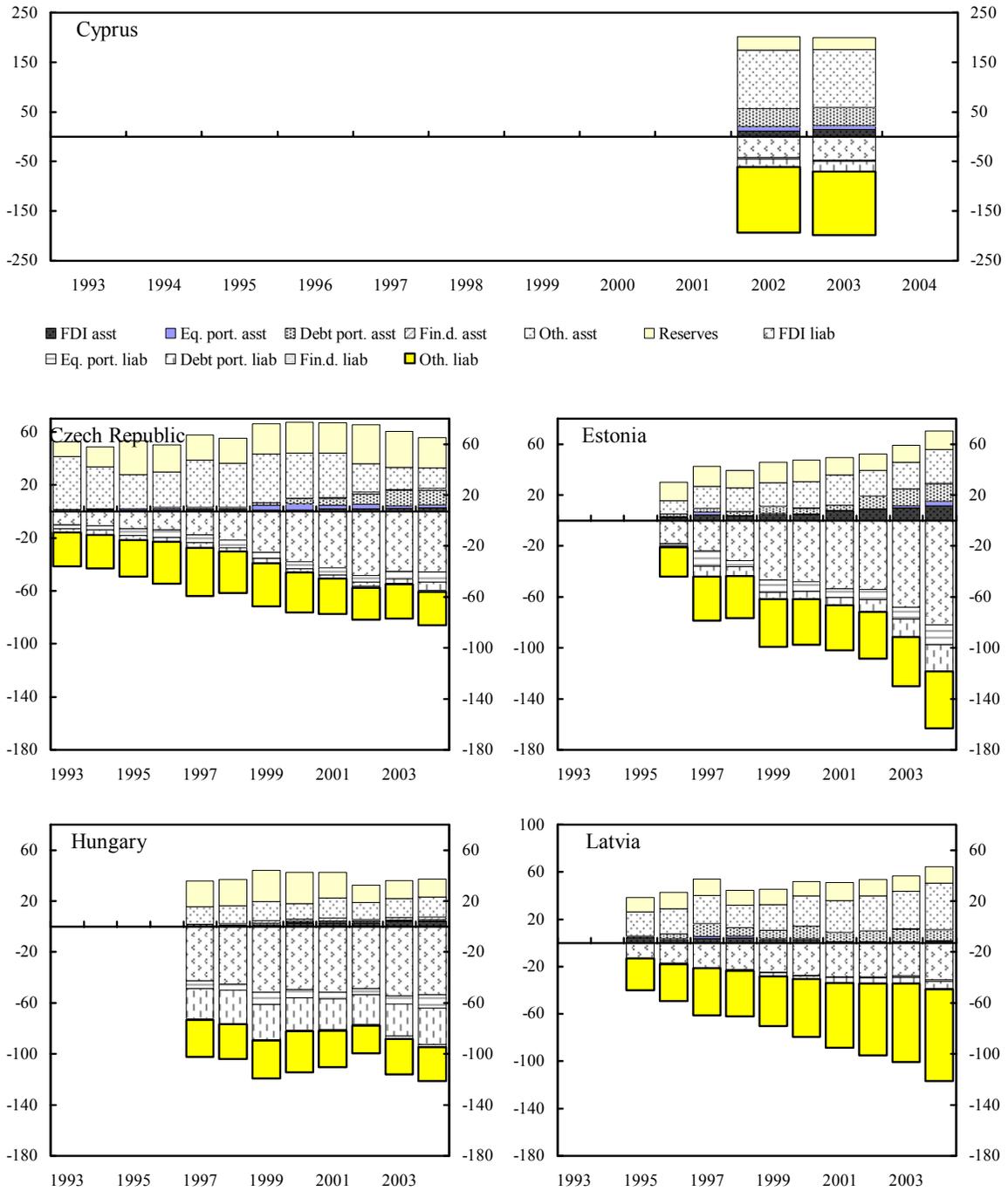


Source: IFS.

