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Hungary: Selected Issues

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HUNGARY

Selected Issues

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Approved by the European I Department

February 3, 1999

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I. Overview

1. Hungary has made substantial economic progress since transition began. In difficult circumstances, wholesale reform of institutional and corporate governance structures has been implemented. In addition, the large external imbalances that emerged in the mid–1990s have been corrected, the fall in output that marked the early stages of transition has been decisively reversed, and, during 1998, inflation fell rapidly towards single digits.

2. In this context, the challenge for policymakers, now, is to build on the improved economic performance already achieved, and thereby to lay the foundations for early accession into the European Union.

3. This Selected Economic Issues Paper addresses several topics related to this agenda. Chapters II–IV focus on the nominal anchor framework. The remaining chapters discuss growth potential and fiscal issues affecting that potential, and the external constraint. The standard section on exchange arrangements concludes the paper.

4. The discussion of the nominal anchor framework has several components. Chapter II presents an empirical analysis of the leading indicators for inflation and Chapter III models the determinants of inflation. This material summarizes current knowledge about the behavior of inflation and thus underpins the subsequent discussion of possible changes to the current nominal anchor framework.

5. Chapters II and III suggest that some relatively stable econometric relationships can be found, despite the considerable structural and policy changes that occurred during the 1990s. Stable leading indicators reported in Chapter II include producer and import prices, as well as nominal and real exchange rates. Interestingly, neither nominal wages nor nominal unit labor costs are leading indicators of inflation. This reason for this finding is suggested by the exercise in Chapter III, which models inflation directly. That exercise suggests that nominal wages adjust to recent inflation, rather than determining future inflation. It also suggests that real wages follow productivity closely as well as responding rapidly to labor market imbalances, both signs of sound labor markets.

6. Two key conclusions from these chapters are highlighted. First, the nominal exchange rate—a variable that the authorities have direct control over under the crawling–peg regime—is both a stable leading indicator of inflation and a key determinant of inflation. Second, the impact of changes in the nominal exchange rate on the real exchange rate is largely exhausted within two years, implying that inflation inertia is less pervasive than might be expected.

7. Accordingly, the risks of a real appreciation arising from a strengthening of the nominal exchange rate, while present, are offset in practice by a relatively rapid adjustment of

prices to nominal exchange rate shocks. This empirical evidence may ease concerns that an accelerated exchange–rate led disinflation might put undue pressure on competitiveness and hence on the external accounts. But the evidence is qualified by the quality and the limited time–span of the data and by the structural changes that occurred in that period.

8. With this background, Chapter IV consists of a qualitative discussion of current issues in the design of the nominal anchor framework. In particular, it considers issues related to the appropriate speed of prospective disinflation, the exchange rate regime in that context and ahead of EU accession, and issues pertaining to the suitability of an inflation targeting approach for Hungary.

9. The discussion notes that the case for a gradual disinflation in Hungary rests on inflation inertia, given international evidence that speedy disinflation is commonly less costly in terms of lost output than gradual disinflation. It also suggests that in the medium–term, a widening of the exchange rate band could be appropriate, to react to evidence that capital flows into Hungary are becoming increasingly sensitive to yield differentials and to anticipate further capital inflows as EU accession approaches. In particular, a band widening would increase the flexibility of interest rate policy and diminish the need for sterilized intervention to prevent the forint from appreciating out of its current narrow band. But, the chapter also emphasizes that the case for such a step would also have to weigh the risks of an unsustainable real appreciation of the forint, within a wide band, if prices did not respond rapidly enough. Finally, it is noted that the promising results described in Chapters II and III, while preliminary, bode well for the introduction in the medium term of an inflation targeting framework in Hungary. Issues pertaining to a further strengthening of the legal independence of the central bank, which is already substantial, are also discussed.

10. Increased supply–side flexibility, while primarily aimed to further stimulate growth, would also contribute to an accelerated disinflation. The remaining chapters address these and related issues. Chapter V presents an exploratory analysis of the contribution of factor accumulation and total factor productivity growth to the behavior and prospects for output. The key conclusion is that if the latter is within norms achieved by European industrialized countries during their so–called "golden age" of growth in the 1950s and 1960s, growth rates of 5–6 percent would be achievable with fixed investment growing in real terms by around 7 percent. This would require, however, falling unemployment rates as well as increased labor force participation rates, and policy measures to ensure that productivity growth is strong.

11. Chapter VI considers a number of tax policy issues that impact on the strength of labor supply and productivity growth. In particular, it notes the high rate of taxation on labor and discusses both its short– and long–run macroeconomic effects. A key conclusion is that initiatives to substantially further reduce the burden of labor taxation, in order to stimulate employment and productivity growth, will require additional public expenditure reform to maintain a prudent fiscal balance. This is because most potential tax sources are already fully exploited.

12. Chapters VII and VIII consider the perennial issue of the external constraint in Hungary. This constraint has in the past been the first constraint on growth to bind and has also been a key concern in consideration of an accelerated exchange rate–led disinflation. Chapter VII reports the results of an exercise to model of the determinants of the trade balance empirically. The growth of domestic demand relative to trend, and a measure of cyclical external demand are found to be key determinants. The real exchange rate (measured by relative unit labor costs) also plays a role. An implication of these findings is that policy to slow domestic demand could offset the short–run impact of an accelerated exchange rate led disinflation on the external balance, to keep that balance within limits set by Hungary's long–term intertemporal external financing constraint. Factors affecting that long–term constraint are discussed in Chapter VIII, which also presents a series of simulations to quantify the constraint. Chapter IX presents a brief summary of Hungary's exchange arrangements and its capital control regime.

II. Are There Leading Indicators of Inflation in Hungary?[1]

A. Introduction

13. This chapter investigates the leading indicator properties of macroeconomic aggregates for inflation in Hungary.

14. The investigation uses nonstructural VAR systems. These make no assumptions regarding the structure of the economic model underlying inflation, and simply identify patterns in the data. In this respect, the approach contrasts with that in Chapter III, which attempts to model inflation explicitly.

15. Three principal methods are employed to identify the leading indicator properties for inflation of the aggregates under consideration: bivariate Granger causality tests, bivariate variance decompositions, and bivariate impulse–response functions. The results of these tests provide the basis for the estimation of an unrestricted multivariate VAR model of inflation.

16. Section B discusses the measures of inflation used in the study. Section C presents empirical results for the period 1992:1 to 1998:5. Section D contains a simple multivariate VAR model with an evaluation of parameter stability and forecasting properties. Section E offers concluding remarks.

B. Construction of Inflation Measures

17. The first task is to consider which measure of inflation to seek leading indicators for.

18. Clearly, the consumer prices index (CPI) should be included because of the prominent place it holds in the monetary framework. But it is not necessarily a good measure of inflation. Several factors affecting the CPI do not reflect the stance of financial policies, such as administrative price and relative price adjustments, but these show up in the CPI. These factors may account for the highly skewed and kurtotic cross–sectional distribution of the rate of change in the CPI,[2] which implies that the headline inflation rate is vulnerable to changes in a few key components.

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[1]Prepared by Peter Doyle and Dan–Frederik Nyberg who was on a summer internship in European I Department, Central II Division on June 16–September 11, 1998.

[2]See Bryan and Cecchetti (1994)

19. The concept of "core" inflation has been developed in response to these issues.[3] Such measures essentially attempt to remove temporary price shocks from conventional inflation measures, but some also attempt to extract the impact effects of changes in indirect taxes. In the transition context, procedures to do this have generally been applied to the CPI excluding administered prices. This approach is adopted here. A number of methods of defining the "core" of the nonadministered price indices have been used, two of which have been adopted in this paper. The first follows Bryan, Cecchetti and Wiggins (1997), building a "trimmed mean" measure of market–determined inflation. Thus, the tails of the cross–sectional distribution of the consumer price index excluding administered prices, are trimmed and the central portion of the distribution is reweighted. The second measure is constructed by removing its more volatile components such as food, fresh vegetables, and motor fuels. (See Appendix I for details of the construction of these measures).

20. Thus, four inflation measures are defined and presented in (Figure 1).

(i) Headline CPI.

(ii) CPI excluding fresh food, vegetables, motor fuels, and regulated prices (*mcore*),

(iii) Nonregulated CPI, excluding 10 percent of each tail in the distritution (*mt20*),

(iv) Weighted median of nonregulated CPI (*mmed*).

21. Note that 15 of the 160 CPI categories are under administrative control, so the indices excluding them consist of 145 series. In what follows, the market determined series is referred to as CPI(145). The authorities report an index for nonadministered prices which is slightly different from that constructed here. This is mainly because changes to indirect taxes have also been excluded from the authorities' nonregulated price index, whereas such changes remain included in the CPI(145), for reasons of simplicity. As can be seen in Figure 1, the various core inflation measures are generally below headline CPI inflation and are less volatile.

22. Descriptive statistics for the measures of inflation investigated here are reported in (Table 1). The headline CPI displays the highest standard deviation, while the core of nonregulated CPI has the lowest standard deviation. The Ljung–Box statistic cannot reject the null hypothesis that there is no autocorrelation up to lag 24, which can be interpreted as a sign of strong persistence and possibly of a unit root process. The trimmed mean (*mt20*), weighted median (*mmed*), and headline CPI (*mcpi*) exhibit strong kurtosis and skewness, while the core of nonadministered prices displays moderate kurtosis.

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[3]There is no consensus regarding the definition of core inflation. Early attempts can be found in Eckstein (1981), and more recent examples in Bryan and Cecchetti (1993) and Bryan, Cecchetti and Wiggins (1997).

Figure 1. Inflation Values, 1992-98

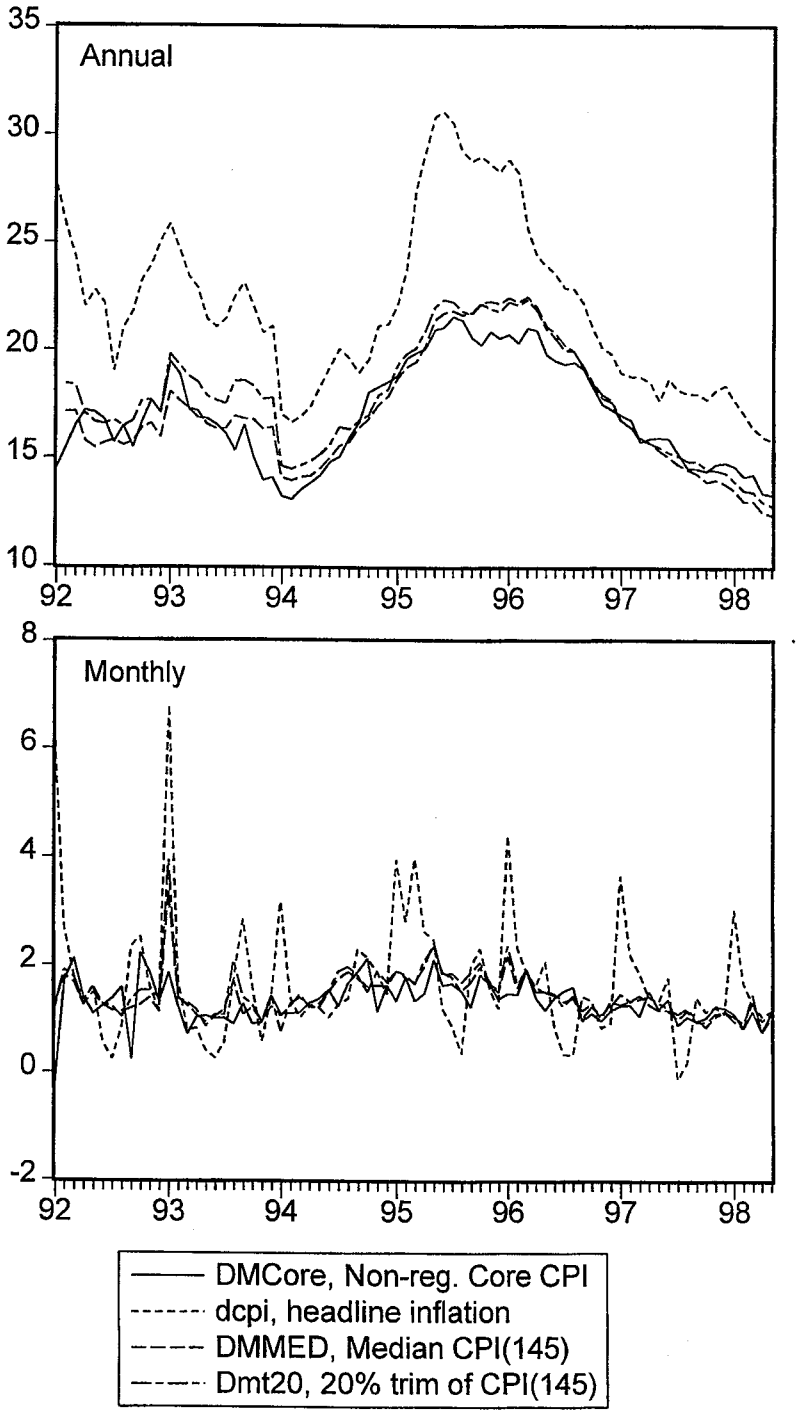

Table 1. Hungary: Descriptive Statistics—Inflation Measures

	Core of nonregulated CPI (*Mcore*)	Median of CPI 145 (*mmed*)	20 Percent Trim of CPI 145 (*Mr20*)	Headline CPI (*mcpi*)
Mean	0.0129	0.0141	0.0146	0.0169
Standard Deviation	0.00402	0.00424	0.004653	0.0123
Skewness	-0.13	1.504	1.967	1.54
Kurtosis	4.65	7.399	10.84	6.7818
Jarque–Bera	10.23	102.99	279.36	87.46
(p–value)	0.006	0	0	0
Ljung Box Q–stat	36.046	82.382	57.68	81.94
(p–value)	0.054	0	0	0

Note: All variables are in log first differences. A normal distribution has a skewness of zero and a kurtosis of three.

C. Empirical Results

23. The list of indicator candidates Table 2 draws from standard literature on inflation indicators, as most analyses conclude that inflation in transition countries can be explained in terms of standard macroeconomic theory (Sahay and Vegh, 1995; Cottarelli et al. (1998a); Moghadam (1998); Cooray, Mecagni, and Offerdal (1996). Monthly data are used, for 1992:1 to 1998:5.[4] Indicator candidates are tested for predictive content on target variables using Granger causality tests, impulse responses, and variance decompositions. The Granger causality tests provide information of statistical forecasting properties of the variables tested; the variance decompositions measure the proportion of the variance of inflation that is explained by the variance of the indicator variable; and the impulse responses can be useful in assessing the time horizon properties of the indicator variables. The estimated bivariate VAR equations are of the following form:

$$\Delta X_t = \alpha(L)\Delta X_{t-1} + \beta(L)\Delta Y_{t-1} + \epsilon_t$$
$$\Delta Y_t = \alpha(L)\Delta Y_{t-1} + \beta(L)\Delta X_{t-1} + \epsilon_t \qquad (1)$$

[4] All variables are in logs, except for the interest rates and budget balance. The monthly inflation rates are calculated by taking the first difference of the logarithms.

Table 2. Hungary: Indicator Variables

Exchange Rates	Financial	Fiscal	Real Variables	Monetary Aggregates	Import Variables	Wages
Real effective exchange rate based on cpi (reercpi)	Net Domestic Assets of Banking System (fnda)	Budget balance of Central Government (percent of nominal GDP) (bbal)	Retail sales (ars)	Broad Money (fmb)	Import Prices in dollars (Ppi6$)	Total Industry Wages (lmegrs)
Nominal effective exchange rate (neer)	Net Domestic Credit (fdc)		Stock market Index (bux)	Currency outside banks (fmbcur)	Mirror import values from the EU in dollars (mireu)[1]	Unit labor costs (hulc)
Forint per deutsch mark (ftperdm)	Deposit interest rates more than one year (fidmy)		Industrial production (aip)	M2–real (m2real)	Mirror import from the World (mirw)[2]	
Forint per dollar (ftperdo)	Treasury bill rate (tb90)		Unemployment rate (unemp)	M2 (m2)		
Real effective exchange rate based on ppi (reerppi)	Call money interest rate (cmon)		Producer price index (ppi)			
Real effective exchange rate based on ulc (reerule)	Deposit interest rates of less than one year (fid 12m)					

[1] Mirror import trade values are those reported by Hungary's trade partners as their exports to Hungary. The need for these data arises from several changes in Hungary's import series, including the treatment of trade passing through Hungary's free trade zone. Hungary's trade data were also used, with inconclusive results, possibly due to these changes.
[2] Mirror imports from the rest of the world is available only for 1992:1–1997:12. However, mirror imports from the European Union is constructed for 1992:1–1998:4.

Note: All inflation variables are seasonally adjusted. Of the indicator variables, industrial production (aip), retail sales turnover (ars), total industry wages (lmegrs), unit labor costs (hulc), monetary aggregates, unemployment and producer price index (ppi) are seasonally adjusted. Interest rates, stock market index, and exchange rates are not seasonally adjusted. The interest rates are transformed to backwards–looking 'real' interest rates by subtracting the 12–month inflation rate from the nominal rates.

where L is the lag operator. X is the set of inflation measures described above. Y is the set of indicator variables.

Unit root testing

24. Before Granger causality testing and application of bivariate VAR systems, the stationarity properties of the time series need to be determined. For this purpose the Phillips Perron (PP) and the augmented Dickey–Fuller (ADF) tests were used. The ADF could not reject the null hypothesis of a unit root for any of the series tested in levels except for deposit interest rates (*fid12m, fidmy, fid1m*), while the PP test rejected the null for industrial production (*aip_sa*), budget balance (*bbal*), unit labor costs (*hulc*), mirror import values (*mireu*, and *mirw*), real effective exchange rate based on unit labor cost (*reerulc*), and unemployment (*unemp*) in levels. The PP test in first differences rejects the null hypothesis of a unit root for all series tested, while the ADF test could not reject the null for deposit interest rates of more than a year (*fidmy*), three month treasury bills (*tb90*), net domestic assets (*fnda_sa*), M2, broad money (*fmb_sa*), producer price index (*ppi_sa*) as well as all the inflation variables.

25. The difference in results between the PP and the ADF may reflect the ability of the PP test to identify more complex error processes. The results are, however, sensitive to the lag length selected. Considering the need to impose a uniform order of integration and the low power of ADF tests, all variables have been treated as I(1).

Granger causality tests

26. This test identifies if movements in one variable tend to be followed by movements in another. A series of these tests was carried out for each indicator variable: first, a test on the first lag, then on the first two lags together, and so on up to eight lags. It would have been desirable to study longer lag lengths as well, but the loss of degrees of freedom becomes considerable, so a cutoff at eight lags was used. Recall, however, that the series used are seasonally adjusted. (Table 3) reports the groups of lags of each indicator variable which were significant leading indicators for the 12–month rate of change of the four price indices at the 10 percent level.

27. A wide variety of variables have some statistical predictive power for at least some of the measures of inflation. Those with predictive power across all the different core inflation measures include the following: producer prices (*ppi*), import prices (*ppi6$*), import values in dollars from EU (*mireu*), budget balance (*bbal*) and 12 months deposit interest rates (*fid12m*). Of the exchange rates, real exchange rates based on cpi (*reercpi*) and the nominal forint per dollar exchange rate (*ftperdo*) help forecast future inflation for the core measures.

28. Some have predictive power for two of the core measures. These include net domestic assets (*fnda*) which shows weak signs of predictive content for median of CPI(145) (*mmed*) and trim of CPI(145) (*mt20*), and the mirror import values from the world (*mirw*).

Table 3. Hungary : Summary of Granger Causality Test, Significance, 10 Percent Level

Indicator Target	mcore	mcpi	mmed	mt20
Industrial production (aip)				
Retail sales (ars)				
Budget balance (bbal)	1-2 lags		4-8 lags	4-5, 8 lags
Stock market index (bux)		3 lags		
Call money (cmon)				
Net domestic credit (fdc)				
Deposit interest rate (fid12m)		7-8 lags		
Deposit interest rate (fidmy)	8 lags	8 lags	1 lag	
Deposit interest rate (fitb1m)				
Treasury bill (tb90)				2 lags
Broad money (fmb)	1, 5 lags			
Money outside Banks (fmbcur)			1 lag	1 lag
M2 Real (m2real)		7 lags		
M2 (m2)				
Net domestic assets (fnda)			1-2 lags	1-2 lags
Forint per DM (ftperdm)	2, 4-7 lags			
Forint per Dollar (ftperdo)	4-8 lags		2, 4-8 lags	2, 4-8 lags
Unit labor costs (hulc)				
Gross wages industry (lmegrs)	7 lags			
Imports from EU (mireu)	1-5 lags		6-8 lags	6-8 lags
Imports from world (mirw)		1-3, 5-6 lags	1-8 lags	1-8 lags
Nominal effective exchange rate (neer)			6 lags	
Producer price index (ppi)	1-7 lags	1-7 lags	2, 7-8 lags	2, 7-8 lags
Import prices in dollars (ppi6$)	4-8 lags	3, 4-8 lags	4, 5-8 lags	6-8 lags
Real effective exchange rate (reercpi)	6-8 lags		6 lags	6 lags
Real effective exchange rate (reerppi)			5-6 lags	6 lags
Real effective exchange rate (reerulc)		2 lags		
Unemployment rate (unemp)		6-7 lags		

Note: The Table represents the lags which were significant on the 10 percent level. All series are in first differences.

29. It is notable that the real variables such as industrial production (*aip*), stock market index (*bux*) and retail sales (*ars*) have generally no predictive power in the Granger causality sense. Likewise, gross wages (*lmegrs*), unit labor costs (*hulc*) and monetary aggregates such as *m2real*, and *m2*, display little predictive power. Broad money and currency outside banks, *fmb* and *fmbcur*, respectively, show some significance at very short lags for the trimmed core inflation variables. The unemployment rate (*unemp*) does not help forecast core inflation.

Variance decompositions

30. Variance decompositions illuminate the relative contribution of innovations in the variables in the VAR to the dependent variable. The procedure used for orthogonalizing the innovations is the Cholesky factorization. The variance decompositions were carried out with four lags for the forecast horizons of 1, 3, 6 and 12 months.

31. The results of bivariate variance decompositions largely reinforce the results obtained from the Granger causality tests. Based on the variance decompositions, it appears that the producer price index (*ppi*), and import prices (*ppi6$*) contain predictive content across all inflation measures. Budget balance (*bbal*) and stock market index (*bux*) also display predictive power.[5]

32. Exchange rates such as the real effective exchange rate based on CPI (*reercpi*) and nominal effective exchange rate (*neer*) have only moderate predictive power on the variance decomposition test. The forint per deutsch mark variable (*ftperdm*) is relatively strong for the nonregulated core variable (*mcore*), while weak for the others. Imports in dollars from the EU (*mireu*) is strong for the nonregulated core measure, while imports in dollars from the world (*mirw*) is strong for all variables except the core of nonregulated (*mcore*). The interest rates (*fidmy* and *tb90*) show moderate predictive power.[6]

33. The variance decompositions for wage measures (*lmegrs*), and industrial production (*aip*), retail sales (*ars*), unit labor costs (*hulc*) display little or no predictive content across different inflation measures. The behavior of the monetary aggregates (*m2real*, *m2*, *fmb*, and *fmbcur*) is erratic for the different inflation measures.

Impulse responses

34. The Granger causality tests and variance decompositions have yielded indicator candidates that have information in a statistical sense about future inflation. An examination of the impulse response functions illuminates the lag length between innovations in the candidatate variable, and inflation. The indicators that perform robustly in the impulse responses are generally the ones indicated by the Granger causality and variance decompositions.

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[5] Stock market index is strong except for core inflation measure, while the budget balance is weak for the nonregulated core (*mcore*) and headline inflation (*mcpi*) .

[6]The deposit interest rates 1–12 months (*fid12m*) explains 15 percent of the variation for the nonregulated core variable.

35. The producer price index (*ppi*) appears to have information regarding future inflation peaking at 4–5 months, while the impact of import prices (*ppi6$*) is evident 4–9 months ahead with a peak at five months. Budget balance (*bbal*) contains information over a time period of 2–9 months with a peak at 5 months.

36. The impulse response functions of the various interest rate measures ((*fid12m*), (*fidmy*), (*cmon*), and (*tb90*)) are erratic. Moreover, the interest rate measures are positively associated with inflation.

37. The forint per deutsch mark (*ftperdm*) consistently generate a response between one and seven months with a peak at three months. The behavior of the import value variables is peculiar as import values from EU (*mireu*) have the right sign with a peak of impact two to four months ahead of time while the sign of the impulse response of imports from the world (*mirw*) is consistently negative.

38. The impulse responses of wages (*lmegrs*), unit labor costs (*hulc*), employment (*unemp*) and monetary aggregates (*m2real, m3real, fmb*, and *fmbcur*) as well as retail sales (*ars*) and stock market index (*bux*) fail to consistently generate a significant impulse response of the right sign.

Assessment

39. The indicators that emerge from the Granger Causality tests, variance decompositions and the impulse responses with significant indicator properties are the producer price index, import prices, budget deficit, and real and nominal exchange rates. Note that the unemployment rate, wages, and monetary aggregates have little predictive power. In addition, the impulse responses indicate relatively short lags between the innovations and inflation, all well less than one year, in some contrast to the perception of inertia in Hungarian inflation.

40. These results represent the statistical relationships emerging out of a VAR; they should not therefore be interpreted as necessarily suggesting causal relationships. Nevertheless, a number of observations may be made about the statistical results.

41. The fact that wages do not have leading indicator properties is particularly notable given the often expressed view of the importance of wage formation in inflation. Not even unit labor costs appear to have leading indicator properties, so productivity does not obviously account for the absence of a statistical link between nominal wage growth and subsequent inflation. Shocks to profit share may mask the link between wage pressures and inflation in the period covered by the data.

42. The importance of real and nominal exchange rates and import prices is not surprising for a small open economy. And the role of the exchange rate in determining the producer price index (*ppi*) may account for the latter's leading indicator properties. The fact that monetary aggregates fail to show any indicator properties may reflect the instability of money demand as a result of the transition.

43. Two interpretations of the positive association of interest rates with inflation seem possible. First, to the extent that sterilized intervention has been effective in the pre– and post–crawl eras, the positive association reflects that interest rates have not been raised early enough to nip incipient inflationary pressures in the bud, and vice versa. As a result, interest rates and inflation have risen and fallen together. Second, to the extent that sterilized intervention has not been effective, capital flows have failed to fully anticipate the inflationary pressures. The leading indicator properties of the budget deficit is notable, but is qualified to the extent that inflation also affects the balance though nominal interest payments.

D. Multivariate VAR Model of Inflation

44. Based on the preceding results, exploratory VAR models of the measures of core inflation have been constructed.[7] The independent variables included in the VAR systems are nominal money, budget deficit, industrial production, nominal exchange rate, import prices, interest rates, and wages. On basis of the standard errors, r–squared, significance and forecasting properties of the different permutations, "tested down" models are selected. The final models include industrial production, producer price index, broad money and forint per deutsch mark rate as well as a dummy for the Jan. 1993 outlier (VAT shock).[8] Only two lags are included and the result of the four–variable VAR(2) are summarized in (Table 4).

45. The indicator variables generally have the expected sign across the various target measures, but only lagged inflation (one and two lags), broad money (two lags) and the dummy are significant for all measures of core inflation. Of the various inflation measures, the median of CPI(145) (*mmed*) variable displays the highest r–squared value and the lowest standard error. The standard error is also highest for the model of headline inflation, MCPI, likely reflecting the role of administered and volatile prices.

46. The impulse responses of the VAR(2) model are presented in (Figure 2). The impulses are of the right sign and in the case of producer price index fairly persistent over the 12 month period. Though this could indicate that producer prices have information on inflation 12 months ahead, it could also indicate the presence of a unit root.

47. The residuals from the VARs are generally well behaved. The residuals of the headline inflation measure *(mcpi)* fluctuate quite frequently outside the standard error bands, with spikes around September 1992, September 1993, March 1995, and May–June 1997. The residuals of the nonregulated core *(mcore)* are generally within the bands, save for a period in October–December 1992. The residuals of the median and trim of CPI (145) *(mmed* and *mt20)* are also mostly within the one standard error bands. The coefficients in the VARs were also reasonably stable as the data set was progressively increased.

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[7]See Bruno (1993) for a theoretical model.

[8]The variable import prices (*ppi6$*) was originally included but had the wrong sign and was therefore excluded in favor of industrial production (*aip*). Various exchange rate measures, nominal and real, were considered, with the best results produced by forint per deutsch mark (*ftperdm*).

Figure 2. VAR Impulse Responses

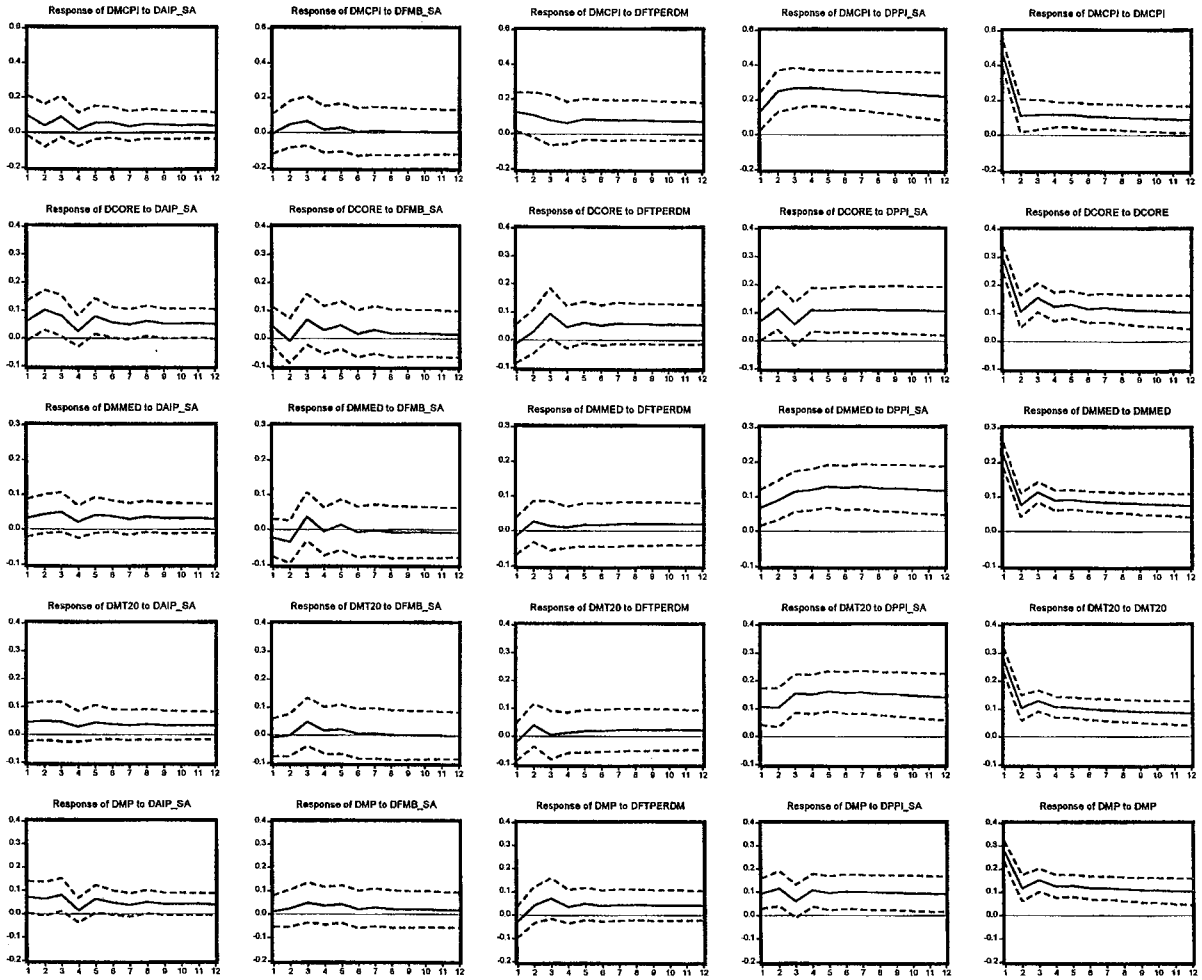


Table 4. Hungary: Summary Statistics of VAR Model

	MCPI	MCORE	MMED	MT20
R–squared	0.340572	0.134049	0.672133	0.576731
Adj. R–squared	0.232469	-0.00791	0.618385	0.507342
Sum sq. resids	18.65405	7.329185	3.855847	6.26187
S.E. equation	0.552996	0.346627	0.251417	0.320396
Akaike AIC	-53.2363	-19.6052	3.516698	-13.9393
Schwarz SC	-52.8885	-19.2573	3.864522	-13.5915
Mean dependent	1.619253	1.302352	1.41887	1.459257
S.D. dependent	0.63121	0.345265	0.406988	0.456472

48. Finally, the out–of–sample dynamic forecast errors are reported in Figure 3, with the system estimated up until 1997:7, and the obtained values are used to forecast the period 1997:7–1998:5. It is worth noting that the forecasts consistently overestimate the inflation out of sample, for all target variables (a pattern reported again in Chapter IV). This overestimation could be an indication of missing elements in the model, such as unanticipated productivity growth during 1998 or the boldness of the authorities' inflation targets for that year. Of the different target variables, the median measure (*mmed*) consistently produces the best forecasts, while headline CPI produces the worst.[9]

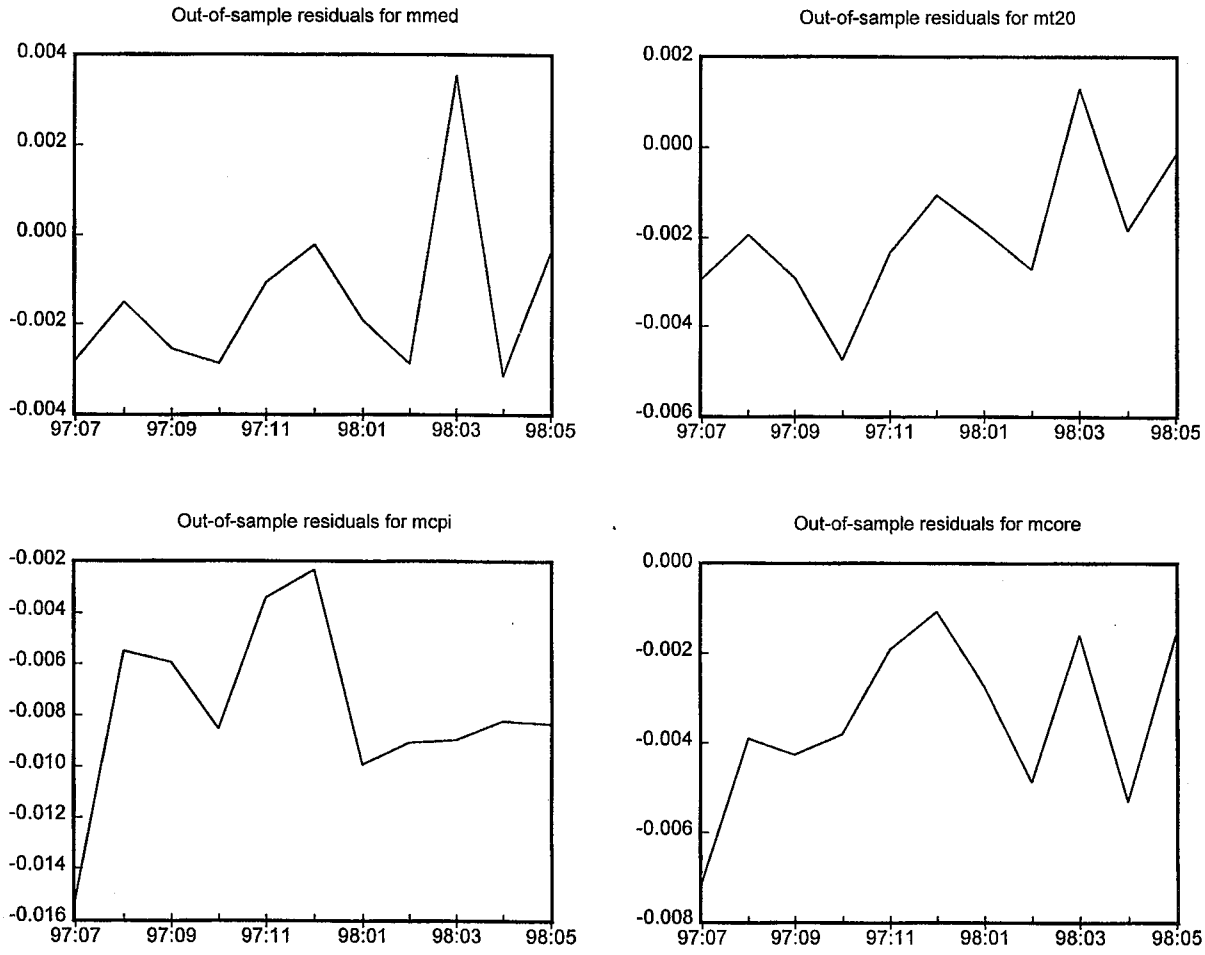
E. Concluding Remarks

49. The empirical investigation has shown that there are macroeconomic variables that contain, in a statistical sense, information about future inflation. Producer prices, import prices, nominal and real exchange rates, and budget balance all seem to possess this information at various horizons. In most cases, these horizons were relatively short, always less than one year. Wages, unit labor cost and monetary aggregates did not exhibit leading indicator properties.

50. These findings do not necessarily indicate causal relations. Note, in particular, that none of the statistical tests distinguish between permanent and temporary shocks to the indicator variables. While this qualifies the results as indicative of structural relationships, this treatment does nevertheless mimic the practical problem often faced by policymakers, for whom it is not always possible to make the distinction in practice in the time available before a response is required. To this extent, variables with significant leading indicator properties according to these tests may be particularly helpful to policymakers, either because this

[9]Bryan and Cecchetti (1994) find that the median measure produces superior forecasts of inflation in United States.

Figure 3. Step Out of Sample Forecast Errors VAR(2)



distinction is not central in their case, or because there is leading indicator information even in "temporary" shocks to these variables.

51. The study also indicates the gains from constructing core inflation measures and, possibly, using them as the focus for monetary policy. In the context of a leading indicator study, the main case for them is that they are more predictable than the headline measure. In particular, of those considered here, the trimmed mean measure seems particularly predictable. Using the two trimmed core inflation measures, 20 percent trim and median of the cross–sectional rate of change distribution of the CPI, consistently yields lower standard errors as well as better dynamic forecasts than using the core inflation measure excluding volatile items and headline CPI. Of the two trimmed mean core variables, the median appears to possess the most attractive forecasting properties. However, there is no guarantee that using the median is the optimal trim. A suggested path for further research would be finding the optimal trim, as defined by Bryan, Cecchetti and Wiggins (1997), of the CPI cross–sectional rate of change distribution as a target variable. But whatever the technical advantages of a trimmed mean measure, it is complicated and, to that extent, less transparent than headline CPI. If, on these grounds, such a measure was not adopted as the principal inflation target, trimmed mean measures could still be useful for internal assessment by the monetary authorities.

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CONSTRUCTION OF CORE INFLATION MEASURES: TRIMMED MEANS

1. The motivation for constructing core inflation measures is that monetary policy ought to react to changes in underlying inflation and disregard temporary shocks. Changes in a few key components will give a distorted impression of the rate of inflation. Bryan and Cecchetti (1994) have shown how skewness in the cross–sectional distribution for high frequency data can cause significant noise in the CPI. One solution to the problem is to remove the distortionary influence of 'outlier' prices, i.e. remove the tails of the cross sectional distribution. Thus by eliminating temporary movements, we can identify permanent trends in inflation by looking at what is happening to the central portion of the distribution.

2. There are several ways to calculate core inflation.[10] A common method is to remove certain volatile components of the CPI such as food and energy. Following the alternative approach of Bryan, Cecchetti and Wiggins (1997), a trimmed mean is constructed from the CPI(145) data set by discarding 10 percent of each tail in the distribution and then taking the average of the remaining data.[11]

3. More specifically, the observations, x, and their associated weights, w, are ordered. Then we define W as the cumulative weight from observation 1 to I, i.e. $W=\sum w$. We then determine the central portion to be calculated by $\alpha/100<W<(1-\alpha/100)$. This portion is called $I\alpha$. We compute the weighted trimmed mean as

$$\bar{x}_{\alpha}=\frac{1}{1-2\frac{\alpha}{100}}\sum_{i\in I_{\alpha}} w_i x_i \qquad (2)$$

4. The 20 percent trim is measured by averaging the central 80 percent of the price change distribution each month.

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[10]For additional approaches, see Roger (1997) and Quah and Vahay (1995).

[11]For an overview of various trimmed mean measures, see Berkowitz (1998).

III. Wage–Price Dynamics in Hungary[12]

A. Introduction

52. The dynamics of wage and price adjustment are of interest to analyze alternative disinflation strategies. The magnitude and timing of nominal exchange rate effects on inflation, the flexibility of wages with respect to unemployment, and the degree of nominal inertia in wage growth, are among the key factors shaping the size and timing of real exchange rate responses to disinflation. To investigate these issues, this chapter presents a model of Hungarian inflation based on the theoretical structure for wage and price setting of Layard, Nickell, and Jackman (1991).[13] Variants on such models are commonly used, including the supply–side of the OECD's INTERLINK model (Turner *et al*, 1996). Section B outlines the long–run model specification, section C covers the estimation technique and results, while section D discusses system properties. Given the short sample available, and the extent of structural change in goods and labor markets in Hungary, the results reported are preliminary. Section E concludes by discussing potential extensions to this research.

B. Model Specification

53. The system has three equations, a wage equation based on bargaining theory, a consumer price equation being a mark–up over marginal costs and tradable goods prices, and an equation linking domestic producer prices to foreign prices, as Hungary is a small open economy. The model embodies the Balassa–Samuelson effect, as real wages reflect aggregate labor productivity growth, and if this exceeds productivity growth in the nontraded goods sector, inflation in nontraded goods prices will exceed that in traded goods, producing a real appreciation on a CPI basis.

Consumer prices

54. The price of regulated goods has risen sharply in real terms, primarily to bring domestic energy prices in line with production costs, contributing substantially to inflation measured by the official CPI. Therefore, a core measure of the CPI is modeled, excluding regulated goods and also seasonal foods. This core CPI depends on the domestic currency

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[12]Prepared by Craig Beaumont.

[13]van Elkan (1996) estimated an error–correction model for CPI inflation based on an empirical long–run cointegrating relationship amongst consumer prices, industry wages, the nominal effective exchange rate, and broad money. This chapter also reports estimates of error–correction models, but for a system of price and wage equations, where the long–run relationships reflect the theoretical structure outlined below. The money stock does not feature in this analysis as under a pegged exchange rate regime it is largely endogenous.

price of tradable consumer goods, and on the price of nontradable consumer goods that are set as a mark–up (that may be demand sensitive) over marginal costs in the non–traded goods sector, or in logs:

$$pc = \alpha_1 (pct^* + e) + \alpha_2 (oil + e) + (1-\alpha_1-\alpha_2)\, mcn + \alpha_3\, d \qquad (1)$$

where:
pc = Hungarian core CPI
pct* = foreign price of tradable consumer goods
e = exchange rate (price of foreign currency)
oil = crude oil price, and other commodities if relevant
d = demand indicator (nontrending)
mcn = marginal cost in nontradable sector

55. The restriction on the marginal cost coefficient of (1) ensures long–run nominal homogeneity in the levels of prices and costs.[14] Martin (1997) shows that with a CES production function (elasticity of substitution σ) that marginal cost is given by:

$$mcn = wn - (1/\sigma)\, lpn \qquad (2)$$

where:
wn = gross average wage in nontraded goods sector
lpn = labor productivity in nontraded goods sector

In the Cobb–Douglas case where $\sigma=1$, marginal cost equals unit labor costs, but otherwise the coefficient on wages and labor productivity need not be equal.

Producer prices

56. The PPI includes the prices of pre–dominantly traded goods, but also includes the domestic price of energy. Administered price hikes each January have aimed to bring Hungarian energy prices in line with world prices over time. The specification for producer prices must therefore include dummy variables for this impact in addition to the domestic currency price of foreign producer goods and commodities:

$$ppi = \beta (ppi^* + e) + (1-\beta) (oil + e) + Dummies \qquad (3)$$

where:
ppi = Hungarian PPI
ppi* = foreign price of producer goods

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[14]de Brouwer and Ericsson (1995) provide a full discussion of the specification and estimation of this type of equation.