Figure 4 (concluded). EU New Member States: Foreign Assets and Liabilities by Institutional Sector, 1993-2004 (Percent of GDP)
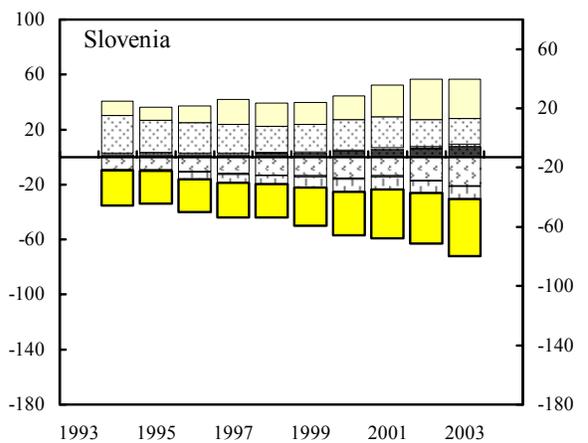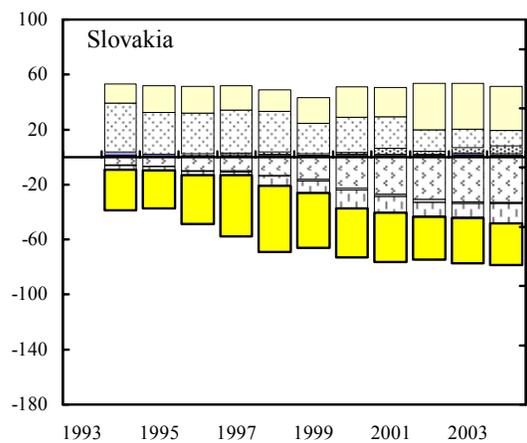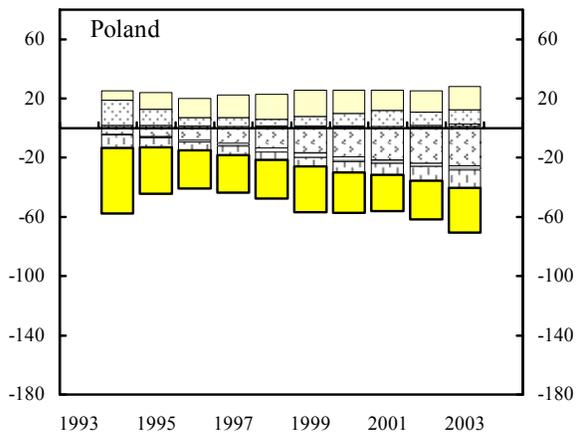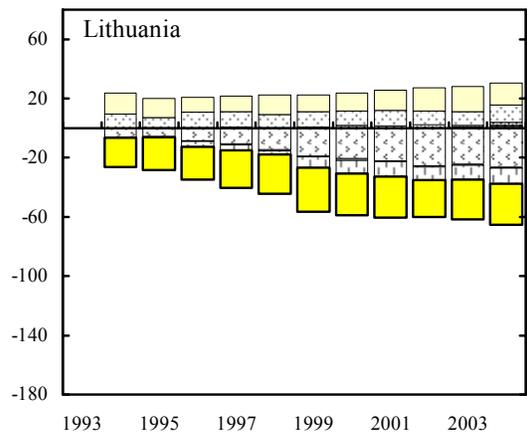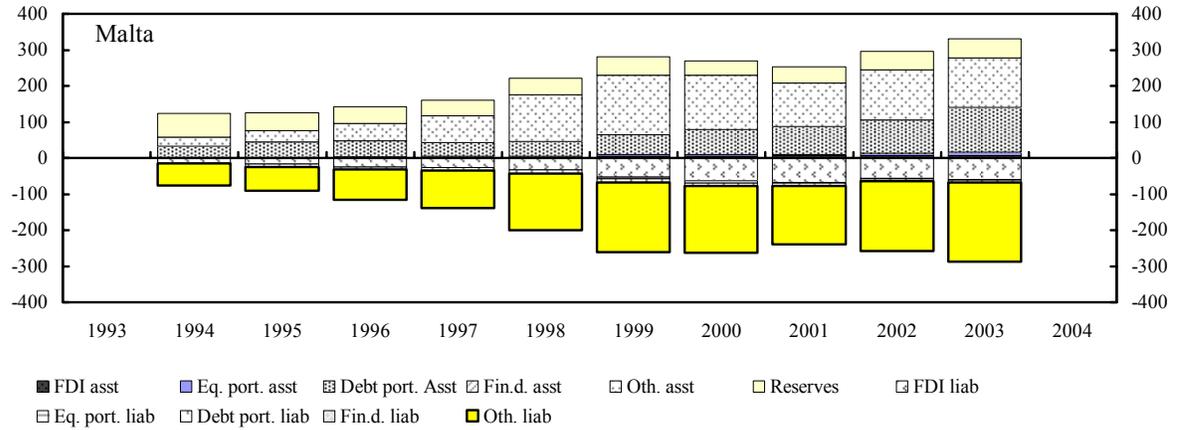


Source: IFS.

Figure 5. EU New Member States: Foreign Assets and Liabilities by Institutional Sector, 1993-2004 (Percent of GDP)
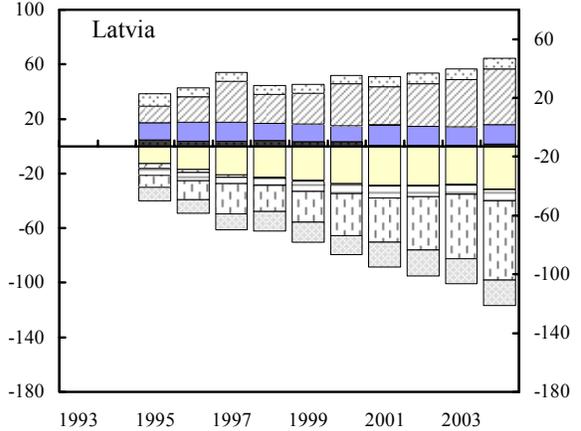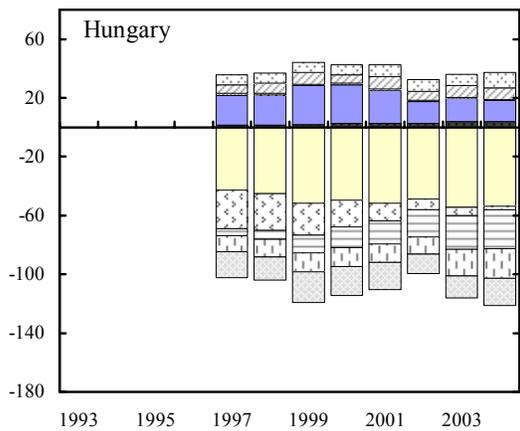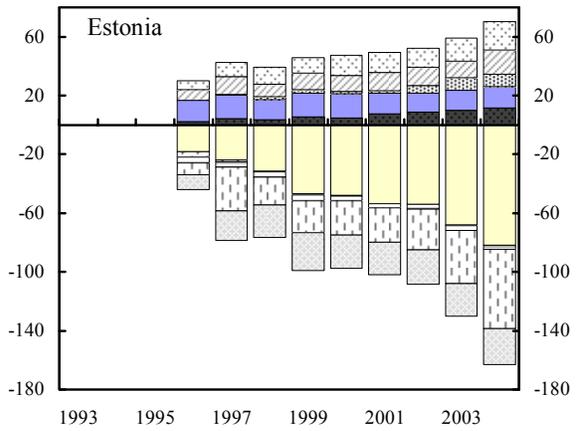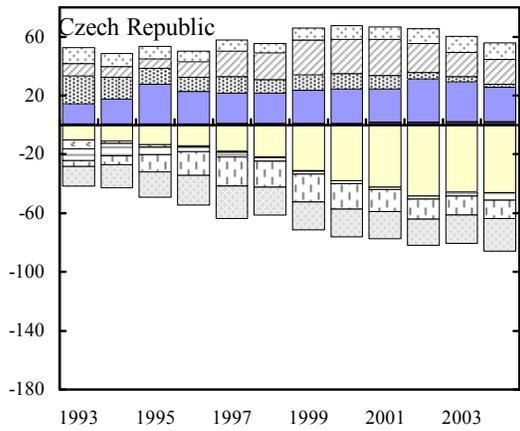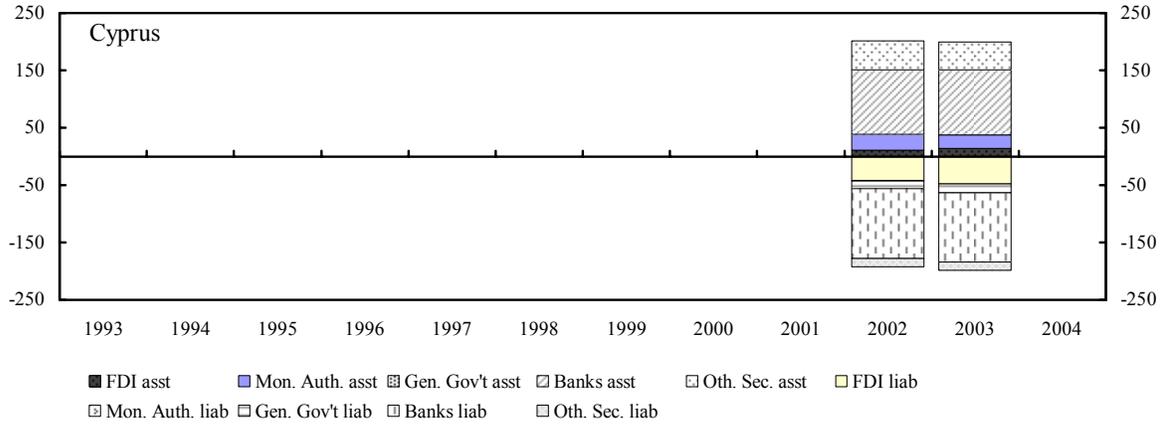


Source: IFS.

Figure 5. (concluded). EU New Member States: Foreign Assets and Liabilities
by Institutional Sector, 1993-2004 (Percent of GDP)
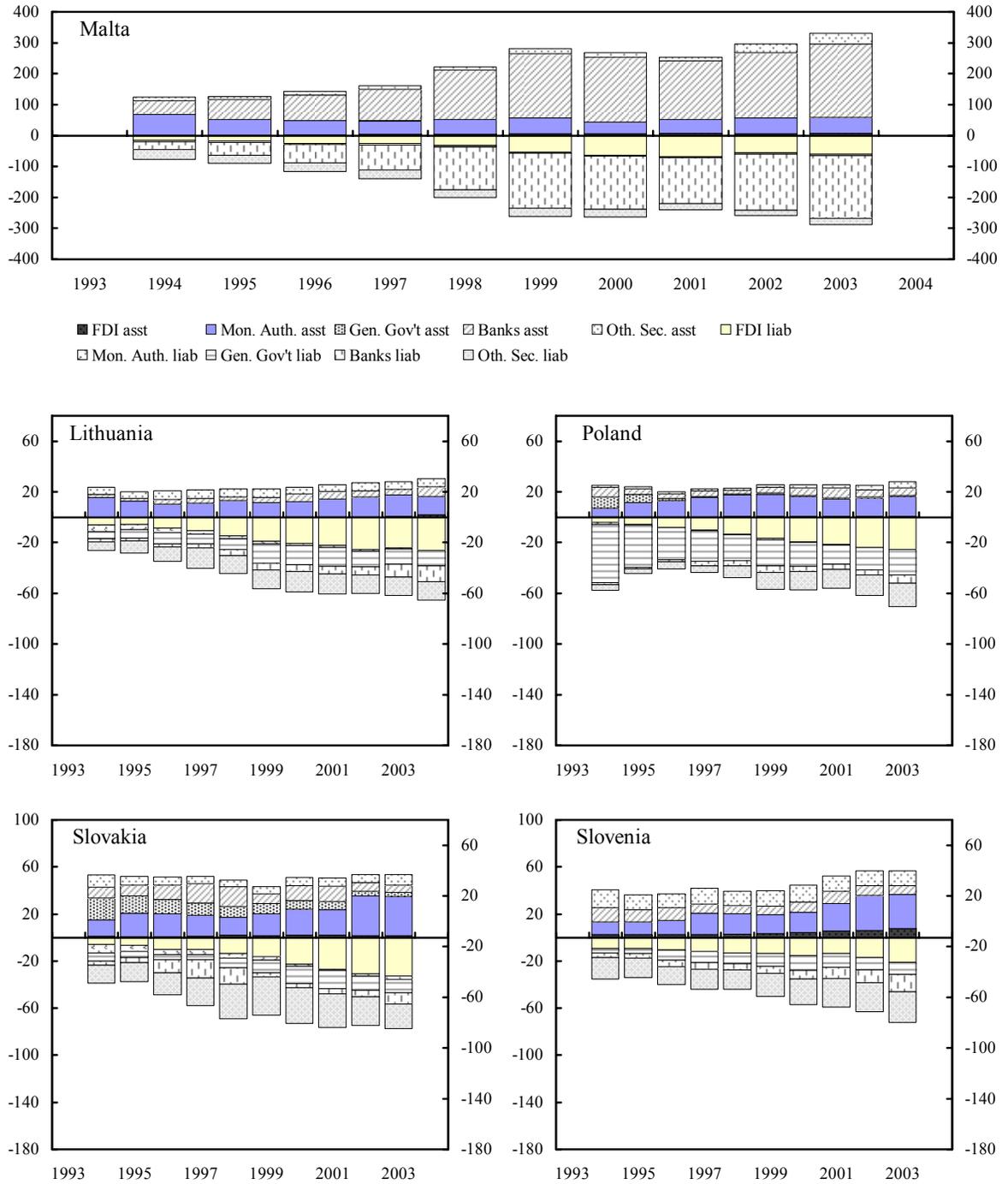


Source: IFS.

**REFERENCES**

Lane, Philip R., 2000, "International Investment Positions: A Cross-Sectional Analysis," *Journal of International Money and Finance,* Vol. 19, pp. 513–34.

———, and Gian Maria Milesi-Ferretti, 2000, "External Capital Structure: Theory and Evidence," IMF Working Paper 00/152 (Washington: International Monetary Fund).

———, 2001, "The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries," *Journal of International Economics,* Vol. 55, pp. 263–94.

———, 2005a, "A Global Perspective on External Positions," NBER Working Paper No. 11589 (Cambridge, Massachusetts: National Bureau of Economic Research).

———, 2005b, "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2003," manuscript in progress.

Obstfeld, Maurice, 2004, "External Adjustment," *Review of World Economics*, Vo1. 40 (4), pp. 541–68.

Stavrev, Emil, 2003, "Current Account Sustainability in the Baltic Countries," Chapter I of *Republic of Estonia: Selected Issues and Statistical Appendix,* IMF Country Report No. 03/331 (Washington: International Monetary Fund).