Gross Wages

57. Moghadam and Wren–Lewis (1994) derive a wage equation from bargaining theory, where real consumption wages in equilibrium depend on labor productivity, payroll taxes and other components of the wedge between the real wage of employees and firms, unemployment benefits or some other indicator of the "fallback position" of employees, and labor market conditions affecting bargaining power, e.g., the unemployment rate.

$$w - pc = lp + \delta_1(ppi-pc) + \delta_2\, pt + \delta_3\, reg + \delta_4\,(ub-pc) + \delta_5\, u \qquad (4)$$

where: w = average gross wage
lp = aggregate labor productivity
pt = wedge between gross and net wage, due to payroll taxes
reg = wedge between total and core CPI, due to regulated prices and indirect taxes
ub = unemployment benefit
u = unemployment rate or other labor market indicators

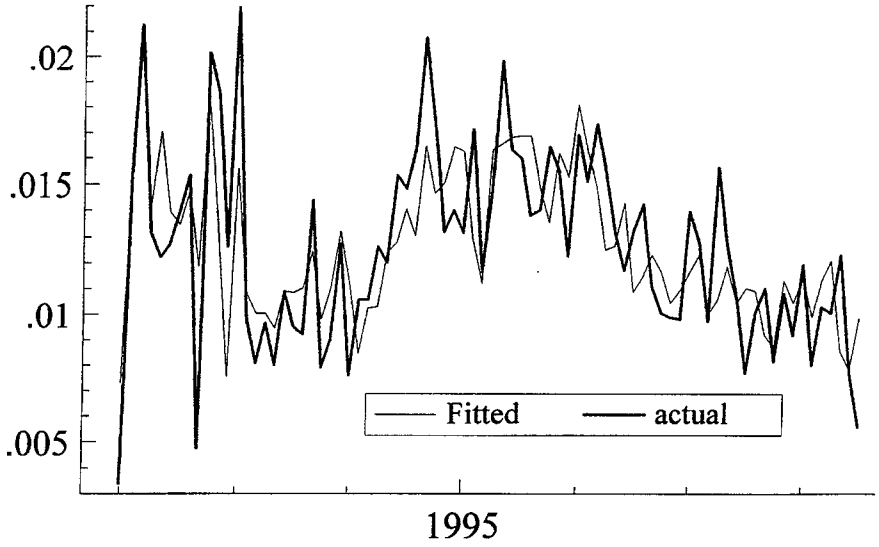
58. As discussed by Greenslade *et al* (1998a), under the classic "right-to-manage" bargaining model, it would be expected that $\delta_1=1$, while $\delta_2 = \delta_3 = 0$, so that employees would bear the full effects of changes in these wedges in the long–run. The model makes no explicit allowance for the wage guidelines of the Interest Reconciliation Council. The rapid decentralization of wage bargaining has made these guidelines less relevant over time, and there is a technical difficulty that no guidelines were issued in 1992 and 1995.

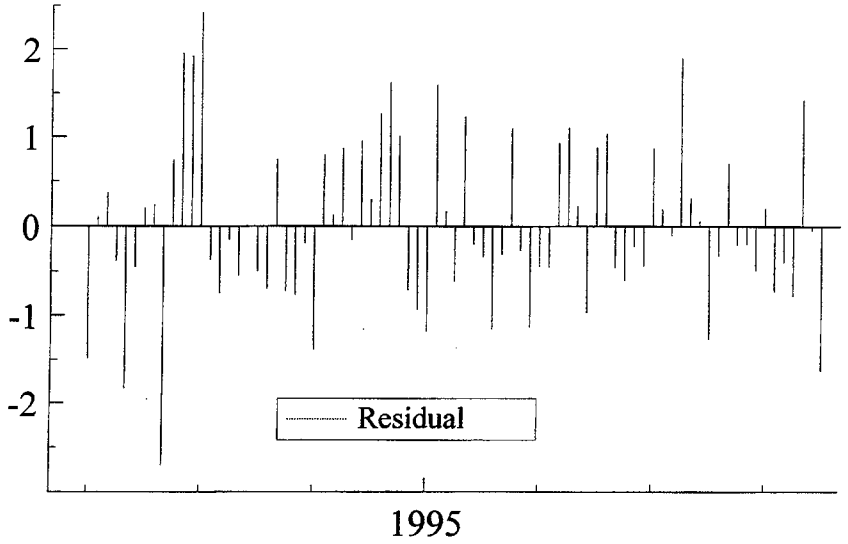
C. Equation Estimates

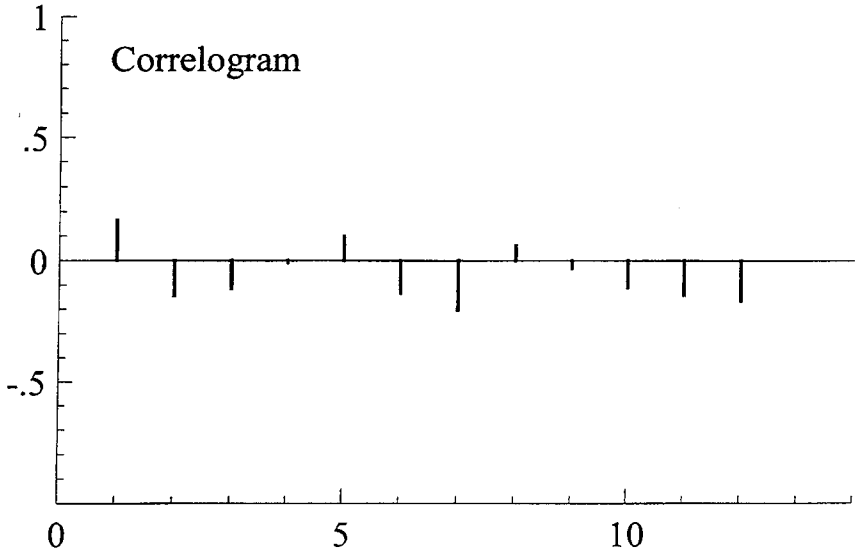
59. All data are clearly nonstationary in levels, and standard tests reject a unit root in differences, though at seven years the sample span is rather short for such tests. Given the system of equations, and the nonstationarity of the data, estimation using the maximum likelihood method of Johansen (1988) appears most appropriate. However, this preliminary work estimates each equation separately, using the single–step estimation of the unrestricted ECM form of Banerjee *et al* (1986). Inder (1993) finds that this estimator avoids the finite sample bias that afflicts the Engle–Granger (1987) two–step procedure, and that it also gives precise estimates and valid t–statistics even in the presence of endogenous variables.

60. The **core CPI equation** is presented in Appendix II and Figure 4, with variable names and descriptions in Appendix I. In the long–run, the core CPI is estimated to have an elasticity of 0.70 with respect to nominal wages, a 0.22 elasticity to the foreign CPI, and a 0.08 elasticity to the price of motor fuels. The influence of wage growth on official CPI inflation will be somewhat lower, as a substantial component of regulated prices—which have a 17.3 percent weight in the CPI basket 1998—are set according to world energy prices. Note

Figure 4. Core CPI Equation







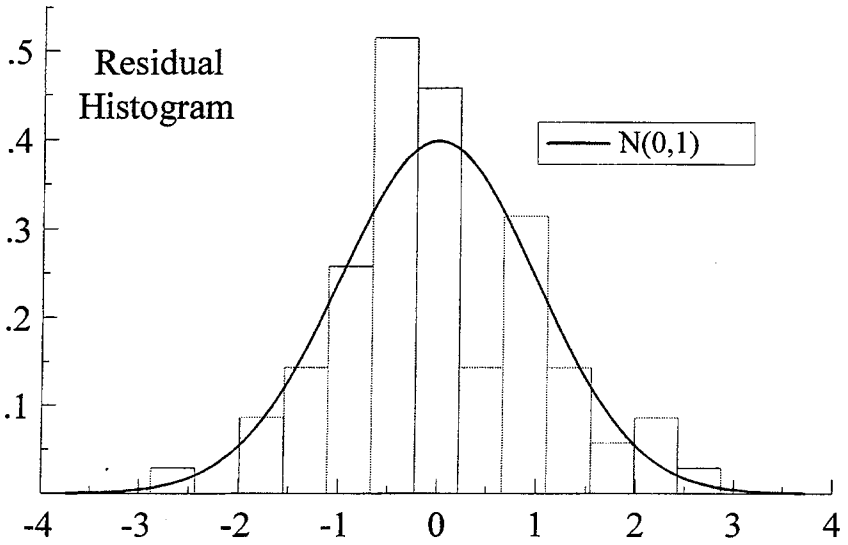
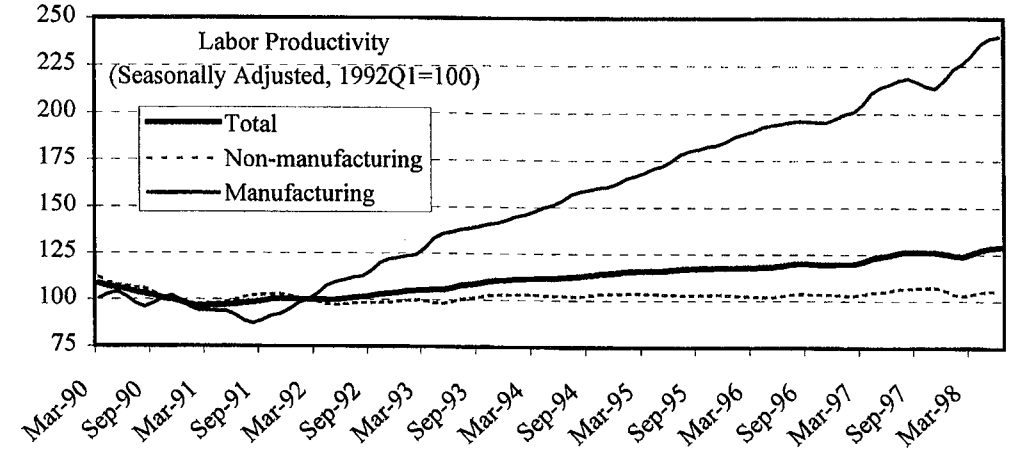
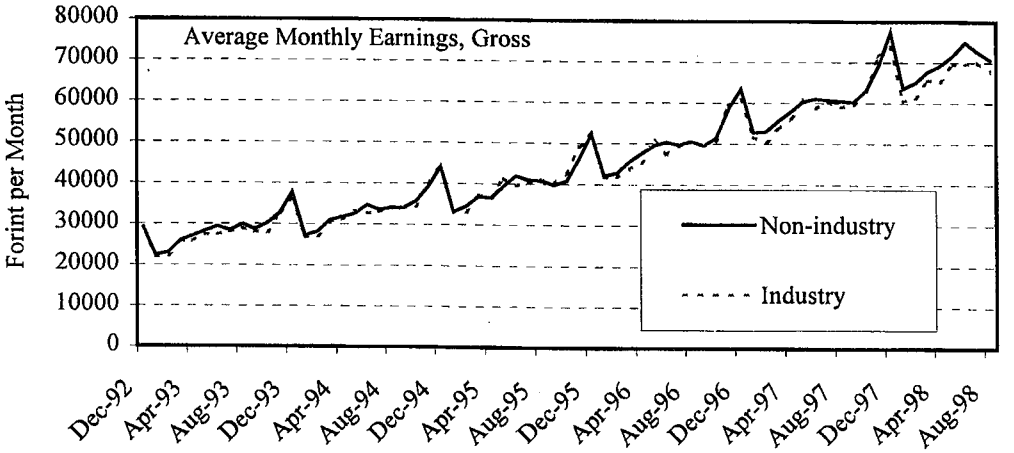
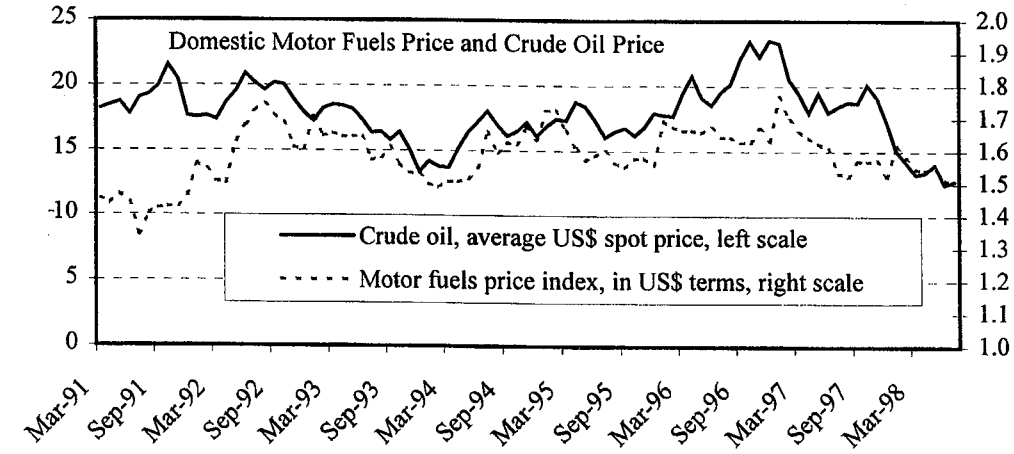


Figure 5. Hungary: Productivity, Wages, and Energy Prices, 1990-98







Source: Central Statistical Office and staff calculations.

that industrial wages are used in the CPI equation. Though an estimate of the nonindustrial wage was made to proxy wages in the nontraded goods sector, Figure 5, this variable performed less well.

61. Labor productivity in the nontraded goods sector was initially proxied by a estimate using total GDP excluding manufacturing, Figure 5. However, perhaps due to the recorded productivity fall early in the sample, this variable did not perform as well as a simple time trend. The time trend has an annual contribution of negative 2.9 percent, well above the roughly 1 percent rate of productivity growth in the nonmanufacturing sector over 1992'H1 to 1998'H1. Further refinements to the productivity calculation, for example by excluding government output and employment, may be needed to produce a variable that better reflects productivity in relation to the goods and services that are included in the CPI.

62. The Austrian CPI was the best proxy found for tradable consumer goods in Hungary, from a search covering also German and U.S. prices. This finding implies that the exchange rate to the German mark (to which the Austrian schilling has been pegged during the 1990s) has the dominant role in consumer price determination. The U.S. dollar has a role in the equation through its impact on motor fuels prices.[15] The estimated long–run effect of the motor fuels price is about 2 percent greater than its weight in the core CPI, indicating some indirect price effects. Though it was expected that international prices of agricultural products would affect the CPI, in practice indices of commodity prices were not found to be significant. The price of regulated goods, both with and without the estimated VAT contribution, was also not found to affect the core CPI in the long–run. Finally, no effect from demand was detected, which may reflect statistical problems with the retail sales data used to proxy demand.

63. Making the plausible assumption that motor fuels prices are linked to the exchange rate in the long–run, the estimated "passthrough" elasticity of the core CPI with respect to the exchange rate is 0.3, that is, other factors unchanged, a 1 percent depreciation leads to a core CPI increase of 0.3 percent. Figure 6 (top panel) shows this adjustment is rapid, being completed within 12 months, reflecting the relatively high estimated error correction coefficient.

64. The **producer price equation** is presented in Appendix III and Figure 7. In the long–run the Hungarian PPI is estimated to reflect German producer prices with an elasticity of 0.43, U.S. producer prices with an elasticity of 0.39, and crude oil prices with an elasticity of 0.18. The dummies for the January adjustment of regulated prices are negative in years when the contribution is smaller that the normal seasonal impact, which is estimated at 2.4 percent over 1992 to 1998. The exchange rate dynamics are faster than suggested by the error correction coefficient, with three–quarters of an exchange rate shock passed into the PPI

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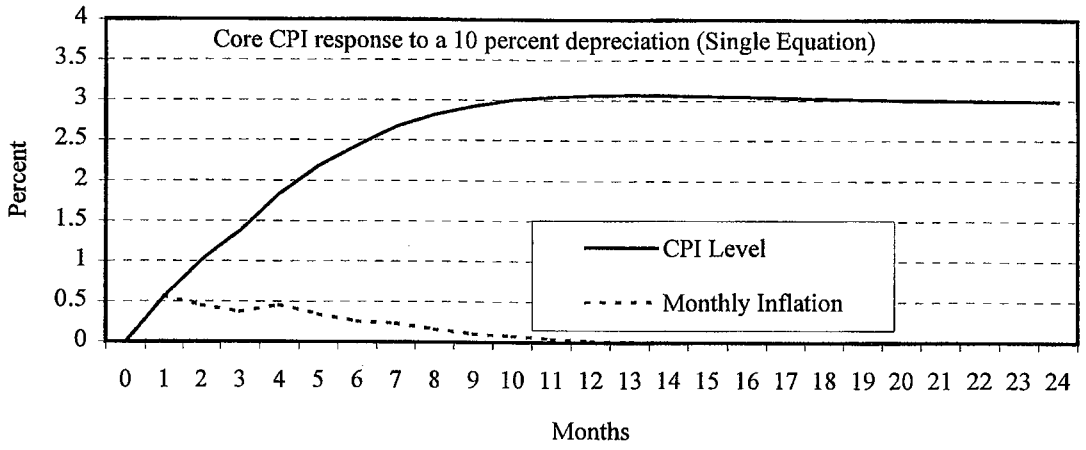
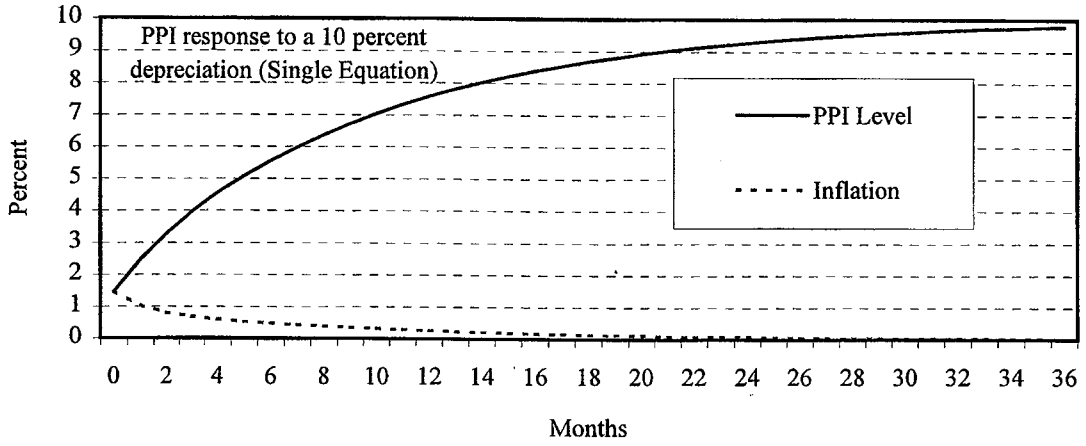
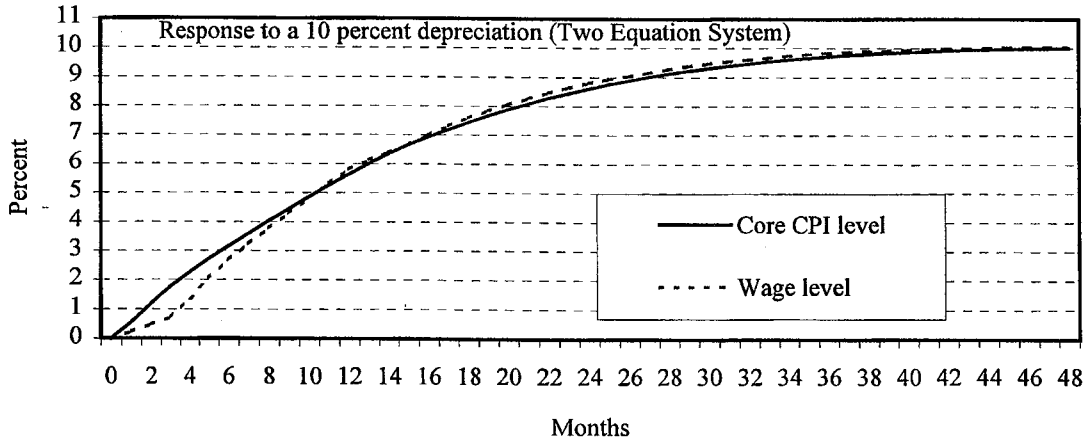
[15]The crude oil price performed poorly, possibly reflecting the substantial past divergences between domestic petroleum prices and crude oil prices; Figure 5.

Figure 6. Hungary: Wage-Price Model Simulations

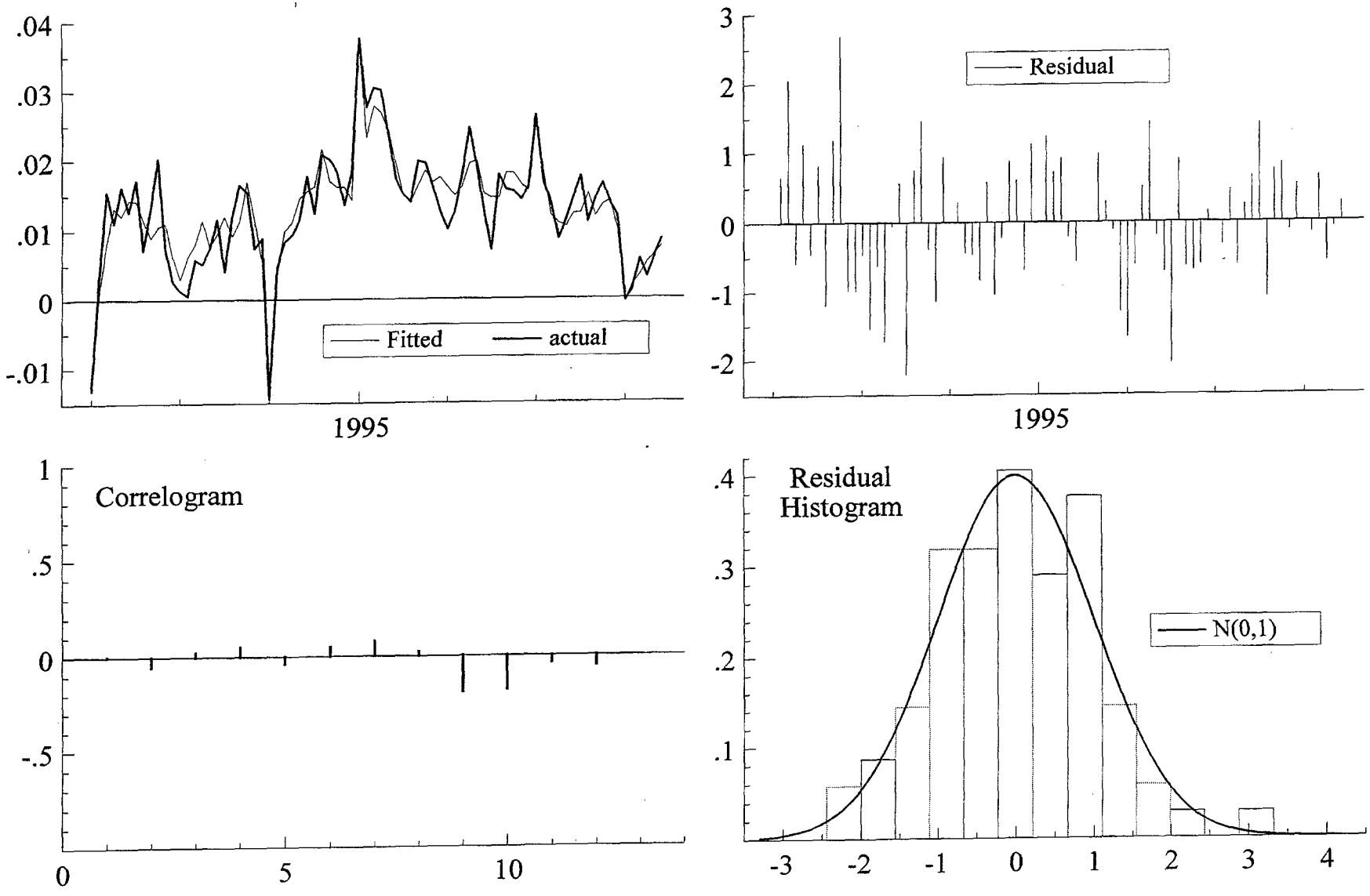






Source: Staff calculations.

Figure 7. PPI Equation



within 12 months, Figure 6 (middle panel), due to the dynamic terms in the exchange rate basket and lagged PPI inflation. Therefore, nominal exchange rate shocks have only a relatively short–lived effect on the real exchange rate on a PPI basis.

65. To reflect the typically annual frequency of wage negotiations, the **wage equation** presented in Appendix IV and Figure 8 models the 12 month growth rate of real wages.[16] The restriction that the coefficient on labor productivity be unity was accepted, with this long–run relationship evident in Figure 9. Real wages were found to be quite sensitive to the rate of unemployment, with a 1 percentage point increase in the unemployment rate estimated to have a negative 1.2 percent effect on real wages in the long–run. This corresponds to an elasticity of -0.12 at a 10 percent rate of unemployment, consistent with the -0.11 elasticity estimated by Kertesia and Köllô (1996) on cross–sectional data in 1994 and 1995. The unemployment effect is stronger in the short–run, at about negative 1.9 percent for rises in unemployment in the last 12 months. Nonlinearities in the unemployment effect were not evident when logarithmic and quadratic functional forms were evaluated.

66. No effect from the wedge between producer and consumer prices was detected, which may partly reflect problems in the PPI series, including the high weight of energy prices in the PPI. Similarly, no long–run effects from payroll taxes or regulated prices were found, implying that changes in these are fully borne by employees. The effect on industry wages of the unemployment benefit, the minimum wage, and public sector wages, remains to be examined.

67. This equation explains the adjustment of real rather than nominal wages, with nominal wage growth calculated by adding the recent core CPI inflation rate. Inflation surprises, as proxied by the change in the inflation rate relative to rates in the recent past, were found to have a relatively short–run effect on real wages.[17] Nominal wage adjustment therefore appears to involve a degree of informal indexation for recent inflation, or in other words, a reasonably rapid catchup in nominal wages to preserve real wages. The implication is that nominal wage inflation will slow soon after a slowing in CPI inflation, which may well account for the fall in nominal wage inflation seen in the second half of 1998 despite falling unemployment and steady productivity growth. Attempts to model nominal wage growth using the standard Phillips–curve approach of backward–looking inflation expectations, including a combination of past inflation and the announced inflation targets, were not successful.

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[16]An equation for monthly wage inflation had a similar long–run solution, but a lack of persistence in its dynamics meant that the implied 12–month wage inflation showed swings not seen in the actual series.

[17]The SUP variable used is the difference between current quarter inflation and the average quarterly inflation in the previous three quarters. This formula was arrived at from a general–to–specific search on changes in the inflation rate at various frequencies. The change in the inflation rate is also used by Turner *et al* (1996) to estimate nominal inertia.

Figure 8. Wage Equation

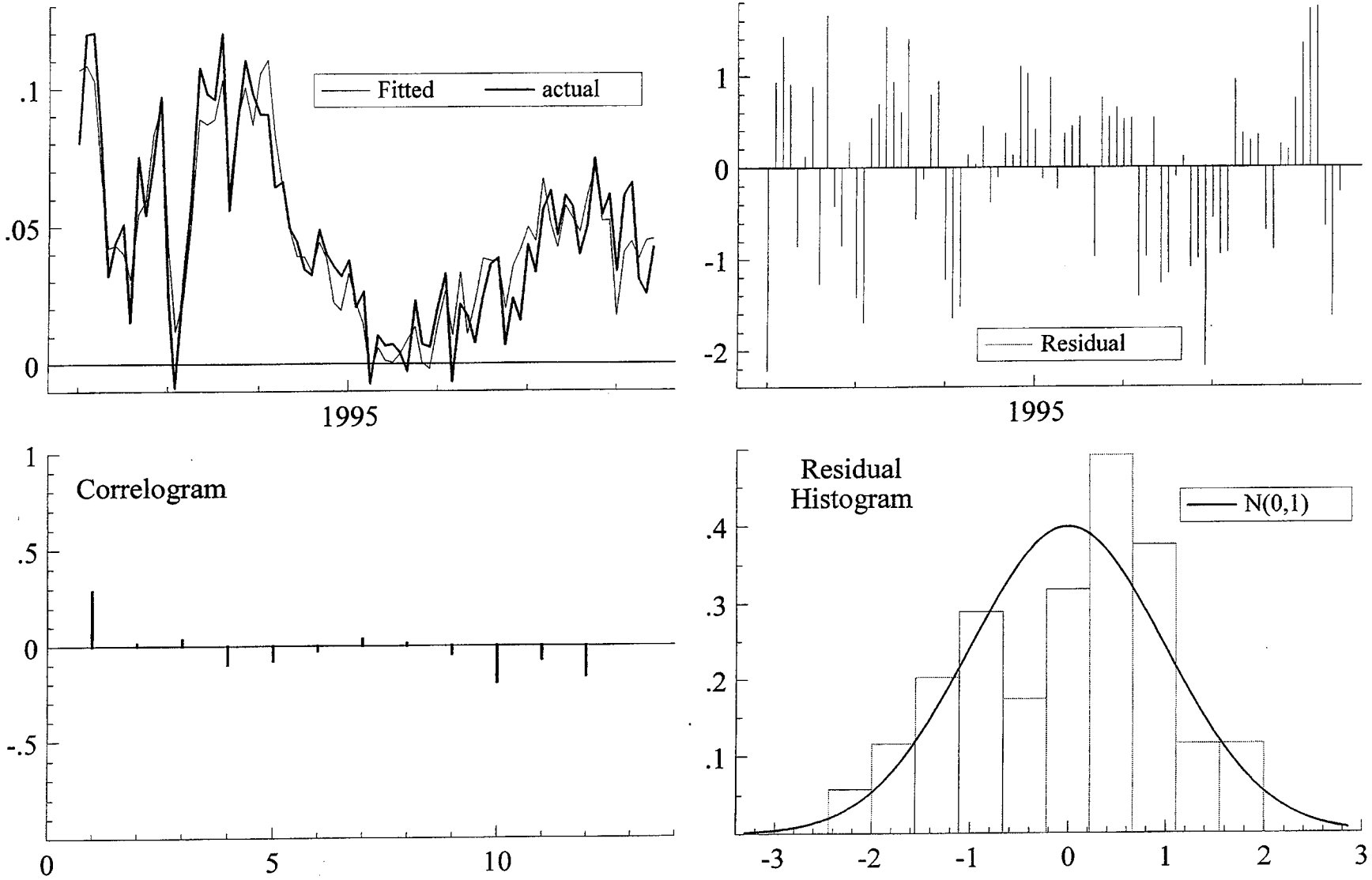


Figure 9. Real Wages and Labor Productivity
(Log Scale, left and right scales differ only in intercept)

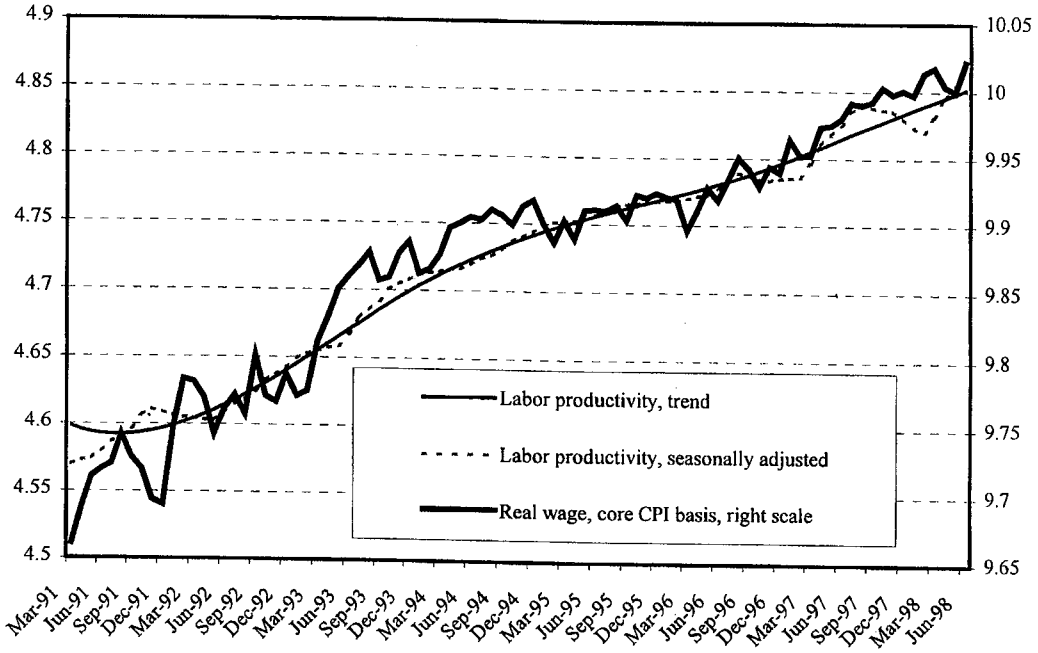
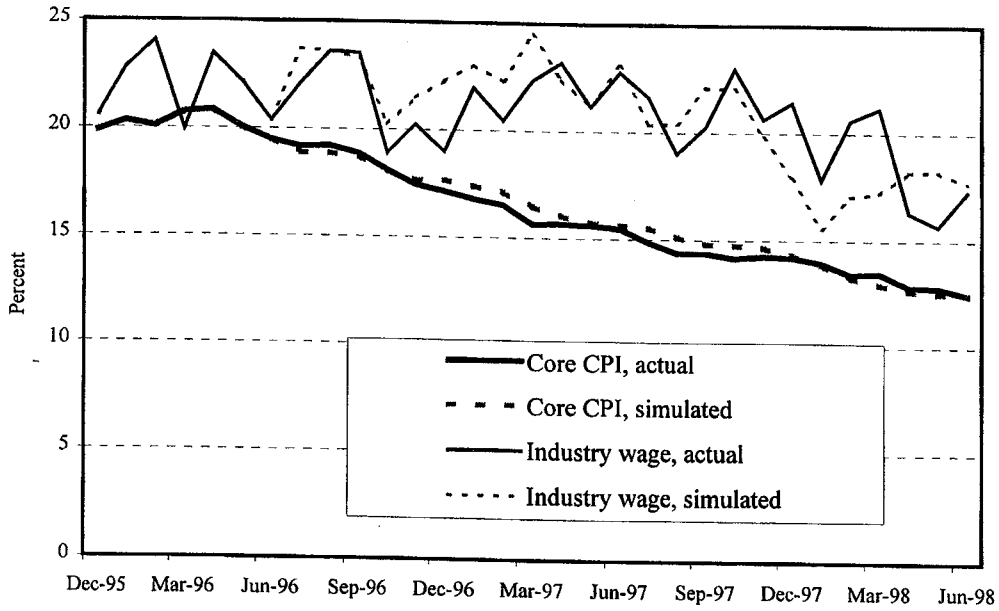


Figure 10. Dynamic Simulation of 12-month Inflation Rates
(June 1997 to June 1998)



Source: Hungarian Central Statistical Office and staff calculations.

D. System Properties and Forecasting

68. Only the wage and core CPI equations are needed for the system, as the PPI was not found to affect wages as allowed for in the theoretical model. The two equation system is homogenous in the nominal exchange rate in the long–run, with Figure 6 (bottom panel) showing that wage–price adjustment to a 10 percent depreciation is virtually complete after three years. Twelve months after the depreciation the core CPI level has risen by about 5.6 percent, with the wage response adding 2.6 percent to inflation over the direct passthrough effect of the exchange rate. While the exchange rate shock initially affects the CPI more than wages, after three months wages begin to catch–up with consumer price inflation, and after 12 months wages lead the inflation.

69. The key simulation of interest is the real exchange rate impact of changes in the nominal exchange rate. For the two equation system, this is just the mirror image of the simulation reported on Figure 6 (bottom panel). With a 5.6 percent price response after 12–months, the real exchange rate on a CPI basis will have changed by only 4.4 percent, down from the initial 10 percent shock. Similarly, with nominal wages responding by 5.8 percent after 12 months, only 4.2 percentage points of the initial shock to the real exchange rate on a ULC basis will remain. However, the simulation is incomplete, as the feedback from the real exchange rate on activity and unemployment, and therefore on wages, is omitted. As a real appreciation will likely slow activity and increase unemployment, wage growth and therefore price inflation would be lower, unwinding the real appreciation. So this partial simulation likely overstates the real exchange rate effects of a change in the nominal exchange rate.

70. An initial evaluation of forecasting performance of the system is reported in Figure 10. This dynamic simulation of the core CPI and wage equations over a two–year within sample period, (using actual data for the exchange rates, labor productivity, foreign prices, and the unemployment rate) is quite accurate, with the standard deviation of errors in the annual inflation rates being 0.4 percent for the core CPI and 2.0 percent for wages in industry. However, true out–of–sample projections will also be subject to errors in projecting unemployment, energy prices, and other variables exogenous to these equations, along with potential structural changes and parameter uncertainty. While standard tests showed no evidence of structural instability, a re–estimation of the core CPI and wage equations until 1997:6 produced a higher core CPI elasticity to wages (0.775 compared to 0.701), and lower elasticities on foreign prices. The corresponding out–of–sample core CPI projections were too high by 2.6 percent after 12 months.

E. Conclusions and Extensions

71. Equations for the core CPI and for the PPI were estimated, and found to have both long–run properties consistent with the theoretical models, and dynamics broadly consistent with prior beliefs. The core CPI equation reinforces the view that slowing wage inflation is the key to slowing CPI inflation, and also finds that the nominal exchange rate has a significant direct impact in the near–term.

72. In the long–run, real wages were found to have a relationship with labor productivity and unemployment consistent with theory. However, the dynamics of nominal wage adjustment showed less inertia than might have been expected from the history of nominal wage growth, see Figure 11. Taking this property at face value might suggest that an exchange–rate based disinflation faces little risk of a significant and sustained real appreciation that would undermine the trade balance. However, this conclusion could be misleading if the accompanying fall in interest rates stimulated demand, reduced unemployment, and boosted pressure on real wages. A full model is needed to draw sound policy conclusions. There is also the possibility that the apparent informal wage indexation or rapid "real–wage catch–up", may tend to weaken at lower inflation rates, or it may function more strongly for inflation rises than inflation falls. In either case, the real exchange rate response to an exchange rate based disinflation would be larger than suggested above. Nevertheless, the standard tests of specification do not reveal problems with the wage equation, and it fits the data relatively well, suggesting that the finding of low inertia in nominal wages at least merits further investigation.

73. As mentioned, further analysis would ideally be conducted using a systems approach to estimation, perhaps using the procedures of Greenslade *et al* (1998b) to ensure the identification of cointegrating vectors with a structural economic interpretation, given the small data sample available in Hungary. There may be the possibility to improve data in a number of areas, including labor productivity. Data from the Labor Force Survey could be used to test for different effects from short–term and long–term unemployment. Additional variables that might be investigated include alternative measures of demand and labor market tightness, agricultural commodity prices, the unemployment benefit, the minimum wage, and public sector wages. Thorough testing of the forecasting performance of a further developed wage–price system would be needed to have adequate confidence in applying it to make inflation projections that might guide monetary policy formulation.

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VARIABLES

Note that SA denotes seasonally adjusted.

Endogenous variables:

PCSA	Nonregulated CPI excluding fruit and vegetables (CPI items 140, 141, 142)
PPISA	Hungarian PPI
WIGSA	Monthly average gross earnings in industry (inc. payroll taxes of employee).

Exogenous variables:

PA	Austrian CPI (Harmonized CPI from 1995:1)
PPIG	German PPI
PPIUS	United States PPI
PMF	CPI component for motor fuels (CPI item 541)
OIL	Crude oil, average spot price in US$
EUS	Forint per U.S. dollar, monthly average
EDM	Forint per DM, monthly average
EB	Forint per basket, 70 percent DM, 30 percent U.S. dollar
URSA	Official unemployment rate.
LPT	Trend labor productivity (GDP/Employment from Labor Force Survey). Quarterly GDP calculated by cubic–spline of annual data until 1996, then using CSO four–quarter growth rates. Quarterly data is seasonally adjusted, and monthly labor productivity is interpolated. The trend is computed using a Hodrick–Prescott filter with a smoothing parameter of 1600.
LPNMT	Trend labor productivity in non–manufacturing. Calculated as for LPT, but excluding NBH data on manufacturing GDP and employment from the totals.
SUP	Estimate of surprise in core CPI, due to the difference between inflation in the current quarter, and average inflation in the previous three quarters. $SUP = \ln(PCSA) - \ln(PCSA)_{-3} - (\ln(PCSA)_{-3} \ln(PCSA)_{-12})/3$

Dummies:

Trend	Time trend
D9X:Y	Dummy equal to 1 in year 199X, month Y, 0 otherwise
DL9X:Y	Dummy equal to 1 until and including year 199X, month Y, 0 otherwise

CORE CPI EQUATION

Dependent variable: ΔlnPCSA

Sample: 1992:1 to 1998:7, 8 variables and 79 observations

Variable	Coefficient	Std.Error	t-value
$ECMC_{-1}$	-0.18642	0.02843	-6.557
$\Delta lnPCSA_{-3}$	0.27979	0.08859	3.158
ΔlnPMF	0.02496	0.01341	1.861
DL93:3	0.00703	0.00143	4.931

Error–correction term:

$$ECMC = lnPCSA - [\underset{(15.996)}{0.70131}\ lnWIGSA + 0.21610 * ln(PA*EDM) + \underset{(1.967)}{0.082593}\ lnPMF - \underset{(-31.991)}{0.0024465}\ Trend - \underset{(-21.332)}{8.4743}\ ]$$

$R^2 = 0.553$ S.E.E.= 0.26 percent DW = 1.61

Normality:	$Chi^2(2)$ =	1.0493 [0.5918]
Autocorrelation:	F(5,66) =	1.0713 [0.3843]
Heteroskedasticity:	F(11,59) =	1.9615 [0.0492] *

Comments on statistical properties:

The equation marginally fails the heteroskedasticity test, possibly reflecting the clustering of larger residuals earlier in the sample. Tests of stability do not detect problems once the dummy for the first 15 months of the sample is included, possibly reflecting the relative price adjustments early in the transition. The high t–statistic on the error correction coefficient rejects the null hypothesis of no cointegration at 1 percent significance, using Dickey–Fuller critical values.

PRODUCER PRICE EQUATION

Dependent variable: ΔlnPPISA
Sample: 1992:1 to 1998:6 , 12 variables and 78 observations

Variable	Coefficient	Std.Error	t-value
$ECMP_{-1}$	-0.05845	0.01685	-3.469
ΔlnEB	0.14588	0.03500	4.168
$\Delta_2$lnOIL	0.01420	0.00515	2.755
$\Delta lnPPISA_{-1}$	0.35349	0.06252	5.655
D92:1	-0.02153	0.00378	-5.672
D94:1	-0.02171	0.00378	-5.744
D95:1	0.02198	0.00366	6.007
D97:1	0.01138	0.00382	2.978
D98:1	-0.00728	0.00384	-1.894

Error–correction term:

$$ECMP = \ln PPISA - [\ \underset{(3.945)}{0.43331}\ \ln(PPIG*EDM) + \underset{(2.727)}{0.17860}\ \ln(OIL*EUS) + 0.38809*\ln(PPIUS*EUS) - \underset{(-36.160)}{4.6514}\ ]$$

$R^2 = 0.841$ S.E.E.= 0.36 percent DW = 2.00

Normality:	$Chi^2(2)$ = 0.78361	[0.6758]
Autocorrelation:	F(5,61) = 0.08646	[0.9941]
Heteroskedasticity:	F(15,50) = 0.56113	[0.8901]

Comments on statistical properties:

No specification problems are detected. The null hypothesis of no cointegration is rejected at 5 percent significance, using Dickey–Fuller critical values for the t–statistic on the error correction coefficient. Chow–tests and recursive parameter estimates do not indicate instability.

GROSS WAGE EQUATION

Dependent variable: Δ_{12} ln(WIGSA/PCSA)
Sample: 1992:1 to 1998:6 , 6 variables and 78 observations

Variable	Coefficient	Std.Error	t-value
$ECMW_{-12}$	-0.8521	0.08042	-10.956
Δ_{12} URSA	-1.8760	0.25942	-7.231
Δ_{12} $URSA_{-12}$	1.2091	0.10201	11.852
SUP	-0.5958	0.20467	-2.911

Error–correction term:

$$ECMW = \ln(WIGSA/PCSA) - [\ \ln LPT \underset{(-3.444)}{- 1.2147\ URSA} \underset{(131.637)}{+ 5.3260}\ ]$$

$R^2 = 0.871$ S.E.E. = 1.21 percent DW = 1.37

Normality:	$Chi^2(2)$ =	4.3397 [0.1142]
Autocorrelation:	F(5,67) =	1.4898 [0.2049]
Heteroskedasticity:	F(8,63) =	1.5785 [0.1493]

Comments on statistical properties:

No specification problems are detected. The null hypothesis of no–cointegration is rejected at 1 percent significance, using Dickey–Fuller critical values for the t–statistic on the error correction coefficient. Chow–tests and recursive parameter estimates do not indicate instability.

IV. Monetary Policy Framework for Disinflation and EU Convergence[18]

A. Introduction

74. This chapter discusses issues related to the nature of the framework in which Hungary will conduct monetary policy in coming years. Hungary's monetary policy framework is bound to be shaped by its prospective entry into the European Union (EU) and subsequent participation in Economic and Monetary Union (EMU). An inflation performance consistent with these goals will require further disinflation from the low double–digit rate of inflation in 1998. The appropriate medium–term inflation target and the optimal pace of disinflation are discussed in sections B and C, focusing on the period leading to EU entry, rather than the subsequent period of qualifying for EMU.

75. The monetary policy framework for this disinflation will be superseded when Hungary enters EMU. A key issue for the transitional framework is the degree of exchange rate flexibility. Vujec (1996) suggests that the factors making it optimal for Hungary and other Central and East European (CEE) countries to join EMU also encourage these countries to peg to the euro earlier. However, more flexible exchange rate regimes permit more active use of the interest rate instrument, and may also assist with adjustment to shocks. This issue is discussed in section D.

76. An inflation targeting (IT) approach to monetary policy is being used by several small open economies. Section E discusses whether Hungary meets certain prerequisites for the adoption of IT, along with some aspects of the implementation of an IT policy framework. The independence, accountability, and transparency of the National Bank of Hungary (NBH) underpins the credibility of monetary policy. Section F analyzes the NBH legislation from this perspective, also noting the requirements of EMU.

B. Inflation Objectives and EU Membership

77. To prepare for their EMU participation, Finland from early 1993 began targeting the achievement of 2 percent inflation by 1995, and Spain adopted an inflation target of less than 3 percent in mid–1994. Other countries also explicitly target low inflation rates, (Table 5). Should Hungary prepare for EU entry by adopting similar inflation goals?

78. An inflation rate in the range indicated in Table 5 would likely be consistent with the Maastricht Treaty convergence criterion for participation in EMU, that inflation be no higher than 1.5 percentage points above the average rate in the three EU countries with the lowest inflation. However, the Maastricht criteria do not apply to EU accession (Temprano–Arroyo and Feldman, 1998). The 1993 Economic Council in Copenhagen defined the requirements for EU accession, but did not specify an acceptable inflation rate, only the general requirement

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[18] Prepared by Craig Beaumont.