## II. DRIVING FORCES OF INFLATION IN THE NEW EU8 COUNTRIES[1]

### A. Introduction

1. **Headline inflation in most of the new EU8 members exceeded the Maastricht inflation criterion in 2004.** With the new member states preparing for Euro adoption, discussion of the determinants of inflation in these countries is getting increasing attention among policy makers. The question is of immediate importance for Estonia, Lithuania, and Slovenia—the first group set to join the euro-zone in 2007—but it is also relevant for the rest of the EU8 countries which intend to adopt the euro toward the end of the decade.

New EU8 Countries: Nominal Convergence
(Data for 2004)

|  | Deficit | Debt | **Inflation** | Interest rate 1/ |
|---|---|---|---|---|
|  | (In percent of GDP) | | (In percent) | |
| New EU8 member countries | -2.8 | 31.1 | **4.3** | 5.4 |
| Czech Republic | -3.5 | 24.1 | **2.8** | 4.8 |
| Estonia | 1.7 | 4.9 | **3.0** | 4.4 |
| Hungary | -5.4 | 60.8 | **6.8** | 8.2 |
| Latvia | -1.1 | 15.0 | **6.2** | 4.9 |
| Lithuania | -2.2 | 23.3 | **1.2** | 4.5 |
| Poland | -6.5 | 49.5 | **3.5** | 6.9 |
| Slovak Republic | -3.3 | 43.6 | **7.5** | 5.0 |
| Slovenia | -1.9 | 27.8 | **3.6** | 4.7 |
| *Memorandum Items:* | | | | |
| Maastricht Convergence criteria, 2004 | -3.0 | 60.0 | **2.3** | 6.4 |
| EU25 | -2.8 | 71.2 | **2.2** | 4.3 |

Sources: Eurostat, IFS, and country authorities.

1/ Estonia: interest rates on new kroon-denominated loans to non-financial corporations
and households with maturities over five years.
Lithuania: primary market yields of government bonds with maturities of close to ten years.
The rest of the new EU8 countries: secondary market yields of government bonds
with maturities close to ten years.

2. **This paper shows that a substantial part of headline inflation in the new EU8 countries is the result of common factors.** However, idiosyncratic factors have also played a role in the inflation process. The country specific factors are most likely related to the time path of administered price adjustments and increases of indirect taxes associated with EU accession, as well as the specific monetary conditions, pass-through from foreign prices, and market conditions in each country.

3. **The remainder of the paper is organized as follows.** Section B provides background information about inflation in the new EU8 members. Section C presents the data and the model. Section D discusses the estimation results. Section E presents some preliminary conclusions.

### B. Inflation Background

4. **The new EU8 countries are more energy intensive than the old members.** On average, measured by the CPI weight of energy consumption, the new EU8 members consume about 50 percent more energy than the rest of the EU countries. Consequently,

---

[1] Prepared by Emil Stavrev.

energy price shocks have a much more pronounced effect on headline inflation in the new EU8 members than in those countries already in the euro area (Figures 1&2).

5.      **Despite the similarities in energy intensity, the impact of energy shocks on core inflation (excluding energy) differs among the new EU8 countries.** A bi-variate VAR analysis of energy and core inflation suggests that variation in energy prices explains more than ¾ of the variation of core inflation in Lithuania, about ⅓ in the Czech Republic, Slovak Republic, and Poland, about 15 percent in Hungary, and less than 10 percent in Estonia and Slovenia (Figure 3). These differences in the transmission of energy shocks to the underlying inflation most likely reflect different degrees of product market competition and labor market flexibility within the various countries. In this case, headline inflation will tend to return to its core level faster in the countries with the more flexible markets.

**New EU8 Members: Energy Intensity**

| | Energy | Liquid fuel |
|---|---|---|
| | Share in CPI basket, in percent | |
| Czech Republic | 13.6 | 3.7 |
| Estonia | 14.9 | 6.6 |
| Hungary | 13.0 | 5.1 |
| Latvia | 12.9 | 3.2 |
| Lithuania | 14.0 | 4.3 |
| Poland | 14.9 | 4.3 |
| Slovak Republic | 16.0 | 3.6 |
| Slovenia | 12.5 | 7.8 |
| | | |
| Euro Area | 8.4 | 4.5 |

Source: Staff calculations; and Eurostat.

### C.   The Data, Methodology, and the Model

6.      **The paper uses 4-digit level of Harmonized Index of Consumer Prices (HICP) data for the new EU8 members.** The data panel consists of 695 cross-section series (HICP components). The sample period is January 2001–July 2005—the longest common sample. Inflation is defined as year-on-year percent change of HICP components.

7.      **To estimate the common and idiosyncratic components of inflation, the paper uses the generalized dynamic factor model (GDFM).[2]** The GDFM decomposes each time series on two sets of unobservable components—a common (principal) component, or underlying inflation, and an idiosyncratic, or transient, component. Underlying inflation is driven by a small number of shocks common to the entire data set, but each inflation component is allowed to react differently to the common shocks. The common component of inflation is driven by the underlying inflationary process and is persistent. The idiosyncratic component reflects temporary forces affecting specific sectors such as excise tax hikes or increases in administered prices. It also includes measurement errors. Although the

---

[2] Forni et al. (2000 and 2003) further extended the principal component analysis and the Stock and Watson's (1989) method by developing both a coincident and a leading indicator—the generalized dynamic factor model. The GDFM also allows for limited cross-correlation among idiosyncratic components.

idiosyncratic components do not affect inflation over the longer-term, they can play an important role in the short-term in explaining inflation.

8.      **The GDFM is an unobserved component model.** Each process $x^i_t$ is decomposed to the sum of two components—a common component $f_t$ and an idiosyncratic component $\varepsilon_t$. The model assumes that the processes are stationary with zero mean. The ($q$ x $t$) vector of common shocks $f_t$ has mutually orthogonal components with zero mean and unit variance. The vector of idiosyncratic components $\varepsilon_t$ is orthogonal to the vector of common components, however, the model allows for cross-correlation between the idiosyncratic components. The model is estimated using the one-side estimator proposed by Forni et al. (2003).

9.      **Cross-country correlation analysis suggests that a significant amount of the variation in inflation in the new EU8 countries is explained by common shocks.** In general, except for the Slovac Republic and Slovenia inflation in the rest of the countries is significantly positively correlated. Country specific components, however, have also played a role, especially where the share of administratively regulated prices was significant (18 percent in the Czech Republic, 15 percent in Estonia, 14 percent in Latvia, and 22 percent in the Slovak Republic). In addition, there were various indirect tax adjustments related to the EU accession that differed among the countries in the data set.

**New EU8 Countries: Core and Headline Inflaiton--Cross Correlations**
(January 2002--July 2005)

| | Czech Republic | Estonia | Hungary | Latvia | Lithuania | Poland | Slovak Republic | Slovenia |
|---|---|---|---|---|---|---|---|---|
| *Inflation excluding energy, food, alcohol and tobacco* | | | | | | | | |
| Czech Republic | 1.0 | | | | | | | |
| Estonia | 0.6 | 1.0 | | | | | | |
| Hungary | 0.7 | 0.3 | 1.0 | | | | | |
| Latvia | 0.6 | 0.3 | 0.0 | 1.0 | | | | |
| Lithuania | 0.7 | 0.8 | 0.1 | 0.8 | 1.0 | | | |
| Poland | 0.9 | 0.7 | 0.5 | 0.8 | 0.8 | 1.0 | | |
| Slovak Republic | 0.1 | -0.4 | 0.6 | -0.1 | -0.4 | -0.1 | 1.0 | |
| Slovenia | -0.2 | 0.1 | 0.3 | -0.8 | -0.4 | -0.4 | 0.3 | 1.0 |
| *Headline inflation* | | | | | | | | |
| Czech Republic | 1.0 | | | | | | | |
| Estonia | 0.6 | 1.0 | | | | | | |
| Hungary | 0.7 | 0.1 | 1.0 | | | | | |
| Latvia | 0.6 | 0.4 | 0.2 | 1.0 | | | | |
| Lithuania | 0.7 | 0.8 | 0.1 | 0.7 | 1.0 | | | |
| Poland | 0.9 | 0.7 | 0.5 | 0.8 | 0.8 | 1.0 | | |
| Slovak Republic | -0.1 | -0.6 | 0.5 | 0.0 | -0.4 | -0.1 | 1.0 | |
| Slovenia | -0.2 | -0.1 | 0.0 | -0.8 | -0.4 | -0.4 | 0.0 | 1.0 |

Source: Staff calculations.

## D.   Discussion of the Results

10.     **Common shocks explain about 80 percent of variability of the cross-section data over the medium term.** Spectral decomposition of the data set suggests that the common component of inflation estimated using 2 dynamic factors has significant explanatory power. The common component of inflation explains about 80 percent of the variability of the cross-section data at longer periodicity [0, $\pi/7$] interval (over a year) and more than 50 percent at shorter periodicity [0, $\pi$] interval (less than a year).

Cumulative Variance Explained by First 6 Common Factors
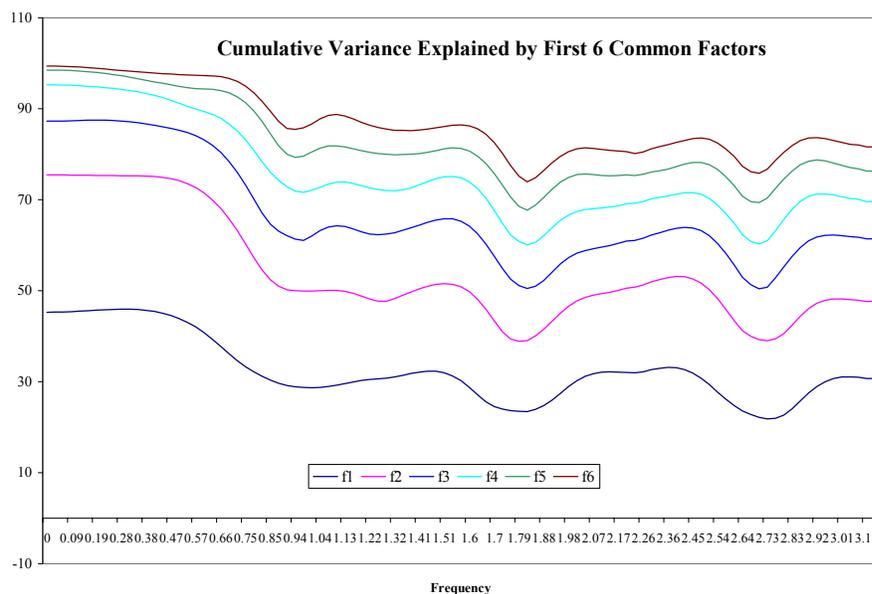
11. **Common component inflation performs better than a core measure (excluding energy, food, alcohol, and tobacco) in explaining headline inflation variability in most of the new EU8 countries** (Figure 4)**.** Regression results show that, with the exception of the Slovak Republic and Slovenia, the common component of inflation is a superior measure of underlying inflation in the sample countries. The share of headline inflation variance explained by common component inflation is 80 percent or above, with the exception of Hungary where it is 71 percent.

**Share of Inflation Variance Explained by Alternative Measures of Inflation**
(In percent)

|  | Core inflation (Headline inflation excluding energy, food, alcohol and tobacco) | Common component |
|---|---|---|
| Czech Republic | 43 | 82 |
| Estonia | 3 | 89 |
| Hungary | 69 | 71 |
| Latvia | 86 | 93 |
| Lithuania | 51 | 83 |
| Poland | 35 | 88 |
| Slovak Republic | 85 | 80 |
| Slovenia | 93 | 80 |

Source: Staff calculations.

12. **The idiosyncratic component is driven mainly by differences in monetary conditions in the sample countries.** Monetary conditions, captured by the real long-term interest rate, are a significant determinant of the idiosyncratic component. The sample real long-term interest rates have a significant negative effect on inflation in every country in the sample. Also, in most countries, EU inflation has a significant and positive effect on inflation and in determining its deviation from the underlying level (Table 1)

### E.  Concluding Remarks

13.      **Our preliminary findings suggest several conclusions.** First, a significant part of inflation in the new EU8 members is driven by common factors. Second, the proposed common component measure of inflation is a better estimator of underlying inflation than core inflation (i.e., headline inflation excluding energy, food, alcohol and tobacco). While further analysis is needed to determine if common component inflation fares better than other core measures of inflation in capturing the underlying inflation processes in the new EU8 countries, it has several appealing properties. First, this approach does not have the disadvantage of defining the core measure by excluding hey elements which tend to underestimate the effect of supply shocks. Second, it overcomes the subjectivity implied in some other statistical approaches such as trimmed-means.