Table 5. Hungary: Specification of Inflation Targets

Country	New Zealand	Canada	United Kingdom	Sweden	Finland	Australia	Spain
Date first adopted	1990 March	1991 February	1992 October	1993 January	1993 February	1993 April	1994 Summer
Initital inflation target	0 to 2%	1 to 3%	1 to 4%	2%	2%	2 to 3%	less than 3%
Expired/revised	End 1996	No	Spring 1997	No	No	No	End 1997
Current inflation target	0 to 3%	1 to 3%	2.5%	2%	2%	2 to 3%	2%
Time-frame of current inflation target	5 years to 2003	Through end-1998	From mid-1997 thereafter	1996 onwards	1996 onwards	On average over the cycle.	From end-1997 thereafter
Inflation measure	CPIX	CPI	RPIX	CPI	Underlying CPI	Underlying CPI	CPI
Components excluded from CPI	Credit charges.	None	Mortgage interest payments.	None	Mortgage interest payments, indirect taxes, subsidies, house prices.	Mortgage interest payments, indirect taxes, other volatile items.	None

Source: Debelle (1997).

that "macroeconomic stability has been achieved including adequate price stability and sustainable public finances and external accounts." Nevertheless, adequate progress towards the Maastricht criterion for inflation is perceived to be part of the EU convergence process.

79. The path for entry to EMU helps to define the desirable progress on inflation prior to joining the EU. Once a country joins the EU it may enter the new Exchange Rate Mechanism (ERM II), and prior to EMU entry there must be no downward realignments within ERM II for at least two years. ERM II will be a relatively flexible arrangement, with the euro as the anchor currency and fluctuation bands of ±15 percent.[19] While a slow depreciation within the wide ERM II bands could accommodate a modest inflation differential, in practice speculative pressures in expectation of a realignment can develop well before exchange rates reach the floor of the band, as demonstrated by the March 1995 devaluations of the peseta and escudo, Masson (1998). Therefore, at the time of entering ERM II the inflation rate in Hungary should already be close to the level consistent with avoiding significant downward deviations from the ERM II central parity. Inflation may of course be lower, creating the potential for upward realignments.

80. Even with a stable peg to the euro, Hungary can expect higher inflation than in the EMU countries, as it will have a wider gap between productivity growth in the traded and nontraded goods sectors, i.e. the Balassa–Samuelson effect will be stronger.[20] Simon and Kovács (1998) find that traded goods sector productivity growth in Hungary was 4.6 percent faster than in the nontraded goods sector over 1991–96. They calculate that if this rate of differential growth continued, the long–run average real appreciation on a CPI basis would be 3.4 percent if agriculture is treated as a nontradable, or 1.2 percent if it is treated as a tradable. The productivity growth differential may narrow somewhat over time, tending to moderate the Balassa–Samuelson effect by the time of ERM II entry.

81. The inflation targets in Table 5 are not centered on zero partly due to measurement bias in the CPI, estimates of which range from 0.5 percent to 1 percent in the inflation targeting countries, Debelle (1997). Such biases may affect the Hungarian CPI more strongly, for example, the "quality bias" may be higher if the quality of goods and services rises faster in Hungary than in EMU countries as real incomes catch–up. The "outlet bias" may also be high due to the rapid growth in supermarkets and shopping malls. However, this bias should diminish to more typical levels over time, and the "substitution bias" may be quite low, as the

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[19] The participating central bank has primary responsibility for the stability of their exchange rate within ERM II, as interventions by the European Central Bank (ECB) to support the currency of an ERM II member must not impinge on the ECB's primary objective of price stability. Timely realignments of central parities will be encouraged.

[20] The Balassa–Samuelson effect on inflation equals the share of nontraded goods multiplied by the difference between labor productivity growth in the traded and nontraded goods sectors. See Masson (1998) for a derivation.

Hungarian CPI weights are updated annually, more frequently than is typical of EMU countries.

82. Allowing for the Balassa–Samuelson effect and some potential additional bias in the Hungarian CPI relative to the EMU countries, a medium–term target range for CPI inflation of 3 percent to 5 percent would seem reasonable. Achieving such an inflation target in the run–up to EU entry will demonstrate macroeconomic stability, make good progress toward satisfying the Maastricht criterion for EMU participation, and permit a credible entry into ERM II.

C. Optimal Pace of Disinflation in Hungary

83. The above target implies a total disinflation prior to EU entry of about 6 percentage points from the CPI inflation rate 10.3 percent at end 1998. The pace of this disinflation could range from a fast one or two years to a more gradual four years. Inertia in nominal wage growth is the key factor that could slow disinflation. For the total enterprise sector, wage inflation has been rather steady at about 20 percent per annum from mid–1994 to early–1998, Figure 11.[21] A fast exchange rate based disinflation may not be sustainable if credibility is limited, as the initial lack of nominal wage deceleration would reduce competitiveness and undermine the trade balance. However, a gradual disinflation may fail to demonstrate commitment to low inflation, increasing disinflation costs and risking a delay to EU entry. The following outlines the arguments on rapid versus gradual disinflation.

84. A number of factors urge that disinflation be completed early in the period leading to EU accession and ERM II membership. First, capital mobility between Hungary and EU countries will rise as accession approaches, making sterilization increasingly costly. If inflation remained above target close to EU accession, requiring high nominal interest rates, the pre–accession capital inflows would be very costly to sterilize. An earlier disinflation would allow interest rates to fall to stem these inflows. Second, disinflation may involve a temporary real exchange rate appreciation, so an earlier disinflation will reduce the risk of entering ERM II with an over–valued exchange rate. Finally, if other CEE countries in the EU accession process make more rapid progress on disinflation, and thereby achieve earlier EU admission, the economic benefits to Hungary of EU entry may be somewhat lower.

85. Blanchard (1998) concludes that conditions in Hungary provide a strong case for a speedy disinflation, of just one or two years. His analysis of studies on OECD countries finds that faster disinflations are less costly, with the sacrifice ratio—the output loss for each percentage point reduction of inflation—rising significantly with the length of the

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[21] Wage inertia may be lower than is apparent in Figure 11, as further discussed in Section E.

Figure 11. Hungary: Wage Inflation, 1993-98
(Three-month average gross earnings, 12 month percent change)

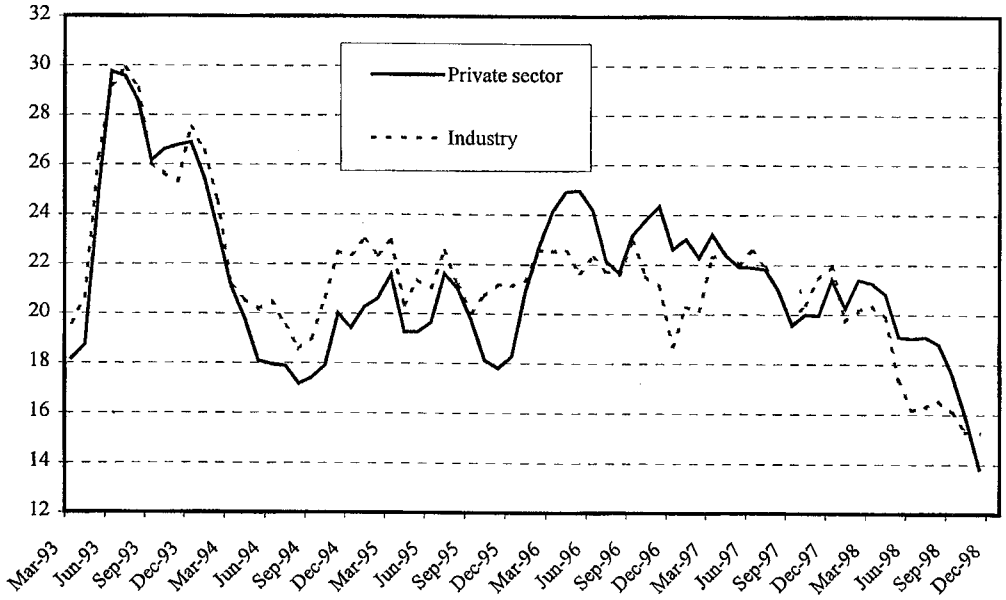
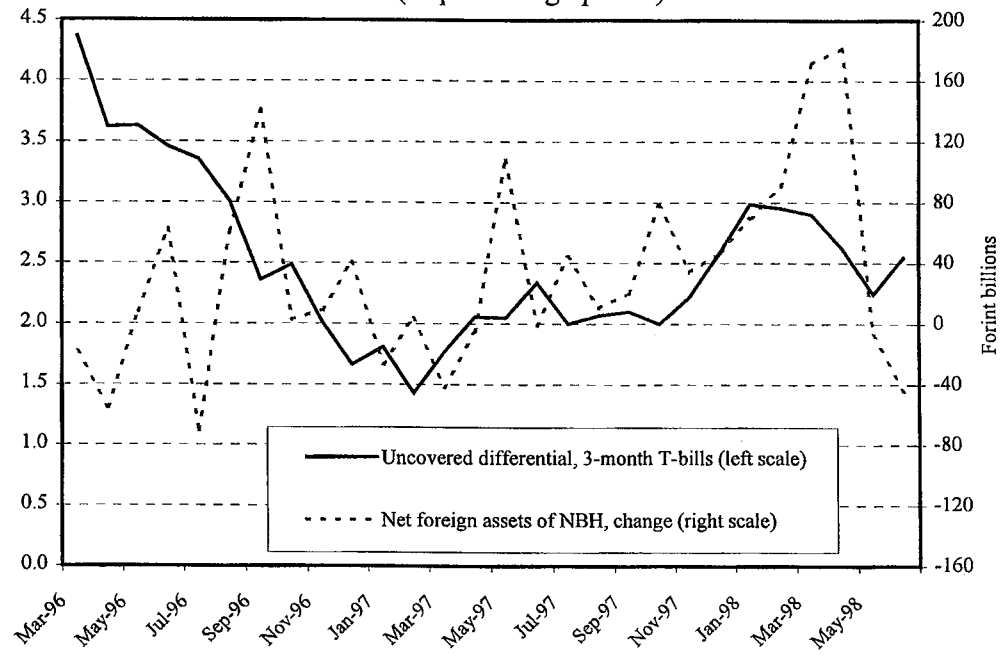


Figure 12. Hungary: Interest Differential and Net Foreign Assets of NBH, 1996-98
(In percentage points)



Sources: Hungarian Central Statistical office, National Bank of Hungary , and staff calculations.

disinflation.[22] In his view, disinflation in Hungary is largely a problem of coordinating a simultaneous slowing in wage and price inflation, with no need to reduce real wages.[23] Conditions for achieving this coordination appeared favorable, as wage negotiations are on an annual basis rather than less frequently, without formal backward–looking indexation. Although wage negotiations had become more decentralized, Blanchard suggested that the Interest Reconciliation Council—a forum including representatives of trade unions, employers, and the government—could facilitate a "disinflation pact," in which agreed nominal wage increases are based on the official inflation target.[24]

86. One objection to such a fast disinflation is the risk of a "credit crunch" that could exacerbate any weakening in activity due to firm monetary and fiscal policies. However, Hungarian enterprise sector profits are robust at 15 percent of GDP, and enterprise debt is modest at about 200 percent of profits, with only half being forint denominated, (Table 6). Even if the performance of enterprise loans was affected, banks are well capitalized with a capital adequacy ratio of 15.8 percent at June 1998, so a sharp recession due to a credit crunch is unlikely.

87. The main argument for a gradual disinflation is provided by Ministry of Finance (1997), which presents a macroeconomic framework where reaching inflation of 4 percent to 5 percent takes four years due to "difficulties tackling inflation's large inertial component. This is because economic policy credibility is still to be strengthened, given that targets announced in previous years have not always been attained." However, credibility now appears to have improved, as 1998 will be the second year that the official inflation targets are achieved or bettered. Further evidence of improved credibility is provided by the slowing of wage inflation in mid–1998, led by the industrial sector (Figure 11). The political consensus for joining the EU underpins the commitment to disinflation, making the conditions for a rapid

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[22] Ball (1994) finds that sacrifice ratios for faster disinflations are lower while controlling for the output–inflation trade–off for each country in non–disinflation periods, suggesting that the result does not just reflect the ability of countries with a low sacrifice ratio to disinflate faster. Interestingly, a study of European transition economies by Christoffersen and Doyle (1998) found no evidence of significant costs for disinflation, except, however, when substantially reducing a moderate inflation rate while maintaining a pegged exchange rate.

[23] This perspective is supported by the initiation of aggregate employment growth in 1998, at 1.2 percent in the first half compared to the first half of 1997. Strong labor productivity growth, at 3.2 percent economy–wide in 1997, and 9.3 percent in manufacturing, suggests room for continued moderate real wage increases.

[24] Finland may provide an example of interest, as during the approach to EMU Finland included "catch–up" clauses in its incomes policies. These clauses never came into effect, but were designed to give confidence to employees that they would not take a risk of real wage losses by accepting wage rises based on the inflation targets.

Table 6. Hungary: Indicators of Enterprise Sector Leverage

	1995	1996	1997
	(In billions of forint)		
GDP	5614	6845	8395
Profits (tax base estimate)	690	967	1280
Enterprise debt	1621	1959	2523
Banks	999	1265	1764
Of which: Forint	773	914	1249
Foreign	622	694	759
	(Percent of GDP)		
Profits (tax base estimate)	12.3	14.1	15.2
Enterprise debt	28.9	28.6	30.1
Banks	17.8	18.5	21.0
Of which: Forint	13.8	13.4	14.9
Foreign	11.1	10.1	9.0
	(Percent of profits)		
Enterprise debt	235	202	197
Banks	145	131	138
Of which: Forint	112	95	98
Foreign	90	72	59

Sources: Central Statistical Office and Ministry of Finance.

low–cost disinflation particularly propitious.[25] Achieving the above medium–term inflation target within a two year period (by end 2000 or early 2001) appears feasible while sustaining growth, ensuring that disinflation is completed sufficiently in advance of entry to the EU. The specification of inflation targets is further discussed in Section E.

D. Transitional Exchange Rate Regime

88. Hungary's crawling peg exchange rate regime is described in Chapter IX. Participation in ERM II will entail a peg to the euro rather than to the basket, the elimination of the preannounced crawl, and a wider exchange rate band.[26] From January 1, 2000 the Hungarian authorities plan to define the central parity of the forint in terms of the euro, and they expect to eliminate the crawl when inflation is sufficiently low. Therefore, the key exchange rate regime decision is whether to retain the narrow ±2¼ percent band until ERM II entry, or if not, when and how much to widen the band, or even whether to float the forint at some point. Other CEE countries have been shifting to more flexible exchange rate regimes,[27] but the Hungarian authorities will need to weigh many factors including: 1) minimizing the cost of disinflation, 2) facilitating growth and real convergence to the EU, 3) assisting adjustment to real shocks and maintaining external balance, 4) containing exposure to disruptive capital flows, and 5) preparing for entry to ERM II.[28] The following outlines the costs and benefits of the alternative regimes after describing developments in capital flows and controls in Hungary.

Capital flows and controls

89. Capital flows appear to have become increasingly sensitive to interest rate differentials during the period of the crawling narrow exchange rate band, Figure 12. This trend reflects improving financial market confidence in Hungary, the privatization of the major banks, and the partial liberalization of capital controls made in the course of joining the OECD.

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[25] Sobczak (1998) finds that in Spain, the commitment to participate in EMU, and the implementation of fiscal policy consistent with this goal, generated credibility improvements that were that main element underlying the disinflation in 1996–97.

[26] Countries with a sufficient degree of convergence may seek narrower fluctuation bands against the euro, but this must be approved by the European Commission, the Economic and Financial Committee, the ECB, and the finance ministers of the euro–area countries.

[27] Poland has widened its crawling band in steps to ±12.5 percent by October 1998, and it intends to float the zloty by gradually widening the band and reducing the rate of crawl, National Bank of Poland (1998), whereas the Czech Republic and Slovakia have moved to managed floats.

[28] Eichengreen and Masson (1998) provide an overview of exchange rate regime choice.

Chapter IX describes the remaining capital controls, which primarily apply to short–term lending and trading in short–term securities between residents and non–residents.

90. Until mid–1998 the forint has typically been at the most appreciated edge of the band, requiring sustained foreign exchange purchases by the NBH, and therefore sterilization operations to the extent that liquidity injections exceeded growth in base money demand. By the end of 1997 the liabilities of the NBH that arise principally from its sterilization activities had risen to Ft 681 billion from Ft 18 billion at end March 1995, a stock exceeding currency held by the public, and a flow equivalent to almost US$4 billion.[29] The interest sensitivity of capital inflows became particularly evident in the first quarter of 1998. Though the rate of crawl was cut from 1.0 percent to 0.9 percent per month on January 1, 1998, interest rate cuts by the NBH were small.[30] Consequently, the uncovered interest differential rose from around 2 percent in late 1997 to average 3 percent in the first quarter of 1998, attracting strong capital inflows, as reflected in sterilization liabilities rising to Ft 1083 billion by end March, a flow equivalent to about US$1.9 billion.[31] The cost of sterilization is given by the interest differential between the sterilization liabilities and foreign reserves, less the revaluation gains on foreign reserves, together averaging about 2.5 percent. Sterilization in the first quarter of 1998 will cost about 0.1 percent of GDP in 1998, and had this rate of sterilization been sustained through 1998 the impact on the fiscal deficit would have been substantial.

91. Most of the funding for the purchase of sterilization instruments in the first quarter of 1998 came from foreign borrowing by banks (with net liabilities up Ft 187 billion), along with the use of their foreign exchange deposits at the NBH (down by Ft 119 billion). The NBH introduced in early 1999 reserve requirements on the short–term foreign liabilities of banks, though initially with a zero rate.[32] While making the requirement effective by applying a non–zero rate would raise the interest rate threshold on capital inflows through the banks, this measure may not offer lasting insulation given that liberalization of short–term capital flows will likely occur in the next few years, as discussed in Chapter IX.

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[29] Sterilization liabilities include short–term (one–day, one–week, and one–month) deposits (formerly reverse repos) of banks with the NBH, and one–year NBH bills.

[30] The key one–month reverse repo rate was cut from 19.75 percent to 19.5 percent on February 6, 1998 and to 19.25 percent on March 2, in comparison to a cut in the annualized rate of crawl of 1.2 percent.

[31] The differential is calculated against German and U.S. interest rates weighted as in the basket, using the actual rate of crawl in place over the next three months.

[32] The reserve requirement on domestic liabilities—denominated in either forint or foreign exchange—is 12 percent, with remuneration of 10 percent in December 1998, relative to Treasury bill yields of 16.4 percent.

Narrow band regimes: fixed and crawling pegs

92. Introducing a fixed peg to the euro, with a narrow band, could be motivated by deepening integration with the EMU area to accelerate growth, structural convergence, and EU and EMU entry. However, pegging before inflation has declined further may undermine competitiveness due to inflation inertia. This risk is exacerbated by high capital mobility, as the drop in interest rates towards EMU levels bought about by the peg would stimulate aggregate demand. Indeed, in the face of strong and potentially volatile capital flows, Vujec (1996) and Masson (1998) argue that it is not likely feasible for even the front–running CEE countries to sustain a fixed exchange rate peg with a narrow band.[33]

93. Crawling pegs reduce the risk of a loss of competitiveness as they allow a more gradual reduction in inflation. However, *narrow band* crawling pegs involve some of the drawbacks of pegged exchange rates, in particular the loss of control over domestic interest rates (short of expensive sterilization) and the resulting potential stimulus to domestic demand. Moreover, by reducing the risk of sharp exchange rate changes, such a crawling peg encourages capital mobility (with respect to a float), thus raising exposure to the risk of volatile capital flows.

94. Another drawback of pegs and crawling pegs with narrow bands is the loss of flexibility in responding to shocks. In the early phase of convergence to the EU, Hungary will be more likely to face external shocks affecting its economy differently to the rest of the euro area. However, this risk appears relatively low, as the industrial sector is highly integrated with the EU through both ownership and trade, and the agricultural sector (at 6.4 percent of GDP in 1995) is small relative to other CEE countries, and not greatly larger than in some EU countries.[34] There may be greater risk of internal shocks, e.g. to the savings rate or to real wages. A narrow band would limit changes in interest rates in response to such shocks, and may also constrain the adjustment of exchange rate policy, as an open policy shift would likely undermine the credibility of future exchange rate commitments.

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[33] Masson notes that a currency board may minimize the risk of speculative attacks, potentially making a fixed peg feasible. Dornbusch and Giavazzi (1998) recommend that CEE countries adopt currency board arrangements to attain a robust fixed exchange rate. Vujec instead proposes that the ECB form an exchange rate arrangement with the CEE countries negotiating to enter the EU as a means to make a peg feasible prior to their entry. Temprano–Arroyo and Feldman (1998) note that while no such pre–EU accession arrangement is officially envisaged, it is likely to be high on the EU political agenda.

[34] Of Hungarian goods exports, 71 percent were to the EU in 1997, of which 87 percent were manufactures.

More flexible exchange rate regimes: the risk of overshooting

95. The above discussion highlights the potential risks associated with retaining a narrow band in the medium–term as the pressures from capital flows intensify. A more flexible exchange rate would also enable the likely pressures for an equilibrium real appreciation during the convergence to the EU to be realized, at least partly, via nominal exchange rate appreciation rather than through higher inflation. However, there are concerns that greater flexibility could be detrimental to disinflation if an exchange rate "overshooting" weakened the current account balance. As discussed by Surányi and Vincze (1998), Hungary's track–record has left enterprises and households with the expectation that a weak external balance will lead to a devaluation and higher inflation, undermining the credibility of disinflation. Nevertheless, the following argues that there may be less risk of a current account deterioration when disinflating under a more flexible exchange rate regime, due to enhanced interest rate flexibility.

96. Under the narrow band, monetary policy relies on the slowing rate of crawl being transmitted through the domestic price of traded goods to reduce broader inflation. The use of interest rates to restrain demand pressures on nontraded goods prices and wages is curtailed by sterilization costs, with Figure 13 showing the stability in real interest rates during the crawling peg regime. A wider band will enhance interest rate flexibility, as reflected in the much higher uncovered interest differential in Poland though 1997 and 1998, Figure 14, though Poland and Hungary have more similar interest spreads on external debt.[35] Raising interest rates under a wider band (or a float) will appreciate the nominal exchange rate, and initially the real rate given wage–price inertia. While this appreciation will likely weaken the trade balance (see Chapter VII), higher real interest rates will also reduce domestic demand, mitigating the impact on the trade balance, and also slowing nontraded goods inflation more quickly and thereby unwinding the real appreciation over time. To achieve the same pace of disinflation without interest rate flexibility, the smaller reduction in nontraded goods inflation must be offset by a larger cut in traded goods inflation, and therefore eventually a larger real appreciation, risking a greater trade balance deterioration.

97. A simple model illustrates this point (variables in logs, Δ is the difference operator):

CPI:	$p = \lambda\, p^{NT} + (1-\lambda)\, p^{T}$
Traded goods price:	$p^{T} = e$
Phillips curve for non–traded goods:	$\Delta p^{NT} = \Delta p^{e} - \alpha\, y$
Inflation expectations:	$\Delta p^{e} = \delta \Delta p^{*} + (1-\delta)\Delta p_{-1}$
Aggregate demand:	$y = -\beta\, r - \gamma\, (p^{NT} - p^{T}) + \epsilon$

[35] Widening the band will not itself lead to an appreciation, as the higher exchange rate risk will increase the risk premium on forint denominated assets.

Figure 13. Hungary: Real Interest Rates, 1992-98
(Nominal interest rates relative to actual 12-month inflation rate, in percent)

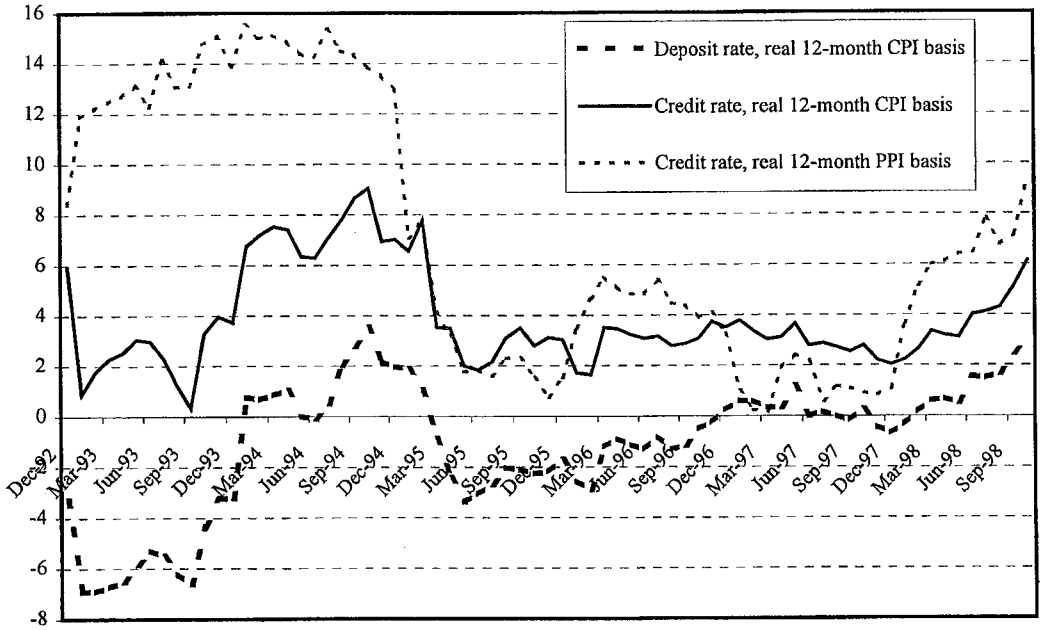
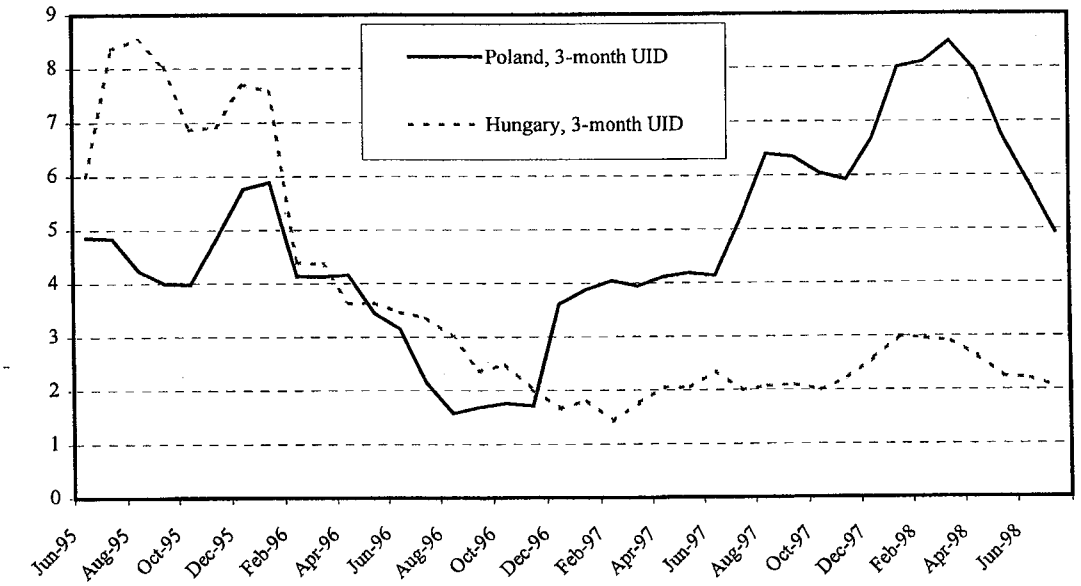


Figure 14. Hungary and Poland: Uncovered Interest Differentials, Hungary and Poland, 1995-98
(In percent)



Sources: Hungarian Central Statistical office, National Bank of Hungary , and staff calculations.

Where Δp^* is the announced inflation target, e is the price of foreign exchange, y is output, r is the real interest rate, and $p^{NT} - p^T$ is the real exchange rate. The disinflation over one period is given by:

$$\Delta p - \Delta p_{-1} = \lambda \delta (\Delta p^* - \Delta p_{-1}) + (1- \lambda)(\Delta e - \Delta p_{-1}) - \lambda\alpha [\beta r + \gamma(p^{NT} - e) - \epsilon]$$

A highly credible disinflation (δ close to 1) can be achieved with little need for a monetary policy induced recession, simply by making the nominal depreciation (Δe) consistent with targeted inflation. However, given some inertia in inflation expectations, a tight monetary policy that temporarily lifts the real interest rate and/or the real exchange rate is required to achieve the inflation targets. Without the flexibility to increase real interest rates, more pressure from the real exchange rate is required to achieve same inflation reduction. Interest rate flexibility also provides a tool to counter the impact of demand shocks (ϵ) that would otherwise result in a deviation from the targeted disinflation unless the exchange rate was more appreciated.

98. The empirical relevance of this argument depends on the responsiveness of aggregate demand to interest rates, and of nontraded goods prices to aggregate demand. Real interest rates were found to have a significant effect on household savings in IMF (1995), suggesting that at least one channel for the interest rate effect on demand is effective. Nominal wage growth—and thus nontraded goods prices—should also be responsive to weaker demand, as Kertesia and Köllô (1997) find real wages in Hungary to be as responsive to unemployment as in the United States, and significant real wage flexibility to unemployment is also reported in Chapter III.

99. Disinflation experiences also tend to support the perspective that an exchange rate regime that permits greater interest rate flexibility involves less risk of undermining the external position. Calvo and Végh (1998) analyze countries with chronic inflation (above 30 percent to 40 percent), finding that exchange rate based stabilizations are accompanied by an initial activity boom, a growing real exchange rate appreciation, and a deterioration of the trade balance. A currency crisis and economic contraction often followed, reversing the disinflation. In contrast, "money–based" stabilizations—covering a range of more flexible exchange rate regimes—also involve a real appreciation, but the rise in real interest rates is associated with an earlier recession, and no clear–cut effect on the trade balance. Inflation stabilizations in Western Europe are examined by Detragiache and Hamann (1997). It is notable that Italy reduced inflation from 22 percent in 1980 to 4 percent by 1986 with little real appreciation during a period of "weak commitment" to the exchange rate target but a restrictive monetary stance. Portugal maybe the most relevant case, as in the early 1990s it had a broadly similar fiscal position to Hungary, and CPI inflation in 1991 of 11.4 percent was cut to 6.5 percent by 1993. Despite a real appreciation in the early 1990s the current account did not deteriorate, as the Bank of Portugal kept interest rates high, and a stable primary fiscal surplus was retained, at least until the 1993 recession.

Forms of flexible exchange regimes

100. Either a managed float or a peg (fixed or crawling) with a wider band would serve to enhance interest rate flexibility. In Hungary's case, a wider band may achieve sufficient interest rate flexibility while putting a reasonable bound on short–term swings in the exchange rate. Furthermore, abandoning the preannounced crawling band could prove unsettling to inflation expectations, suggesting that some type of band be retained.

101. The design of a band regime involves more than determining the band width, as in practice it is common to have "intra–marginal" intervention. For example, after the ERM exchange rate bands were formally widened in August 1993 from ±2¼ to ±15 percent, ERM member central banks still typically intervened according to the old narrow bands, insisting that they remained committed to the narrow bands except possibly in the short–run under strong market pressure. Bartolini and Prati (1998) find that such a "soft" inner band is significantly less vulnerable to speculative attacks than a "hard" band, consistent with the sharp abatement of speculative pressures on the ERM currencies after August 1993. However, a pattern of intra–marginal intervention will reduce perceived exchange rate risk and therefore interest rate flexibility. Therefore, at least during a period of disinflation, it may be advisable to focus intra–marginal intervention on countering exchange rate movements inconsistent with the final policy objectives, rather than keeping the exchange rate within a narrow inner band.

102. The above discussion suggests that some widening of the exchange rate band may prove advantageous.[36] The liberalization of short–term capital flows that is envisaged (see Chapter IX) would likely add to the desirability of a wider band in making the transition to ERM II. If the exchange rate band is widened, the anchoring role for inflation expectations played by the crawling peg will be diminished, suggesting that the goals that the NBH will be pursuing with its enhanced policy flexibility would need to be clearly specified.

E. An Inflation Targeting Framework?

103. A number of countries have announced that monetary policy will pursue specific targets for inflation without committing to a particular intermediate target, including the

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[36] This strategy was used by Portugal in the face of large capital inflows prior to its ERM entry in April 1992, by expanding the fluctuation margins to a few percentage points around the central parity in October 1990. Renewed inflows in mid–1991 were met by a tightening of capital controls, rather than a further widening of the band, perhaps partly reflecting the relatively narrow ERM bands at the time.

Czech Republic and, most recently, Poland.[37] Such a monetary policy framework allows greater instrument flexibility to respond to shocks, but this high degree of discretion may also erode the credibility of the targets. The inflation targeting (IT) framework aims to reduce this problem by making the inflation target the sole over–riding objective of the central bank, by ensuring that the central bank has sufficient instrument independence to achieve this target, and by establishing monitoring and accountability mechanisms for its performance relative to the targets. This environment provides strong incentives for the central bank to continually adjust monetary policy to ensure that its inflation projections remain in line with the targets.

104. The following discusses whether Hungary satisfies the technical pre–requisites for IT, and considers how an exchange rate band might fit into an IT framework. From Debelle (1997) and Masson *et al* (1997), the pre–requisites for adopting IT are:

(i) the ability to carry out an independent monetary policy, especially one not constrained by fiscal considerations;

(ii) a well developed financial system to allow the effective operation of monetary policy;

(iii) freedom from commitment to another nominal anchor, e.g., the exchange rate;

(iv) an adequate ability to produce inflation forecasts and to assess the impact of changes in monetary instruments, and;

(v) political institutions that facilitate agreement on policy goals.

105. The broad conclusion is that Hungary has moved a great deal towards meeting these pre–requisites for using an IT approach to monetary policy. Regarding (I), the NBH Act provides for the independence of the NBH, though there are issues related to the specification of its primary objective, and to a lesser extent, its instrument independence with respect to the exchange rate, see Section F. The budget has typically had little reliance on revenue from NBH transfers, and new NBH credit to the government has been virtually eliminated. Though gross public debt is 60 percent of GDP in 1998, this is much reduced from 84 percent of GDP in 1995, and a fiscal policy consistent with EU entry will be reflected in a further decline in the debt burden. All this suggests that "fiscal dominance" of monetary policy is not overbearing

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[37] A new Act on the National Bank of Poland (NBP) came into effect on January 1, 1998, making price stability the primary objective of monetary policy, while also requiring the NBP to support the government's economic policy so long as this did not conflict with the primary objective. The NBP elaborated a policy framework centered on inflation targets in October 1998, National Bank of Poland (1998). There are no intermediate targets for money, interest rates, or the exchange rate, these being policy instruments or indicators for achieving the inflation targets. The medium–term objective is to lower inflation below 4 percent by 2003.

on a forward–looking basis.[38] As to (ii), the health of the Hungarian banking system does not to constrain monetary policy, and the key financial markets are sufficiently well developed, see van Elkan (1998).

106. Regarding (iii), in the cases where IT is a more permanent monetary framework (e.g., New Zealand, Canada, U.K., Australia) there is no commitment to another nominal anchor like the exchange rate. However, Svensson (1997) suggests it is possible to have an exchange rate band within an IT framework, but only as a "temporary intermediate target" that would be altered if a conflict with the inflation target arose. The countries that maintained an IT framework in conjunction with participating in ERM, Spain and Finland, did not face such a test of target priority. However, in Israel a conflict arose between the 1994 inflation target of 8 percent and the targeted 6 percent exchange rate depreciation. The foreign exchange market was stable but demand pressures accelerated inflation through the year. A monetary tightening—that likely would have disturbed exchange rate stability—was delayed, allowing inflation to reach 15 percent by end 1994. This experience suggests that continuing with an exchange rate band risks undermining the credibility of an IT framework. However, this risk can be reduced by ensuring that the band is sufficiently wide, and by prioritizing the inflation target ahead of the exchange rate band in a clear and transparent manner, Leiderman and Bufman (1996).

Inflation target specification

107. Before discussing (iv), it is useful to review the specification of inflation targets. Such targets should be specified as simply as possible while providing a meaningful benchmark for the performance of monetary policy. There is the choice of price index used, the calculation of inflation, and the horizon of the targets, as discussed more fully in Debelle (1997).

108. Targeting a measure of consumer prices is common to all countries using IT, and it is also the measure used under the Maastricht Treaty. While the official CPI would be the most simple and transparent target, half of the countries in Table 5 target the CPI excluding certain items, called an underlying or core measure of the CPI.[39] By excluding the impact of price shocks not related to aggregate demand, e.g., seasonal swings in food prices or the impact of tax changes, a core CPI provides a more reliable benchmark for evaluating the performance of monetary policy. However, if targets based on core CPI are to be relevant, the core CPI measure should be expected to have a similar trend to the official CPI. In Hungary changes in regulated prices and direct taxes had a large impact on inflation in recent years, Figure 15,

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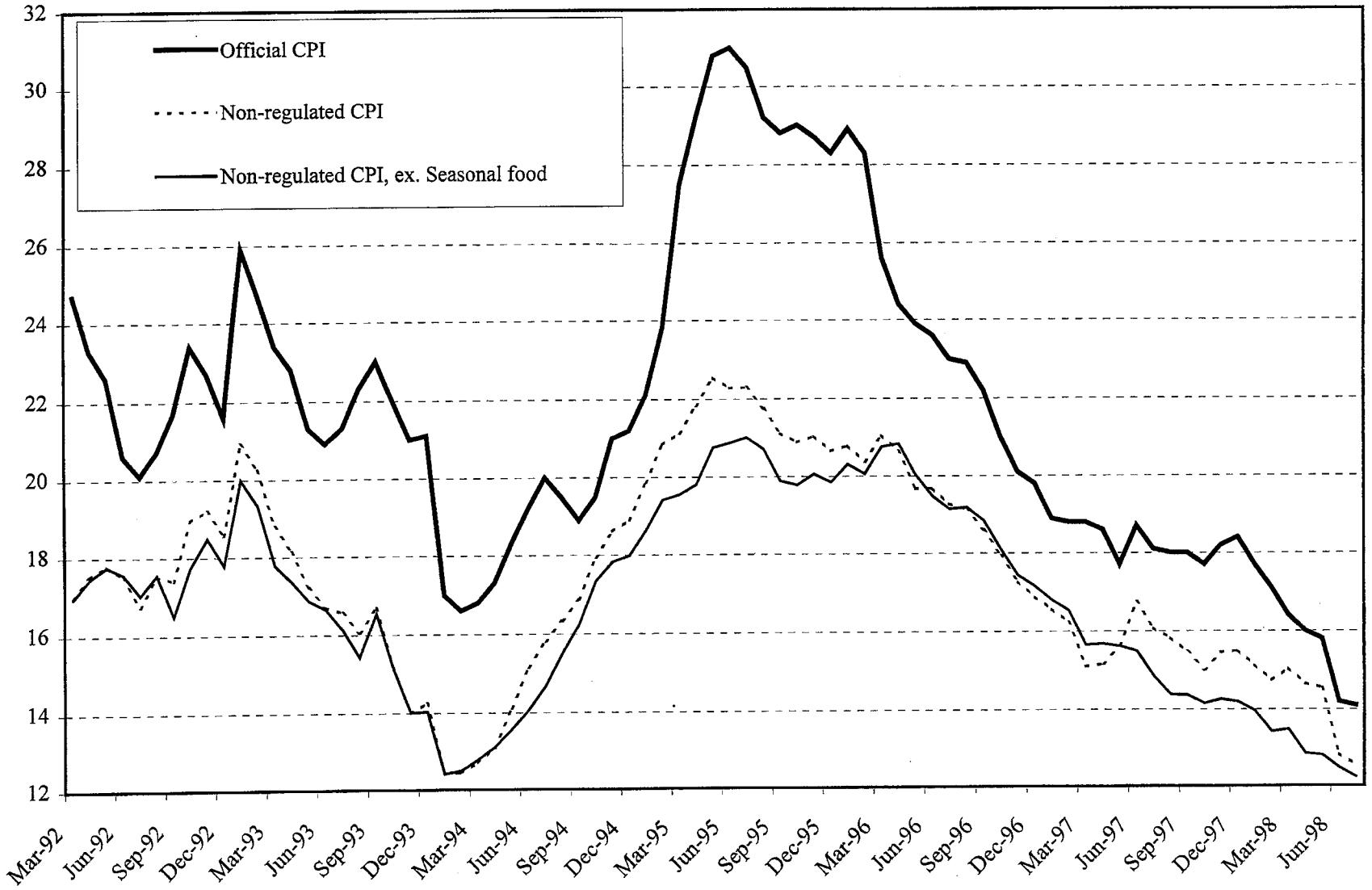
[38] An operation to securitize the foreign exchange revaluation losses of the NBH effective on January 1, 1997 strengthened the financial independence of the NBH, though it retains claims on the government with below market interest rates.

[39] Interest rates are the most frequently excluded CPI item in Table 5, but interest rates are not included in the Hungarian CPI.

Figure 15. Hungary: CPI Inflation,12-month basis, 1992-98



suggesting that inflation targets defined in terms of nonregulated goods prices would not have been acceptable. Nevertheless, given that domestic energy prices have moved closer to world levels this may be less problematic in future, indeed, the difference between official inflation and inflation net of regulated prices narrowed significantly by end 1998.[40]

109. Announced inflation targets in Hungary have in the past emphasized the annual average rate of inflation, but the average inflation rate depends on the path of prices in the previous year, so it would be preferable to set the targets in terms of the 12–month inflation rate. The budget is on a calendar year basis, making it logical to have end of year targets for 12–month inflation. Ideally, if inflation targets were adopted, they would be specified for more than one year ahead, so that through each year monetary policy could increasingly focus on achieving the inflation target in the following year. The targets could take the form of a ceiling, but no lower level, until inflation has been reduced significantly, allowing the flexibility to have a faster disinflation if conditions are favorable.

Inflation projections and indicators

110. To consistently achieve inflation outcomes close to the specified targets, a central bank under an IT framework must be able to reliably evaluate the required monetary policy stance, i.e., pre–requisite (iv) from ¶104. This evaluation requires the ability to make inflation projections that take into account the time–lags between the adjustment of monetary instruments and the impact on inflation, along with the outlook for other factors bearing on inflation. Ideally these projections would be developed within an economic model capturing the key transmission mechanisms between the monetary conditions and inflation, so that the central bank can solve for the monetary policy path that will best achieve the inflation targets.[41]

111. Even in countries with relatively advanced economic models, central bankers in an IT framework often draw on a long "check–list" of inflation indicators when developing monetary policy. Chapter II reports on the properties of a range of potential leading indicators for CPI inflation in Hungary, finding that the PPI, foreign producer prices, the budget balance, and both the nominal and real exchange rate have significant leading information, particularly

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[40] The Czech National Bank has chosen to focus monetary policy on "net inflation," which excludes changes in administered prices. The National Bank of Poland has announced that inflation performance relative to the targets will be verified using underlying inflation indicators as well as the official CPI.

[41] Examples of models that attempt to achieve this goal are Poloz *et al* (1994), and Black *et al* (1997). Both models used calibration techniques as well as traditional estimation, due to problems experienced with estimating models with plausible economic properties. This would suggest that the structural change that Hungary has experienced need not be an insurmountable barrier to the eventual development of a model.

for measures of core or underlying inflation. The impulse–response analysis finds that the effects of the nominal exchange rate are felt with 1 to 7 month lag, with a peak at 3 months, suggesting that monetary transmission lags with respect to the exchange rate are comparatively short in Hungary. Fiscal policy is found to have only slightly slower effects, with the budget balance impacting on inflation from 2 to 9 months later, with a peak effect after 5 months. Some commonly used indicators like wages, money and credit aggregates, and industrial production were found to have little leading information, suggesting these indicators be used cautiously. Moreover, even the better indicators account for less that one quarter of the variance in monthly inflation, so it is not possible to rely on just a few indicators in formulating monetary policy.

112. The price and wage equations reported in Chapter III help to interpret some of these indicator results, as well as providing information on some aspects of the monetary transmission mechanism, and allowing further evaluation of inflation predictability. Allowing for regulated price adjustments, the PPI is found to be well modeled as a tradable price, depending on foreign PPIs, the price of oil, and the exchange rate to the German mark and the U.S. dollar. Thus the good leading indicator properties of the PPI likely reflect that it captures the impact of both the nominal exchange rate and foreign producer prices.

113. While a sustainable disinflation must slow labor cost inflation, the size and timing of exchange rate "passthrough" via traded goods prices to the CPI is a key parameter in the design of an IT monetary policy in a small open economy. Chapter III reports that the first round impact—holding labor costs fixed—of a nominal exchange rate depreciation of 1 percent is to raise a core CPI measure by 0.3 percent, with about three–quarters of this impact after 6 months, and virtually complete adjustment in 12 months. The exchange rate elasticity is likely higher for the official CPI, which includes energy prices that are linked to world market prices. These results confirm that the exchange rate will be a key instrument in the disinflation process, and suggest that an IT monetary policy in Hungary could use a policy horizon of at least 12 months.

114. The dynamics of wages and inflation expectations are the key factors in medium–term inflation developments, and the sustainable pace of disinflation. Chapter III finds that real wages move in line with labor productivity over the longer–run, with a significant negative response to unemployment. Nominal wage adjustment was found to be closely linked to recent core CPI inflation, so that a slowing of core CPI inflation is soon followed by a deceleration in wage inflation. Inertia in nominal wage growth is therefore less than expected, reducing the risk of a real appreciation and trade balance deterioration from a more rapid disinflation, a finding sufficiently surprising to merit further analysis.

115. Chapter III also reports that a dynamic simulation of the wage–price system over a two year horizon performed quite well in forecasting the core CPI. This result is suggestive that prerequisite (iv) can be satisfied, at least for a measure of core inflation. Nevertheless, as is the practice of all central banks using an IT approach, it would be necessary to supplement the results of any inflation forecasting models with well–informed judgement.

F. Institutional framework for monetary policy

116. Does the institutional framework of the National Bank of Hungary facilitate a credible disinflationary monetary policy? Relatedly, does it meet requirements of EMU? Temprano–Arroyo and Feldman (1998) examine the position of Hungary and the other CEE countries in relation to the EU rules in the area of EMU. The rules that bear directly on the institutional framework for monetary policy include:

(i) The term of the central bank Governor and board members must be no less than five years.

(ii) Dismissal of the Governor and board members may occur only under circumstances of serious misconduct or inability to perform their duties.

(iii) The central bank should not take any instructions from the government.

(iv) Price stability must be the primary objective of the central bank.

(v) Central bank direct financing to government must be prohibited.

117. Under the Act on the National Bank of Hungary of 1991, as amended effective January 1, 1997, much of the legislative aspects of the institutional framework for monetary policy have already adapted to the requirements for EU membership, but there are some areas where further amendments will be required. These areas will be noted in the course of analyzing the institutional framework for the NBH in terms of those features considered to be most important for monetary policy performance: a clear objective, independence with respect to instrument setting, governance with long horizons, and adequate accountability and transparency.

Objectives

118. The NBH has multiple objectives, as the "basic task of the NBH is to safeguard the domestic and external purchasing power of the national currency," Article 4(1). Meeting the requirements of EMU, by making price stability the primary objective, will support the credibility of a disinflationary monetary. The NBH also "supports the implementation of the economic policy program of the Government with monetary policy means available to it," Article 3. There is no qualification that this support will be provided if it does not conflict with the basic task, so this article may perhaps need amendment to ensure price stability is the primary objective of monetary policy.

119. Articles 42 to 50 shape the relations of the NBH with the Government. The "NBH shall not be subject to instructions from the Government", as is required for EMU. However, the NBH must "mutually reconcile" with the Ministry of Finance, concerning the annual

budget and its financing with the annual monetary guidelines. Also, the Government "takes a stand" regarding the guidelines before they are presented to Parliament. If the processes of consultation fail, "the NBH is authorized—if it cannot assert its standpoint in any other way—to make public its opinion about economic policy decisions of the government..." Overall, these arrangements may serve to facilitate negotiation of an agreed framework for monetary and fiscal policies between the NBH and the government, therefore satisfying requirement (iv) for adopting inflation–targeting from ¶104.

Instrument independence

120. In Article 6, the "NBH develops its monetary policy as well as the instruments serving its implementation independently within the framework of this Act". However, independence with respect to the exchange rate is qualified, as under Article 13(2) the "order of determining and/or influencing the exchange rate is approved by the government in agreement with the NBH." Therefore, any change in the exchange rate arrangements, at either a broad level, e.g., adoption of the crawling peg, or at a more detailed level, e.g., a change in the rate of crawl, requires approval by government. While this has not in practice been a constraint on NBH policy, it could at some point restrict the instrument independence of the NBH. Cottarelli (1994) argues that a central bank that is not responsible for exchange rate policy is not truly independent in the scope and timing of its actions, especially when capital flows are unrestricted. With the deepening liberalization of capital movements in Hungary, it may be appropriate to update Article 13(2) to preserve the instrument independence of the NBH. Nevertheless, even the ECB does not have full independence in this regard, so an acceptable formulation might require government approval for exchange rate regime changes, but not for adjustments within a regime. An alternative approach would allow the NBH to alter exchange rate policy, though subject to over–ride by the government.

121. The instrument independence of the NBH is not significantly impaired by requirements to finance the government, as the NBH may not purchase securities directly from the state, and may only extend credits on an exceptional basis. These are "liquidity loans for bridging the momentary liquidity difficulties of the Single Treasury Account—up to 2 percent of the planned budget revenue of the actual year," Article 19(4). Such credits may be outstanding for at most 15 days of any month, and must not be outstanding at year end. This provision has been used only few times, but it violates EMU prohibitions on central bank financing to government.

Governance

122. Members of the governing body of the NBH have long–term appointments, but meeting EMU requirements may further strengthen both appointment terms and protection from dismissal. The Central Bank Council (CBC) is the key policy–making body of the NBH. It consists of the President, up to five Vice–Presidents, and other members in a number equal to the Vice–Presidents plus one. All members are appointed by the President of the Republic, with Vice–Presidents nominated by the NBH President, and other members nominated by the

Prime Minister. The President and Vice–Presidents have six year terms, longer than the four year parliamentary term, but other members have three year terms. To meet the requirements of EMU entry the terms of NBH managers on the CBC will need to be extended.

123. The NBH Act allows only the President of the Republic to relieve the NBH President or a Deputy President of their position. However, the reasons for doing so are not strictly limited, being "for reasons for which [the President or Deputy President] can be blamed, does not attend to the tasks stemming from his appointment, commits a crime proven by a valid judgement–at–law, or has become unworthy of his office in any other way," Article 58(8)b. This article may also need to be amended to met EMU requirements.

Accountability and transparency

124. To ensure the accountability of the NBH, the Act provides for a Supervisory Committee, composed of parliamentarians, a representative of the Ministry of Finance, and an expert invited by the Minister of Finance, which is "obliged to inform the Parliament and the Minister of Finance appointing them," Article 65. A range of publications are used to provide the transparency needed to monitor the performance of monetary policy. The NBH must provide an annual report to Parliament—it typically also publishes an interim report—and Parliament may also request occasional information. The NBH President must also present the annual guidelines of monetary policy to the Parliament, which have a more forward–looking nature. Finally, the NBH has recently started to publish quarterly reports analyzing recent inflation developments, a practice typical of the inflation–targeting central banks.

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V. Potential Output Growth in Hungary[42]

125. Hungary is one of the most advanced transition economies. Having started its transition already in the early 1980s, by 1990 as much as 75 percent of Hungarian prices were already market determined and the private sector was expanding rapidly. Yet since the late 1980s, Hungary's output growth performance has been relatively modest compared to neighboring transition economies. By 1997, official data indicate that real GDP in Hungary was still around 9 percent below its level in 1988; this contrasts with the Czech Republic and Poland where real GDP in 1997 were equal to or exceeded the 1988 levels by 12 percent, respectively.

126. This Chapter employs a neoclassical growth accounting framework in an attempt to determine the underlying forces driving Hungary's growth performance. This assessment is intended to form the basis for establishing a view on future potential output growth, although it can provide also some tentative indications on the current level of the output gap. In order to achieve a good understanding of the underlying growth factors, it is particularly important to understand the sharp contraction in the early 1990s and the subsequent relatively slow recovery: was economic activity suffering from insufficient demand or were other factors at play?

127. The analysis suggest that most of the collapse in output in the early 1990s was probably due to a loss of productive potential as the barter trade arrangement collapsed. The initial output drop was followed by several years of below potential growth, resulting in a widening output gap. Since last year, however, real GDP growth has picked-up thus narrowing the output gap significantly. An illustrative scenario focuses on a set of conditions (in terms of employment, investment, and total factor productivity growth) that would allow potential output to grow by 5–5¼ percent on average during 1998–2003. This scenario is in line with the results in earlier studies, for example, van Elkan (1997), Borensztein and others (1991), and EBRD (1997) which estimated that—assuming successful structural reform—that potential growth rate was in the 5–5½ percent range.

A. The Growth Accounting Framework

128. The traditional growth accounting framework dates back to Solow (1957). In this framework, GDP and GDP growth are split into the contribution from two factors of production—capital and labor—and a residual, the "Solow residual" or "total factor productivity" (TFP). It can be shown that, assuming a Cobb–Douglas production function, the natural logarithm of real GDP can be decomposed into a weighted sum of the two factors of production—where the weights are the respective factor income shares—and a residual (TFP):

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[42] Prepared by Ketil Hviding

(1) $Y = (1-\alpha)L + (\alpha)K + TFP$

where α is the capital income share. Equation 1) can also be expressed in terms of growth rates since the first difference of the growth rates of the natural logarithm is approximately equal to the percent change in the underlying variable. Furthermore, it can be shown that total factor productivity growth is equal to the sum of capital productivity growth (output growth minus percent change in the capital stock) and labor productivity growth weighted by income shares. The growth of "labor" can be broken down into change in the working–age population, change in the trend participation rate, and change in the natural rate of unemployment.

129. The basic growth accounting framework can be used to assess the level and growth of potential output. This is done by distinguishing between actual employment (L) and potential employment (L*). Potential employment is usually derived from an estimate of the "non–accelerating inflation rate of unemployment" (NAIRU=u), structural labor market participation rate (P_a), and the working–age population (P_w):

(2) $L^* = (1-u/100)\, P_a P_w$

The capital stock is generally assumed to be fully utilized, but a "capacity utilization gap" can also be proxied by using survey data. Potential TFP growth is normally estimated by applying a Hodrick–Prescott or other filtering techniques to the natural logarithm of the difference between real output and the weighted product of potential employment and the capital stock.

130. In addition to the standard qualifications to this approach (in particular, the assumed production function), several issues are paramount when applied in a transition context. First, capital and labor were probably underutilized in the era of state planning. Second, the transition period led to a massive shift of demand, rendering a large proportion of the existing capital stock obsolete. Third, official figures probably overestimate the fall in real output from the planning period—when barter, quotas, and price regulations led to substantial economic distortions—to the transition years when a whole new range of better quality products became available.

131. In order to use the growth accounting framework to assess the future growth potential of the Hungarian economy, it is first necessary to estimate the current **level** of capital. This is required since the growth impact from a given investment–to–output ratio depends on the size of the initial capital. In the next section, the growth accounting framework is applied to Hungary's recent history, tracking the period from 1985, before the transition started, until 1997. This will provide an estimate of historic and actual potential output, the output gap, and the capital–output ratio from 1985 to 1997.

B. Potential Output: 1985–97

132. Capital stock data for 1985–90 were based on official data on the nominal value of the capital stock (Central Statistical Office, 1993). In order to transform the series into fixed 1995–price values, the nominal capital stock values were deflated by using the fixed investment deflator from national accounts. In spite of the likely poor quality of the data, the pre–transition capital stock data provides a valuable starting point for the estimates of post–transition capital stock.

133. The sharp contraction triggered by the collapse of CMEA trade in 1990–91 overshadows smaller cyclical fluctuations which are the main components of the output gap in mature market economies. The cumulative loss in GDP from 1990 to 1993 exceeded 18 percent. As a result of this major structural break, standard methods used to trace potential output, such as a detrending of real GDP or the use of Vector Autoregressions (VAR), are not applicable to Hungary or other transition economies[43]. These methods are based on the assumption that real GDP can be described as the outcome of a "smooth" stochastic process, and so are not applicable to the context of large one–off "discrete" structural shocks.

134. Thus, in order to avoid the problem with these time series methods, a one–off reduction in the capital stock was assumed in 1990 and 1991, the time of the collapse of the CMEA trade (Figure 16). An approximation of the warranted reduction was based on estimates of the direct and indirect effects of the trade shock and the effect of "disorganization" (Box 1). A one–off cut of 35 percent was introduced in 1991, corresponding to some 20 percent loss due to the collapse of CMEA trade and 15 percent due to "disorganization."

135. Capital accumulation in the post–transition period was based on data on new investment in machinery and equipment and construction, and the assumption of an annual depreciation rate of 20 percent for machinery and equipment and 5 percent for real estate (corresponding to an average life of 5 years and 20 years, respectively). These depreciation rates are in line with international standards, for example, as used by the OECD. No correction was made for the potential larger productivity of the new investment, as it was assumed that, partly, the old capital equipment would be reallocated and that the full potential of the new investment would only be reached gradually and would be appropriately included into TFP growth[44].

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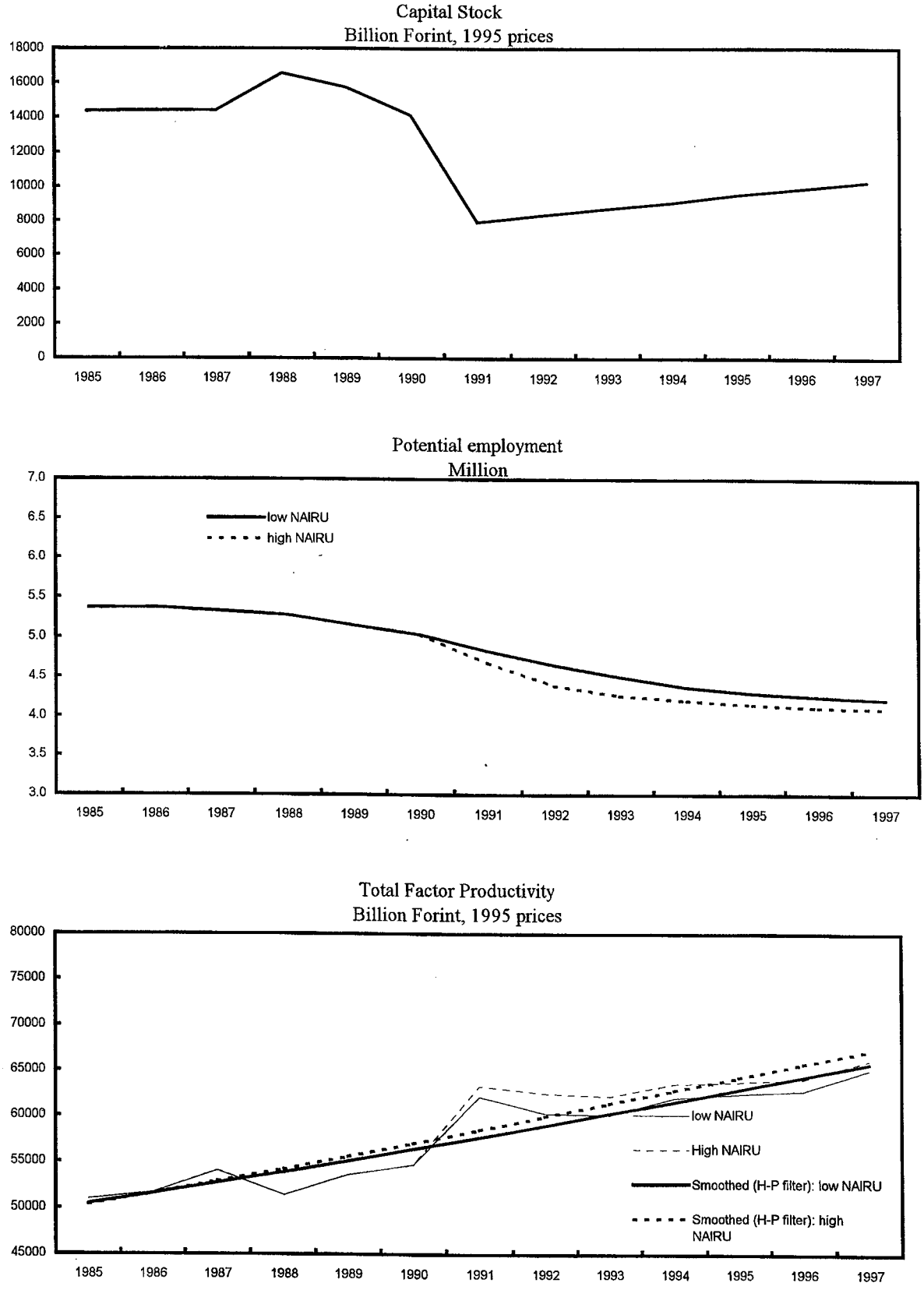
[43] See Magnier (1998) for the application of several different time–series techniques to estimate potential output and the output gap in Austria.

[44] See Borensztein and others (1991) for an estimation of the relative productivity of pre–transition fixed investment in Hungary, Poland, and Czechoslovakia.

Figure 16. Hungary: Components of Potential Output, 1985-1997



Sources: Central Statistical Office and staff estimates.

Box 1. The Loss of Productive Potential

1. The breakdown of CMEA trade exposed Hungary to a combination of a substantial demand shock and a terms of trade shock. The collapse in CMEA import demand dramatically reduced Hungarian export volumes: from 1989 to 1992, Hungarian exports to the CMEA area fell by some 50 percent in real terms. At the same time, the collapse of barter trade led to a large terms of trade deterioration, and a sharp rise in the oil price. The terms of trade loss was compound by a sharp rise in the international oil market price as a result of the Gulf war.

2. The effect of the drop in external demand induced a loss in the productive potential of the economy as it rendered obsolete capital in industries that relied on CMEA exports. In most cases, the redirection of exports to Western markets meant a disruption of previous production lines. As a result, capital equipment used to produce the lower grade products traded within CMEA (food products, textiles and clothing, and various machinery and appliances) had to be scrapped as it was inadequate to produce the higher quality products demanded by developed market economies. Furthermore, embedded human capital, such as product specific know–how and informal networks, was disrupted as a result of the dramatic change in demand. For a theoretical and empirical discussion of the costs of "economic disorganization," see Blanchard (1997).

3. A further loss in productive potential arose from trade liberalization, which was significantly accelerated in 1990–91. The entry of new goods lowered the market clearing price of domestically produced goods to below its short–run break–even level, disrupting the production of these goods and scrapping product–specific real and human capital. The scrapping process was accelerated by the large increase in energy costs. In addition, the bankruptcy legislation of 1992, while having overall positive effects, resulted in the liquidation of a number of economically viable companies.

4. The loss in productive potential arising from these factors is difficult to measure. A lower bound estimate can be obtained by focusing on the direct and indirect effects of the collapse in CMEA exports. According to the OECD (1993), about one–third of the fall in industrial output from 1988 to 1991 can be ascribed to direct and indirect effects of the collapse in ruble exports, using input–output tables at detailed sector level. With a drop in industrial output of about 30 percent in the period (of which 9½ percent was directly or indirectly due to the drop in rouble exports), this alone would have contributed to a 7 percent drop in potential output (given an output share of manufacturing industries of about 70 percent). Under the assumption of a Cobb–Douglas function and a capital income share of about 40 percent, such an output drop corresponds to a 20 percent fall in the capital stock. The other effects discussed above come on the top of the effect of the fall in export demand.

136. Developments in potential labor supply are equally difficult to determine since the unemployment rate surged and the participation rate dropped sharply in the wake of the transition (Figure 17). In such an environment, estimates of the "natural" rate of unemployment or the NAIRU are highly uncertain. One key question is whether the workers fired from previously state–owned companies were employable in the new private industries. While the generally high level of education of Hungarian workers suggests that these workers are relatively easily employable, the market economy requires different skills, which may be difficult to acquire for the older workers accustomed to central planning and state ownership. In the absence of reliable microeconomic data on the extent of skill–mismatch, the concomitant increase in unemployment and vacancies during 1991–93 suggest that a significant share of the increase in unemployment has been structural.[45] Consequently, the share of the long–term unemployed has also increased rapidly, albeit still significantly less than in the average of the EU. Given these uncertainties, two alternative estimates of potential labor supply are presented: one is based on a "low" NAIRU, where the NAIRU is assumed equal to a moving average of long–term unemployment; the other, the "high" NAIRU estimate, was based on a simple average between long–term unemployment and actual unemployment (Figures 16 and 17).

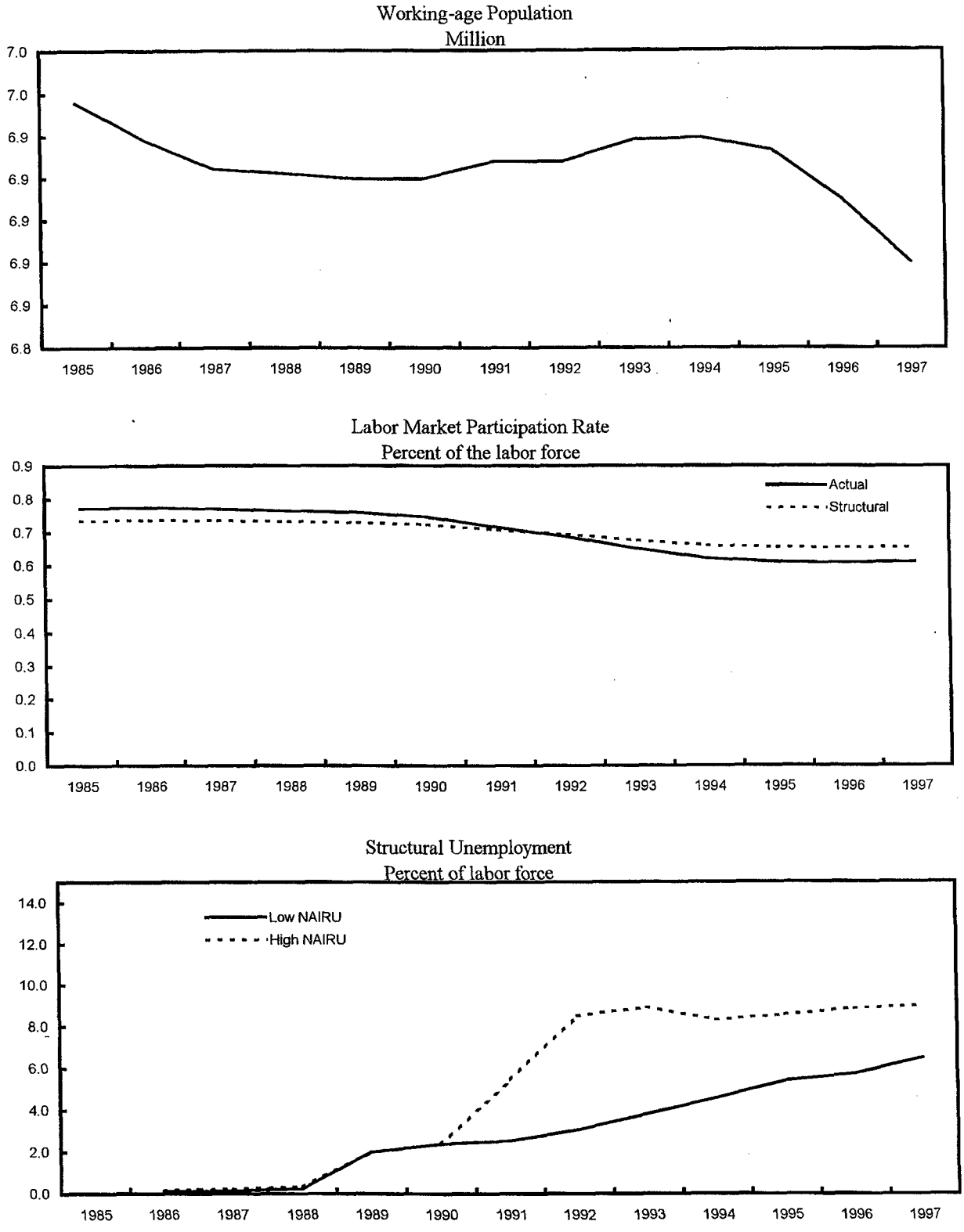
137. The contribution of labor and real capital was added together by using an average capital income share as reported by the Hungarian national accounts in 1993–97 which, at 39 percent, is significantly above the international average (25–30 percent).[46] The capital income share is also large in relation to Hungary's neighboring transition economies and reflects moderate wage developments, labor shedding, and the success of structural reform in redressing the return on fixed investment. TFP or the "Solow residual" was estimated by smoothing the natural logarithm difference between actual output and the weighted product of the capital stock and potential employment.

138. Adding up the natural logarithm of all the components—the weighted sum of the input factors potential employment and capital, explained TFP, and the smoothed residual—provides an estimate of the level of the natural logarithm of real potential output. The resulting estimate of potential output indicates that the collapse of output in 1989 to 1992 and the subsequent slow growth were mainly a result of a drop in the productive potential of the economy (Figure 18). Indeed, actual output may have exceeded potential output in 1991

[45]For details see OECD Economic Survey of Hungary, 1997 (p. 75).

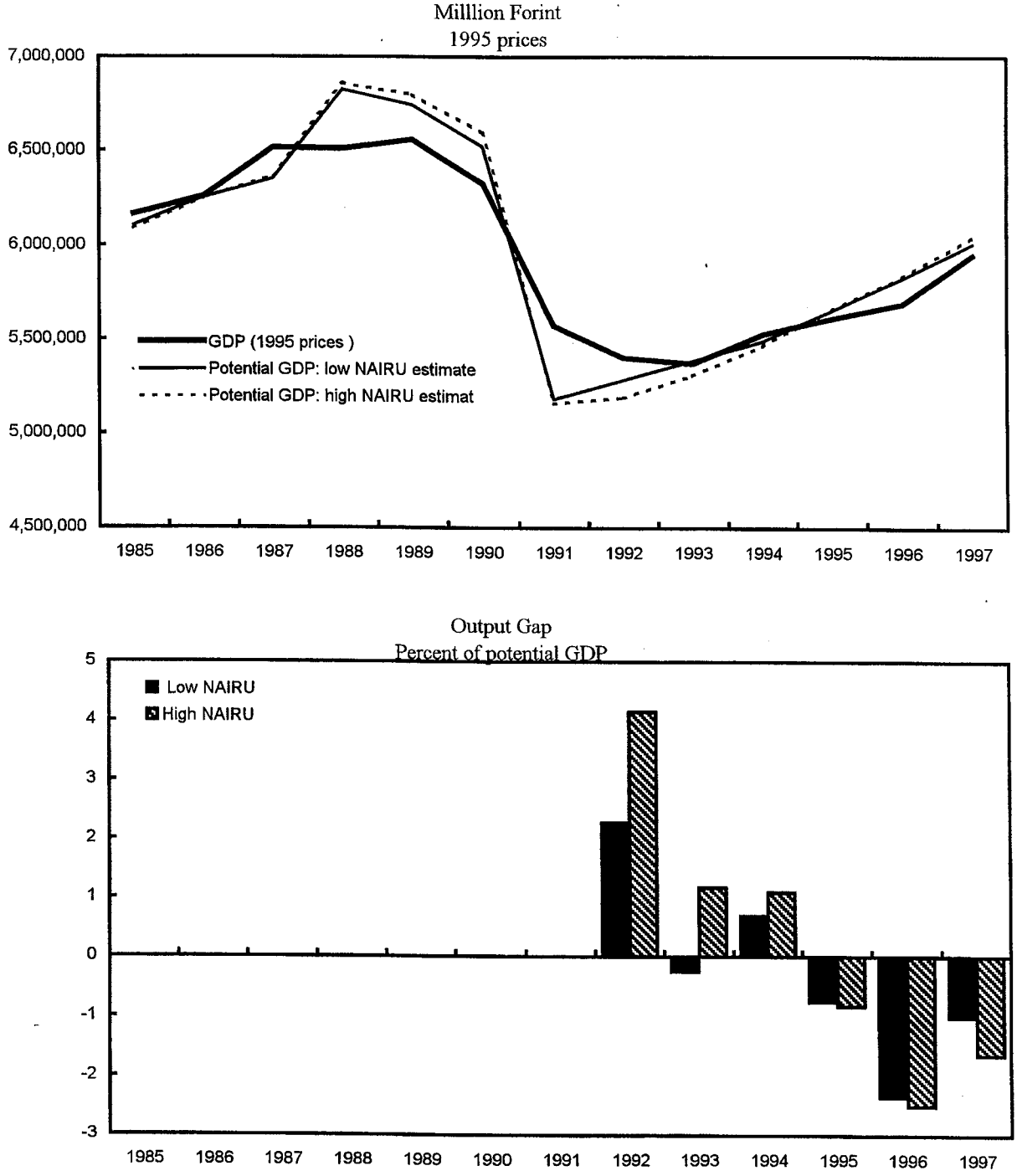
[46]The capital income share was calculated as the ratio of net property income to nominal GDP.

Figure 17. Hungary: Components of Potential Employment, 1985-1997



Sources: Central Statistical Office and staff estimates.

Figure 18. Hungary: Actual and Potential GDP, 1985-1997



Sources: Central Statistical Office and staff estimates

and 1992. Since 1994, however, both in the case of the low and high NAIRUs the estimates suggest that potential output has outpaced actual output by some margin, resulting in a negative output gap.[47]

C. Prospects for Future Growth

139. The previous section established a starting point for assessing the conditions, in terms of employment, investment and total factor productivity growth, that would allow Hungary to grow at a targeted growth rate. For illustrative purposes, we focus on a possible GDP growth target of 5–5¼ percent over the medium–term. The scenario (Table 7) shows that growth rates in this range can be achieved with a relatively contained increase in the investment–to–GDP ratio. The scenario is based on the following assumptions:

- gross fixed investment grows on average by 8 percent per year, leading to an increase in the fixed investment–to–GDP ratio from 23½ percent in 1998 to 27 percent in 2002;

- the NAIRU gradually declines from 6½ percent in 1998 (the average of the high NAIRU and low NAIRU scenarios discussed in the previous sections) to 5 percent in 2002, as a result of labor market reform, particularly cuts in the tax wedge;

- the participation rate gradually increases from 61 percent in 1997 to 70 percent in 2002, close to its pre–transition level; this should again, reflect the effect of labor market reform;

- the working–age population shrinks fast (¾ percent per year), in line with World Bank projections, reflecting the retirement of the large postwar "baby boom" generation. This is expected to subtract almost ½ percent per year from the potential growth rate;

- total factor productivity increases by 2½ percent per year; this is in line with the experience of many emerging market economies: during 1978–96, for example, TFP in Thailand and Singapore is estimated to have increased by 2 percent and 2¼ percent respectively (Sarel, 1997). However, this is well below the post–war experience of larger European countries and Japan: during 1950–73, TFP in Japan and the three largest EU countries (Germany, France, and Italy) is estimated to have increased by 3½ percent and 3¼ percent per year, respectively.

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[47]The output gap is estimated to be some 1½–2 percent of GDP in 1997. However, owing to the high degree of dependency of this result on the assumption made on potential labor supply and TFP, this estimate should be treated with caution.

Table 7. Hungary: Potential Output Growth, 1997-2002 1/

(Annual percent change)

	1997	1998	1999	2000	2001	2002	1999-2002
				Projection			
Potential output (A+B+C)	3.2	4.1	4.8	5.0	5.3	5.2	5.1
Contributions from:							
Capital (A)	1.5	1.8	2.2	2.4	2.4	2.4	2.4
Labor (B)	-0.6	0.0	0.2	0.1	0.3	0.3	0.2
of which							
Working-age population	*-0.3*	*-0.4*	*-0.4*	*-0.5*	*-0.3*	*-0.3*	*-0.4*
NAIRU	*-0.5*	*0.0*	*0.1*	*0.2*	*0.2*	*0.2*	*0.2*
Participation rate	*0.2*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*
TFP (C)	2.2	2.3	2.4	2.5	2.5	2.5	2.5

Source: staff estimates.

1/ The NAIRU was assumed to fall gradually from 6.5 percent in 1998 to 5 percent in 2002. The labor market participation rate was assumed gradually to reach 70 percent in 2002.

It must be stressed that different assumptions regarding investment have a relatively small effect on the growth rate of potential output. This reflects the relatively high capital–output ratio, even after the large negative shocks introduced in 1990–91. By contrast, different assumptions regarding the trend in the NAIRU or the participation rate have more powerful effects for the period considered. This underscores the importance of maintaining a high degree of flexibility in labor and product markets and of lowering labor taxation.

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VI. Tax Reform in Hungary[48]

A. Introduction

140. Like most European OECD countries, Hungary places a higher burden of taxation on labor income than on capital income. By international standards, marginal labor tax rates are one of the highest of the European OECD countries, but are not atypical as compared to most Central and Eastern European countries. The main reason for the high marginal rates on labor is the high social security contribution rates levied on employers and employees to finance old–age pensions, health care, and other social transfers. During the last three years, developments in the Hungarian tax system have shown a reduction in the labor tax burden. In line with this trend, the 1999 tax reform aims at a further reduction in personal income and payroll taxes and a broadening of the base of social security contributions.

141. This chapter studies taxation issues in Hungary with a special focus on the impact of the reduction in labor taxes on economic efficiency and income distribution. To this end a simple model of the labor market is developed and calibrated with plausible parameters which are taken from the literature. The structure of the chapter is as follows. Section B provides a brief description of the tax system before the 1999 tax reform, comparing the Hungarian system with that of other countries. Section C studies the short–run and long–run effects of labor taxation from a theoretical point of view. Section D presents the tax reform incorporated in the approved 1999 budget. It tries to quantify the likely effects on tax rates, employment, and income distribution. Section E studies alternative sources of revenues that may be considered in the near future to compensate for the revenue loss of further cuts in labor taxes. Section F concludes and summarizes the results.

B. Aspects of the Hungarian Tax System

142. The principal elements of the Hungarian tax system were laid down in the 1988 tax reform which introduced the personal income tax (PIT)—with a top marginal rate of 60 percent and 11 tax brackets—and a value–added tax (VAT). In 1989, a market–oriented enterprise profit tax was introduced, although it came into effect only in 1992. Since then, no major structural reforms of the tax system have been undertaken. However, marginal tax rates, tax credits, tax exemptions and tax brackets of the PIT have changed almost on a yearly basis.[49]

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[48]Prepared by Jenny Ligthart.

[49]Vamosi–Nagy et al. (1998) provide further details on the developments in the Hungarian tax system over the last 10 years. Newbery and Révész (1997) report that during 1988–96 the top marginal PIT rate was changed seven times whereas the number of tax brackets changed on six occasions.

143. Hungary's tax system imposes a heavy burden on the economy. The overall tax burden—as measured by the ratio of tax revenue to GDP[50]—is above the OECD average and that of selected Central and Eastern European countries (Table 8).[51] Labor taxes (including social security contributions) and VAT are the major revenue generating taxes, contributing 46 percent and 18 percent to 1996 revenues, respectively. Hungary's tax burden declined gradually from 47 percent of GDP in 1990 to 42 percent in 1998 (Table 9), in line with the government's commitment as agreed in the 1995 public finance reform program.[52] The latter aim was accomplished through a reduction in marginal PIT rates and a cut in social security contribution rates. Moreover, the contribution base of social security declined as wages and salaries fell as percentage of GDP.[53]

144. In 1998, the progressive part of the PIT had six different marginal rates of which the minimum rate is 20 percent and the top rate was 42 percent. Dividend income and capital gains on securities are taxed at a flat rate of 20 percent. The number of marginal rates was larger than what is typically observed for middle–income European countries, but lower than in most Central and Eastern European countries (see Table 10). The simple average of marginal PIT rates was 31.5 percent in 1998 which is broadly in line with the 30.5 percent weighted average.[54] As average earnings were close to the lower income bound of the top PIT bracket, high marginal rates bit at a relatively low income level. Accordingly, a substantial share of the taxable base (about 33 percent) was taxed at the top rate so that changes in this rate would significantly affect economic efficiency and public revenues.

145. PIT revenues in Hungary are low by international standards. However, the top marginal PIT rate is close to the OECD average of 43 percent suggesting a relatively narrow PIT base. This can be explained by various factors. First, a part of the progressive tax base is lost due to various tax credits and specific exemptions. For example, interest income and

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[50]Note that, tax revenue to GDP is not all an encompassing indicator of tax distortions at the micro level as it does not include the excess burden (i.e., the welfare costs of taxation in excess of public revenues collected) arising from behavioral responses to taxes and public goods financed with these taxes.

[51]Key features of the Hungarian tax system can be found in Appendix II.

[52]Compared to other European OECD countries, Hungary has done well during the last five years. In these countries, the (unweighted) tax revenue to GDP ratio continued to increase from 38 percent in 1985 to 41 percent in 1996 reflecting the increased pressure on social spending resulting from the aging of the population and high levels of unemployment

[53]See Ruggiero (1998) for further details on the 1995 public finance reform program.

[54]This measure weights the marginal rates by the percentage of taxable base that falls in the various tax brackets.

Table 8. Hungary: Some Comparative Revenue Ratios, 1996

(In percent of GDP)

	Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovak Republic	OECD Total[1]	OECD Europe
General government revenue	33.6	42.7	44.4	45.0	29.6	46.9	n.a.	n.a.
Tax revenue	27.9	39.0	42.6	38.3	26.6	39.2	37.7	40.6
Personal income tax	4.2	5.3	6.6	9.2	6.1	5.2	10.4	10.4
Social security contributions	7.3	15.9	13.0	9.5	7.4	13.2	9.8	11.6
Value-added tax	7.0	7.2	7.5	7.8	4.9	8.4	6.7	7.6
Corporate income tax	4.5	4.1	1.8	3.1	3.2	6.0	3.1	2.9

Source: OECD (1998) and staff calculations.

1/ Unweighted average of 29 OECD countries.

Table 9. Hungary: Consolidated General Government, 1990-99 1/

(In percent of GDP) 2/

	1990	1994	Estimate 1998	Budget 1999
Total revenues 3/	47.0	43.5	42.9	41.3
Primary revenues	47.0	42.7	41.5	40.5
VAT	6.4	7.6	8.2	8.5
Excises	4.7	3.7	4.1	4.0
CIT	7.5	1.9	2.3	2.5
Customs	2.2	3.4	1.3	1.2
PIT	3.4	7.2	6.4	6.4
Employers' contributions	12.6	11.9	11.3	10.3
Employees' contributions	2.8	2.7	2.1	2.2
Other tax receipts	7.0	3.6	5.0	4.5
Non-tax receipts	0.4	0.6	0.9	0.9
Interest and National Bank of Hungary receipts		0.8	1.4	0.9
Total expenditures	46.0	52.2	47.2	45.4
Primary expenditures	41.0	45.5	39.3	37.6
Pensions and social transfers	11.4	11.2	9.2	9.2
Subsidies to enterprises and households	5.0	5.2	4.7	4.3
Other current expenditure	19.8	24.1	21.4	21.3
Investment	4.8	5.0	4.0	3.7
Interest and National Bank of Hungary expenditure	5.0	6.7	7.9	6.9
Primary balance	6.0	-2.8	2.2	2.0
Net interest	-5.0	-5.9	-6.5	-6.0
Overall balance	1.0	-8.7	-4.3	-4.0

Source: Data provided by the Hungarian authorities; and Fund staff estimates.

1/ Central budget, social security funds, extrabudgetary funds, and local governments. The data shown for consolidated revenue and expenditure exclude staff estimates of double-counting arising from transfers of funds between different levels of government. These estimates are subject to further revision. Data for 1996-99 are not strictly comparable with those for earlier years due to incomplete data for the extrabudgetary funds prior to 1996.
2/ Official GDP data for 1994 have been adjusted to be comparable with the data for 1995 onwards.
3/ Primary revenue is defined as total revenue minus transfer of profits from the National Bank of Hungary and interest revenues.

Table 10. Hungary: Top Marginal PIT Rates and Number of Marginal Rates for Various Countries, 1997

	Top marginal rates	Number of tax brackets
OECD-22 average[1]	42.8	5.6
OECD-7 average[1,2]	48.5	5.2
Bulgaria	50.0	9.0
Czech Republic	40.0	5.0
Hungary	42.0	6.0
Latvia[4]	25.0	1.0
Poland	44.0	3.0
Romania[3]	60.0	15.0
Slovak Republic	42.0	6.0
Slovenia	50.0	6.0
Ukraine	40.0	6.0

Sources: Deloitte Touche Tohmatsu International (1997) and Owens (1997).

1/ Based on data for 1995.
2/ United States, Japan, Germany, France, Italy, United Kingdom, and Canada.
3/ Salary tax.
4/ Flat rate that applies to all taxable income.

social security benefits (provided on a net–of–tax basis) are tax exempt. Also, individuals could credit 20 percent of wages and salaries (up to Ft 4,200 per month) against the tax owed, thereby reducing the effective average tax rate.[55] In 1998, 10 percent of the PIT base was lost due to tax credits. Second, high labor taxes in Hungary have adverse effects on employment and economic growth (see Section C), and may have caused a shift of economic activities to the black economy. Lackó (1995) estimated that the size of the hidden economy in Hungary was 30 percent in 1990 and that share increased by 4–5 percentage points between 1990 and 1993. This means that a significant portion of economic activity is not captured within the tax net.

146. As observed in most OECD countries, social security contributions in Hungary raise more revenues than personal income taxes mirroring high levels of social security expenditures. In 1997, 33 percent of revenues was derived from social security contributions against 15 percent from personal income taxes. The bulk of social security tax revenues was paid by employers who contributed 83 percent to social security revenues in 1998. This is reflected in the structure of contribution rates. Employers paid 43 percent of gross wages to social security of which 39 percent was earmarked for old–age pensions and health insurance and 4 percent was allocated to unemployment insurance. Employees paid much less social security contributions (11.5 percent of wages). Hungarian social security contribution rates are among the highest in the group of Central and Eastern European countries (Table 11). Nominal contribution rates have been cut in small steps from 63 percent in 1993 to 54.5 percent in 1998.

147. Revenues from the corporate income tax in Hungary are significantly below the OECD average (Table 8). This is not surprising given that the corporate income tax (CIT) rate is currently only 18 percent compared with an average rate of about 32 percent for OECD countries.[56] The effective CIT rate in Hungary was only 15.7 percent in 1997. This can be explained by various factors. First, the CIT law reflects the goal of attracting foreign capital and stimulating investments in underdeveloped regions and sectors. Numerous special tax incentives were granted to firms in the past. Many of them have already been abolished but enterprises continue to enjoy the incentives for which they qualified. In 1997, CIT credits amounted to 33 percent of taxes payable before credits of which 61 percent was granted to joint ventures. Also, a special CIT rate of 3 percent applies to offshore companies which are engaged in trading activities or provide services to third countries. Second, due to the falling rate of inflation, the effective CIT rate also fell because depreciation allowances are defined on a historic cost basis.

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[55]A tax credit system is more equitable from a distributional point of view. Under a deduction system, individuals at higher marginal rates derive greater absolute benefits than those at lower marginal rates.

[56]Calculated using CIT rates for 1995 as listed in Owens (1997).

Table 11. Hungary: Social Security Contribution Rates of Selected Countries, 1997[1]

Country	Program	Employers	Employees	Total	Individuals
Bulgaria	Total	42.0	12.0	54.0	--
	Social security	37.0	10.0	47.0	--
	Unemployment fund	5.0	2.0	7.0	--
Czech Republic	Total	36.0	12.5	37.5	43.1[3]
	Health insurance fund	9.0	4.5	13.5	13.5
	Social security fund	26.0	8.0	24.0	29.6
Hungary	Total[2,4]	43.0	11.5	54.5	--
	Pension fund	24.0	7.0	31.0	--
	Health insurance fund	15.0	3.0	18.0	--
	Unemployment insurance	4.0	1.5	5.5	--
Poland	Total	48.2	--	48.2	--
	Social security	45.0	--	45.0	--
	Unemployment fund	3.0	--	3.0	--
	Special labor fund	0.18	--	0.18	--
Romania	Total	30.0	4.0	34.0	--
	Social security	23.0	3.0	26.0	--
	Unemployment insurance	5.0	1.0	6.0	--
	Health fund	2.0	--	2.0	
Slovenia	Total	15.9	22.1	38.0	--
	Pension insurance	8.85	15.5	24.4	--
	Health insurance	6.36	6.36	12.7	--
	Unemployment	0.06	0.14	0.2	--
	Maternity leave	0.10	0.10	0.2	--
	Work-related accident insurance	0.53	--	0.5	--

Source: Deloitte Touche Tohmatsu International (1997).

1/ All contributions are made on gross salaries unless otherwise indicated.

2/ Employers also pay a fixed contribution of Ft 3,600 per employee.

3/ Individuals engaged in business activities make contributions on the basis of 35 percent of the previous year's income tax base.

4/ Employers contributions are based on gross salaries and other remuneration paid.

148. The standard VAT rate in Hungary is 25 percent. A number of products and services are charged at 12 percent (such as basic foodstuffs and household electric power) and exports and pharmaceuticals are zero rated. Financial services, education, health services, and postal services (which constituted 5 percent of the VAT base in 1998) are exempted. Revenues from VAT (as percentage of GDP) are closely in line with international trends, but the top VAT rate is well above the OECD and European Union (EU) average.

C. The Macroeconomic Effects of Labor Taxation: Theory and Evidence

Short–run effects

149. Labor taxes cause a wedge between the after–tax income of workers and the gross labor costs paid by employers (i.e., the producer wage). Personal income taxes and employees' social security contributions reduce the take–home pay of workers which discourages households' labor supply. Similarly, if consumption taxes increase, households' after–tax real wage declines, inducing them to substitute leisure for consumption. Employers' social security contributions increase firms' labor costs, which reduces their labor demand (or lowers the gross wage offered at a given level of employment). Accordingly, the *effective* tax wedge[57] is the relevant concept to measure the tax burden on labor. Table 12 shows the nominal and effective tax wedge for Hungary during 1992–99. Indirect taxes form only a small part of the effective tax wedge. From 1989 to 1995, the nominal tax wedge (expressed as percentage of employers' wage costs) increased by 15 percentage points. Since 1995, the nominal tax wedge has been declining and will reach a level of 57 percent of employers' labor costs (70 percent of employers' costs in effective terms) in 1999.

150. To study the short–run employment effects of labor taxation, a simple model of the labor market is developed which is set out in Appendix I.[58] To keep matters simple, a perfectly competitive labor market is assumed in which workers and firms take wages and prices as given.[59] This reflects the flexible nature of the Hungarian labor market in which the majority of wage agreements are concluded at the plant level. Both a labor demand and labor supply schedule—featuring various tax rates and social spending—are derived from firm and

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[57]The nominal tax wedge includes contributions for old–age pensions, health care, and unemployment insurance paid by both employers and employees. The effective tax wedge includes, in addition, VAT and excise taxes.

[58]The model extends Ligthart and van der Ploeg (1995) to allow for various tax instruments, social security contributions, and public spending.

[59]The model abstracts from important aspects of reality such as the effect of minimum wages and trade unions on equilibrium wages and employment.