14.      **There are several areas where this study could be extended.** First, the sample of countries could be enlarged to include the other EU countries. This would allow for a better decomposition of the common factor of inflation and the idiosyncratic component. Second, the estimated idiosyncratic and common components of inflation could be explicitly modeled to estimate the long- and short-run driving forces.

Table 1. New EU8 Countries: Determinants of Idiosyncratic Component 1/

| | Constant | Industrial production | Retail sales | Exchange rate versus EURO | Exchange rate versus USD | Real long-term interest rate | EU inflation | Adjusted R-squared |
|---|---|---|---|---|---|---|---|---|
| Czech Republic | -2.51 (1.60) | n.s. | 0.36 (0.19) | -0.08 (0.02) | n.s. | -0.70 (0.12) | 1.44 (0.63) | 0.57 |
| Estonia | -7.60 (1.06) | n.s. | 0.06 (0.02) | n.s. | n.s. | -0.11 (0.05) | 3.41 (0.47) | 0.67 |
| Hungary | -0.60 (0.95) | -0.05 (0.02) | n.s. | n.s. | n.s. | -0.84 (0.07) | 1.15 (0.39) | 0.82 |
| Latvia | n.s. | n.s. | -0.08 (0.02) | 0.08 (0.03) | 0.10 (0.03) | -0.18 (0.03) | n.s. | 0.58 |
| Lithuania | n.s. | -0.04 (0.01) | n.s. | n.s. | 0.08 (0.02) | n.s. | 1.48 (0.44) | 0.78 |
| Poland | n.s. | -0.16 -0.03 | n.s. | n.s. | 0.12 -0.03 | -0.42 -0.10 | n.s. | 0.65 |
| Slovak Republic | -4.99 (2.27) | n.s. | -0.22 (0.04) | 0.23 (0.11) | n.s. | -0.28 (0.09) | 2.24 (1.07) | 0.60 |
| Slovenia | n.s. | n.s. | n.s. | 0.39 (0.07) | n.s. | -1.19 (0.19) | 1.10 (0.38) | 0.78 |

Source: Staff calculations.

1/ Dependent variable: Idiosyncratic component of inflation: defined as headline inflation minus principle component inflation.

Long-term interest rate in percent; the other variables y-o-y, in percent. Standard errors in parenthesis.

Statistically significant variables reported; n.s.--not statistically significant at 1 percent, 5 percent, or 10 percent.

Figure 1. New EU8 Countries: Contribution of Energy to Inflation
(Inflation-left scale, in percent; energy's contribution to inflation, right-scale, in percentage points)
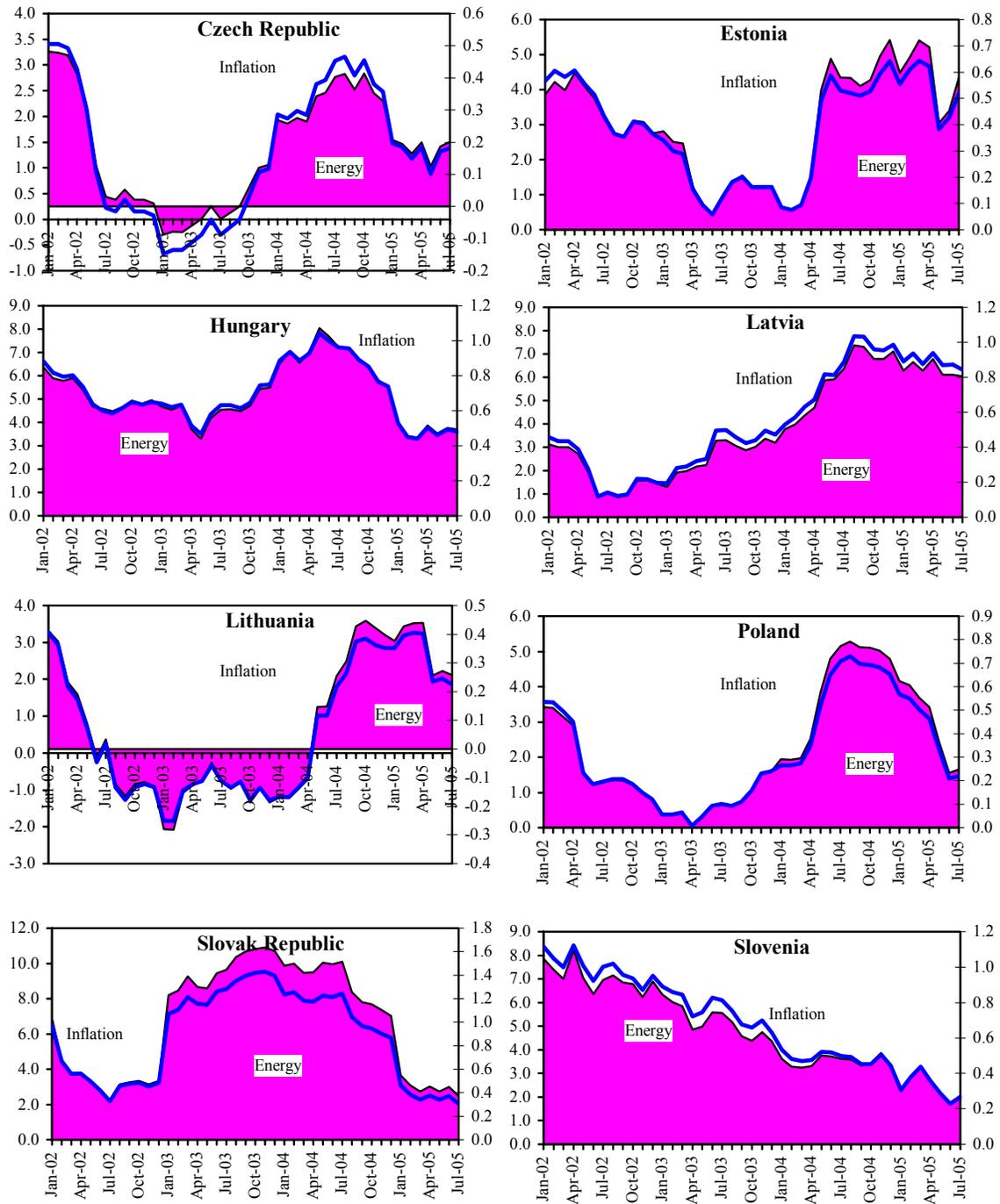


Sources: Staff calculations; and Eurostat.

Figure 2. EU: Energy and Inflation
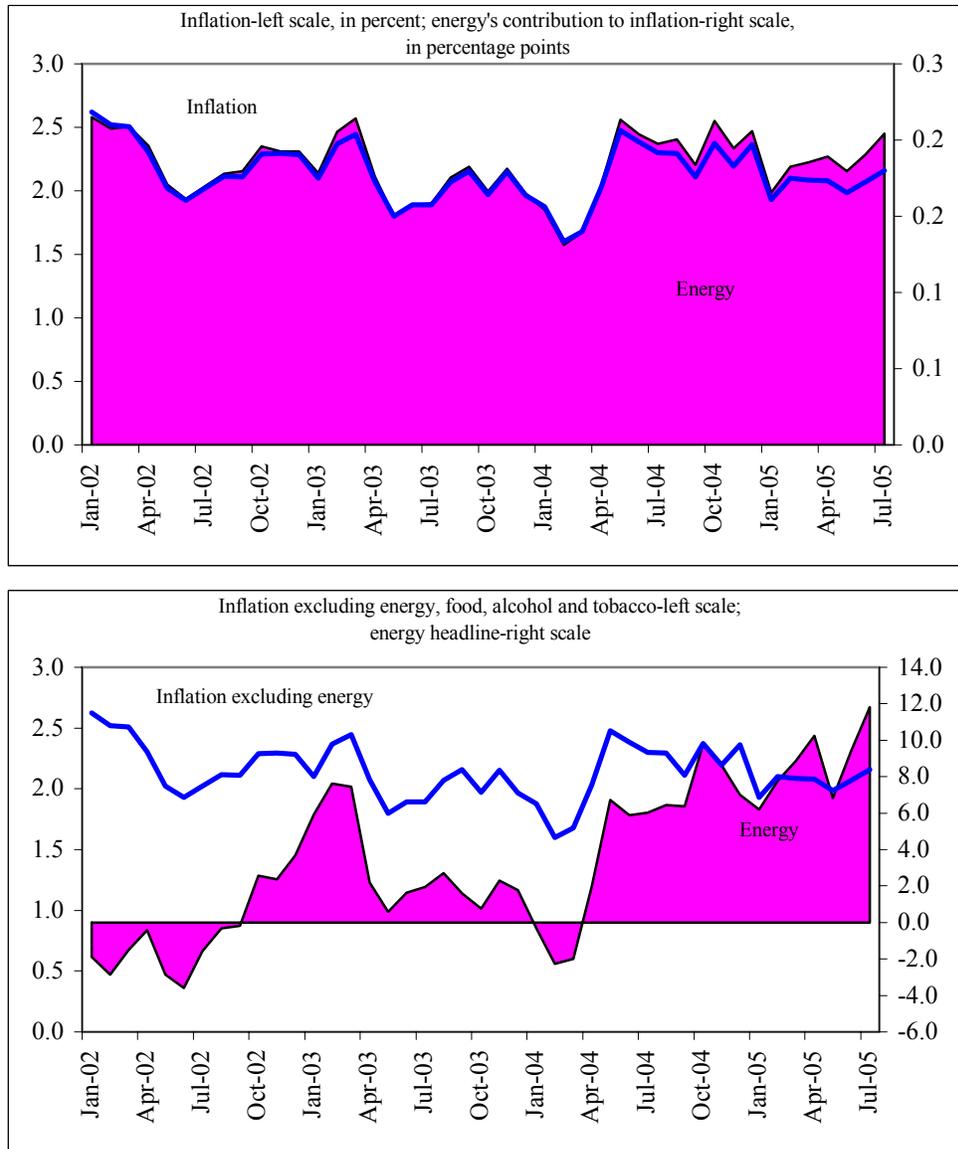


Inflation Sources: Eurostat; and Staff calculations.

Figure 3. Variance Share of Core Inflation (excluding Energy) Explained by Energy
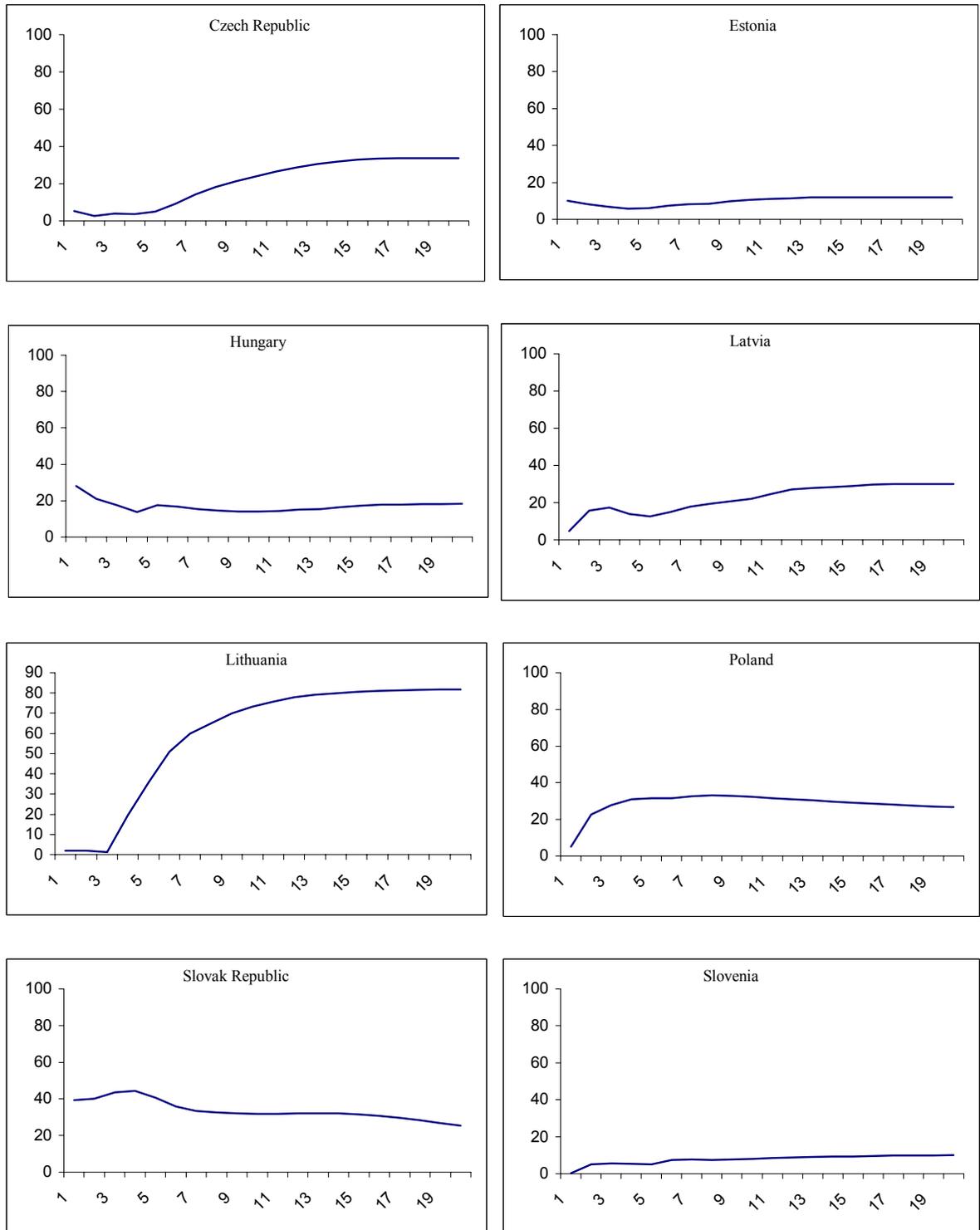