Table 12. Hungary: Nominal and Effective Tax Wedges, 1989-99

	1989	1992	1993	1994	1995	1996	1997	Estimate 1998	Projection 1999
Employer pays	143.9	149.0	151.0	149.3	148.8	147.3	143.5	143.0	136.0
Social security contributions	43.9	44.0	44.0	44.0	44.0	42.5	39.0	39.0	33.0
Solidarity Fund	...	5.0	7.0	5.0	4.5	4.5	4.2	4.0	3.0
Wage Guarantee fund	...	...	...	0.3	0.3	0.3	0.3	...	...
Workers' gross wage	100	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pension and health contributions	10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	11.0
Solidarity Fund	...	1.0	2.0	1.5	1.5	1.5	1.5	1.5	1.5
Personal income tax 1/	14.6	18.4	20.9	24.0	32.5	32.5	29.1	30.7	28.7
Net wage	75.4	70.6	67.1	64.5	56.0	56.0	59.4	57.8	58.8
Nominal tax wedge	68.5	78.4	83.9	84.8	92.8	91.3	84.1	85.2	77.2
As percentage of employers' costs	47.6	52.6	55.6	56.8	62.4	62.0	58.6	59.6	56.8
As percentage of the net wage	90.8	111.0	125.0	131.5	165.7	163.0	141.6	147.4	131.3
Effective tax wedge	...	92.2	97.8	98.4	107.2	107.0	100.8	102.3	94.8
As percentage of employers' costs	...	61.9	64.8	65.9	72.0	72.6	70.2	71.5	69.7
As percentage of the net wage	...	130.6	145.7	152.6	191.4	191.1	169.6	176.9	161.3

Source: Ministry of Finance: and Fund staff estimates

1/ The effective PIT rate on progressively taxed incomes before tax credits.

household optimization behavior. The labor market model can be employed to study the effects of changes in PIT and social security rates on employment. The following equation defines the relative change in employment:

$$\frac{\Delta L}{L} = -\alpha_1 \frac{\Delta t_M}{1-t_M-t_W} + \alpha_2 \frac{\Delta t_A}{1-t_A-t_W} - \alpha_3 \left(\frac{\Delta t_W}{1-t_A-t_W} + \frac{\Delta t_E}{1+t_E} \right) - \alpha_4 \frac{\Delta G}{G}, \qquad (1)$$

where t_A, t_M, t_W, and t_E denote the average PIT rate, the marginal PIT rate, employees' social security contributions and employers' social security contributions, respectively. Public spending on transfer income is denoted by G. The α_is are composite coefficients of various elasticities:

$$\alpha_1 \equiv \rho \epsilon_{SC}, \quad \alpha_2 \equiv \rho \epsilon_{SI}, \quad \alpha_3 \equiv \rho \epsilon_{SU}, \quad \alpha_4 \equiv \rho \epsilon_{SG},$$

$$\rho \equiv \frac{\epsilon_D}{\epsilon_{SU} + \epsilon_D}, \quad \epsilon_j \geq 0, \quad \rho \geq 0, \quad \alpha_i \geq 0, \qquad (2)$$

where ϵ_{SU}, ϵ_{SC}, ϵ_{SI}, ϵ_{SG}, and ϵ_D denote the uncompensated wage elasticity of labor supply, the compensated wage elasticity of labor supply, the income elasticity of labor supply, the public spending elasticity of labor supply, and the wage elasticity of labor demand, respectively.

151. The labor market model shows that if the government cuts marginal personal income (or social security) taxes combined with a reduction in government transfers to workers, employment is affected through three channels. First, the increase in the real consumer wage rate causes workers to supply more hours of labor—the *substitution effect* of a wage change. Second, higher consumer wages increase households' income discouraging them from working additional hours—the *income effect* of a wage change. The net effect on employment is positive if households can easily substitute between consumption and leisure. Third, transfer income acts as a subsidy on leisure, so that a cut in government transfers will increase labor supply. If transfers are primarily provided to non–working pensioners and unemployed households, the increase in employment of a coordinated labor tax–transfer cut is smaller than when transfer income mainly accrues to working households because the third channel does not operate. Although it may seem counterintuitive, a reduction in average PIT rates depresses employment because the lower average rates raise after–tax income on intramarginal hours which induces households—through the income effect—to work less hours at the margin.

152. Statutory tax rates are not a good indication of tax incidence as the person upon whom the tax is levied may shift some (or all) of it to other parties. Tax shifting occurs if the price of what is taxed changes when the tax is imposed. Firms, for example, may be able to shift their tax burden to workers (through lower wages) or to consumers (via higher prices of final goods). The incidence of labor taxation depends on the wage elasticities of labor demand

and labor supply. Employers are better able to shift the burden of taxation to employees if households' labor supply is relatively inelastic and firms' labor demand is relatively elastic (see the tax–shifting coefficient, ρ, in equation (2)). Estimates of wage elasticities of labor demand and labor supply are lacking for Hungary. Empirical evidence for the U.S.—which features a flexible labor market like in Hungary—demonstrates that employers are only able to shift a part of the burden of labor taxes to employees. Alesina and Perotti (1994) show that taxes are less distortionary and thus have smaller effects on employment in economies where wages are predominantly negotiated at the plant level.[60]

Long–run effects

153. Labor taxes also affect employment through the household's intertemporal tradeoff between consumption today and consumption in the future. Heijdra and Ligthart (1998) show, using a dynamic general equilibrium model for a closed economy, that an increase in labor income taxation causes a reduction in short–run labor supply, interest rates and consumption. Interest rates, private saving, domestic investment, and employment decline along the transition path toward the long–run equilibrium, which is characterized by a lower level of output, less employment, and a smaller capital stock.[61] In the shortrun employees can shift a part of the burden of labor taxes to capital, but in the long run the incidence of labor taxes is fully borne by labor.

154. The direction of the effect of labor taxation on the level of income and the rate of economic growth is not clear cut. On the one hand, increases in taxes create distortions which may impede capital formation and economic growth, particularly at high rates of taxation.[62] On the other hand, a higher level of public goods provision increases the productivity of private physical capital and human capital.[63] Plosser (1992) finds that taxes on income and profits are growth depressing; an increase in the average income tax of 0.05 percent is associated with a reduction in the annual growth rate of more than 0.4 percentage points.

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[60]See Section D for values of the elasticities and some illustrative calculations of the employment effects of cuts in labor taxes.

[61]According to an OECD (1994b) study there is no clear evidence that the level of taxation does generally affect the level of household saving. Leibfritz et al. (1997) provide more details on how taxation may affect total saving and domestic investment.

[62]From the theory of public finance it is well known that the distortionary effect of taxes increases with the square of the tax rate.

[63]Barro (1990) has shown in a simple endogenous growth model in which public spending enters a constant returns to scale production function that the relation between the size of the government and the per capita growth rate is an inverse U–shaped curve. On the upward–sloping section of the curve, the efficiency enhancing role of public spending exceeds the distortionary effect of taxation.

Box 2: Tax Reform in the 1999 Budget

Personal income tax:

- *Reduction in individual income tax:* A new PIT schedule is introduced consisting of three tax brackets (20 percent, 30 percent, and 40 percent). The lower income bound of the top bracket is reduced from Ft 1.1 million in 1998 to Ft 1 million capturing a larger share of the taxable base in the top income band.

- *General tax credits are reduced*: 10 percent of wages and salaries up to a maximum of Ft 3,000 per month may be credited if incomes are not larger than Ft 1 million. In 1998, tax credits amounted to 20 percent of wages and salaries up to a maximum of Ft 4,200 per month.

- *Introduction of children's tax credits:* Families with one or two children can credit Ft 1,700 per child per month against personal income taxes owed and with three or more children receive a tax credit of Ft 2,300 per child per month. Families with seriously disabled children may credit Ft 2,600 per child per month.

- *Reduction in investment tax credits:* Rates are reduced from 30 percent to 20 percent and the amount is limited to Ft 200 thousand per year.

Social security contributions:

- *A reduction in employers' social security contribution rates:* Rates are reduced by 7 percentage points. Contributions to old–age pensions fall by 2 percentage points, social security payments earmarked for health insurance drop by 4 percentage points, and contributions to the unemployment benefit scheme decrease by 1 percentage point. To partially compensate for the loss of revenues from the rate cuts, the fixed health care contribution per employee is increased from Ft 2,100 in 1998 to Ft 3,600 in 1999.

- *An increase in employees' social security contribution rates:* The rate of contributions to old–age pensions increases by 1 percentage point.

- *Broadening of the contribution base*: An 11 percent health–care contribution is levied on dividend incomes which was previously exempt. Income from company cars will be subjected to a 25 percent health–care contribution. In addition, a 3 percent contribution to the unemployment benefit scheme applies to company cars.

Consumption taxes:

- *Increase in excises*: The specific rates of various excisable products increase on average by 11 percent. Cigarettes, petrol, vehicle gasoline, and fruit brandy will increase by more than the average.

- *Changes to VAT*: VAT rebates (up to Ft 400 thousand) are granted for the construction or purchase of new dwellings. Textbooks for primary and secondary education, diapers and oxygen for medical treatment are taxed at a zero rate. The VAT rate on pharmaceutical raw materials which can be used in other industries will increase from zero percent to 25 percent.

Various other studies—see Slemrod (1995) for an overview—have found a negative relationship but recent studies have demonstrated that this relationship is by no means robust.[64]

D. The Government's Tax Reform Proposals

155. The 1999 budget introduced various new fiscal measures. This section studies these measures and analyzes quantitatively the consequences for tax rates, employment, and income distribution.

156. Box 1 summarizes the new measures most of which pertain to reforms in the area of labor taxation. The main changes made to the PIT system were: the reduction in marginal rates, the introduction of tax credits for children, and the reduction in general tax credits. In addition, social security contribution rates were cut, the social security tax base was broadened, and means testing for family allowances[65] was abolished. Minor changes were made to VAT and the CIT system remained unchanged. The 1999 reform goes much further than the 1996 and 1997 reforms which mainly achieved the reduction of the top marginal PIT rate from 48 percent to 42 percent.

Effects on tax rates

157. The 1999 tax reform cuts the top marginal PIT rate from 42 percent to 40 percent. In addition, the number of tax brackets will be reduced from 6 to 3 simplifying tax administration considerably. Figure 19 shows the new and old rate structure. Weighted by the share of taxable base, the average of marginal PIT rates declines from 30.5 percent in 1998 to 28.2 percent in 1999. The latter measure neither takes into account any tax relief households enjoy from tax credits nor does it say anything about the effect on different types of households. To get an impression of the distributional consequences of the 1999 PIT reform, the effect on marginal and average PIT rates for three different groups of households are calculated.[66] Also, an attempt is made to determine the effect on the *effective* average tax rate.

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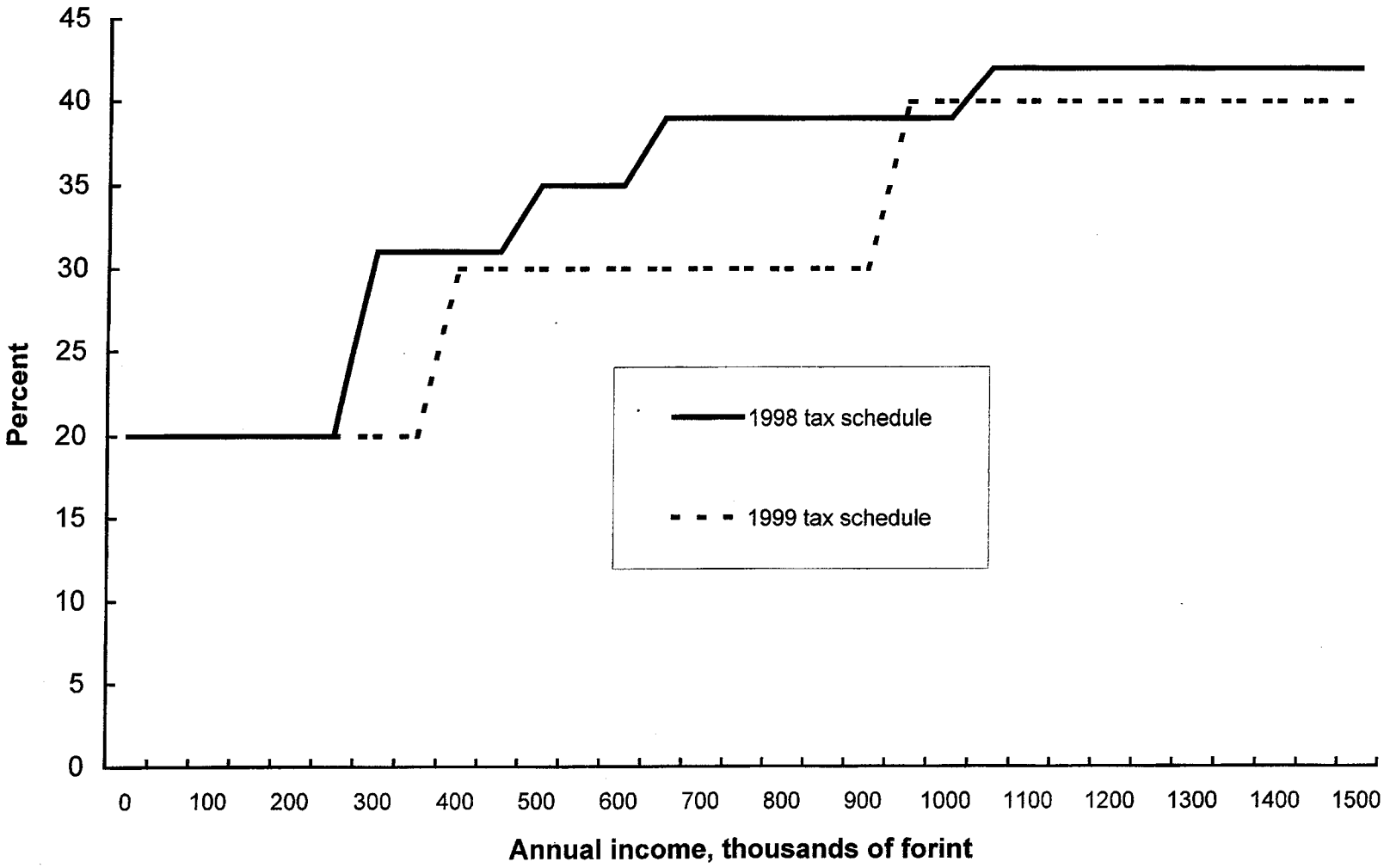
[64]Easterly and Rebelo (1993) point out that the "evidence that tax rates matter for growth is disturbingly fragile" as the negative correlation disappears when the initial level of income is controlled for.

[65]Granted to families with children up to the age of 16 (20 in the case of students) and those who are chronically ill regardless of age. The family allowance is a tax free amount which varies according to the number of children in the family.

[66]This analysis focuses only on tax rate effects and does not allow for changes in the tax base caused by changes in wages or employment. See the subsection on the revenue effects of tax reform for a further elaboration on this.

Figure 19. Marginal Personal Income Tax Rates



The latter incorporates the effect of a reduction in general tax credits, the introduction of children's tax credits, and the abolishment of means testing for family allowances in 1999. Therefore, families are also differentiated by the number of children they have.

Table 13. Effects of the 1999 Tax Reform on PIT Rates

		Without CA		With CA 1/		
Income 2/	Share 3/	ΔMR	ΔAR	ΔAR 0 Children	ΔAR 2 Children	ΔAR 3 Children
Low income	43.6	-2.0	-0.3	6.5	-3.5	-3.5
Middle income	30.9	-9.0	-4.6	-3.0	-7.5	-12.2
High income	25.5	-2.0	-4.1	-0.2	-12.0	-6.6
Average 4/		-4.2	-2.6	1.9	-6.9	-7.0

Key: MR=marginal tax rate, AR=average tax rate, and CA=credits and allowances.

1/ Includes general tax credits, children's tax credits, and family allowances.
2/ Low–income households (Ft 300,000), middle–income households (Ft 900,000), and high–income households (Ft 1,300,000).
3/ Taxable base in the respective tax bracket as estimated by the Ministry of Finance.
4/ Weighted by the share of taxable base in the respective tax band.

158. Table 13 summarizes the tax rate effects of the 1999 tax reform. Column 3 presents the change in the average tax rate without any credits and allowances whereas in columns 4–6 the change in the effective average tax rate is calculated. The main beneficiaries of the 1999 tax reform are middle– and high–income households with two or more children. They enjoy the largest cut in effective average rates making the tax system less progressive for them. Due to the elimination of means testing, high–income and middle–income households with less than three children receive family allowances whereas they did not get any under the old system. Low–income households without children are hurt the most. They experience an increase in their effective average PIT rate of 6.5 percentage points.

159. Two proposals pertaining to the introduction of tax credits to families with children were submitted to Parliament during preparation of the draft 1999 budget. The first proposal called for a high level of children's credit and no increase in family allowances, which was adopted in the 1999 budget (see Box 2). An alternative proposal called for a lower level of tax credit of Ft 1,300 per child per month for families with one or two children and Ft 1,700 per child per month for families with three or more children. Lower children's credits were complemented by an increase in family benefits of 8 percent as of May 1999.

160. Tables 13 and 14 show the effects of both proposals on the effective average PIT rates for various types of households. Clearly, the alternative proposal (Table 14) provides more tax relief on average than the adopted proposal. In particular, the effective tax burden of low–income households would be reduced by more than under the high tax credits scenario because they benefit from the increase in family allowances. Moreover, the alternative proposal would put less pressure on the budget. The Ministry of Finance had estimated that the high tax credits scenario would cost the budget Ft 36 billion against Ft 31.2 billion for the alternative proposal.

Table 14. Effect of the Alternative Proposal on Effective Average PIT Rates 1/

Number of children	0	1	2	3	4
Low income	6.5	0.2	-5.5	-6.5	-7.5
Middle income	-3.0	-0.5	-7.1	-10.8	-13.4
High income	-0.2	-6.3	-11.7	-5.6	-7.4
Average 2/	1.9	-3.1	-7.6	-7.6	-9.3

1/ Alternative proposal compared to the past rates.
2/ Weighted by the share of taxable base in the respective tax band.

161. The 1999 tax reform reduces employers' social security contribution rates by 7 percentage points whereas employees' rates increase by 1 percentage point. However, the fixed health care contribution employers must pay per employee increases by 71 percent thereby attenuating the effective reduction in contribution rates. However, the contribution base is broadened to include non–wage income. As of January 1999 dividend income and income from the use of company cars are subjected to an 11 percent health care contribution.

Employment effects

162. To estimate the employment effect of the 1999 labor tax reform, ideally one would like to employ a computable general equilibrium model of the Hungarian economy. However, this is beyond the scope of the present paper. To get a feel for the likely size of the tax impact on employment, a partial equilibrium approach is taken which uses the model developed in the previous section. Plausible values of wage elasticities of labor supply and labor demand, taken from the literature, are substituted in equations (1)–(2) together with changes in marginal and average PIT rates and changes in social security taxes.

163. Because Hungary's labor market is quite flexible, estimates of U.S. elasticities are employed as proxies for the true values. A high and low scenario for the wage elasticity of labor demand is considered, the results of which are presented in Table 15.[67] Tax shifting by employers—defined previously in (2)—is small in the low elasticity scenario, but reaches a value close to unity for a wage elasticity of labor demand of about 0.3. In that case, employers are able to shift almost the entire burden of labor taxes to employees. The average employment effect is larger in the high elasticity scenario, but is generally small. Employment of middle–income households is affected the most by the cut in labor taxes in both scenarios. The labor supply response of high–income households is the smallest as they experience a larger negative income arising from the reduction in average tax rates.

Table 15. Employment Effects of the 1999 Reform

(In percentage points)

	low ϵ_D	high ϵ_D
Low income	0.08	0.18
Middle income	0.09	0.20
High income	0.06	0.15
Weighted average 1/	0.08	0.18
Tax shifting coefficient	0.4	0.9

1/ Weighted by the share of taxable base in the respective tax band.

Revenue effects

164. Cutting personal income taxes and social security contributions does not necessarily lead to lower revenues if initially labor taxes are set beyond levels that maximize total

[67]The low elasticity of labor demand scenario takes ϵ_D=0.02 from Alesina and Perotti (1994) and the high elasticity of labor demand scenario takes ϵ_D=0.30 from Hamermesh (1993). The following labor supply estimates for the U.S. are used: ϵ_{SU}=0.03, ϵ_{SC}=0.95, and ϵ_{SI}=0.98 (Hausman (1985)). Other empirical studies of married men's labor supply find zero and in some cases even negative uncompensated wage elasticities of labor supply for the U.S. and some European countries. In practice, these aggregate elasticities vary in value between different groups depending on hours worked and family composition. The effect of public spending on employment is abstracted from.

revenues. Then, the economy operates on the downward–sloping section of the Laffer curve.[68] No empirical studies have estimated the Laffer curve for Hungary, but revenue losses associated with labor tax rate cuts in previous years indicate that the Hungarian economy is likely to be on the correct side of the Laffer curve.

165. The 1999 fiscal reform aims at a reduction in the overall tax burden (as measured by the revenue to GDP ratio) by 1.6 percentage points whereas expenditures are budgeted to decline by 2 percentage points so that the fiscal balance improves slightly compared to the previous year. The Ministry of Finance has budgeted a reduction in the ratio of labor tax revenues (including social security taxes) to GDP of 0.9 percentage point as a result of the 1999 tax reform (see Table 9). However, the ratio of PIT revenues to GDP does not change despite the lower PIT rates because a part of the revenue loss due to a fall in tax rates is recouped by a decline in tax credits. Tax credits have been projected to decline by 9 percent because of the large fall in general tax credits which exceeds the increase in tax credits from the introduction of children's credits.[69]

E. Coordinated Tax Reform: Offsetting the Revenue Loss

166. The Hungarian government intends to bring down the burden of labor taxes in the medium term. Given the government's aim to close the fiscal gap there is limited latitude for revenue losses unless expenditures are further cut. In search of alternative sources of revenue to compensate for the revenue loss of labor tax cuts, three compensatory revenue sources will be studied which have received attention in the European tax reform debate in the early 1990s: (i) consumption taxes, (ii) environmental taxes, and (iii) corporate income taxes.

Consumption taxes

167. Changing the tax mix from personal income taxes toward consumption taxes was on the tax reform agenda in many OECD countries during the last decade. It was argued that this would increase work incentives as after–tax wages were expected to increase. However, the labor market model (see Appendix I) shows that consumption taxes have adverse effects on employment as they are "implicit taxes" on labor income. Higher consumption taxes decrease the *real value* of take–home pay which reduces the household's willingness to supply an additional hour of labor. However, from an efficiency point of view, broadly–based consumption taxes are a better device to raise revenues. Due to their broader tax

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[68]Intuitively, a rise in the labor tax rate has two effects on public revenues. First, a *tax rate effect* which increases public revenues. Second, a negative *tax base effect* as higher tax rates erode the tax base through lower employment. On the downward–sloping section of the Laffer curve the second effect dominates the first.

[69]The revenue loss due to tax credits in 1999 amounts to 27 percent of progressive personal income taxes before credits.

base—including transfer income and capital income in addition to net labor income—they are generally less distortionary than labor taxes. Moreover, consumption taxes are less easy to avoid and evade than personal income taxes.

168. Converting personal income taxes to general consumption taxes may have undesirable distributional consequences. Higher consumption taxes reduce pensioners real income compared to labor taxation as pensioners will benefit from the transfers but do not bear the burden of labor taxes. This conclusion depends crucially on the assumed absence of wage–linked transfers. Because VAT rates in Hungary are high by international standards and a large share of transfer income is provided to low–income households outside the labor market, switching from labor to consumption taxation is not a viable option in Hungary.[70] Indeed, Hungary needs to reduce the 25 percent VAT rate so that its VAT system will not hinder Hungary's aim of EU integration. As Vamosi–Nagy et al. (1998) have suggested, revenue losses associated with reductions in the top VAT rate could possibly be offset by an increase in the middle VAT rate of 12 percent.

Environmental taxes

169. The Hungarian Environmental Action Plan calls for the introduction of air pollution taxes in the near future which will be discussed in Parliament this year.[71] Pollution taxes improve economic efficiency by charging polluters with a price for the damage they cause. Accordingly, the (too low) private marginal costs of polluting activities are raised to the level of the social marginal costs. Besides internalizing pollution externalities, pollution taxes generate government revenues as an additional benefit. Recently, economists have suggested using the revenues from environmental taxes to cut distortionary labor taxes in a revenue–neutral fashion. This may yield a "double dividend:" (i) an improvement in environmental quality, and (ii) higher employment through a less distortionary tax system (Pearce (1991), Bovenberg and de Mooij (1994), and OECD (1995)). Ligthart (1998) argues that such a double benefit can only be reaped if the burden of green taxes can be shifted to those outside the labor market such as capital owners, transfer recipients, and foreign energy producers. However, this is likely to come at the cost of a distortion in the income distribution.

170. In various European countries the double dividend hypothesis was eagerly embraced by green lobbies to push for politically unpopular environmental taxes. Resistance to green taxes is based on their adverse effect on the income distribution and the existing pattern of international competitiveness. Energy taxes are generally regressive as they disproportionally

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[70]Newbery and Révész (1997) have analyzed the distributional impact of revenue–neutral indirect tax reforms that yield the same set of relative consumer prices in each year. They found that these reforms had an adverse effect on the income distribution during 1989–96.

[71]The main environmental instruments are penalties and (fixed) charges on environmentally damaging products, the revenues of which are earmarked for environmental purposes.

hurt low income households which spend a relatively large share of their income on energy. Moreover, energy taxes raise production costs of energy–intensive firms. This weakens their competitiveness and may induce capital flight in the long run. Therefore, the OECD "Jobs Study" (1995) proposes a coordinated introduction of energy taxes in all EU countries. In 1996, however, the Netherlands unilaterally introduced an energy tax on households and small firms.

171. Some empirical studies—based on large scale macroeconometric models—have found small but positive employment effects of green tax reforms for various European countries (OECD (1997)). Simulations with the European Community's QUEST model for the EU as whole show that a reduction in social security contributions by 10 percent, financed by an increase in carbon taxes decreases unemployment by 0.9 percentage points.[72] Other studies based on simulations with general equilibrium models have found negative employment effects (see Goulder (1995) for an overview). No systematic sensitivity analysis has been performed yet to unravel the channels underlying the differences in results.

172. Transition economies face several difficulties beyond the typical problems encountered in market economies in adopting a system of eco–taxes.[73] First, administrative limitations inherited from centralized planning may curtail the effective administration and enforcement of green taxes. Second, the provision of energy below market prices contributes to wasteful energy use by households and firms. Third, many enterprises retain monopoly power which limits the incentive effects of environmental taxes because they can pass on any increase in production costs to consumers via higher prices. Moreover, many enterprises, even after privatization, lack sufficient information on the technological possibilities for pollution control.

Corporate income taxes

173. When deciding on the optimal level of CIT policy makers need to strike a balance between two opposing forces. On the one hand, they want to sustain tax revenue. On the other hand capital is highly mobile, so increasing tax rates on it may lead to capital flight and governments also try to boost investment by providing an attractive tax climate to both foreign and domestic investors. Hungary has modeled its CIT system along the second line. Consequently, the marginal excess burden of capital taxation is significantly below the marginal excess burden of labor taxation. Capital is thus likely to be "undertaxed"—particularly compared to the U.S. tax system—and may promote the substitution of capital for labor in an environment of already high unemployment.

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[72]Public revenue from environmental taxes is still limited. They typically account for less than 1 percent of GDP in EU countries (Owens (1997)).

[73]See OECD (1994a) for further details on this issue.

174. Hungary promotes investment via low nominal CIT rates and various special investment incentives which erode the base of the CIT. In 1995, the general CIT rate was lowered from 36 percent to 18 percent. A tax of 20 percent applies to dividends. Profit income distributed as dividends are effectively taxed at a rate of 34.4 percent which creates an incentive to reinvest earnings as these are only taxed at 18 percent.[74] Although, the effective tax on income taken out as dividend is close to the implicit rate[75] on progressively taxed personal income (31 percent in 1998), the tax burden on labor significantly exceeds this value due to social security taxes. To make it less attractive for enterprises to take out income in the form of dividends rather than wage income, the dividend tax is raised to 35 percent if dividends withdrawn exceed twice the basic rate of the National Bank of Hungary.

175. Tax incentives granted to particular sectors may be justified on the grounds of domestic market failures—if the industry under consideration generates positive externality to the rest of the economy. These externalities are hard to measure and it is therefore difficult to determine how much government support a particular industry should receive. In the absence of any spillovers, however, investment incentives misallocate resources since they create effective tax rates that differ across sectors or regions. Broadway and Shah (1992) conclude in their review of studies on the impact of tax incentives in various developing countries that these incentives yielded windfall gains to investments that would have occurred anyway.

176. Broadening the base of the CIT by eliminating special tax incentives would generate additional revenues. Tax reforms in OECD countries since the mid–1980s were aimed at reducing the extent of tax incentives and broadening the CIT base. In the early 1990s, the Hungarian tax law repealed various CIT exemptions and tax incentives, but this trend was reversed in 1996 when the range of activities that qualified for tax credits was significantly expanded to exports, certain investments, and underdeveloped regions.

F. Conclusion

177. Hungary's tax system taxes labor income heavily. Marginal labor taxes are high by international standards and the labor tax base is narrow due to various exemptions and tax credits. The main reason of the high marginal tax rates is the high social security contribution rates, particularly those levied on employers, which are needed to sustain high levels of social spending. High labor tax rates have caused a substitution of capital for labor in a setting of already high rates of unemployment.

178. Since it was laid down in 1988, the tax system of Hungary has been revised on almost a yearly basis. Tax reforms in the past three years were aimed at reducing the labor tax burden

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[74]Retained earnings are favored anyway as Hungary employs a classical system of corporate income taxation with double taxation: enterprises pay taxes on income taken out as dividends and households pay a tax on dividend income.

[75]The ratio of CIT revenues to the CIT base.

to foster employment and economic growth. This chapter has studied the reforms introduced in 1999 which consist of a further reduction in the burden of labor taxation—through a reduction in marginal rates and a broadening of the tax base—in line with the past trend and tax reforms pursued in other countries. It was shown that the 1999 reform increases after–tax income of middle– and upper–income households. The employment effects of cuts in labor taxes are likely to be relatively small, pointing at the need for further reform.

179. Unless the government undertakes a major expenditure reform, tax reform aimed at a further reduction in marginal labor tax rates will widen the fiscal gap. Increases in corporate income tax rates and the elimination of various investment incentives may (partially) offset revenue losses associated with reductions in labor taxes.

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The Employment Effects of Labor Taxation: A Theoretical Model

1. In this Appendix a simple analytical model is developed to study the employment effects of government spending, labor taxation, and consumption taxation. In addition, the model touches upon the issue of tax incidence. It is shown under what conditions the incidence of labor and consumption taxation falls on employees. The model assumes a perfectly competitive labor market that fully clears. Below, the three sectors of the economy—firms, households, and the government—are described.

A. The Analytical Model

2. Consider a representative firm which supplies a homogeneous good, Y, which is produced under constant returns to scale. The production function is given by $Y=aF(L)$, with properties $F_L>0$ and $F_{LL}<0$, where L denotes employment and a represents economy-wide productivity. The firm maximizes profits, Π, under perfect competition by choosing employment:

$$\Pi \equiv paF(L) - w(1+t_E)L, \tag{1}$$

where p is the price of final output, w is the gross wage rate and t_E is the employer's tax on labor (i.e., social security contributions). Profit maximization yields the following optimality condition: $aF_L(L)=w(1+t_E)/p\equiv w_P$ which says that the marginal productivity of labor should equal the real producer wage (inclusive of tax). Rewriting this expression yields the firm's demand for labor: $L^d=l^d(w_P,a)$. To study the comparative static effects of changes in tax rates, the model is linearized around an initial position. Denote a relative change by a "~", e.g., $\tilde{w}=dw/w$, except $\tilde{t}_E=dt_E/(1+t_E)$. The equation describing the relative change in labor demand is given by:

$$\tilde{L}^d = -\epsilon_D\left[\tilde{w} - \tilde{p} + \tilde{t}_E - \tilde{a}\right], \quad \epsilon_D \equiv -\frac{\partial l^d}{\partial w_P}\frac{w_P}{L^d}>0, \tag{2}$$

where ϵ_d denotes the wage elasticity of labor demand. A rise in the employer's tax on labor shifts the demand curve for labor to the left thereby reducing employment at a given (tax exclusive) real wage. A favorable productivity shock is equivalent to a reduction in employers' payroll taxes, shifting the labor demand curve to the right, thereby increasing real wages for a given level of employment.

3. The representative household derives utility, U, from consumption, C, and leisure, $V \equiv 1-L$:[76]

$$U \equiv U(C,V), \quad U_C>0,\ U_{CC}<0,\ U_V>0,\ U_{VV}<0. \tag{3}$$

Households maximize utility subject to the household budget constraint: $p(1+t_C)C=w(1-t_A)L+G$, where G denotes lump-sum transfers from the government (which is assumed to be tax exempt), t_C is a consumption tax, and t_A is the average labor tax levied on employees' labor income.[77] No separate social security tax on employees is distinguished because its effects are qualitatively similar to changes in the marginal income tax rate. To keep matters simple, households' labor income is assumed to be taxed according to a single marginal tax rate, t_M, of which T_0 is tax exempt, so that tax revenue from labor income is given by: $-T_0+t_M wL$.[78] With a single labor tax rate and no tax exempt threshold (or zero-rated income band), average tax rates and marginal tax rates would theoretically coincide. However, Hungary does not have a zero-rated income band. Obviously, in a tax system of various tax bands—as is the case for Hungary—average and marginal rates always differ.

4. From the household's optimization problem the following expression characterizing the optimum can be derived: $U_V/U_C = w_C \equiv w(1-t_M)/p(1+t_C)$, where w_C denotes the real consumer wage. Workers equate the marginal rate of substitution between leisure and consumption to the real consumer wage—which features the marginal tax rate rather than the average tax rate since the former is the relevant tax rate for the consumer's decision to supply an additional hour of labor. From this and the household budget constraint, the labor supply equation, $L^s=l^s(w_C,G)$, results which features the consumer wage and transfer income as arguments. In relative changes this yields:[79]

$$\tilde{L}^s = \epsilon_{SU}\tilde{w} - \epsilon_{SP}(\tilde{p}+\tilde{t}_C) - \epsilon_{SC}\tilde{t}_M + \epsilon_{SI}\tilde{t}_A - \epsilon_{SG}\tilde{G}, \tag{4}$$

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[76]The number of hours available to the household has been normalized to unity to keep matters simple.

[77]Because the fixed capital stock is rented from households, profit income accrues to working households. For simplicity, it is assumed that profits are not included in the household's budget constraint and thus do not affect its labor supply decision.

[78]Government expenditures consist of transfer income which are financed by taxes on labor income and consumption: $G+T_0=(t_E+t_A)wL+t_C C$.

[79]The following definitions are employed: $\tilde{t}_M \equiv dt_M/(1-t_M)$, $\tilde{t}_A \equiv dt_A/(1-t_A)$, and $\tilde{t}_C \equiv dt_C/(1+t_C)$.

where the elasticity of labor supply with respect to transfer income is $\epsilon_{SG} \equiv \alpha_L(1-\omega)>0$, ω denotes the share of net wage income in total household income, $\alpha_L \equiv V/(\omega V+L)>0$ measures the intensity of leisure consumption, and the wage elasticity of labor supply is given by:

$$\epsilon_{SU} \equiv V(\sigma-\omega) = \epsilon_{SC} + (-\epsilon_{SI}), \quad \sigma \equiv \frac{d\ln(C/V)}{d\ln w_c}>0, \tag{5}$$

where $\epsilon_{SC}=V\sigma>0$, $\epsilon_{SI}=V\omega>0$, $\epsilon_{SP} \equiv V(\sigma-1)$ stand for the compensated wage elasticity, the income elasticity, and price elasticity of labor supply, respectively.[80] A higher wage or a lower consumer price exerts two (converse) effects on labor supply. First, it makes leisure more expensive and thus increases the supply of labor (i.e., the substitution effect, represented by ϵ_{SC}). Second, households feel more wealthy, inducing them to consume more leisure and thus supply less labor (i.e., the income effect, denoted by ϵ_{SI}). An upward sloping labor supply curve—with $\epsilon_{SU}>0$—is obtained if the substitution effect dominates the income effect. This requires that the elasticity of substitution between consumption and leisure, σ, is sufficiently large (i.e., $\sigma>\omega$). Accordingly, the larger σ, the more elastic the labor supply curve.

5. An increase in the marginal labor tax rate shifts the labor supply curve to the left thereby decreasing the number of hours supplied at a given real wage. However, an increase in the average tax rate shifts the labor supply curve to the right and thus raises the number of hours worked at a given real wage rate. This somewhat counterintuitive result can be explained by the *income effect* in labor supply: household will work harder to compensate for the income loss. Conversely, through the income effect, a rise in government transfers depresses labor supply, particularly if the share of transfers in household income is large and a lot of leisure is consumed by the household.

B. The Effects of Labor Taxation on Employment and Wages

6. There are several ways to close the model. By assuming full wage flexibility it is assured that labor market equilibrium, $L^s=L^d$, is obtained implying that any observed unemployment is of voluntary nature. Alternatively, the disequilibrium interpretation assumes a real consumer wage which is exogenously fixed above a level that ensures full employment.[81] Accordingly, employment is determined by labor demand and unemployment is the defined by $(L^s-L^d)/L^d$. In the following a fully clearing labor market is assumed.

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[80]Without transfer income, ϵ_{SU} and ϵ_{SP} are equal to $V(\sigma-1)$.

[81]The inflexibility of real consumer wages can, for example, be explained by the presence of trade unions who set a wage above the market clearing level to maximize the utility of its members.

7. To study the employment and wage effects of taxation, labor market equilibrium is perturbed by small changes in the government's transfer and taxation instruments. From this, the relative change in employment can be derived:[82]

$$(\epsilon_{SU}+\epsilon_D)\tilde{L} = -\epsilon_D\left[\epsilon_{SP}\tilde{t}_C + \epsilon_{SC}\tilde{t}_M - \epsilon_{SI}\tilde{t}_A + \epsilon_{SU}(\tilde{t}_E - \tilde{a}) + \epsilon_{SG}\tilde{G}\right], \quad (6)$$

and the relative change in the wage rate is given by:

$$(\epsilon_{SU}+\epsilon_D)\tilde{w} = \epsilon_{SP}\tilde{t}_C + \epsilon_{SC}\tilde{t}_M - \epsilon_{SI}\tilde{t}_A - \epsilon_D(\tilde{t}_E - \tilde{a}) + \epsilon_{SG}\tilde{G}. \quad (7)$$

A measure of the progressivity of the labor tax system is given by the elasticity of after-tax labor income with respect to pre-tax income:

$$z \equiv \frac{\mathrm{d}\log(W_N L)}{\mathrm{d}\log(WL)} = \frac{1-t_M}{1-t_A}, \quad W_N = W(1-t_A). \quad (8)$$

An increase in the marginal tax rate, $\tilde{t}_M>0$, combined with an increase in the tax exempt threshold to keep the average tax rate constant so that taxes become more progressive (i.e., $\tilde{z}>0$) decreases employment and raises the wage rate through the negative *substitution effect* in labor supply. However, a higher average tax rate, $\tilde{t}_A>0$, through a decline in the tax exempt threshold, raises the progressivity of the tax system, raises employment and depresses the wage rate. Employment declines and wages are pushed up if the government increases transfers or raises consumption taxes. Lowering the marginal labor tax reduces the progressivity of the tax system and increases employment.

8. The model can be easily used to study the issue of tax incidence which draws on the notion that the agent upon whom the statutory tax is levied is not necessarily the person who effectively pays the tax. Assume now, for simplicity, that the personal income tax is characterized by a flat rate without a tax exempt threshold so that the marginal and average tax on labor are equal. To simply matters further it is assumed that households do not receive any transfers from the government and productivity does not change. From the model, the relative change in the real producer and consumer wage follow:

$$\tilde{w}_P = (1-\rho)(\tilde{t}_E + \tilde{t}_A + \tilde{t}_C), \quad \tilde{w}_C = -\rho(\tilde{t}_E + \tilde{t}_A + \tilde{t}_C)<0, \quad (9)$$

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[82]In the following, changes in the producer price are omitted.

which depends on the tax-shifting coefficient, $\rho \equiv \epsilon_D/(\epsilon_{SU}+\epsilon_D)>0$, and the relative change in the "tax wedge" which is defined as the sum of the respective tax rates. The tax-shifting coefficient measures the degree to which employers are able to shift the burden of labor taxes to employees. Tax shifting crucially depends on the values of the wage elasticities of labor demand and supply. Under "normal" assumptions about labor supply and demand elasticities, the tax-shifting coefficient takes on values in the range between zero and one. Tax shifting by employers is large—with ρ close to unity—if labor supply is relatively inelastic and labor demand is relatively elastic. In that case, the consumer wage decline is large whereas the change in employment is small. A number of special cases can be distinguished. In case of a vertical labor supply curve, $\rho=1$, an increase in the labor tax rate is fully borne by employees implying that the consumption wage falls one-for-one with the increase in the labor tax rate. However, employees can fully escape the burden of labor taxes if labor supply is perfectly elastic but employment declines a lot. This is equivalent to the case of a rigid real consumer wage at the level of full employment. In the rare case of a backward bending labor supply curve—$\epsilon_s^u<0$ and $\rho>1$— employers can overshift the burden of labor taxes.

9. In a standard neoclassical labor market model the "Invariance of Incidence Proposition" (IIP) holds which says that it does not matter for the effect on employment, consumer wages, and producer wages whether the statutory labor tax is levied on employers or on employees. Ergo, swapping higher employees' social security contributions for an equal decrease in employers' social security contributions does not affect economic efficiency; consumption wages and the level of employment remain unaffected. However, the IIP breaks down when some of the underlying assumptions are relaxed. Allowing for a low degree of competition on the labor market resulting from rigidities such as regulations (i.e., minimum wages) and trade unions, invalidates the proposition. In such a case, employees can shift a larger part of the tax burden than under perfect competition. Similarly, capital income, which is taxed under the personal income tax but not under employers' social security taxes modifies the proposition. Swapping an increase in the personal income tax for an equal decrease in employers' taxes would alleviate the tax burden on labor encouraging a substitution of labor for capital in production. Because personal income taxes are progressive whereas social security taxes are generally levied at a flat rate, shifting the revenue raising task from social security taxes to personal income taxation may increase the tax burden on labor.

Hungary: Summary of Major Taxes as of November 1, 1998

Tax	Description of Tax	Deductions and Exemptions	Rates
1. Personal income tax (Act 97 of 1995 on personal income tax)	**Taxpayers:** Residents and non-residents who receive income in Hungary. Each individual in a family is taxed separately. **Object of Taxation:** Total income received during the tax year. This can be, for example, cash, and credited amounts of the value benefits received in kind. Residents are taxed on their world-wide income. Non-residents are taxed on their Hungarian source income only. Private entrepreneurs may pay taxes using three methods: (1) Those who determine their taxable incomes through an itemized accounting of incomes and costs, who pay corporate income taxes, pay 20 or 35 percent of their after-tax income (see 2). (2) Under certain conditions presumptive taxation may be elected (see below);	**Tax credits**: The calculated tax is reduced by: - The first 20 percent of wages and salaries up to a maximum of Ft 4,200 per month; - 25 percent of pension contributions and private pension fund membership fees; - Old age pensions, child care aid, child maintenance allowances, nursing fees, and scholarships; - 30 percent of tuition fees of listed high schools (up to a maximum of Ft 60,000 per year); - 20 percent of annual savings deposits made to buy or construct a house mortgage payments made by a bank (credit may not exceed Ft 60,000); - A maximum of Ft 100,000 per year of individually grown agricultural produce; - 25 percent of income from intellectual activity up to a maximum of Ft 50,000; - Scholarships of students in institutions of higher education are tax exempt; - Donations to associations of public interest are 30 or 35 percent of the donation paid by the donor; - 20 percent of premiums for private life insurance or pension plan up to a maximum of Ft 50,000; - 30 percent of the increment of the amount invested in a business as compared to the previous year; **Investment tax preferences** applying to entrepreneurial income are as follows: (a) 50 percent: On investments exceeding Ft 1 billion: - to establish a commercial site yielding an increase in gross receipts of at least 25	The following rates apply to aggregate income: Taxable income — Tax + % on excess over the lower amount 0 - 250,000 — 0 — 20 250,001 - 300,000 — 50,000 — 22 300,001 - 500,000 — 61,000 — 31 500,001 - 700,000 — 123,000 — 35 700,001 - 11,00,000 — 193,000 — 39 Over 11,00,000 — 349,000 — 42 The following rates apply to other sources of income: - Dividends are taxed at 20 percent. Excess dividends (i.e., if the dividends withdrawn exceed twice the basic rate of the central bank that is valid on the first day of the tax year) are taxed at 35 percent. - Capital gains (from securities and income from options and futures) and incomes from leasing land are taxed at 20 percent. - Benefits in kind are taxed at 44 percent. The payer of the benefits is liable to the tax. - Use of the company cars for private purposes is subject to a fixed monthly payment depending on the purchase price and age of the vehicle.

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
(Continued) **Personal income tax**		percent (an a minimum of Ft 600 million); - to establish a production site which yields an increase gross receipts by 5 percent of the value of the investment; (b) 100 percent: - in key zones (where unemployment exceeds 15 percent) if the gross receipts increase by 5 percent of the value of the investment; - in entrepreneurial zones if the gross receipts increase by 1 percent compared to the preceding year. **Exemptions**: - various social amenities (aid, child care fees, burial assistance, financial support to the unemployed, etc.); - housing support (mortgage payments); - amounts received from foundations and charitable organizations; - exemptions related to economic activity; e.g., per diem paid by international organizations, the income of foreign students derived from work, various awards, gifts, compensation for meals (up to Ft 400,000 per year), etc.; - cost reimbursement types of income such as housing support for the armed forces, cash reimbursement for working clothes, etc.; - government assistance for natural damage or disasters, compensation for accidents and damages, the amount of risk and life insurance in the case of complete and irreversible loss of ability to work, etc.; - income from inheritance contracts, inheritances, gifts from individuals, gains from the sale of property and on bonds issued prior	

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
(Continued) **Personal income tax**		to Jan. 1, 1988, and interest and dividends on certificates of property value redeemed by the state, etc; - benefits received in kind; educational, health and welfare benefits from the government and churches, vacation checks, textbook support, meal support, accident prevention and health protection, meals supplied by employers up to Ft 2,200 per month, merchandise certificates up to Ft 1,400 per month, gifts to retirees up to Ft 10,000, etc. - Interest income from savings deposits	
Presumptive tax			
a. Average tax (Act 117, 1995 on personal income tax)	**Taxpayers:** Private entrepreneurs may opt for presumptive taxation under certain conditions, such as having been a private entrepreneur for more than 183 days with an annual turnover not greater than Ft 3.5 million (in case of retailers not greater than Ft 15 million). For small scale agricultural producers, receipts may not exceed Ft 4 million. **Taxable income**: 20 percent of receipts for private entrepreneurs.	**Reduced taxable base**: - Taxable income is 13 percent of turnover if sales are to final consumers and 7 percent in case of retail activity. - Taxable income of agricultural producers growing crops is 15 percent of receipts and 6 percent in case of stock keeping.	Taxable base: Rate up to 200,000 12.5 200,001 - 600,000 25.0 600,001 - 800,000 30.0 over 800,000 35.0
b. Itemized average tax (Act 117, 1995 on personal income tax)	**Taxpayers**: May be chosen by: hairdressers, beauticians, taxi drivers, knife sharpeners, basket weavers, folk and cottage industry weavers, small scale providers of commercial accommodations.		A fixed annual amount varying by type of economic activity: - Taxidrivers pay Ft 120,000 per year, - People in the business of renting commercial accommodations pay Ft 24,000 per year per room; and - others pay Ft 100,000 per year.

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
2. Corporate income tax and dividend tax (Act 81, 1996 on corporate income tax and dividend tax)	**Taxpayers:** Corporate Income Tax: domestic entities (domestic corporations, cooperatives, state-owned enterprises, attorneys' offices, organizations partly owned by employees, non-profit public organizations, private and public foundations, and social organizations); Foreign entrepreneurs are taxed on income from entrepreneurial activity conducted in Hungary. Foreign organizations pay tax on income gained in Hungary as stipulated in the law. **Object of taxation:** - Profits of domestic entities assessed for the calendar year; - Receipts minus costs of foreign entrepreneurs. If profits areless than 12 percent of accounted costs then 12 percent of the accounted costs will form the tax base. Dividend withholding tax: Taxpayers receiving domestic and foreign dividends	**Exemptions:** - foundations, public foundations, social organizations, housing cooperatives not qualifying as non-profit public organizations (if their income from the entrepreneurial activity is not more than Ft 10 million and does not exceed 10 precent of total receipts); - voluntary mutual insurance accounts (if receipts from entrepreneurial activity do not exceed 20 percent of the total receipts). **Deductions from the taxable base:** - a monhtly sum of Ft 6,000 after employing one skilled worker trainee; - the social security contributions of a previously unemployed person (for up to 12 months); - Ft 3,000 monthly on employment of a disabled employee; - the entire amount of donations to organizations of public benefit and 1.5 times the amount given to support an organization of particular public benefit (to a maximum of 20 percent of pre-tax profits with the total exemption not exceeding 25 percent of pre-tax profits). **Investment tax incentives:** Tax credits of 50 percent: - if investments are at least Ft 1 billion and turnover grows by at least 25 percent and Ft 600 million to expand commercial accommodations; - if turnover increases by at least 5 percent of the value of production investments	The corporate income tax is 18 percent. A special rate of 3 percent applies to activities conducted abroad (i.e., offshore companies and joint-stock companies with 100 percent foreign ownership which service third countries). The withholding tax on dividends is 20 percent and recognizes the rates that apply under the treaty preventing double taxation.

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
(Continued) **Corporate income tax and dividend tax**		Tax credits of 100 percent: - for production investments in special zones (where unemployment exceeds 15 percent) if receipts grow by 5 percent of the value of investment; - for production investments in entrepreneurial zones if turnover grows by 1 percent compared to the preceding year; - in economically underdeveloped areas if investments made in 1998 exceed Ft 3 billion and receipts increase by 5 percent of the investment, and the average number of employees increases by 100 persons, compared to the year prior to the time the investment was made; - for production investments of Ft 10 billion, applying for 10 years, if production is increased by 5 percent of the value of the investment, and the number of employees is increased by 500 persons compared to the year prior to the time the investment was made.	

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
3. Value-added tax. (Act 74 on general sales tax).	**Taxpayers**: Individuals, legal entities and organizations that are not legal entities. **Object of taxation**: The before-tax sales price of goods and services sold domestically. In the case of imports, the taxable base is the value of imports (c.i.f.) plus customs duties, customs clearance fees, and excise taxes. The VAT act regulates certain products and services (such as commercial accommodation provision, agricultural sales, retail sales in shops, tourist activity, and the sales of recycled products, works of art, collections and antiques) in a manner that differs from the general rules.	**Exemptions:** - Private entrepreneurs whose turnover does not exceed Ft 2 million may opt to be exempt. - Certain activities are exempt from the general sales tax: education, public administration, financial services, postal services, radio and television services, sports services, and health services, etc.;. - Imported products that are duty free are generally also exempt under the VAT - Contributions to develop the gas and electricity networks.	The standard VAT rate is 25 percent. A number of services and products are charged at 12 percent (including basic foodstuffs, household electric power, etc.). Exports and raw materials for pharmaceuticals are zero-rated.

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
4. Excise Taxes a. Act 103, 1997 on excise taxation	**Taxpayers**: inbound warehouse permit holders and importers of the following products: fossil fuel products, spirits, beer, champagne, intermediary products containing alcohol, tobacco products **Tax base**: - the unit of the product (liter, hectoliter, kilo, etc.) - In case of the tax on tobacco, the price appearing on the tax seal	**Tax exempt:** - exported and reexported products; - fuel and commodity samples that can be handled duty free by customs; - duty free imports based on international contracts; - excisable products used to produce other products; - fuel oil used by electric power stations; - kerosene used in international air traffic. Tax on diesel fuel used for rail and domestic water transport is reimbursed for 100 percent and 65.5, respectively.	Fuel: - Unleaded gasoline Ft 77.00 per l - Leaded gasoline Ft 83.10 per l - Diesel fuel Ft 67.60 per l - Liquid gas Ft 86.70 per kg - Condensed gas Ft 41.80 per nm^3 - Heating oil Ft 67.60 per l - Petroleum and kerosene Ft 83.10 per l - Benzol and homologues Ft 83.10 per l - Lubricant oil additives Ft 60.80 per kg - Cigarettes: Ft 1,950 per 1000 units + 17 percent - Other tobacco products: 25 percent - Fruit and regular brandies: Ft 970 per hl - Other alcohol: Ft 1270 per hl - Beer Ft 285 per hl - Champagne Ft 60 per l - Interm. alcohol (sparkling) Ft 60 per l - Interm. alcohol (non sparkling) Ft 80 per l
b. Act 77, 1991 on consumption tax and consumer price supplementation	**Taxpayers**: manufacturers and importers of the following products: passenger cars, coffee, grape wine, products made of non-silver precious metals. **Object of taxation:** - The pre-tax sales price of the domestic product. - The invoiced value of imported products.	**Tax exempt products:** Exported products and products imported duty free based on international contracts.	Passenger cars: - up to 1,600 cm^3: 22 percent without a catalytic converter and 10 percent with a catalytic converter; - over 1,601 cm^3: 32 percent without a catalytic converter and 20 percent with a catalytic converter. - Products of non-silver precious metals 5 percent - Roasted coffee and real coffee extracts 12 percent - Grape wine with a maximum 11 percent

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
5. Social insurance contributions (Act 80, 1997, Act 4, 1991, Act 88, 1996).	**Tax payers**: Employers and employees. **Objects of taxation:** Employers pay social insurance premiums on gross salaries and other remuneration paid (any income that is subject to personal income tax unless specifically exempt). Exemptions include, among others, capital gains, dividends, interest income, scholarships, and use of company cars. Employees pay premiums on total remuneration received that subject to personal income tax. The health contribution is paid by the employer according to a fixed monthly amount based on the number of employees.	**Exemptions**: Foreign nationals employed by foreign firms and persons without a legal insurance relationship (e.g., persons living on incomes from capital or freelancers).	Employers pay a 43 percent social insurance contribution which consists of the following: - Contribution to old age pension: 24 percent - Contribution to health insurance: 15 percent - Employers' contribution to to the Solidarity Fund* for unemployment insurance 4 percent - Employers pay a fixed contribution for health care per employee of Ft 2,100 per month * which forms part of the Labor Market Fund. Employees pay an 11.5 percent social insurance contribution which consists of the following: - Contribution to old age pension: 7 percent in case of participation in the new pension system, workers contribute 6 percent to the private fund and 1 to the public plan. - Health insurance contribution: 3 percent - employee contribution to the Solidarity Fund 1.5 percent - the ceiling amount for the payment of contributions under the state and private pension schemes is Ft 1,565,850. No ceiling applies to contributions to the Solidarity Fund. - Uninsured individuals pay a health insurance contribution of 11.5 percent

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
6. Tariffs (Act 100, 1995 on tariff law, customs procedure and customs administration			
(a) Customs duty	**Taxpayers**: Individuals and companies importing commodities **Object of taxation**: The value of imported commodities, c.i.f.	- Preferential rates apply to imports from developing countries and commodities from least developed countries receive a duty-free treatment; - Preferential rates apply to trade with EU, CEFTA, and EFTA.	Ad valorem rates apply. They are differentiated by product according to the Commercial Customs Tariff (13,293 tariff lines). - The collected tariff rate in 1998 is 2.5 percent. - The simple average of all nominal tariff rates is 14.3 percent.
(b) Customs handling fee	See above.	Imports from WTO members.	The fee is 2 percent independent of the type of product.
(c) Statistical fee	See above.	Imports from WTO members.	The fee is 3 percent independent of the type of product.
7. Product charges (Act 56, 1995 on environmental product fees)	**Taxpayer**: Domestic producers and importers of the products subject to the fee. **Object of taxation**: Fuel and other petroleum products, rubber tires, refrigerators and parts of, coolant, packaging materials, lubricant oils, rechargeable batteries. The fuel charge applies to the price of fuels (gasoline and diesel oil).	**Exemptions:** - Based on international agreements; - If the entity subject to the tax collects, recycles, or reprocesses the product subject to the production fee or uses it to produce energy;	Itemized fees based on Ft/kg or Ft/unit. For example, Lubricant oils: Ft 60.5 per liter. Batteries: Ft 41.0 per kg Tires: Ft 32.4 per kg The charges applying to packaging materials vary (from Ft 2.2 to Ft 11.0 per kg) depending on the type of packaging material. The fuel charge is 3 percent of the excise tax on vehicle fuels.

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
8. Inheritance tax (Act 93, 1990 on fees	**Taxpayers:** Hungarians and nonresidents inheriting wealth (including real estate, movable property and legal rights of property) **Object of taxation:** Total value of property that is inherited	**Exemptions**: - the first Ft 300,000 of personal property; - securities and bank accounts; - the marital home; - land on which the beneficiary builds a house within four years. **Preferences:** If arable is inherited only one half of the fee otherwise payable needs to be paid.	- rates are 11, 15, or 21 percent of the value depending on the type of relationship between deceased and beneficiary: - if a house is inherited rates are 2.5, 4 and 5 percent depending on the relationship.
9. Gift tax Act 93, 1990 on fees)	**Taxpayers:** Recipients of gifts **Object of taxation:** Value of gifts	**Exemptions:** - gifts of personal property up to Ft 150,000;, - securities, other assets, and bank accounts, - plots of land if the recipient of the gift builds on it within four years. **Preferences**: Half the fee otherwise payable is to be paid for arable land.	- the general level is 11, 15 or 21percent, depending on the relationship between the donor and the recipient; - in the case of a house it is 5, 8 and 11 percent.
10. Tax on transfer of ownership (fee on transfer of encumbered wealth; Act 93, 1990 on fees)	**Taxpayers:** Purchasers (private entities, legal entities, or economic associations) of property and motor vehicles. **Object of taxation:** The value of the property.	**Exemptions:** - the purchase of a plot of land if the purchaser builds a house on it within four years, - purchase of a motor vehicle if the purchaser is a distributor of motor vehicles. **Preferences**: If arable land is purchased, one fourth of the otherwise payable fee must be paid.	- the general rate for real property is 10 percent of the value. - in the case of housing the fee is 2 percent up to a value of Ft 4 million and 6 percent for the amount exceeding that. - for motor vehicles: Ft 8 per cm^3 of the volume of the engine. - the level for the sale of real property is 2 percent of the value.

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
11. Tax on tourism (Act 100, 1990 on local taxes)	**Taxpayers:** individuals who do not reside in a community and spend more than one day the municipality. **Object of taxation:** The number of days of the stay or accommodation fee.	**Exemptions:** - persons present to conduct work or study - people under the age of 18 - people over the age of 70 - students.	The rates are set by the local government (by decree) within the following maximum levels: - Ft 300 per night; or - 4 percent of the accommodation fee.
12. Local business permit tax (Act 100, 1990 on local taxes)	**Taxpayers:** an enterprise (i.e., individual entrepreneur, legal entity, or economic association) which has a headquarter or a branch in the community. **Object of taxation**: Profits of business activities.	The local government can establish exemptions by decree.	The rate is determined by the local authorities. The maximum rate is 1.4 percent for 1998 and 1.7 percent for 1999.
13. Buildings tax (Act 100, 1990 on local taxes)	**Taxpayers**: Owners of buildings of all kinds. **Object of taxation:** The tax base is either 50 percent of the adjusted market value of the building or the floor area. This can be decided by the local government.	**Exemptions** - buildings owned by budget-sponsored bodies, churches, non-profit public organizations; - emergency housing; - Houses without conveniences up to 100 m^2 in small communities (population below 500); - buildings for educational and training purposes; - buildings for health and welfare institutions (enterprises); - buildings for agricultural purposes.	Rates are determined by the local government by decree. Maximum levels are: - Ft 900 per m^2 of useful area; - 3 percent of the value (50 percent of distribution value).

Hungary: Summary of Major Taxes as of November 1, 1998			
Tax	Description of Tax	Deductions and Exemptions	Rates
14. Tax on plot of land (Act 100, 1990 on local taxes)	**Taxpayer**: the owner of a plot of land suitable for building purposes. **Object of taxation**: land plots in areas without buildings. The is either the area of the plot or 50 percent of the market value of the plot, depending on the decision of the local government.	**Exemptions:** - plots on which construction is prohibited, - plots needed to be able to use a building as designed, - plots used for agricultural cultivation.	Depending on local government decision on the tax base the following maximum levels apply: - Ft 200 per m^2 on the area of the plot, or - 3 percent of the value of the plot (50 percent of the market value).
15. Communal tax on entrepreneurs (Act 100, 1990 on local taxes)	**Taxpayer**: the enterprise (individual enterprise, economic association, or legal entity). **Object of taxation**: employment in enterprises.	Exemptions are determined by local government decree.	The maximum rate is Ft 2,000 per year per employee.
16. Motor vehicle tax (Act 83, 1991 on motor vehicle tax)	**Taxpayer:** the owner of the vehicle. **Object of taxation**: motor vehicles': - net weight (passenger cars and buses) - net weight plus 50 percent (trucks)	**Exemptions:** - vehicles for the disabled; - buses used in scheduled public transport; - ambulances; - fire fighting vehicles; **Preference:** 50 percent of the otherwise payable tax for vehicles complying with the most recent environmental protection norms.	The local government determines the tax level per 100 kg of weight between Ft 400 and Ft 800.

VII. The Trade Balance and the Real Exchange Rate[83]

A. Introduction

180. This chapter analyzes the relationship between the trade balance and the real exchange rate in Hungary. The next section discusses developments in the trade balance relative to domestic and foreign demand conditions, and measures of the real exchange rate, highlighting the few but major swings in Hungary's external position during the 1990s. Sections C and D explore the possibility of estimating the magnitude and timing of the impact of the real exchange rate on the trade balance. Section E concludes.

B. Trade Balance Developments

181. Developments in the Hungarian trade balance during the 1990s, both in merchandise trade and in the balance of goods and nonfactor services (GNFS), are shown in Figure 20. The growing surplus on nonfactor services—primarily due to tourism—explains the widening divergence between these measures since the mid–1990s. This chapter focuses on the GNFS balance, as nonfactor services trade likely also depends on competitiveness. From a surplus of about 2 percent of GDP in the early 1990s, the GNFS balance deteriorated very sharply in late 1992–early 1993, and remained in a large (about 8 percent of GDP) deficit position in 1993 and 1994, Table 16. A strong turnaround in 1995 halved the GNFS trade deficit to 3.9 percent of GDP, with a further improvement to reach 1.2 percent of GDP by 1997.

182. These trade balance swings reflect the influence of both demand and supply factors in Hungary, external demand conditions, and the changing relative prices of domestic and foreign goods and factors of production, or the real exchange rate. The top panel of Figure 21 illustrates the likely importance of domestic demand—using interpolated data on gross national expenditure—for both the trade balance deterioration in 1992–93 and the 1995 turnaround. However, it is notable that the demand expansion since 1996 was not associated with a renewed deterioration in the trade balance in 1997 or early 1998. This stability may reflect the expansion in external demand seen in the bottom panel of Figure 21, as measured by the deviation from trend of industrial production in Hungary's six largest western trade partners. External demand appears to have also played a role in 1992–93, though the trade balance further weakened in 1994 despite the external recovery in that year.

183. The early 1990s saw rising real effective exchange rates (REER) on both a CPI and unit labor cost basis (ULC), Figure 22, indicating declining competitiveness ahead of the high deficits in 1993–94. There was a very sharp decline in the real exchange rate on a ULC basis through 1995, of 20 percent compared to the average in 1994, as labor productivity in manufacturing (gross production relative to employment) rose by 11 percent, but nominal labor costs increased by only 20 percent compared to a nominal effective exchange rate

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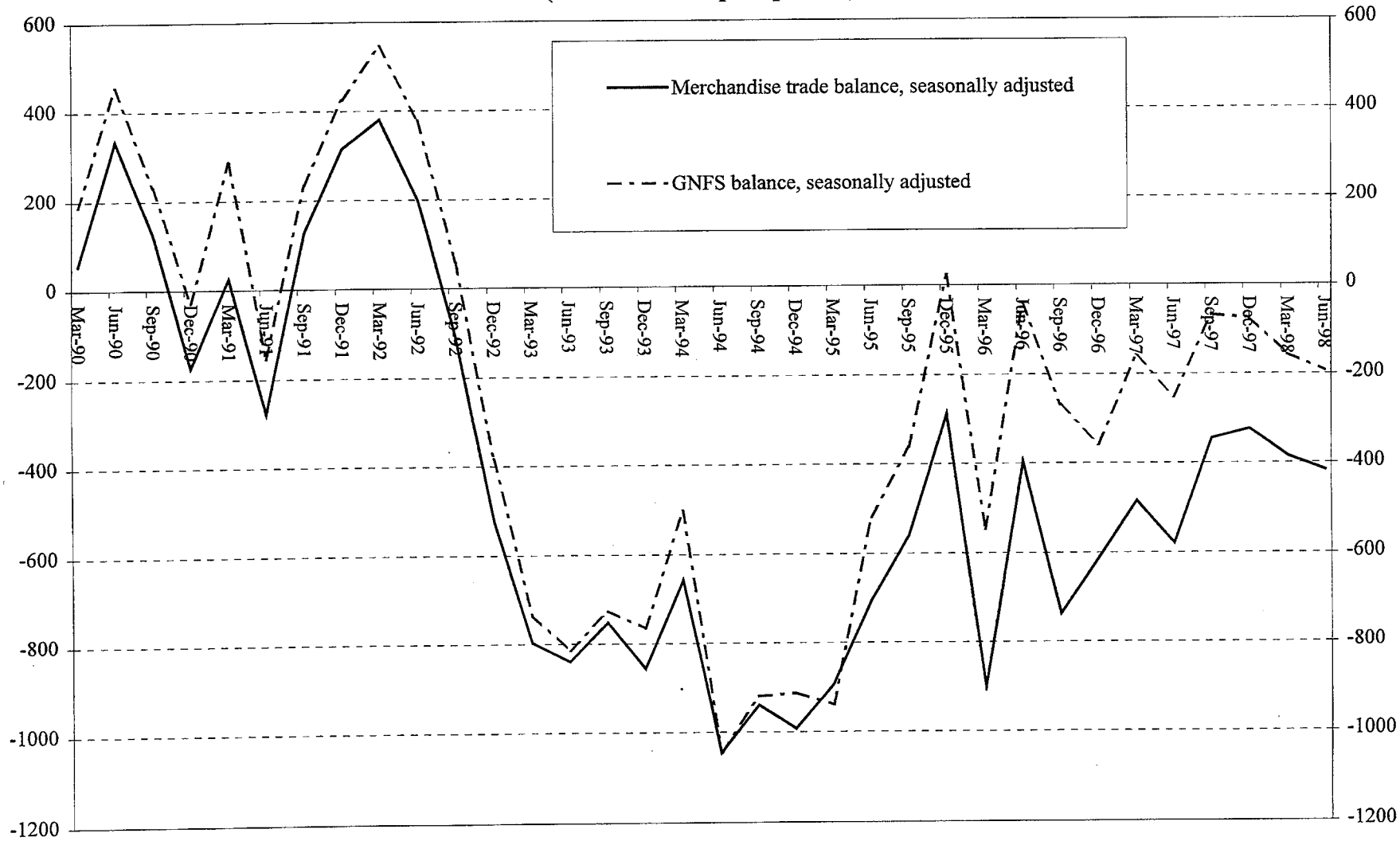
[83] Prepared by Craig Beaumont.

Figure 20. Hungary--Trade Balance, 1990-98
(US$ millions per quarter)



Source: National Bank of Hungary.

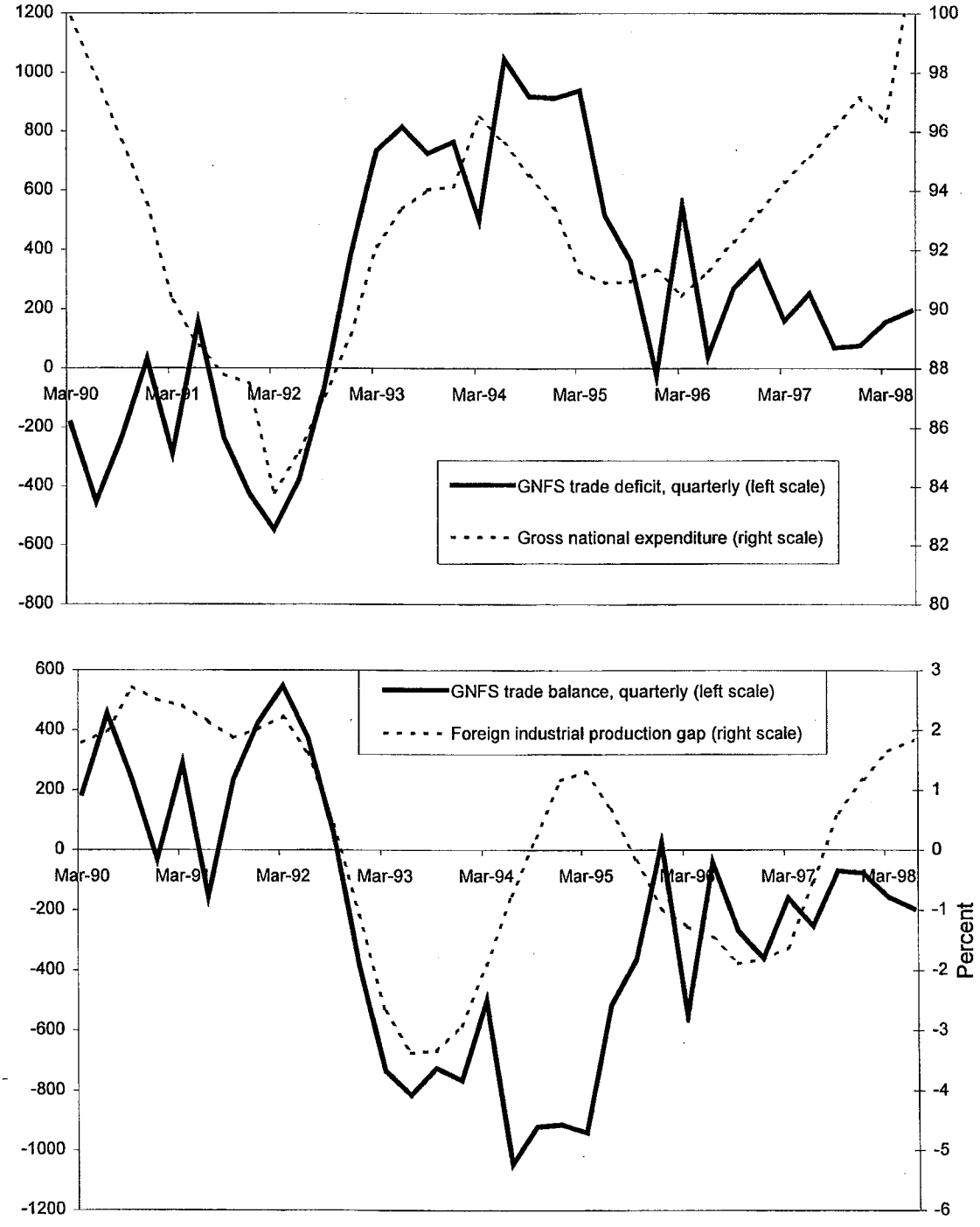
Table 16. Hungary: Trade Balance 1991-97 1/

	1991	1992	1993	1994	1995	1996	1997
			(In millions of U.S. dollars)				
Goods and services, net	790	717	-2,996	-3,377	-1,763	-1,146	-558
Exports, GNFS	11,621	13,332	10,886	10,671	17,028	19,189	24,508
Imports, GNFS	-10,831	-12,615	-13,882	-14,048	-18,791	-20,335	-25,066
Goods, net	189	-48	-3,246	-3,634	-2,443	-2,645	-1,735
Exports	9,258	10,028	8,094	7,614	12,810	14,183	19,637
Imports	-9,069	-10,076	-11,340	-11,248	-15,253	-16,828	-21,372
Nonfactor services, net	601	765	250	257	680	1,499	1,177
Credit	2,363	3,304	2,792	3,057	4,218	5,006	4,871
Debit	-1,762	-2,539	-2,542	-2,800	-3,538	-3,507	-3,694
Of which: Travel, net	560	590	442	503	659	1,288	1,428
Other, net	41	175	-192	-246	21	211	-251
			(In percent of GDP)				
Goods and services, net	2.4	1.9	-7.8	-8.1	-3.9	-2.6	-1.2
Exports, GNFS	34.8	35.8	28.2	25.6	38.1	42.8	54.3
Imports, GNFS	-32.4	-33.9	-36.0	-33.7	-42.1	-45.3	-55.5
Goods, net	0.6	-0.1	-8.4	-8.7	-5.5	-5.9	-3.8
Exports	27.7	26.9	21.0	18.3	28.7	31.6	43.5
Imports	-27.2	-27.1	-29.4	-27.0	-34.1	-37.5	-47.3
Non-factor services, net	1.8	2.1	0.6	0.6	1.5	3.3	2.6
Credit	7.1	8.9	7.2	7.3	9.4	11.2	10.8
Debit	-5.3	-6.8	-6.6	-6.7	-7.9	-7.8	-8.2
Of which: Travel, net	1.7	1.6	1.1	1.2	1.5	2.9	3.2
Other, net	0.1	0.5	-0.5	-0.6	0.0	0.5	-0.6

Sources: Data provided by the Hungarian authorities; and staff estimates.

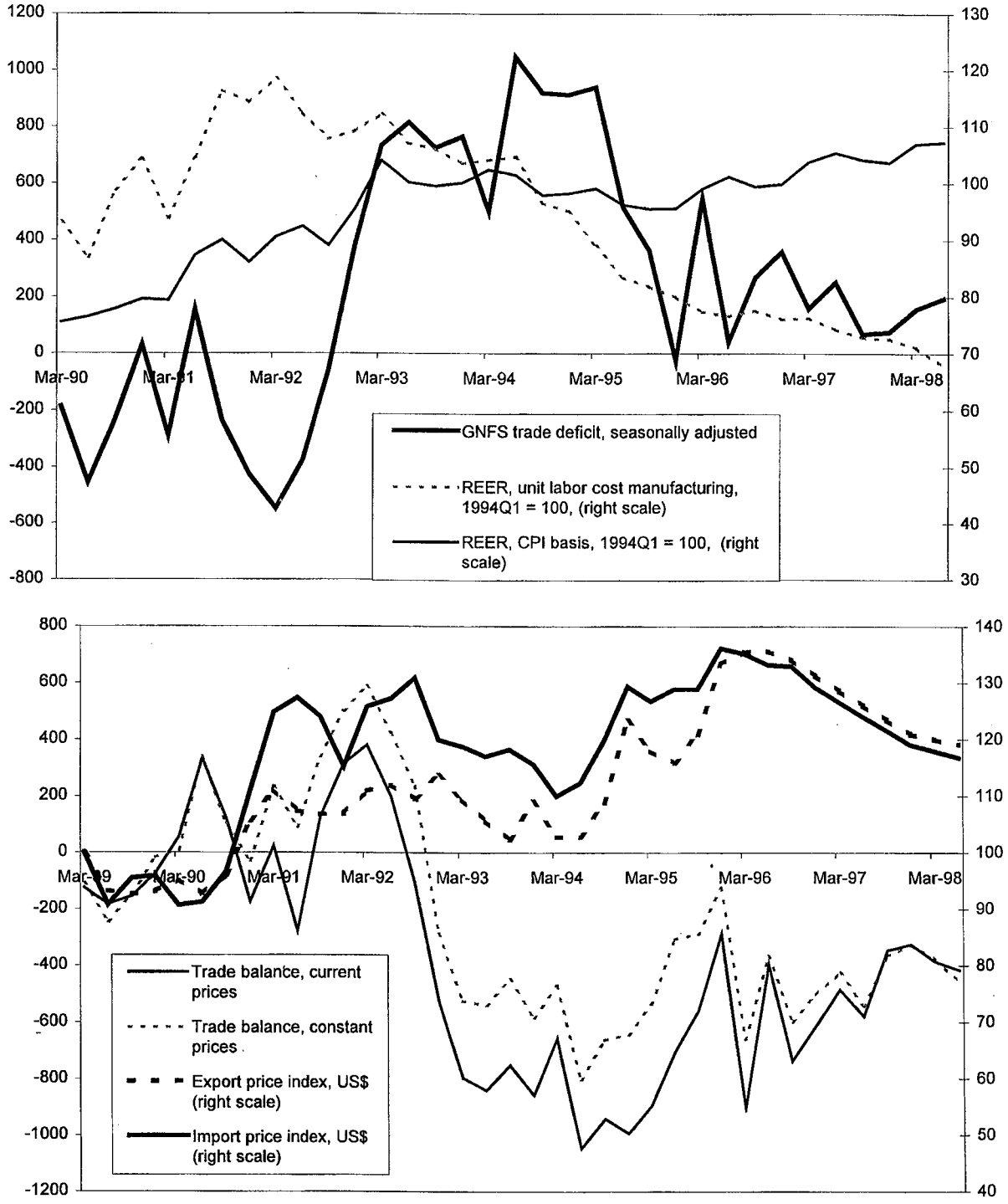
1/ Through 1995 in convertible currencies, from 1996 in both convertible and nonconvertible currencies.

Figure 21. Hungary: Trade Balance and Domestic and External Demand, 1990-98
(In millions of U.S. dollars)



Sources: National Bank of Hungary, Hungarian Central Statistical Office, and staff calculations.

Figure 22. Hungary: Trade Balance and Relative Prices, 1990-98
(In millions of U.S. dollars)



Sources: National Bank of Hungary, OECD Analytical Databank, and staff calculations.

depreciation of 29 percent. The CPI basis REER also depreciated in 1995, by 3 percent. Thus the turnaround in the trade deficit through 1995 coincides with a significant real depreciation, suggestive of a quite rapid trade balance response to the real exchange rate. The depreciation of the ULC basis REER continued at a declining pace over 1996 to 1998, while the REER on a CPI basis reverted to its tendency to appreciate over time.

184. Evaluating the relative roles of domestic and external demand and the real exchange rate in these trade balance developments may provide information on how sensitive financial policies should be to future developments in the real exchange rate. The following analysis attempts therefore to more clearly identify the sources of these trade balance dynamics.

C. Model Specification

185. As Hungary is a small open economy, the standard approach to this question would be to take world prices as exogenous, and to estimate import demand and export supply equations, as Halpern and Székely (1992) did for the 1968–1989 period. However, the structural change in the composition of Hungary's trade through the 1990s would likely result in biased estimates for the income and price elasticities. Trade has become highly focused on manufactured goods and machinery, which rose from 34.6 percent of exports in the first half of 1992 to 84.6 percent in the same period of 1998, primarily as FDI related investments came on stream. These exports require a high share of imported intermediate inputs, which coupled with the trade liberalization, saw gross export and import volumes expand much faster than GDP, so that exports rose to 54 percent of GDP in 1997 from 35 percent of GDP in 1991. A standard model of exports and imports would therefore likely find artificially high income elasticities, and other parameter estimates may also be biased.

186. One approach would be to attempt to control for structural change by including a proxy in the standard trade equations, and perhaps including exports in the import equation to proxy the demand for intermediate imports. The difficulty is to produce an adequate proxy for structural change in the absence of trade data classified by broad economic category, i.e. intermediate, consumption, and capital goods. This section instead develops a model that focuses directly on the trade balance, with the expectation that the effect of the structural change on export and import volumes will be largely offsetting.

187. The short–run supply of gross exports (x) is assumed to reflect production capacity as proxied by domestic potential GDP (y^p), the relative profitability of export production (r_x), and also the trend (t_x) due to structural change in the composition of exports. The foreign

output gap ($y^f - y^{fp}$) is included to capture short–run effects from foreign demand.[84]

$$x = t_x + \alpha_x y^p + \beta_x (y^f - y^{fp}) + \delta_x r_x \quad (1)$$

Gross imports (m) reflect aggregate demand (yd), and the relative price of imports to domestic goods (r_m), and also the trend due to structural change (t_m):

$$m = t_m + \alpha_m yd + \delta_m r_m \quad (2)$$

The trade balance, in terms of constant export and import prices, is therefore:

$$tb = x - m = (t_x - t_m) + \alpha_x y^p - \alpha_m yd + \beta_x (y^f - y^{fp}) + \delta_x r_x - \delta_m r_m \quad (3)$$

188. This constant price measure of the merchandise trade balance moves very similarly to the current price measure, see the second panel of Figure 22, as Hungary's terms of trade have been relatively stable. The trade balance is increasing in potential GDP but falling with aggregate demand, increasing in the foreign output gap, and depends on the relative prices for both export supply and import demand, which in this study are represented by the real effective exchange rates on both a ULC and CPI basis. The trends (that are not likely linear) due to structural change (t_x and t_m) are expected to offset each other to a large extent.

189. Equation (3) is similar to the framework of Rose (1991) and Rose and Yellen (1989), aside from the inclusion of potential GDP, which is consistent with modeling a small open economy. It focuses on the short–term role of the real exchange rate in the switching of expenditures between domestic and foreign goods, and in stimulating traded goods production by increasing utilization of existing capacity and shifting existing resources into the traded goods sector. The real exchange rate may also affect investment and therefore productive capacity, but analysis of these long–run effects of the real exchange rate would require a longer span of data, and a more complete model.

D. Estimates and Tests

190. Equation (3) was estimated on quarterly data for 1992:Q1 to 1998:Q2, with variable definitions provided in Appendix I. Estimation is by OLS, treating all the explanatory variables as exogenous to the trade balance, which is acceptable for foreign activity, and also for domestic demand and the real exchange rate as these variables enter with a lag. The unit root tests in Table 17 leave doubts regarding the order of integration of these variables, as might be expected in this short sample. The estimation assumes that all variables included are stationary, or stationary around a deterministic trend.

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[84] In the long–run, exports are determined by domestic supply, but due to customer–specific production and some price stickiness in exports, foreign demand fluctuations will likely affect export volumes in the short–run.

Table 17. Hungary: Augmented Dickey-Fuller Unit Root Tests

Sample: 1991:Q2 to 1998:Q2, 28 observations.

Variable	No Deterministic Trend Included				Deterministic Trend Included				Conclusion on the Order of Integration
	ADF(1)		ADF(4)		ADF(1)		ADF(4)		
	Beta 1/	t-ratio	Beta 1/	t-ratio	Beta 1/	t-ratio	Beta 1/	t-ratio	
GNFS	-0.18	-1.65	-0.22	-1.72	-0.21	-1.62	-0.28	-1.57	I(0), based on the deviation of the beta estimates from 0.
First difference	-0.96	-3.38 *	-1.24	-2.69	-0.97	-3.33	-1.28	-2.69	
ln (R_ULC)	0.01	0.13	-0.01	-0.25	-0.28	-3.59 *	-0.40	-3.39	I(0) with trend.
First difference	-1.13	-4.82 **	-0.57	-2.05	-1.38	-5.53 **	-0.71	-1.93	
ln(IPF/IPF_T)	-0.15	-3.93 **	-0.12	-2.17	-0.12	-1.99	-0.14	-1.89	I(0)
First difference	-0.32	-3.01 *	-0.38	-2.13	-0.36	-3.34	-0.45	-2.39	
ln(GDE/GDP_T)	-0.11	-1.52	-0.25	-2.69	-0.15	-1.88	-0.36	-2.90	Unit root not rejected, but beta estimates and theory suggest I(0).
First difference	-0.53	-2.30	-0.67	-2.07	-0.53	-2.26	-0.68	-2.04	
Critical values from MacKinnon (1991):									
1 percent (**)		-3.65		-3.68		-4.27		-4.32	
5 percent (*)		-2.96		-2.97		-3.56		-3.58	

1/ Beta (β) is the estimated coefficient on the lagged level of the variable (y) being tested for a unit root:

$$\Delta y_t = \alpha + \mu t + \beta y_{t-1} + \sum_{i=1 \text{ to } n} \gamma_i \Delta y_{t-i} + e_t$$

Where n is the number of lags in the ADF(n) test. Under the null hypothesis of a unit root, beta equals zero.

191. A specification search did not find significant effects from the REER on a CPI basis, and the better performing ULC basis measure is calculated using manufacturing gross production rather than manufacturing value added. The restriction that the long–run effect of aggregate demand and potential GDP be equal but opposite sign ($\alpha_x = -\alpha_m$) was accepted (F(1,19)=2.76, with a p-value of 0.113). The dynamics of the real exchange rate and the other variables were derived by testing down from a more general specification. The preferred estimation results are (t–statistics):

$$\begin{aligned} GNFS = \; & 1.321 \; - \; 0.702 \ln(GDE/GDP\_T)_{-1} \; + \; 0.345 \ln(IPF/IPF\_T) \\ & (2.54) \quad (-4.72) \qquad\qquad\qquad (1.73) \\ & - 0.245 \, LRU4_{-1} \qquad - 0.0061 \, Trend \qquad - 0.331 \, GNFS_{-3} \\ & (-2.41) \qquad\qquad\qquad (-2.71) \qquad\qquad (-3.04) \end{aligned}$$

$R^2 = 0.886$ S.E.E. = 1.33 percent DW = 2.30

Sample: 1992:Q1 to 1998:Q2, 6 variables and 26 observations

Diagnostic tests [p-value]:

Autocorrelation	F(1,19) = 0.507 [0.485]
Heteroskedasticity	F(10,9) = 0.773 [0.655]
Normality	Chi^2 = 1.458 [0.482]
Functional form	F(1,19) = 1.329 [0.263]

192. Graphical analysis of the equation is provided in (Figure 23). The equation passes all the diagnostic tests, including the Chow tests for stability reported in (Figure 24). However, the equation performed poorly when re–estimated until 1997:Q2 and projected out–of–sample over 1997:Q3 to 1998:Q2, with systematic under–predictions of the trade balance. Mismeasurement of potential GDP likely accounts for part of this result, as potential GDP probably rose significantly more strongly that the 3 percent calculated using the Hodrick–Prescott filter over these four quarters.

193. The long–run elasticities with respect to the explanatory variables are the appropriate coefficients multiplied by 1/(1+0.331) or 0.75, due to the inclusion of a lagged dependent variable with a negative coefficient.[85] Thus an increase in gross national expenditure relative to trend GDP by 1 percent is estimated to increase the trade deficit by 0.53 percent of GDP. A rise in foreign industrial production by 1 percent relative to trend results in an estimated 0.26 percent of GDP long–run rise in the trade balance. The long–run elasticity of the GNFS balance with respect to the real exchange rate is estimated to be 0.18, so a 5.4 percent real

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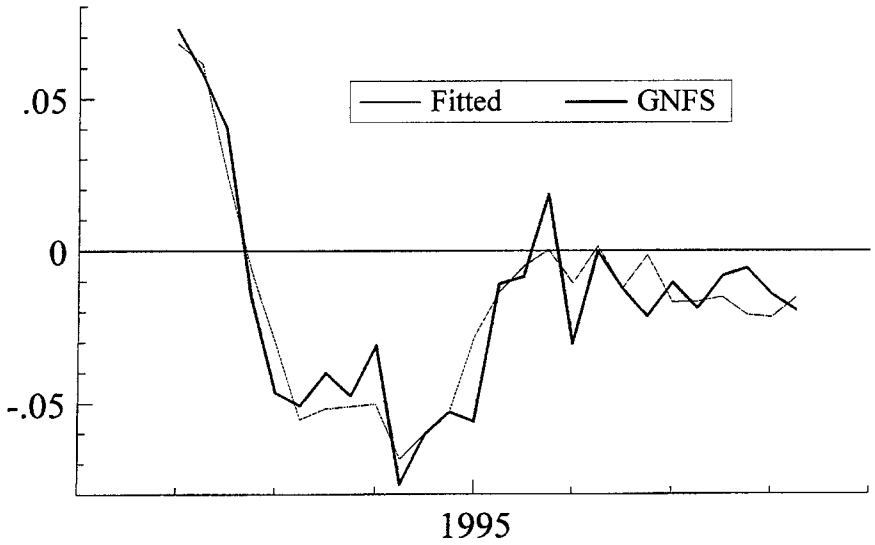
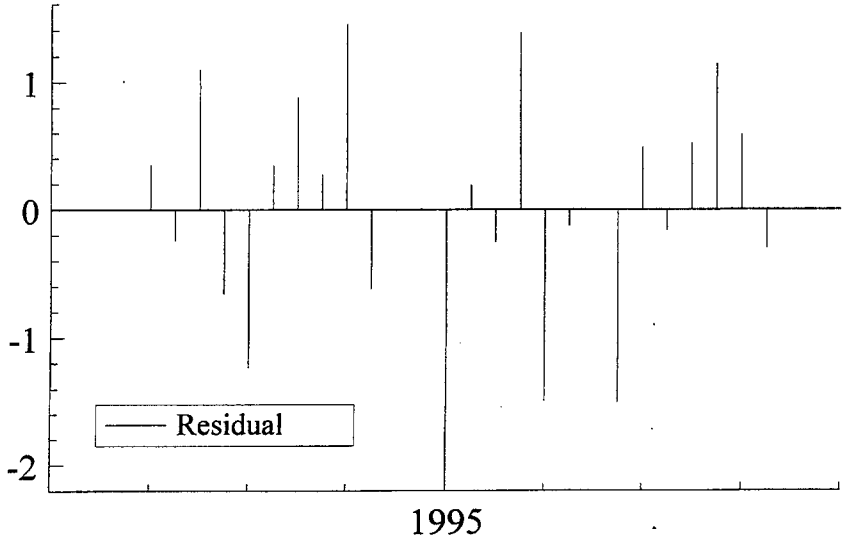
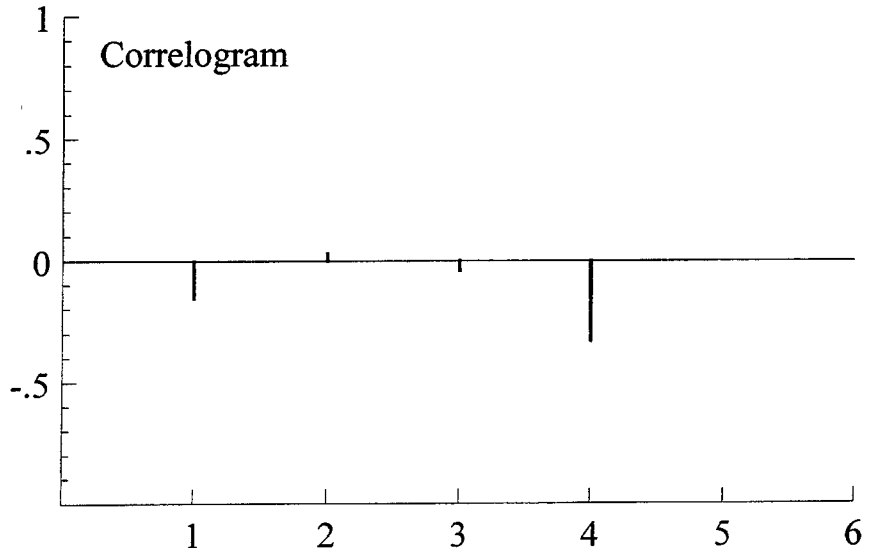
[85] The negative sign of the lagged dependent variable provides further assurance that the data are not non–stationary.