Source: Staff calculations.

## Figure 4. New EU8 Countries: Headline and Core Inflation

(Headline-area; Core--excluding energy, food, alcohol and tobacco-line; common component-dashed line; In percent)
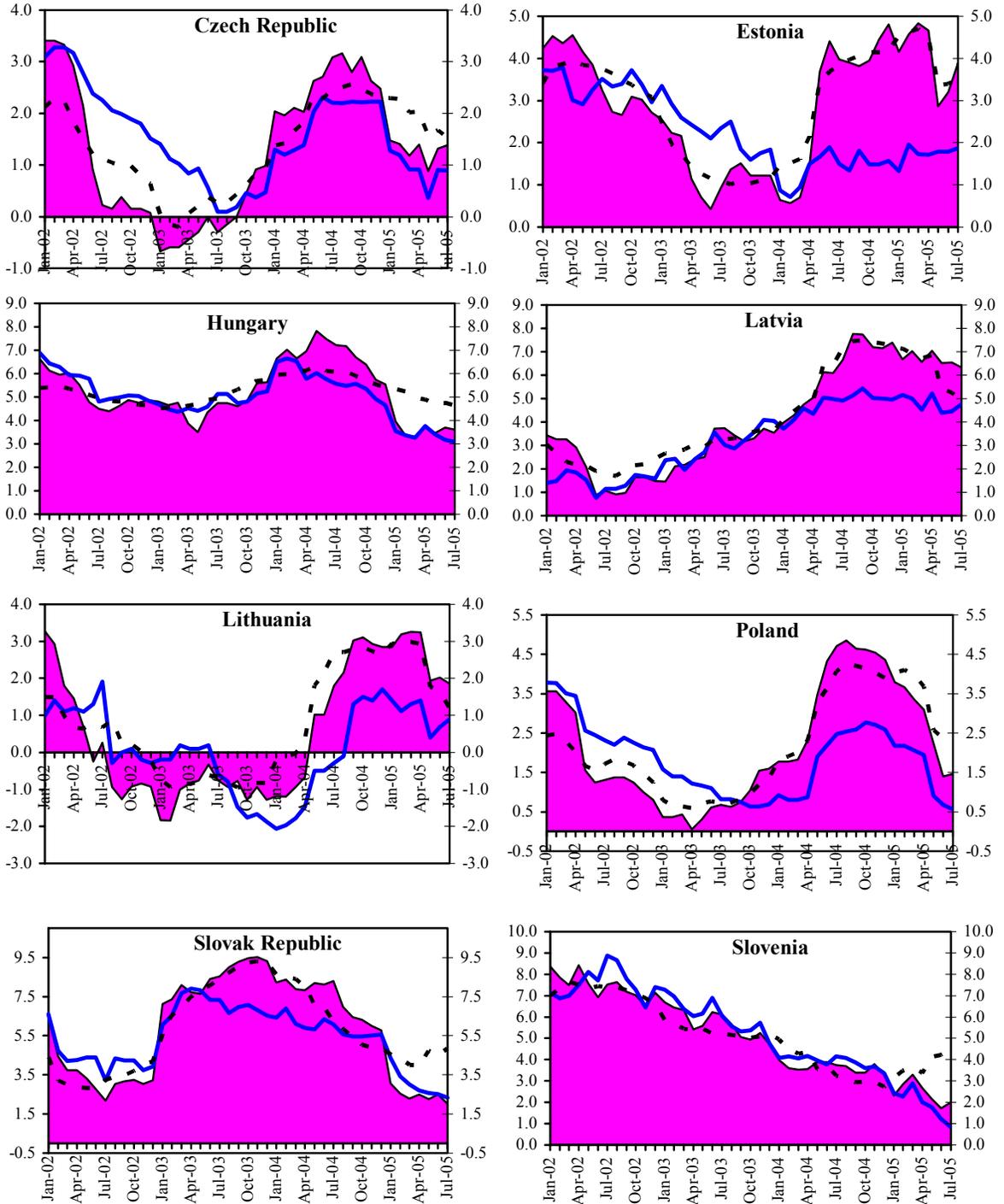


Sources: Staff calculations; and Eurostat.

## REFERENCES

Forni, M., M. Hallin, M. Lippi, and L. Reichlin, 2000, "The Generalized Factor Model: Identification and Estimation," *Review of Economics and Statistics,* Vol. 82, No. 4, pp. 540−54.

———, 2003, "The Generalized Factor Model: One-Sided Estimation and Forecasting," manuscript.

Quah, D., and S. Vahey, 1995, "Measuring Core Inflation," *The Economic Journal*, Vol. 105, 86 (1), pp. 1130−44.

Stock, J. H., and M. H. Watson, 1989, "New Indexes of Coincident and Leading Economic Indicators," NEBR *Macroeconomic Annual Report 1989* (Cambridge, Massachusetts: MIT Press).