Figure 23. GNFS Trade Balance Equation







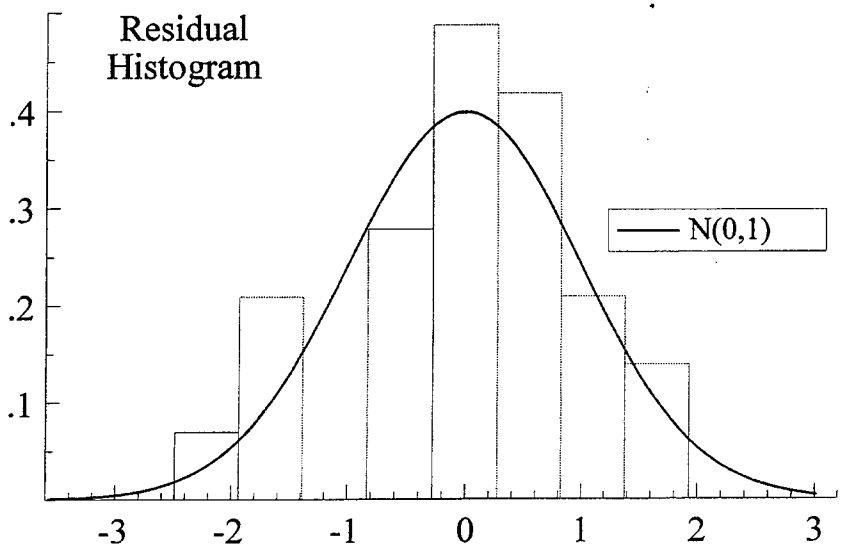
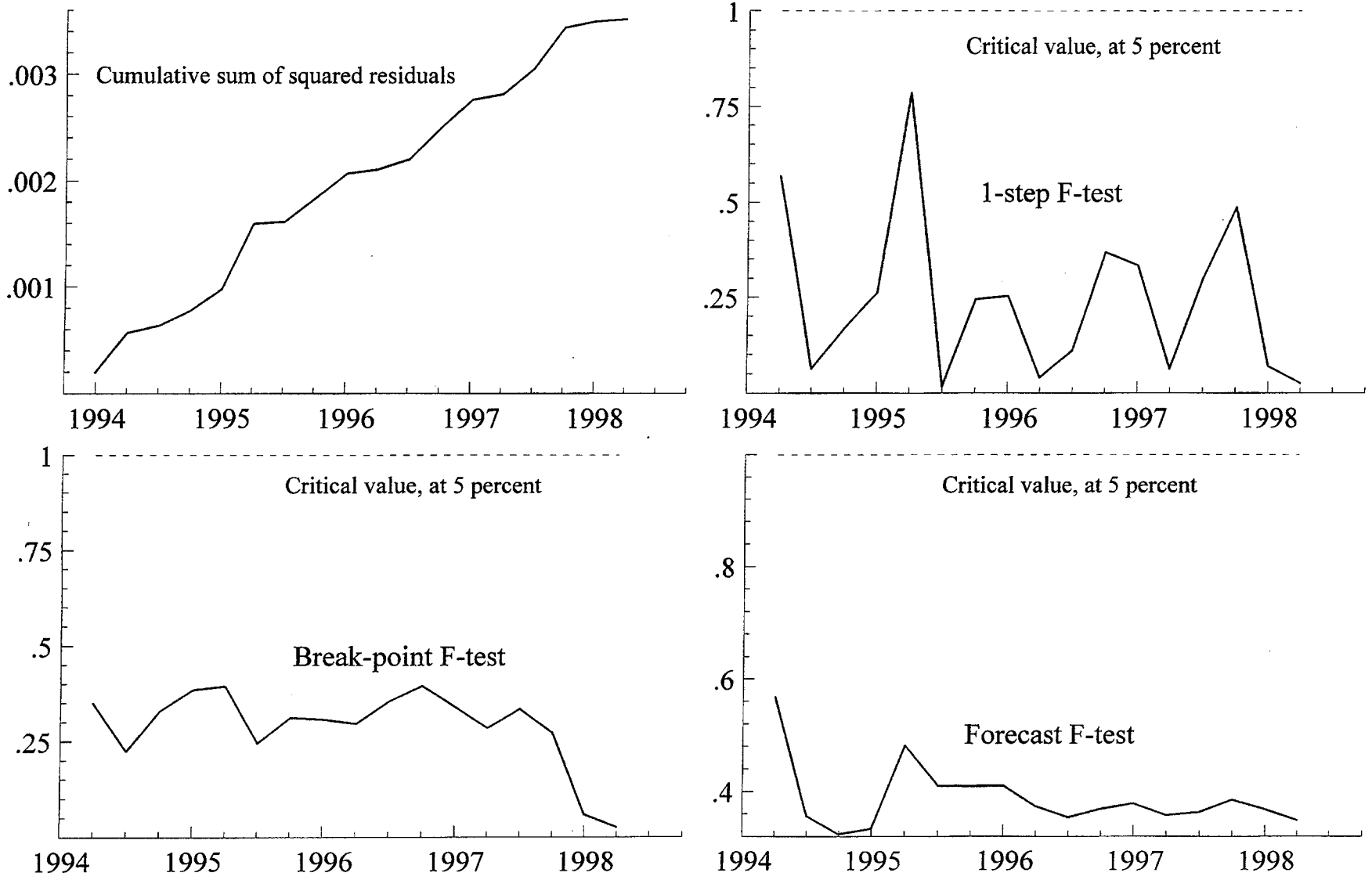


Figure 24. Chow-tests of Structural Stability



appreciation would be required to weaken the trade balance by 1 percent of GDP. Note that the standard error on this estimate would imply an 80 percent confidence interval for this elasticity of 0.08 to 0.29, or 12.1 percent to 3.5 percent in terms of the required appreciation for a 1 percent of GDP impact on the trade balance.[86]

194. The equation displays a modest short–run overshooting in its dynamics. After a 1 percent real exchange rate shock, the peak response of the trade balance occurs 4 quarters later, at 0.225 percent of GDP on an annualized basis, before reverting to the long–run response of 0.18 percent after 8–9 quarters.

195. While most parameters in the estimated equation appear plausible, there remains an unexplained trend with a relatively small effect of negative 0.46 percent of GDP per annum. This may reflect many factors including the omission of relevant variables, statistical problems in the included variables—e.g., the trend in the REER on a ULC basis may be biased down by the overstatement of industrial production growth, or the trend measure of GDP may be a poor approximation—along with the residual effects of structural change.

E. Conclusions

196. The discussion in section B suggested that the real exchange rate might have a significant role in Hungary's trade balance, in addition to the more obvious effects of domestic and foreign demand conditions. An econometric estimate of the size and timing of the real exchange rate effects was made, that attempted to avoid biases due to the radical changes in Hungary's trade structure during the 1990s. This estimate suggests that a real exchange rate appreciation of 1 percent would reduce the trade balance by 0.18 percent of GDP, with this effect coming through within the year following the shock. For example, this estimate suggests that the real depreciation in 1995 of 11 percent accounts for about 2 percent of GDP of the 5.5 percent of GDP improvement in the trade balance in 1996 over 1994.

197. This estimate of the real exchange rate effect was subject to significant uncertainty, as should be expected from the short sample available. Further research along these lines would benefit from improved data, in particular, actual rather than interpolated quarterly GDP and expenditure data. More sophisticated measures of potential GDP than the Hodrick–Prescott filter, or other indicators of supply–side developments in Hungary, also appear to be essential to understanding the strength of Hungary's trade balance in 1997 and early 1998.

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[86] The Student's t–distribution with 20 degrees of freedom is used.

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VARIABLE DEFINITIONS

Trade price data from the OECD Analytical Data Bank (ADB) was used to calculate the merchandise trade balance with constant U.S. dollar prices for merchandise exports and imports, as at 1990'Q1.

$$MTB = XG / PXGD - MG / PMGD$$

Where XG and MG are unadjusted export and import values from the National Bank of Hungary (NBH) and PXGD and PMGD are the ADB data on export and import prices in U.S. dollar terms, extrapolated from 1996'Q4 using data from the World Economic Outlook. This data was seasonally adjusted, and added to seasonally adjusted data for the nonfactor services balance (NFS), and converted to an annualized ratio to GDP using interpolated quarterly GDP in U.S. dollar terms:

$$GNFS = (MTB\_S + NFS\_S) / GDP\_US\$$$

R_ULC = Real effective exchange rate, ULC in manufacturing. Source: NBH

R_CPI = Real effective exchange rate, CPI basis. Source: NBH

The REER indices were averaged over 4 quarters to distribute their impact over time:

$LRC = \log(R\_CPI)$ $\quad LRC4 = [LRC + LRC_{-1} + LRC_{-2} + LRC_{-3}]/4$

$LRU = \log(R\_ULC)$ $\quad LRU4 = [LRU + LRU_{-1} + LRU_{-2} + LRU_{-3}]/4$

GDE = Gross domestic expenditure, cubic spline from annual index calculated from cumulative real growth rates.

GDP_T = Trend in real GDP, where quarterly GDP data were calculated by cubic spline, and the trend uses a Hodrick–Prescott filter with a smoothing parameter of 1600.

IPF = Foreign industrial production: trade weighted (percent) index of Germany (49.7), Austria (17.6), Italy (14.4), United States (7.1), France (5.9), and the U.K. (5.4).

IPF_T = Trend in foreign industrial production, using the Hodrick–Prescott filter with a smoothing parameter of 1600.

VIII. Sustainability in the Hungarian Balance of Payments[87]

A. Introduction

198. Hungary is well placed for a long period of strong growth to catch–up toward the per capita incomes of the EU countries. Investment opportunities will likely exceed domestic savings, attracting foreign capital and implying a deficit on the current account.[88] However, financial markets can lose confidence in a country running high current account deficits. This chapter aims to estimate the current account position that is sustainable in the sense of limiting Hungary's exposure to external crises or pressures in the medium–term, while allowing a sufficient contribution of external savings to growth. The international investment position of Hungary is described in Section B. Section C notes some aspects of Hungary's economy that are relevant when considering the prudent external position. Sustainable current account and trade deficits under various scenarios for growth, foreign direct investment (FDI), and interest rates are estimated in Section D. Section E concludes.

B. Hungary's International Investment Position[89]

199. In response to wide current account deficits in 1993–94, Table 18, the Hungarian government announced a medium–term economic strategy in Ministry of Finance (1995), which included the goal of reducing the current account deficit to a level not exceeding the inflows of FDI. It was projected that achieving this goal would lower net foreign debt–to–GDP a few percentage points by end 1997. In the event, Hungary's net foreign debt actually fell from US$18.9 billion (45 percent of GDP) at end 1994 to US$11.2 billion (25 percent of GDP) at end 1997, Table 19. Valuation effects contributed only US$0.4 billion to this net debt reduction of US$7.8 billion.[90]

200. This rapid debt reduction was made possible by high inflows of foreign equity investment, with the broader net foreign liability position remaining quite stable at just over 60 percent of GDP, Figure 25. Net equity liabilities rose by a total of US$9.2 billion from end 1994 to reach 36 percent of GDP at end 1997, primarily driven by US$8.1 billion of inward

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[87] Prepared by Craig Beaumont.

[88] Knight and Scacciavillani (1998) provide an overview of models of the current account.

[89] This section uses the official BOP data, though Appendix 1 notes that FDI inflows and the current account deficit are underestimated due to the omission of retained earnings by foreign owned companies. As official direct equity liabilities are based on cumulative FDI inflows, these liabilities are becoming increasingly understated.

[90] Cottarelli (1998) notes that the sizeable errors and omissions in the BOP in 1995 to 1997, of US$2.9 billion, may partly reflect unrecorded debt financing so that the fall in net foreign debt may be somewhat overstated.

Table 18. Hungary--Balance of Payments 1991-97 1/

(In millions of U.S. dollars; unless otherwise specified)

	1991	1992	1993	1994	1995	1996	1997
Goods and services, net	790	717	-2,996	-3,377	-1,763	-1,146	-558
Exports, GNFS	11,621	13,332	10,886	10,671	17,028	19,189	24,508
Imports, GNFS	-10,831	-12,615	-13,882	-14,048	-18,791	-20,335	-25,066
Income, net	-1,383	-1,251	-1,192	-1,446	-1,845	-1,454	-1,421
Interest income, net	-1,331	-1,215	-1,130	-1,286	-1,599	-1,198	-952
Equity income, net 2/	-32	-44	-56	-117	-194	-237	-468
Employee compensation, net	-20	9	-5	-43	-53	-21	-1
Transfers, net 3/	861	859	732	908	1,127	922	996
Current account balance	267	325	-3,457	-3,915	-2,480	-1,678	-982
						-1,539	398
Capital and financial account	2,453	436	5,360	3,065	5,786	-1,383	515
Capital account	...	...	...	...	...	156	117
Portfolio and other investment, net	994	-1,035	3,031	1,968	1,376	-3,525	-2,225
Assets, net	84	-298	75	238	128	-1,286	-691
Liabilities, net	910	-737	2,956	1,730	1,248	-2,239	-1,533
Short-term, net 4/	-758	157	-109	581	196	509	859
Long-term, net	1,668	-894	3,065	1,149	1,052	-2,748	-2,393
Of which: Equity securities	...	...	...	46	224	358	34
Direct investment, net 2/	1,459	1,471	2,329	1,097	4,410	1,986	2,622
Abroad, net	0	0	-11	-49	-43	3	-431
Of which: Equity capital, net	...	...	-11	-49	-43	3	-286
In Hungary, net	1,459	1,471	2,339	1,146	4,453	1,983	3,054
Of which: Equity capital, net	1,459	1,471	2,339	1,146	4,453	1,788	2,780
Privatization receipts 5/	330	519	1,204	104	3,025	578	1,241
Net errors and omissions	...	...	733	189	1,225	1,410	296
Overall balance	2,720	761	2,636	-661	4,531	-1,650	-170
Reserve change (increase -)	-2,720	-761	-2,635	661	-4,532	1,650	170
Memorandum items:			(In percent of GDP)				
Current account balance	0.8	0.9	-9.0	-9.4	-5.6	-3.7	-2.2
Equity capital inflows, net	4.4	3.9	6.0	2.7	10.4	4.8	5.5
Excluding privatization receipts	3.4	2.6	2.9	2.5	3.6	3.5	2.8
Debt-creating capital inflows, net 6/	-5.2	-4.8	1.0	6.2	-7.6	-4.5	-4.3
E&0 plus capital account	...	...	1.9	0.5	2.7	3.5	0.9
Net foreign debt, change 7/	-1,383	-1,503	1,875	4,010	-2,601	-2,107	-3,072
Net debt creating inflows 6/	-1,726	-1,796	397	2,583	-3,380	-2,023	-1,929
Valuation changes, other errors	343	293	1,478	1,427	779	-84	-1,143

Sources: Data provided by the Hungarian authorities; and staff estimates.

1/ Through 1995 in convertible currencies, from 1996 in both convertible and nonconvertible currencies.
2/ Excludes reinvested profits.
3/ Through 1995 includes current and capital transfers, from 1996 includes current transfers only.
4/ Through 1992 includes net errors and omissions.
5/ Privatization receipts of US$969 million in 1997 are reclassified from portfolio investment to inward direct investment.
6/ Net portfolio and other investment excl. equity securities plus net FDI in equity capital, less foreign reserve increases.
7/ Includes intercompany loans.

Table 19. Hungary--International Investment Position

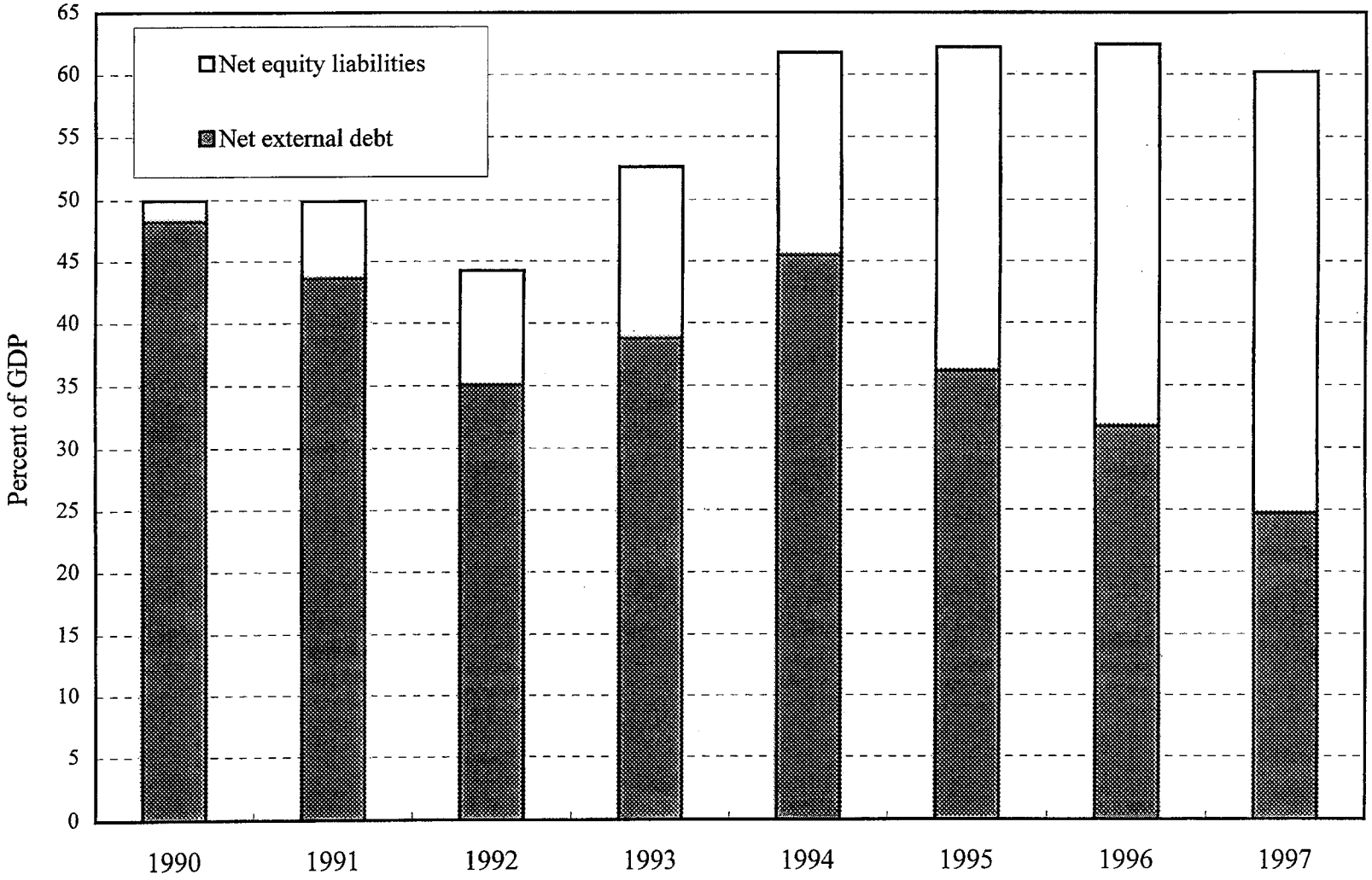
	1990	1991	1992	1993	1994	1995	1996	1997
				(In billions of U.S. dollars)				
Foreign assets	5.3	8.1	8.4	9.9	9.9	15.8	13.9	13.3
International reserves	1.2	4.0	4.4	6.7	6.8	12.0	9.7	8.4
Other non-equity assets	4.2	4.1	4.0	2.9	2.8	3.3	3.7	4.2
Equity assets	...	...	...	0.2	0.3	0.5	0.5	0.8
Outward FDI	...	...	...	0.2	0.3	0.5	0.5	0.7
Equity securities	...	...	...	...	...	0.0	0.0	0.0
Foreign liabilities	21.8	24.8	24.9	30.1	35.6	43.6	41.9	40.5
Foreign debt 2/	21.3	22.7	21.4	24.6	28.5	31.4	27.6	23.7
Equity liabilities	0.6	2.1	3.4	5.6	7.1	12.1	14.2	16.8
Inward FDI	0.6	2.1	3.4	5.6	7.1	11.9	13.3	14.2
Equity securities	...	...	...	...	...	0.2	1.0	2.6
Net foreign liabilities	16.5	16.7	16.5	20.3	25.7	27.8	28.0	27.2
Net foreign debt	15.9	14.6	13.1	14.9	18.9	16.1	14.2	11.2
Net equity liabilities	0.6	2.1	3.4	5.4	6.8	11.6	13.8	16.0
				(In percent of GDP)				
Net foreign liabilities	49.9	49.9	44.2	52.6	61.8	62.2	62.4	60.2
Net foreign debt	48.2	43.6	35.0	38.7	45.4	36.1	31.7	24.7
Net equity liabilities	1.7	6.3	9.2	13.9	16.3	26.1	30.7	35.5
Foreign liabilities	66.1	74.2	66.7	78.2	85.5	97.6	93.3	89.7
Gross foreign debt	64.3	67.8	57.6	63.7	68.4	70.4	61.6	52.6
Equity, direct+portfoilio	1.7	6.3	9.2	14.5	17.0	27.2	31.8	37.2
				(Change in billions of U.S. dollars)				
Net foreign liabilities		0.2	-0.2	3.8	5.5	2.0	0.2	-0.8
Foreign debt		1.4	-1.2	3.1	4.0	2.9	-3.8	-3.9
Net equity liabilities		1.5	1.3	1.9	1.4	4.8	2.1	2.3
Reserves, other assets (-=increase)		-2.8	-0.3	-1.2	0.0	-5.7	1.9	0.8
				(Change in percent of GDP)				
Net foreign liabilities		0.5	-0.5	9.9	13.1	4.6	0.5	-1.8
Foreign debt		4.2	-3.3	8.1	9.5	6.6	-8.5	-8.6
Net equity liabilities		4.6	3.5	5.0	3.5	10.8	4.8	5.0
Reserves, other assets (-=increase)		-8.3	-0.8	-3.2	0.1	-12.8	4.3	1.8
Memorandum items:				(In billions of U.S. dollars)				
GDP	33.1	33.4	37.2	38.6	41.7	44.7	44.9	45.2
Exports, GNFS	12.0	12.2	13.5	11.0	10.8	17.1	19.2	24.5
Imports, GNFS	11.0	11.3	12.7	14.8	14.3	18.9	20.3	25.1
Openess, percent	35	35	35	33	30	40	44	55

Sources: National Bank of Hungary, and staff estimates.

1/ Foreign direct investment and holdings of equity securities, excluding intercompany loans.

2/ Including intercompany loans.

Figure 25. Net External Liabilities: Debt and Equity
(In percent of GDP)



FDI over 1995 to 1997, including US$3.9 billion in privatization receipts from nonresidents. The remaining increase in equity liabilities reflects portfolio equity investment of US$1.6 billion over 1995–97, of which US$1.0 billion were privatization receipts. Thus privatization receipts of US$4.8 billion account for 62 percent of the reduction in net debt. Capital gains on foreign held portfolio equity—officially calculated using the BUX index—raised portfolio equity liabilities by US$1.0 billion in 1996–97, but exchange rate related revaluations reduced the stock of direct equity capital liabilities by a similar magnitude.[91]

201. By analogy with the financial theory of the firm, it might be argued that this shift in the composition of Hungary's external financing from debt to equity was not relevant to the net value of its external position, so that sustainability was not improved.[92] However, at the level of the firm the degree of leverage does affect the risk of illiquidity/insolvency. Similarly, the switch from debt to equity has enhanced sustainability in Hungary by reducing the risk of financial difficulties in response to shocks. The following factors are relevant:

- While foreign debt is usually foreign exchange denominated, and a fixed payment in foreign currency is required regardless of the state of the economy, nonresident equity investors share in all the currency and other risks of the Hungarian company. Thus a negative shock is partly absorbed by a reduction in profits to foreign investors.

- Debt service is linked to foreign interest rates, a source of risk that may be negatively correlated with economic performance, as higher EU interest rates will likely reduce EU demand for Hungarian exports. In contrast, income payments on equity liabilities are positively correlated with Hungarian economic performance.

- While nonresidents can sell portfolio investments and refuse to rollover credit, transnational corporations cannot quickly liquidate direct investments, so pressures on the foreign exchange market from a loss in confidence will be lessened the greater the share of FDI in external financing.[93] Nevertheless, the fixed capital associated with FDI could provide collateral for loans to speculate against the exchange rate peg.

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[91] The official stock of FDI liabilities is treated as being denominated 70 percent in German marks and 30 percent in U.S. dollars. The Fifth BOP Manual recommends market valuations of direct investment assets and liabilities. Milesi–Ferretti (1998) adjusts recorded FDI using the stockmarket index when analyzing sustainability in Chile, but this approach was not used, as the composition the Budapest Stock Exchange is not likely representative of FDI capital.

[92] The value of a firm that shifts from debt to equity financing is unchanged under the zero taxation and zero transactions cost conditions of the Modigliani–Miller (1958) theorem.

[93] Frankel and Rose (1996) find that a higher ratio of FDI to external debt reduces the risk of a currency crash controlling for other risk factors.

- Foreign holdings of equity involve a lower potential claim on foreign reserves in the event of a crisis, as equity prices will likely fall more than the price of bonds.

- Equity investment supports the health of the domestic financial system, as corporate balance sheets are strengthened, making them safer borrowers.

- FDI may ameliorate asymmetric information problems, as foreign portfolio investors learn from direct investors, and as the quality of information provision is likely enhanced, including for banks and companies without foreign investment.

202. Finally, the direct and external benefits of FDI inflows have improved Hungarian growth prospects. However, the reduction in the risk of limited access to international credit markets or of currency crises is not costless. Foreign direct investors have taken additional risk in the expectation of a higher returns, and the risk premia on equity investments will be substantially above those on credit. The higher income stream to foreign equity investors implies that Hungary must run a larger trade balance to achieve the same current account balance. Appendix I discusses the FDI experience and outlook of Hungary, as FDI will remain key to the sustainability of Hungary's current account deficits.

Hungary's foreign debt burden

203. Hungary was classified by the World Bank (1997) as a moderately–indebted middle–income (MIMI) country, based on data for 1993 to 1995.[94] The EBRD (1997) also classifies Hungary as having medium levels of debt in 1996.[95] Hungary's exports of goods and services in 1997 were 128 percent higher than in 1994, helping cut gross debt–to–exports very sharply from a peak of 265 percent in 1994 to 97 percent by 1997, below the moderately–indebted range for both the World Bank and the EBRD, Table 20. Nevertheless, Hungary would still be classified as moderately–indebted as gross external debt–to–GDP is 53 percent at end 1997, though down from a peak of 70 percent at end 1995. What does this foreign debt burden imply for Hungary's ability to manage external shocks?

204. Empirical research provides support to the conventional wisdom that higher external current account deficits and debt ratios increase the likelihood of an external crisis. Kaminsky *et al* (1997) survey 25 empirical studies on currency crises, together exploring a wide range of potential indicators for crises. They conclude that indicators of both domestic and external imbalances are useful, including international reserves, the real exchange rate, credit and money growth, export growth, inflation, and equity prices. The current account deficit and external debt profile did not receive much support as useful indicators of currency crises.

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[94] Moderately–indebted countries have either the debt–to–exports ratio between 132 percent and 220 percent or the debt–to–GDP ratio between 48 percent and 80 percent.

[95] Medium ratios are gross external debt to current account receipts between 100 percent and 200 percent, and external debt net of reserves between 30 percent and 40 percent of GDP.

Table 20. Hungary--Debt and Debt Service Indicators

	1990	1991	1992	1993	1994	1995	1996	1997
				(In billions of U.S. dollars)				
Foreign debt 1/	21.3	22.7	21.4	24.6	28.5	31.4	27.6	23.7
o/w Short-term 2/	2.9	2.2	2.3	2.0	2.4	3.2	3.8	3.9
Government and NBH 3/	18.2	19.4	17.7	20.4	22.5	23.2	18.3	13.8
Non-government	3.1	3.2	3.8	4.2	6.1	8.2	9.3	10.0
Credit institutions	...	...	...	...	...	2.9	3.7	4.5
Enterprise and other	...	...	...	...	...	5.4	5.7	5.4
o/w Intercompany	...	...	...	...	...	0.9	1.4	1.7
Net foreign debt	15.9	14.6	13.1	14.9	18.9	16.1	14.2	11.2
Foreign debt - reserves	20.1	18.6	17.1	17.8	21.8	19.4	17.9	15.3
Total debt service	4.2	4.0	4.7	4.9	6.2	8.4	9.8	11.3
excl. prepayments 4/	4.1	3.7	4.2	4.2	5.2	7.5	8.1	9.7
o/w foreign currency 5/	...	...	...	...	...	...	7.7	7.5
Gross interest payments	1.6	1.6	1.6	1.6	1.9	2.4	2.3	2.3
Amortization, MLT total 6/	2.5	2.4	3.1	3.3	4.3	6.1	7.4	9.0
Net interest payments	1.4	1.3	1.2	1.1	1.3	1.6	1.2	1.0
				(In percent of GDP)				
Gross foreign debt	64.3	67.8	57.6	63.7	68.4	70.4	61.6	52.6
Net foreign debt	48.2	43.6	35.0	38.7	45.4	36.1	31.7	24.7
Foreign debt - reserves	60.8	55.8	45.8	46.2	52.2	43.5	39.9	33.9
Total debt service	12.7	12.1	12.7	12.7	14.9	18.8	21.7	25.0
excl. prepayments 4/	12.5	11.2	11.2	10.9	12.5	16.7	18.0	21.4
o/w foreign currency 5/	...	...	...	...	...	...	17.1	16.6
Gross interest payments	5.0	4.9	4.4	4.1	4.7	5.3	5.2	5.0
Net interest payments	4.3	4.0	3.3	2.9	3.1	3.6	2.6	2.1
				(In percent of Exports, GNFS)				
Gross foreign debt	176.7	185.5	158.8	224.2	264.9	183.5	143.9	96.9
Net foreign debt	132.4	119.2	96.7	136.3	175.9	94.2	74.2	45.5
Foreign debt - reserves	167.0	152.6	126.3	162.7	202.1	113.4	93.3	62.5
Total debt service	34.8	33.1	35.1	44.8	57.7	49.1	50.8	46.1
excl. prepayments 4/	34.5	30.6	30.8	38.4	48.3	43.5	42.0	39.5
o/w foreign currency 5/	...	...	...	...	...	...	39.9	30.6
Gross interest payments	13.7	13.3	12.1	14.5	18.1	13.8	12.1	9.2
Net interest payments	11.7	10.9	9.0	10.3	11.9	9.3	6.1	3.9
				(In percent)				
External debt, share in percent								
Short-term 2/	13.8	9.6	10.7	8.2	8.4	10.1	13.6	16.3
Government and NBH 3/	85.6	85.8	82.4	82.9	78.7	73.8	66.2	58.1
Non-government	14.4	14.2	17.6	17.1	21.3	26.2	33.8	41.9
Credit institutions	...	...	...	...	...	9.1	13.3	19.1
Enterprise and other	...	...	...	...	...	17.0	20.6	22.8

Sources: National Bank of Hungary, and staff estimates.

1/ Debt data includes intercompany loans from foreign direct investors.

2/ Includes short-term other foreign liabilities by original maturity, money market instruments, and financial derivative liabilities. Does not cover any short-term intercompany loans.

3/ Does not include publicly guaranteed non-government debt, which was US$0.9 billion at end 1996.

4/ Total debt service excluding early repayments by the NBH and government.

5/ Excludes payments on forint securities, that are overstated by the inclusion of secondary market transactions.

6/ Principal repayments on medium-and long-term (MLT) debt, including early repayments.

However, Milesi–Ferretti and Razin (1998) found that for middle–income countries (with per–capita income above US$1,500 and population above one million) the risk of a currency crisis rises the wider the current account deficit, and the higher the level of foreign debt relative to GDP. The "event study methodology" analysis of currency crashes by Frankel and Rose (1996) confirms Milesi-Ferretti and Razin's conclusion on the connection between deficits, debt, and external crises. This connection is illustrated with charts showing the difference between the behavior of a range of variables in tranquil times and at times of a currency crisis. These charts suggest that crises are typically preceded by higher than normal current account deficits, high and rising external debt–to–GDP, as well as by an overvalued real exchange rate, low reserves, smaller than normal FDI inflows, higher than normal foreign interest rates, and slow foreign growth. Similarly, a set of case studies by Milesi–Ferretti and Razin (1996) found that persistent deficits are more likely to result in an external crisis when the external debt or interest payments are high relative to exports, the real exchange rate is above historical averages, the financial system is weak, and the level of domestic savings is low.

205. While the above literature points at the risk implicit in high external debt ratios, its usefulness is limited by the fact that it does not control for factors that may affect the appropriate levels of external debt and deficits across countries and time. Low-income countries, where investment opportunities are likely to be higher than in developed countries, while domestic saving is likely to be lower, may optimally run higher external deficits and debt.[96] Thus, in order to assess Hungary's level of external debt, it is useful to compare Hungary's foreign debt position with groups of broadly similar countries.[97]

206. Hungary's debt–to–GDP is now broadly in line with the average of the MIMI country group, but with a more open economy, debt is lower relative to exports, Table 21. However,

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[96] In standard models, e.g. Bandari *et al* (1990) and Van der Ploeg (1996), countries facing a positive productivity shock would initially have high investment partly financed by foreign debt. Hungary faces a transition–related productivity shock, suggesting that higher net foreign liabilities (NFL) would be optimal in the start of the catch–up process. However, Hungary also faces demographic changes that affect optimal savings behavior, that could imply a reduction of NFL ahead of a rising retired population.

[97] Technical issues regarding cross–country comparisons of Hungary's external debt are discussed in Appendix II, which concludes that: external debt should include forint as well as foreign exchange denominated liabilities and also intercompany loans; no evidence of unreliability in the official debt data was found; debt ratios to both exports and GDP are useful, though the ratio to exports is best compared to countries with a similar trade composition; and finally, growth–adjusted debt ratios are not used as the medium-term growth prospects of comparator countries do not appear to be sufficiently different.

Table 21. Sovereign Ratings, Long-term Foreign Currency Debt

At November 1998 1/

Moody's Rating		Standard & Poors Rating	
	Investment Grade		
A1		**A+**	Cyprus, Iceland, Malta
A2	Cyprus, United Arab Emirates	**A**	**Slovenia**, Kuwait, Hong Kong
A3	**Slovenia**, China, Israel, Hong Kong, Malta, Bahamas	**A-**	**Czech Republic**, Chile, Israel
Baa1	**Czech Republic, Estonia,** Greece, Chile, Panama, Kuwait	**BBB+**	**Estonia**, China
Baa2	**Hungary, Latvia**, Qatar, Oman, Mauritius	**BBB**	**Hungary, Lativia**, Greece, Qatar
Baa3	**Poland, Croatia,** Tunisia, Columbia, Malaysia, Saudi Arabia, South Africa, Uruguay, El Salvador	**BBB-**	**Poland, Croatia, Lithuania,** Malaysia, Columbia, Tunisia, Eqypt, Oman, Uruguay, Thailand
	Speculative Grade		
Ba1	**Slovakia, Lithuania,** Phillipines, Bahrain, Thailand, Korea Egypt, Morocco, Barbados, Trinidad & Tobago, Costa Rica	**BB+**	**Slovakia**, Korea, Phillipines, South Africa, Panama Trinidad & Tobago
Ba2	Mexico, Guatemala, India	**BB**	Argentina, Mexico, India, El Salvador, Morocco, Peru, Costa Rica
Ba3	Argentina, Jordan, Kazakhstan, Peru, Jamaica	**BB-**	Brazil, Lebanon, Jordan, Bolivia, Paraguay

1/ The December 1998 upgrading of Hungary by Standard and Poor's is incorporated.

the MIMI countries are not an appropriate forward–looking benchmark for Hungary.[98] A more relevant comparison is to middle–income countries with credit ratings that are "investment grade" (IGMI), see Table 22. The debt indicators for these countries provide information on financial market willingness to extend funds with less risk of interruption than speculative grade borrowers.

207. Hungary's 1997 debt position relative to the estimated positions of the 17 other IGMI countries is illustrated in Figure 26, for both gross debt and gross debt net of official reserves.[99] The polynomial trend lines show the expected pattern of falling debt ratios as per capita GDP rises, though this effect starts beyond per capita income levels of US$7,000 to US$8,000 on a PPP basis. It seems likely that countries with a lower per capita income attained an investment grade rating largely due to their low debt levels. Hungary has among the highest debt ratios to GDP of the IGMI group, exceeded only by Tunisia and Panama, with net foreign debt about 10 percentage points of GDP above trend for its income level. More IGMI countries have higher debt ratios to exports, particularly the less open Latin American economies. However, Chile is a primary goods exporter, and Columbia, Uruguay, and Tunisia are diversified exporters, so they likely require lower imported inputs per unit of exports, making the debt–to–exports comparison less informative.

208. The manufactures exporters of Central and Eastern Europe (CEE) are the most relevant benchmark in terms of exposure to shocks, Table 23, and the greater similarity of trade composition also makes comparisons of debt–to–exports ratios more reliable. Hungary's net foreign debt is substantially higher than the average of 9 percent of GDP in the other CEE countries, and though gross debt–to–exports is broadly in line with the 89 percent CEE average, net foreign debt–to–exports is twice the level in this group.

209. In summary, although Hungary's debt burden is much reduced from the high levels reached in 1994, its debt relative to GDP remains higher than in the group of investment–grade middle–income countries. Relative to exports, Hungary's net foreign debt is also above that of the manufactures exporters of CEE. Hungary also appears to be approaching the income level where investment–grade countries typically start to reduce net foreign debt.

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[98] The MIMI group is: Chile, Colombia, Georgia, Hungary, Macedonia, Malaysia, Mexico, Morocco, Panama, Phillippines, St. Vincent, Thailand, Tunisia, Turkey, Uruguay, Venezuela.

[99] The omission of foreign assets besides official reserves does not distort the analysis of net debt significantly, as Hungary appears to have somewhat below average holdings of these assets, at 49 percent of reserves at end 1997 while the CEE group in Table 23 held other convertible currency assets of 64 percent of their official reserves.

Table 22. Comparitive Debt and Debt Service Indicators

	Hungary 1997	Investment Grade Middle-Income Countries 1997 1/ Median	Average	Manufactures Exporting CEE 1997 2/	MIMI 3/ Average 1996
			(In percent of GDP)		
Gross foreign debt	52.6	31.7	30.3	35.1	47.4
Foreign debt - reserves	33.9	15.3	17.2	19.1	33.0
Total debt service 4/	16.6	5.2	5.8	4.6	8.6
Gross interest payments	5.0	1.8	2.1	1.8	2.9
			(In percent of Exports, GNFS)		
Gross foreign debt	96.9	75.2	87.5	89.4	116.6
Foreign debt - reserves	62.5	48.9	52.3	48.6	81.2
Total debt service 4/	30.6	11.0	16.3	11.7	21.2
Gross interest payments	9.2	5.5	6.2	4.5	7.1
External debt, share in percent					
Short-term	16.3	15.6	23.7	18.5	23.0
Long-term external debt, share in percent					
Public and guaranteed	76.7	...	...	...	72.7
Reserves in percent of					
short-term debt	217	275	315 5/	247	117

Sources: National Bank of Hungary, and staff estimates.

1/ WEO data from 1997 for: Chile, Colombia, Croatia, Czech Republic, El Salvador, Estonia, Hungary, Latvia, Malaysia, Mauritius, Oman, Panama, Poland, Saudi Arabia, Slovenia, South Africa, Tunisia, and Uruguay.

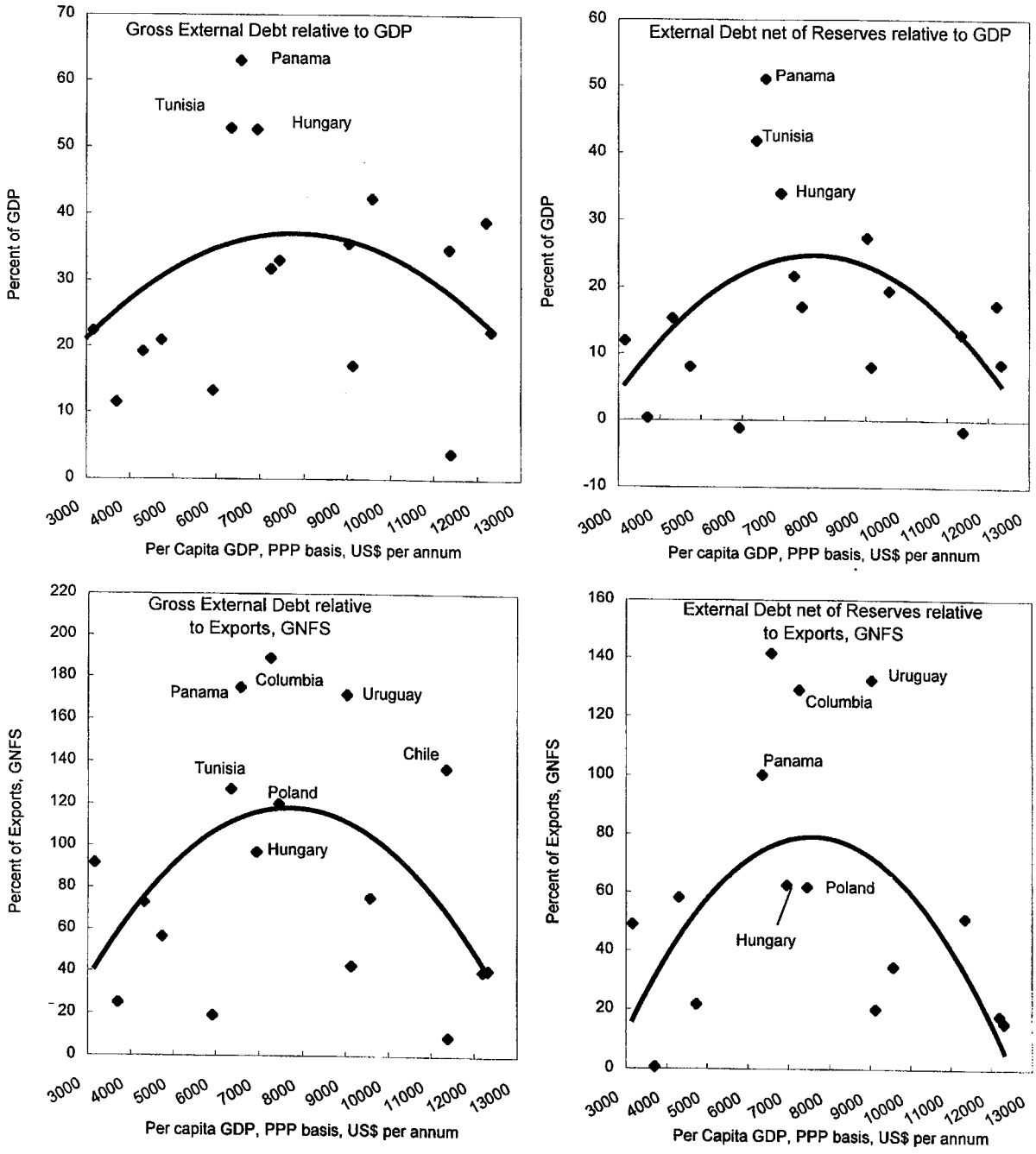
2/ Ratios for the total of Czech Republic, Slovak Republic, Slovenia, Croatia, and Poland 1997 estimates.

3/ Moderately-indebted middle-income countries, from Global Development Finance, 1998.

4/ Debt service data for Hungary excludes amortization of forint debt and prepayments by government, as amortization data for forint debt is overstated by the inclusion of secondary market transactions. Prepayments are not excluded for the other countries, which may bias comparisons somewhat.

5/ Slovenia is excluded from the sample for this average, which would be 696 percent including Slovenia.

Figure 26. Investment Grade Middle-Income Countries:
External Debt Ratios, 1997 Estimates



Source: World Economic Outlook database

Table 23. Foreign Debt Indicators of Central and Eastern Europe, 1997 1/

	Czech Rep.	Slovak Rep.	Poland	Slovenia	Croatia	Total 2/	Hungary
			(In billions of U.S. dollars)				
Foreign debt	22.4	11.6	44.0	4.2	3.9	86.0	23.7
Of which: Short-term	7.3	5.3	2.9	0.0	0.3	15.9	3.9
Foreign assets	21.5	7.4	25.9	4.4	5.2	64.4	12.6
International reserves	9.7	3.5	20.1	3.4	2.7	39.3	8.4
Other assets in convertible currencies	11.8	3.9	5.8	1.1	2.5	25.2	4.2
Foreign debt - reserves	12.7	8.1	23.9	0.8	1.2	46.7	15.3
Net foreign debt	0.9	4.2	18.1	-0.2	-1.3	21.6	11.2
Total debt service	5.8	1.2	2.3	.0.9	1.0	11.2	11.9
Interest payments, gross	2.0	0.5	1.3	0.2	0.3	4.3	2.3
Amortization, MLT debt	3.8	0.7	1.0	0.7	0.7	6.9	9.7
Economy and trade							
GDP	52.0	19.2	134.5	18.9	20.4	245.0	45.2
Exports (GNFS)	29.3	11.1	37.3	10.4	8.2	96.3	24.5
Imports (GNFS)	32.0	12.6	42.1	10.6	10.6	107.9	25.1
Openess, percent 3/	59	62	30	56	46	42	55
			(In percent of GDP)				
Foreign debt	40.9	60.4	32.7	22.1	18.9	35.1	52.6
Foreign debt - reserves	24.4	42.2	17.8	4.3	5.9	19.1	33.9
Net foreign debt	1.7	21.9	13.4	-1.3	-6.4	8.8	24.7
Total debt service	11.2	6.3	1.7	4.9	4.8	4.6	26.4
Interest payments, gross	3.8	2.6	1.0	1.2	1.5	1.8	5.0
Amortization, MLT debt	7.4	3.6	0.8	3.7	3.3	2.8	21.4
			(In percent of Exports, GNFS)				
Foreign debt	72.7	104.5	117.9	40.0	47.3	89.4	96.9
Foreign debt - reserves	43.4	73.0	64.2	7.8	14.7	48.6	62.5
Net foreign debt	3.0	37.8	48.5	-2.4	-16.1	22.4	45.5
Total debt service	19.8	10.8	6.2	8.8	12.0	11.7	48.7
Interest payments, gross	6.8	4.5	3.5	2.2	3.7	4.5	9.2
Amortization, MLT debt	13.1	6.3	2.7	6.6	8.3	7.2	39.5
			(In percent)				
Short-term debt in total debt	32.6	45.7	6.6	0.9	8.5	18.5	16.3
Reserves to short-term debt	133	66	689	9030	815	247	217
Sovereign Credit Rating: 4/							
Moody's	Baa1	Ba1	Baa3	A3	Baa3		Baa2
Standard and Poors	A-	BB+	BBB-	A	BBB-		BBB
IBCA	BBB+	BBB-	BBB+	A-	BBB-		BBB

1/ Estimates from desk economists, subject to revision when final data is available.

2/ Total of the Czech Republic, Slovak Republic, Slovenia, Croatia and Poland, and ratios for this group.

3/ Ratio to GDP of the average of exports GNFS and imports GNFS.

4/ Credit Ratings are as of November 1998.

Other external indicators

210. External financial crises may reflect an underlying concern about solvency, but vulnerability to crisis also reflects the liquidity and foreign exchange exposures of an economy. The following suggests that Hungary appears adequately liquid, but is reasonably reliant on continued access to international financial markets due to relatively high debt service ratios and significant nonresident investments in domestic securities.

211. In spite of the fall in Hungary's debt stock indicators, total debt service has risen to 25 percent of GDP in 1997, from 11–13 percent over 1990–94, Table 20. This rise reflects higher amortization payments, as gross interest payments have remained relatively stable at 4 percent to 5 percent of GDP. However, amortization data is distorted by debt prepayments, and also by the inclusion of payments related to secondary market transactions in domestic government securities. Excluding these items—though not prepayments by the private sector—the debt service ratio is about 17 percent of GDP over 1996–1997, still high compared to the benchmarks in Table 22. At end 1997 Hungary's short–term debt was 16.3 percent of the total, similar to the benchmarks in Table 22.

212. Some commonly used external liquidity indicators are provided in Table 24. While foreign reserves strengthened in the first half of 1998, there was some reduction in liquidity by November 1998, following the impact of the Russian crisis. However, foreign reserves remained strong at 4.1 months of imports of goods and nonfactor services (GNFS), and more than twice the level of short–term foreign liabilities. It is notable that credit institutions account for most short–term liabilities, but a majority of these are covered by their own short–term foreign assets. Foreign debt falling due in the next year is estimated at US$6.7 billion in November 1998, and was more that fully covered by foreign reserves. Foreign holdings of Hungarian domestic bonds increased sharply in the first half of 1998, but there were significant outflows (US$0.5 billion) by November 1998. Nonresident investors also hold substantial portfolio equities, together with bonds accounting for about one-third of reserves in November 1998, so Hungary is significantly exposed to portfolio outflows. To the extent permitted by capital controls, capital outflows could reflect the transactions of residents as well as nonresidents, so in principle the adequacy of international liquidity should be assessed relative to a broad measure of financial sector liabilities. Foreign reserves covered 44 percent of M3 at November 1998, which appears relatively high, but there are as yet no norms for this ratio akin those for the reserves–to–imports ratio.

213. Borrowing conditions on international financial markets are fairly good for Hungary. In early 1998, Hungarian eurobond issues were accepted on similar terms to the less advanced members of the EU, at a time when many other emerging market countries had delayed bond issues. By late 1998, Hungary still had good access to international credit markets, but

Table 24. Hungary: Indicators of External Liquidity, 1996-98
(In billions of U.S. dollars at end of period, unless otherwise indicated)

	1996 Dec.	1997 Dec.	1998 June	1998 Nov.
Total foreign debt of Hungarian residents	**27.6**	**23.7**	**24.6**	**24.9**
Medium- and long-term debt	23.8	19.9	19.8	21.2
Government and NBH	17.8	13.3	13.0	13.0
Credit institutions	1.4	1.6	1.8	2.4
Enterprises and other (inc. intercompany loans)	4.7	5.0	5.0	5.8
Short-term foreign liabilities 1/	3.8	3.9	4.8	3.7
Government and NBH	0.5	0.5	0.7	0.5
Credit institutions	2.2	3.0	3.7	2.8
Enterprises and other	1.0	0.4	0.4	0.4
Domestic security holdings of non-residents	**1.2**	**2.9**	**4.1**	**3.1**
Government bonds	0.3	0.4	1.6	1.1
Equity securities, portfolio 2/	0.9	2.6	2.5	2.0
Foreign debt falling due in the next 12-months 3/	**6.4**	**6.7**	**7.5**	**6.7**
Short-term foreign liabilities 1/	3.8	3.9	4.8	3.7
Amortization of medium and long-term debt	2.6	2.8	2.7	3.0
Public and publicly guaranteed	2.2	2.2	2.1	2.1
Other, estimated 4/	0.4	0.6	0.6	0.8
Foreign assets, excluding equity	**13.4**	**12.6**	**13.9**	**13.6**
Gross official reserves	9.7	8.4	9.6	8.7
Other short-term foreign assets 1/	2.4	2.6	2.6	3.2
Credit institutions	1.6	2.1	1.9	2.3
Enterprises and other	0.8	0.5	0.7	0.9
Reserve-related domestic liabilities of NBH	**5.7**	**4.1**	**4.0**	**2.9**
Foreign exchange deposits, resident banks	3.1	1.6	0.8	2.3
Forint deposits (non-required), resident banks	2.6	2.5	3.2	0.6
Memorandum items:				
Official foreign reserves of NBH				
In months of imports, GNFS	5.7	4.0	4.6	4.1
In percent of:				
Short-term foreign liabilities 1/	258	217	200	233
Foreign debt falling due	152	127	128	130
M3	48	43	52	44
Net foreign debt, including intercompany loans	14.2	11.2	10.8	11.3
In percent of GDP	31.7	24.7	22.5	23.8

Source: Statistics Department, National Bank of Hungary.

1/ Includes short-term loans (by original maturity), money market instruments, and financial derivatives (the market value of positions implying a net payment). Does not include any intercompany loans.
2/ Portfolio equity liabilities from IIP data, where each foreign holding is less than 10 percent of paid in capital.
3/ The amount of debt with put options that can be called within the next year is not included.
4/ Assumes that the share of private MLT debt maturing equals that of publicly guaranteed MLT debt, likely an underestimate.

spreads had widened following events in Russia.[100] In contrast, credit ratings agencies place Hungary towards the bottom of investment grade countries, Table 21. Analysis based on research by Cantor and Packer (1996) is suggestive that the agencies may be under–rating Hungary relative to its fundamentals. Their estimated equation for the average of Moody's and Standard and Poor's ratings (on a scale where 1=Be/B- and 16=Aaa/AAA) with statistically insignificant variables omitted is:

Average Rating = 1.442 +1.242 ln[Per–capita GDP] +0.151 GDP growth
- 0.611 ln [CPI Inflation] - 0.013 External debt–to–exports
+ 2.776 IMF industrial country - 2.042 Default since 1970

This equation predicts that Hungary would have a Baa1/BBB+ rating, two grades above the actual ratings in early 1998.[101] Nevertheless, both Moody's and Standard and Poor's upgraded Hungary in 1998, and Standard and Poor's maintains a positive rating outlook, suggesting that any potential under–rating may not long remain.

C. Economic and Financial Structure of Hungary

214. This section briefly notes some features of Hungary's economic and financial structure that bear on how exposed Hungary is to balance of payments pressures, focusing on Hungarian savings behavior, the composition of trade, and financial sector health.

215. A key factor underpinning the swings in the current account balance seen in the 1990s was the volatility of nongovernment savings, which collapsed from 23.8 percent of GDP in 1990 to 11.6 percent of GDP in 1993, before recovering to 21.1 percent of GDP in 1995.[102] While these developments partly reflect transition–related factors affecting enterprise profitability, volatility in household saving was also significant, with the household saving rate

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[100] Five–year floating rate notes were issued by the National Bank of Hungary (NBH) in January 1998 at a spread of 37.5 basis points over three–month DM Libor, while a fixed coupon eurobond yielded 81 basis points over 5-year U.S. Treasury notes when issued in April 1998, compared to issue spreads of 230 to 250 basis points in 1993 to 1995. In late 1998, after the Russian crisis of August, the NBH twice increased the issue of the five-year DM Libor bonds by DM 250 million, at a 73 basis point spread, and also expanded the eurobond by US$200 million, at a 160 basis point spread.

[101] Based on the following 1997 data: per capita GDP of US$4,460, external debt of 97 percent of exports, CPI inflation of 18.3 percent, overall fiscal deficit of 4.6 percent of GDP, GDP growth of 4.4 percent, not an IMF industrial country, and no default since 1970.

[102] Table 2.2 of Cottarelli et al (1998).

falling from over 16 percent in 1992 to 9.5 percent in 1993.[103] The current account deficit can quickly rise to unsustainable levels with such savings shocks, so some caution is warranted until a record of greater stability in savings is established.

216. Hungary was classified as a diversified exporter in World Bank (1997) based on 1993–95 data. However, recent export growth has focused on manufactures, which accounted for 63 percent of goods and services exports in 1997, Table 25. Of manufactures exports, 77 percent went to the EU in 1997, thus the key risk to exports is the EU durable goods cycle. The volatility of manufactures imports by the EU has been high recently, as imports of key EU members[104] from all other countries fell 7 percent in 1993, but rose 11 percent and 19 percent in 1994 and 1995, respectively.

217. The Asian crisis has re–emphasized the importance of a sound financial system for international financial market confidence. Hungary has privatized most of the banking system to strategic investors, with foreigners owning 61 percent of banking sector capital at end 1997.[105] The relatively good health of the banking sector, and the progressive development of other financial markets, see Van Elkan (1998), suggests that with the vigilance of authorities, Hungary's financial system should be able to effectively allocate debt–creating capital inflows of a reasonable magnitude.

D. Current Account Deficits in the Medium–Term

Two paths for net foreign debt

218. This section seeks to analyze the volume of capital inflows and thus the current account deficit that would be sustainable. The analysis in Sections B and C suggests that an increase in Hungary's debt ratios could prevent significant further improvements in Hungary's credit worthiness, thus current account deficits that would increase Hungary's debt ratios can be considered inappropriate. Should the authorities aim at a further reduction in external debt ratios? Hungary's openness, high inflows of FDI, and the falling share of public foreign debt

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[103] Further analysis of Hungarian savings behavior is provided in IMF (1995).

[104] Germany, France, Italy, UK, Netherlands, Belgium and Spain.

[105] As discussed in Appendix 1, nonresidents own a significant part of the nonfinancial business sector as well as the banks, and these ownership links likely reduce the extent to which creditors treat these enterprises and banks as purely Hungarian risks.

Table 25. Structure of Hungarian Trade, 1997

	Food, beverages, tobacco	Raw materials	Fuels	Manufactured goods, inc. machinery	Total goods	Total services and other	Total goods and services
				(In millions of U.S. dollars)			
Exports	2461	728	507	15373	19069	5439	24508
EU	1005	416	325	11837	13583		
CEFTA	341	109	87	850	1387		
CIS	508	102	8	757	1375		
Other	607	101	87	1930	2724		
Imports	896	695	2109	17407	21106	3959	25065
EU	348	281	227	12347	13203		
CEFTA	64	90	291	932	1378		
CIS	9	173	1563	634	2379		
Other	476	151	27	3493	4146		
				(In percent of total goods and services)			
Exports	10.0	3.0	2.1	62.7	77.8	22.2	100.0
Imports	3.6	2.8	8.4	69.4	84.2	15.8	100.0
				(In percent of goods category)			
Exports	100.0	100.0	100.0	100.0	100.0		
EU	40.8	57.1	64.2	77.0	71.2		
CEFTA	13.9	15.0	17.2	5.5	7.3		
CIS	20.6	14.0	1.5	4.9	7.2		
Other	24.7	13.8	17.1	12.6	14.3		
Imports	100.0	100.0	100.0	100.0	100.0		
EU	38.8	40.4	10.8	70.9	62.6		
CEFTA	7.1	13.0	13.8	5.4	6.5		
CIS	1.0	24.9	74.1	3.6	11.3		
Other	53.1	21.7	1.3	20.1	19.6		

Source: National Bank of Hungary, Monthly Report Table III/V, preliminary data.

tends to reduce its exposure to external crisis.[106] However, the volatile savings record and the less diversified export structure urge greater caution with respect to the external position. The relatively high level of Hungary's net foreign debt–to–GDP compared to the IGMI countries, also suggests that a further debt reduction over time would be helpful.[107] A modest reduction could be realized by targeting no increase in net foreign debt in foreign currency terms, allowing growth and real exchange rate appreciation to erode the debt ratios. The following compares the implications or this strategy against that of stabilizing net foreign debt relative to GDP.

219. The current account deficit (CAD) that would stabilize net foreign debt–to–GDP (NFD), is given by the sum of equity capital inflows (ECI) and the level of debt–creating capital inflows (DCI) that is debt–stabilizing (variables in percent of GDP):

$$CAD^* = ECI + DCI^*; \qquad DCI^* = [g/(1+g)]\,NFD$$

The debt–stabilizing level of DCI is a proportion of the outstanding debt that is increasing with the medium–term growth rate (g). Note that the growth rate is defined in terms of the currency composition of net foreign debt, and is the sum of real GDP growth, foreign GDP deflator inflation, and the real exchange rate appreciation of Hungary on a GDP deflator basis. Assuming a medium–term real GDP growth outlook of 4 percent to 5 percent, foreign inflation of 1 percent to 2 percent, and real appreciation of the forint on a GDP deflator basis between 0.5 percent and 1.5 percent, a feasible medium–term range for g is 5.5 percent to 8.5 percent.[108]

220. With GDP growth 6 to 8 percent in foreign currency terms, the end 1997 level of net foreign debt of 24.7 percent of GDP could be maintained with net DCI of 1.4 percent to

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[106] A lower share of public debt in foreign debt was found to reduce the risk of a currency crash in Frankel and Rose (1996). The fall in total foreign debt over 1994 to 1997 reflected a cut in public sector foreign debt of US$8.7 billion, while private foreign debt rose by US$3.9 billion, shifting the composition of debt sharply, from 79 percent owed by the government and NBH at end 1994 to 58 percent at end 1997, Table 20.

[107] Krueger (1996)—based on the econometric estimates of the relationship between external deficits and demographic, fiscal, and development indicators in Debelle and Farquee (1996)—also concludes that a further decline of the external debt ratio would be appropriate.

[108] This estimate for real exchange rate appreciation applies the Balassa–Samuelson effect, with the traded goods sector equal to half of GDP, productivity growth in the traded goods sector at 2 to 4 percent faster than the nontraded goods sector, and foreign traded goods prices falling 0.5 to 1.0 percent per annum relative to the price of foreign GDP due to traded goods sector productivity rising faster than nontraded goods in foreign economies. Simon and Kovács (1998) find that the real appreciation that can be expected is quite uncertain, being sensitive to the treatment of agriculture among other factors.

1.8 percent of GDP, or about US$0.7 to US$0.85 billion in 1998, Table 26. Further external debt reduction by government and outflows of foreign investment by Hungarian residents would be consistent with larger gross DCI to the private sector. Under the strategy of targeting zero net DCI, net foreign debt–to–GDP would be cut by between 6 and 8 percentage points of GDP by 2002 with growth between 6 percent and 8 percent, Table 27, similar to the reduction estimated by Krueger (1996). Under the conservative expectation that exports grow with GDP, net external debt–to–exports would be cut by 11 percentage to 15 percentage points, implying foreign debt net of reserves broadly consistent with the average 50 percent ratio to exports in the IGMI countries.

221. Net equity inflows must also be estimated to calculate the current account deficit implied by each strategy. Given the already high participation of foreign investors in the equity market, further portfolio inflows will be constrained by new equity issues, and portfolio equity outflows may rise, suggesting that net portfolio equity inflows may be small. The potential FDI inflow is discussed in Appendix I, finding that 3 percent of GDP on a cash basis would be a reasonable expectation in the next few years (1998–2000), allowing for some outward direct investment. This FDI inflow implies debt–stabilizing current account deficits on a cash basis of 4.4 percent to 4.8 percent of GDP for growth rates in foreign currency terms of 6 percent to 8 percent, respectively, and 3 percent of GDP to freeze net foreign debt in foreign currency terms.[109]

Trade balance and foreign interest rates

222. This section reports estimates for the path of the trade balance in goods and nonfactor services (GNFS) that would be consistent with a sustainable current account position, by deriving the GNFS balance as the residual between the current account deficit and the estimated path for international investment income and current transfers. The current account deficit remains constant on an accrual rather than cash basis, reflecting a stable gap between investment and savings, and a stable total FDI inflow. The simulations are not projections, they merely illustrate the implications of running certain deficits on average, under the following assumptions:

- Current BOP transfers: these are significant a source of Hungary's disposable income at 2.2 percent of GDP in 1997. Transfers are assumed to grow at the 2.6 percent rate observed in the 1990s, so this inflow declines as a share of Hungarian GDP over time, which is to be expected as Hungarian per capita income converges.

- Reserves and other nonequity foreign assets: these are assumed to be stable at 27.9 percent of GDP, which likely underestimates the potential expansion in foreign assets as pension and investment funds diversify from Hungarian securities.

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[109] There is however significant uncertainty about the FDI outlook, suggesting that estimates of the sustainable current account deficit be updated periodically.

Table 26. Debt Stabilizing Debt-creating Capital Inflows
(In percent of GDP)

Long-run net foreign debt target	GDP Growth Rate 1/								
	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
30.0	1.4	1.6	1.7	1.8	2.0	2.1	2.2	2.4	2.5
24.7	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**2.0**
20.0	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
15.0	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.2
10.0	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8
5.0	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 27. Net foreign debt, projections for 2002

	Stable net foreign debt to GDP 2/					Stable net foreign debt in FX 3/
	(In percent of GDP)					
GDP growth rate, percent 1/						
5	24.7					19.4
6	24.7					18.5
7	24.7					17.6
8	24.7					16.8
9	24.7					16.1
	(In percent of exports GNFS)					
	GDP growth, percent 1/					
Export growth rate, percent 1/	5	6	7	8	9	
5	45.5					35.7
6	43.4	45.5				34.0
7	41.4	43.4	45.5			32.4
8	39.5	41.4	43.4	45.5		31.0
9	37.7	39.5	41.4	43.4	45.5	29.6

1/ Measured in terms of the foreign currency composition of net foreign debt.
2/ Net debt to GDP stable at 24.7 percent.
3/ Assumes net debt creating inflows are zero, so net debt is fixed in foreign currency terms.

- Net equity liabilities: the official data is adjusted upwards by US$1.8 billion, reflecting cumulative retained earnings of foreign owners not recorded in the BOP estimates of FDI, as discussed in Appendix 1. Depreciation of the capital owned by nonresidents at an annual rate of 5 percent is assumed in estimating equity income.

- Exports of GNFS: are assumed to grow 2 percent faster than GDP in the medium–term, which seems conservative relative to recent growth rates.

- Interest payments: official BOP data include the marking–to–market of debt swaps in both interest payments and receipts, as reflected in the high implied interest rates on foreign assets and debt in 1997, at 9.8 percent and 8.2 percent respectively. The gross interest data for 1997 was adjusted down by US$0.5 billion, producing implied interest rates with a spread of 1.0 percent. This spread is assumed to be stable over time; though the spread paid on sovereign loans may decline, the share of nongovernment loans with higher spreads may rise.

- Equity returns to foreign investors: are estimated at 8.4 percent in 1997, including retained earnings. The rate of return is assumed to rise linearly to 3 percent above the cost of foreign debt by 2002, as the full benefits of earlier investments are realized.

- Repatriated equity incomes: were 43 percent of the total estimated level of equity income to foreign owners of US$1.0 billion in 1997. It is assumed that this repatriation rate is unchanged, so that as total equity earnings increase a larger part of total FDI is funded by retained earnings.

- Total FDI including retained earnings: is assumed constant at 5 percent of GDP, consistent with FDI on a cash basis at just over 3 percent of GDP over 1998–2000, but cash FDI declines to 2.8 percent of GDP by 2007.

223. The simulation in Table 28 is for stabilizing net foreign debt–to–GDP, while Table 29 is for freezing debt in foreign currency terms. Each assumes 6 percent growth (in foreign currency terms) and 5 percent foreign interest rates. As expected, net interest costs are stable in Table 28, but total investment income deteriorates as earnings on foreign owned equity rise.[110] By 2007 an improvement of 1.2 percent of GDP is needed in the GNFS balance from 1998, reflecting a 0.4 percent of GDP reduction in cash FDI, a 0.5 percent of GDP reduction in current transfers, and a 0.3 percent of GDP increase in repatriated equity incomes to

[110] These projected equity income levels are subject to significant uncertainty. In 1999 the introduction a survey of foreign investment enterprises will allow the incorporation of retained earnings into the current account, and also provide a firmer basis for projections.

Table 28. Medium-Term Balance of Payments Simulation: Stable Net Foreign Debt to GDP

	1997		1998	1999	2000	2001	2002	2007
	Act.	Adj. 1/						
				(In percent of GDP)				
Current account, cash basis	-2.2	-2.2	-4.6	-4.5	-4.5	-4.4	-4.4	-4.2
Accrual basis 2/	...	-3.5	-6.4	-6.4	-6.4	-6.4	-6.4	-6.4
Trade balance, GNFS	-1.2	-1.2	-3.7	-3.5	-3.3	-3.2	-3.0	-2.5
Current transfers 3/	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.6
Investment income, cash	-3.1	-3.1	-3.0	-3.1	-3.1	-3.2	-3.2	-3.3
Net interest	-2.1	-2.1	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7
Net equity, cash	-1.0	-1.0	-1.4	-1.4	-1.5	-1.5	-1.6	-1.7
Financial account	1.3	2.6	6.4	6.4	6.4	6.4	6.4	6.4
Debt-creating, net 4/	-4.3	-4.3	1.4	1.4	1.4	1.4	1.4	1.4
Gross foreign debt	-6.0	-6.0	3.0	3.0	3.0	3.0	3.0	3.0
Reserves&other assets	1.8	1.8	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
Net equity inflows	5.5	6.9	5.0	5.0	5.0	5.0	5.0	5.0
Recorded cash	5.5	5.5	3.2	3.1	3.1	3.0	3.0	2.8
Retained earnings	...	1.3	1.8	1.9	1.9	2.0	2.0	2.2
E&O, capital account	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Net foreign liabilities	60.2	64.2	67.0	69.6	72.1	74.4	76.6	85.8
Net foreign debt	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7
Gross foreign debt	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6
Reserves&other assets	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9
Net foreign equity	35.5	39.5	42.3	44.9	47.4	49.7	51.9	61.1
				(In percent of Exports, GNFS)				
Net foreign debt	45.5	45.5	44.7	43.9	43.0	42.2	41.5	37.8
Gross foreign debt	96.9	96.9	95.1	93.3	91.6	89.9	88.2	80.4
				(In percent per annum)				
Rates of return:								
Reserves&other assets	9.8	6.4	5.0	5.0	5.0	5.0	5.0	5.0
Foreign debt	8.2	7.4	6.0	6.0	6.0	6.0	6.0	6.0
Foreign equity	3.4	8.4	8.5	8.6	8.7	8.9	9.0	9.0
				(In billions of U.S. dollars)				
Gross domestic product	45.2	45.2	47.9	50.7	53.8	57.0	60.4	80.9
Exports, GNFS	24.5	24.5	26.5	28.6	30.9	33.3	36.0	52.9
Imports, GNFS	25.1	25.1	28.2	30.4	32.7	35.2	37.8	55.0
Gross disposable income	44.7	44.1	46.6	49.3	52.2	55.2	58.4	77.8
GDP-GDI, percent	0.9	2.3	2.7	2.9	3.1	3.2	3.4	3.9

Assumptions	(In percent)
GDP growth in foreign currency 5/	6.0
Export growth relative to GDP	2.0
Foreign interest rate, average	5.0
Current transfers growth	2.6
Equity premium, long-run	3.0

Simulation summary	(In percent of GDP)
Current account, accruals	-6.4
Cash basis (1998-2002)	-4.5
Trade balance, GNFS (1998-2002)	-3.4
Net equity inflows to GDP, accrual	5.0
Reserves&other assets in percent of GDP	27.9

1/ The end 1997 inward FDI stock is adjusted for estimated cumulative retained earnings of US$1.8 billion, and interest payments are adjusted by US$0.5 billion for the effect of "marking-to-market" on debt swaps.

2/ Includes estimated retained earnings on FDI in investment income debits.

3/ Includes net employee compensation, a relatively small item.

4/ Note that changes in international reserves are incorporated into debt-creating inflows.

5/ In terms of the basket of foreign currencies comprising net foreign debt, largely DM and USD.

Table 29. Medium-Term Balance of Payments Simulation: Stable Net Debt in Foreign Currency

	1997 Act.	1997 Adj. 1/	1998	1999	2000	2001	2002	2007
				(In percent of GDP)				
Current account, cash basis	-2.2	-2.2	-3.2	-3.1	-3.1	-3.0	-3.0	-2.8
Accrual basis 2/	...	-3.5	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0
Trade balance, GNFS	-1.2	-1.2	-2.3	-2.2	-2.1	-2.0	-1.9	-1.7
Current transfers 3/	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.6
Investment income, cash	-3.1	-3.1	-3.0	-3.0	-3.0	-3.0	-2.9	-2.7
Net interest	-2.1	-2.1	-1.7	-1.6	-1.5	-1.4	-1.4	-1.1
Net equity, cash	-1.0	-1.0	-1.4	-1.4	-1.5	-1.5	-1.6	-1.7
Financial account	1.3	2.6	5.0	5.0	5.0	5.0	5.0	5.0
Debt-creating, net 4/	-4.3	-4.3	0.0	0.0	0.0	0.0	0.0	0.0
Gross foreign debt	-6.0	-6.0	1.6	1.6	1.6	1.6	1.6	1.6
Reserves&other assets	1.8	1.8	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
Net equity inflows	5.5	6.9	5.0	5.0	5.0	5.0	5.0	5.0
Recorded cash	5.5	5.5	3.2	3.1	3.1	3.0	3.0	2.8
Retained earnings	...	1.3	1.8	1.9	1.9	2.0	2.0	2.2
E&O, capital account	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Net foreign liabilities	60.2	64.2	65.6	66.9	68.1	69.3	70.3	74.9
Net foreign debt	24.7	24.7	23.3	22.0	20.7	19.6	18.5	13.8
Gross foreign debt	52.6	52.6	51.2	49.9	48.6	47.4	46.3	41.7
Reserves&other assets	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9
Net foreign equity	35.5	39.5	42.3	44.9	47.4	49.7	51.9	61.1
				(In percent of Exports, GNFS)				
Net foreign debt	45.5	45.5	42.2	39.0	36.1	33.5	31.0	21.1
Gross foreign debt	96.9	96.9	92.6	88.5	84.7	81.1	77.8	63.7
				(In percent per annum)				
Rates of return:								
Reserves&other assets	9.8	6.4	5.0	5.0	5.0	5.0	5.0	5.0
Foreign debt	8.2	7.4	6.0	6.0	6.0	6.0	6.0	6.0
Foreign equity	3.4	8.4	8.5	8.6	8.7	8.9	9.0	9.0
				(In billions of U.S. dollars)				
Gross domestic product	45.2	45.2	47.9	50.7	53.8	57.0	60.4	80.9
Exports, GNFS	24.5	24.5	26.5	28.6	30.9	33.3	36.0	52.9
Imports, GNFS	25.1	25.1	27.6	29.7	32.0	34.5	37.2	54.3
Gross disposable income	44.7	44.1	46.6	49.3	52.2	55.3	58.6	78.2
GDP-GDI, percent	0.9	2.3	2.7	2.8	2.9	3.0	3.1	3.3

Assumptions	(In percent)
GDP growth in foreign currency 5/	6.0
Export growth relative to GDP	2.0
Foreign interest rate, average	5.0
Current transfers growth	2.6
Equity premium, long-run	3.0

Simulation summary	(In percent of GDP)
Current account, accruals	-5.0
Cash basis (1998-2002)	-3.1
Trade balance, GNFS (1998-2002)	-2.1
Net equity inflows to GDP, accrual	5.0
Reserves&other assets in percent of GDP	27.9

1/ The end 1997 inward FDI stock is adjusted for estimated cumulative retained earnings of US$1.8 billion, and interest payments are adjusted by US$0.5 billion for the effect of "marking-to-market" on debt swaps.

2/ Includes estimated retained earnings on FDI in investment income debits.

3/ Includes net employee compensation, a relatively small item.

4/ Note that changes in international reserves are incorporated into debt-creating inflows.

5/ In terms of the basket of foreign currencies comprising net foreign debt, largely DM and USD.

nonresidents.[111] Table 29 shows similar trends, but as net interest costs decline by 0.6 percent of GDP, the required improvement in the GNFS balance is reduced to 0.6 percent of GDP.

224. The results of simulations across a range of interest rate and growth rate scenarios, focusing on the average GNFS balance in the next five years, are reported in Table 30. Relative to the GNFS deficit of 1.2 percent in 1997, stabilizing net foreign debt–to–GDP would allow a significant increase (1¼ percent to 2¾ percent of GDP) in the GNFS deficit over 1998–2002 for plausible interest rates and growth rates, while stabilizing net debt in foreign currency would allow a modest increase in the GNFS deficit (0 percent to 1 percent of GDP).

225. Each percentage point rise in foreign interest rates is found to reduce international investment income by 0.4 percent to 0.5 percent of GDP on average over five years, implying that the GNFS deficit and thus domestic spending must be cut by this amount to retain a sustainable current account deficit. The responsiveness is greater than the ¼ of a percent of GDP that would be implied by net foreign debt at 24.7 percent of GDP, as a partial response in net equity income is allowed. The full response—of about 0.7 percent of GDP—cannot be expected until the capital stock held by foreigners reflects the new level of required returns. While the long–run required adjustment in the GNFS trade balance and domestic spending has not been reduced by the switch from debt to equity financing, the short–run impact of changes in foreign interest rates has been significantly reduced from 1994.

E. Conclusion

226. Hungary's foreign debt burden is much reduced from the high levels of the mid–1990s, and the reduction in vulnerability from this and other factors has proven valuable during the turmoil stemming from the Asian and Russian crises. Recent research on currency crises finds statistical evidence on the risks posed by large foreign debt and current account deficits, and country experiences and event studies support this relationship. Thus ensuring that current account deficits do not remain significantly above sustainable levels will contribute to avoiding excessive risk of currency crisis. Nevertheless, many factors may underlie capital outflow pressures, so support in other policy areas is also needed.

227. While Hungary's debt ratios are now at more moderate levels, they remain above the average of investment grade middle–income countries, suggesting that a return to higher debt levels might prevent Hungary realizing the gains in creditworthiness that would appear to be warranted by its improved fundamentals. Further reduction in net foreign debt would be consistent with the expected rise in Hungarian per capita GDP, and the expected decline in total public debt as Hungary approaches entry to the EU. Therefore the sustainability analysis focused on current account deficits implying either no rise in net foreign debt relative to GDP,

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[111] If repatriated equity incomes did not increase, retained earnings would be higher so that FDI in cash could be lower for the same total FDI, therefore requiring the same improvement in the GNFS trade balance to prevent a higher need for debt-creating capital inflows.

Table 30. Estimated GNFS Balances Consistent with Current Account Sustainability

	GDP in foreign currency, annual growth in percent 1/				
	5	6	7	8	9
I. Stable Net Debt to GDP					
Foreign Interest Rate					
Percent					
4	-3.6	-3.8	-3.9	-4.3	-4.6
5	-3.1	-3.4	-3.4	-3.9	-4.1
6	-2.6	-2.9	-3.0	-3.4	-3.7
7	-2.1	-2.4	-2.5	-3.0	-3.2
8	-1.7	-1.9	-2.0	-2.5	-2.8
II. Stable Net Debt in Foreign Currency					
Foreign Interest Rate					
Percent					
4	-2.5	-2.5	-2.6	-2.6	-2.7
5	-2.0	-2.1	-2.2	-2.2	-2.3
6	-1.6	-1.7	-1.7	-1.8	-1.9
7	-1.1	-1.2	-1.3	-1.4	-1.5
8	-0.7	-0.8	-0.9	-1.0	-1.1

1/ In terms of the foreign currency basket of net foreign debt.

or deficits that would be required to prevent debt rising in foreign currency terms, thereby generating a further modest reduction in net foreign debt–to–GDP over time.

228. The latter strategy would limit the current account deficit to net equity inflows, which could be reasonably projected at 3 percent in the next few years. This would reduce net foreign debt–to–GDP by 6 to 8 percentage points of GDP by 2002, for growth rates in foreign currency terms ranging from 6 percent to 8 percent (4 percent to 5 percent in real terms). The debt ratio stabilizing strategy would allow a wider deficit reflecting net debt–creating capital inflows of about 1½ percent of GDP for the same growth range (yielding a total current account deficit of some 4½ percent of GDP).[112] In both cases, resource flows to the private sector could be higher to the extent that the public sector reduces its net external debt.

229. Estimates of the GNFS trade deficits that would be consistent with these current account deficits were made, though these depend on a number of assumptions. These estimates suggested that a debt ratio stabilizing strategy would be consistent with a 1¼ percent to 2¾ percent of GDP increase in the average GNFS trade deficit over the next five years from the 1.2 percent of GDP level in 1997. Freezing foreign debt in foreign currency would allow a more modest rise in the GNFS deficit, of up to 1 percent of GDP. Under either approach, the average GNFS deficit would need to narrow in the long run to offset the expected growth in equity incomes to nonresidents, and the likely decline in current transfers relative to GDP. The eventual reduction needed in the average trade deficit would be smaller if net foreign debt–to–GDP continued to decline in the near-term, due to lower net interest payments.

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[112] The current account deficit on an accrual basis would be larger to the extent that earnings of foreign equity owners–estimated at 1.3 percent of GDP in 1997–were retained in Hungary.

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FOREIGN DIRECT INVESTMENT IN HUNGARY: STATUS AND PROSPECTS

1. Foreign direct investment was a key factor in Hungary's external debt reduction, and in the transition more generally. The following sections compare the FDI position of Hungary with other countries, describe the nature of FDI in Hungary, discuss issues regarding BOP data on FDI, and consider the outlook for both inward and outward FDI.

Where Does Hungary Stand?

2. At end 1997 the BOP estimates the stock of FDI capital received by Hungary at US$14.2 billion, though this is likely an underestimate, see below. With the stock of outward FDI by Hungary at US$0.7 billion, net FDI liabilities are 30 percent of GDP. Table 31 reports FDI stocks by region, and within each region those countries making most use of FDI. Even by 1995 Hungary is in the top league of net recipients of FDI relative to the size of its economy, with Malaysia, New Zealand, and Singapore the only countries in a comparable net FDI position. Among CEE countries the next most significant FDI recipient is Estonia, but Poland and others will have increased FDI as their privatization programs are implemented.

3. Hungary is also in the leading group of FDI relative to fixed investment over 1991–95. Of the entire group of European transition economies Hungary received almost a third of FDI inflows to end 1996, though it had just under one–twentieth of regional GDP. The EU is overall a net provider of FDI, but it is notable that countries with below EU–average incomes (Ireland, Greece, and Spain) are significant net users of FDI, suggesting that FDI is closely entwined with the convergence process.

Nature of FDI in Hungary

4. A detailed picture of FDI in Hungary is provided by CSO (1997), with a summary in Table 32. Foreign investment enterprises (FIE) are enterprises with some proportion of share capital in foreign ownership, and they accounted for 45.6 percent of the paid in capital of all Hungarian enterprises at end 1996, employing 25.1 percent of business sector workers. Companies with foreign participation are focused on trade–intensive activities, producing 62 percent of goods exports in 1996, and importing two–thirds of goods imports. FIEs have been investing very actively, accounting for over half of business sector investment, and two–thirds of investment by the manufacturing sector in 1996.

5. Direct investment in Hungary has become quite diversified across the economy by end 1996, Table 33. Manufacturing (especially machinery, food and beverages, and chemicals) attracted both acquisitions and green–field investments by multinationals like General Electric, Audi, Suzuki, Phillips, Electrolux etc. FIEs accounted for 69.9 percent of the paid in capital of all manufacturing enterprises, and 75.1 percent of paid in capital was foreign owned, so

Table 31. Foreign Direct Investment Stocks and Flows

	Stock of FDI in 1995 (Percent of GDP)			Inward Direct Investment (Percent of Gross Fixed Capital Formation)	
	Inward	Outward	Net Stock	1985-90	1991-95
Central and Eastern Europe	4.9	0.3	-4.6	--	3.9
Hungary	**31.5**	**1.2**	**-30.3**	--	**29.5**
Czech Republic	8.7	0.5	-8.2	--	11.2
Estonia	17.6	1.4	-16.2	--	32.8
Poland	7.2	0.2	-7.0	--	10.0
European Union	13.2	14.6	1.4	9.1	5.7
Austria	8.0	5.5	-2.5	3.0	1.8
Belgium&Luxemborg	31.1	23.0	-8.1	37.0	23.9
Greece	16.9	0.0	-16.9	9.0	5.2
Ireland	20.2	6.5	-13.7	23.1	16.8
Portugal	7.4	3.3	-4.1	17.7	8.0
Spain	17.6	6.0	-11.6	14.8	8.8
Sweden	15.9	31.2	15.3	16.0	18.8
Other developed countries	2.9	6.4	3.5	1.3	0.7
Australia	30.8	11.9	-18.9	11.2	9.3
New Zealand	43.9	12.0	-31.9	27.7	25.5
South America	18.4	1.7	-16.7	7.4	6.3
Argentina	8.7	0.2	-8.5	13.0	17.6
Bolivia	22.3	0.2	-22.1	25.0	19.6
Brazil	17.8	1.2	-16.6	3.1	2.7
Chile	23.1	4.1	-19.0	21.5	9.2
Columbia	14.8	1.7	-13.1	17.0	11.0
Eucador	14.1	0.0	-14.1	14.6	12.3
Peru	9.3	0.2	-9.1	15.5	14.7
Uruguay	8.1	0.1	-8.0	11.1	4.9
South, East and South-East Asia	15.1	7.0	-8.1	9.7	6.7
China	18.2	2.3	-15.9	14.5	16.3
Indonesia	25.2	0.3	-24.9	7.6	4.3
Malaysia	52.1	12.6	-39.5	43.7	21.3
Singapore	67.4	38.4	-29.0	59.3	23.3

Source: UNCTAD, World Investment Report, 1997

Table 32. Foreign Participation in the Hungarian Economy, 1996

	Business sector, total	Foreign investment enterprises 1/	Share of FIEs Percent
Paid in capital, Ft billion	5004	2280	45.6
Manufacturing	1219	852	69.9
Employment, thousands	2248	565	25.1
Manufacturing	835	297	35.6
Investment, Ft billion	885	488	55.2
Manufacturing	313	215	68.6
Exports, goods, Ft billion	2002	1249	62.4
Imports, goods, Ft billion 2/	2468	1645	66.7

Source: CSO (1997), and Statistical Yearbook of Hungary, 1996, CSO.

1/ Companies with foreign participation.

2/ Imports of FDI companies are particularly high as MOL, the oil company, is part foreign owned.

Table 33. Foreign Direct Investment by Industry, end 1996

	Number of enterprises			Paid in capital, Ft billion			Industry share (percent)			FDI capital share (percent)	
	Total Enterprises	FIE Enterprises 1/ Number	Percent	Total Enterprises	FIE Enterprises 1/ Total	o/w FDI	Value Added	Total paid in capital	Total FDI	Total paid in capital	Paid in capital of FIE Enterprises
Agriculture and forestry	9,012	840	9.3	307.3	28.9	18.8	7.1	6.1	1.2	6.1	65.1
Mining and quarrying	290	77	26.6	55.2	27.3	19.9	0.4	1.1	1.2	36.1	72.9
Manufacturing	33,643	4,312	12.8	1218.7	851.7	639.9	24.5	24.4	39.6	52.5	75.1
Food, beverages, tobacco	3,885	544	14.0	286.3	190.3	147.2	4.3	5.7	9.1	51.4	77.4
Textiles, apparel	3,953	601	15.2	66.9	37.6	32.0	2.2	1.3	2.0	47.8	85.1
Wood, paper, publishing	7,390	745	10.1	101.6	50.0	43.2	2.1	2.0	2.7	42.5	86.4
Chemical products	2,233	402	18.0	273.5	247.5	139.8	5.9	5.5	8.7	51.1	56.5
Non-metallic minerals	1,048	178	17.0	64.9	52.8	44.9	1.2	1.3	2.8	69.2	85.0
Metal products	4,483	518	11.6	115.7	49.8	40.5	2.6	2.3	2.5	35.0	81.3
Machinery	8,748	1,120	12.8	286.3	215.9	185.7	5.5	5.7	11.5	64.9	86.0
Other	1,903	204	10.7	23.5	7.8	6.6	0.6	0.5	0.4	28.1	84.6
Electricity, gas, water	421	42	10.0	1058.6	431.3	229.2	3.5	21.2	14.2	21.7	53.1
Construction	17,920	1,219	6.8	147.2	68.1	60.2	4.5	2.9	3.7	40.9	88.4
Trade, wholesale and retail	72,190	12,772	17.7	525.0	234.2	191.4	12.1	10.5	11.9	36.5	81.7
Hotels and restaurants	8,383	1,125	13.4	103.3	56.3	39.9	2.1	2.1	2.5	38.6	70.9
Transport, telecommunications	8,292	805	9.7	614.5	203.2	141.8	9.6	12.3	8.8	23.1	69.8
Financial services	1,477	154	10.4	309.8	215.9	144.4	5.8	6.2	8.9	46.6	66.9
Real estate, business services	51,904	3,886	7.5	529.8	149.5	118.6	17.1	10.6	7.3	22.4	79.3
Education	2,591	144	5.6	2.7	0.8	0.4	4.9	0.1	0.0	14.8	50.0
Health	6,714	169	2.5	4.6	2.8	2.4	4.8	0.1	0.1	52.2	85.7
Other services	9,455	585	6.2	127.7	10.1	7.3	3.5	2.6	0.5	5.7	72.3
Total	222,292	26,130	11.8	5004.4	2280.1	1614.2	100.0	100.0	100.0	32.3	70.8

Sources: NSO--Foreign direct investment in Hungary, 1995-96

1/ Foreign investment enterprises (FIE) have any share of foreign participation.

52.5 percent of paid in capital in the manufacturing sector was foreign owned in 1996.[113] Electricity, gas, and water received substantial FDI when various utilities were privatized, with FIEs accounting for 40.7 percent of paid in capital in this sector, though foreign ownership was only 21.7 percent of capital in this sector at end 1996. The privatization of MATAV accounts for the high level of FDI in telecommunications, and the privatization of the state banks along with the earlier entry of foreign banks is reflected in two–thirds of paid in capital of financial services being held by foreign owners. New companies with foreign participation continue to be established, but data for 1997 suggests a shift in emphasis towards services.

What is the Outlook for FDI into Hungary?

6. Clearly foreign direct investors have an important stake in the Hungarian economy. Though the privatization phase of FDI is largely concluded, the privatizations will pave the way for modernization investment. For example, in 1995 minority stakes in regional gas and electricity distributors and two electric power stations were sold for about US$1.7 billion, with pledges to make further investments of about US$3 billion in the following years. Furthermore, Hungary is emerging as a significant location for export–oriented investment projects, primarily in manufacturing. Established FDI will attract further investment to expand existing capacity, and as related companies and industries are attracted to the region. Thus it appears likely that Hungary will continue to receive substantial inward FDI.

7. Excluding privatization receipts, recorded inflows of FDI equity capital have averaged US$1.2 billion over 1991 to 1997, a flow equal to 3.0 percent of GDP, or 17.2 percent of fixed investment by nongovernment, Table 34. The inflows have been relatively stable, at around US$1.0 billion over 1991 to 1994, then rising in recent years, with FDI excluding privatization receipts and intercompany loans averaging US$1.4 billion in 1995 to 1997, or 3.2 percent of GDP. This recent increase in FDI moves broadly in line with a more general acceleration in investment. Given the relatively stable track–record for FDI an estimate of further inflows (net of outward direct investment) in the order of 3 percent of GDP is reasonable in the near–term, largely consistent with the assumptions in Ministry of Finance (1997) when intercompany loans are excluded.

Outward Direct Investment by Hungary

8. Over 1994 to 1995 Hungarian companies made outward foreign direct investments of about US$50 million per annum, but outward FDI in equity capital surged to US$286 million in 1997, with cumulative outward direct investment reaching US$0.7 billion or 1.6 percent of GDP. As discussed in UNCTAD (1997), the most favored locations were Romania, the United States, Slovakia, and Austria. Hungary's FDI in CEE countries has been focused on manufacturing while FDI in advanced economies is geared towards distribution. The oil and

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[113] There may be an accounting bias where paid–in capital is higher relative to physical capital where the capital subscription is more recent, due to inflation.

Table 34. Foreign Direct Investment Flows in Hungary

	1990	1991	1992	1993	1994	1995	1996	1997
				(In millions of U.S. dollars)				
Direct investment, net	311	1,459	1,471	2,328	1,097	4,500	1,986	1,654
Direct investment in Hungary	311	1,459	1,471	2,339	1,146	4,543	1,983	2,085
Equity capital	311	1,459	1,471	2,339	1,146	4,543	1,788	1,811
o/w privatization 1/	8	330	519	1,204	104	3,025	578	272
other	303	1,129	952	1,135	1,042	1,518	1,210	1,539
Intercompany loans 2/	0	0	0	0	0	0	195	274
Direct investment abroad	0	0	0	-11	-49	-43	3	-431
Equity capital	0	0	0	-11	-49	-43	3	-286
Intercompany loans	0	0	0	0	0	0	0	-145
				(In percent of GDP)				
Direct investment, net	0.9	4.4	3.9	6.0	2.6	10.1	4.4	3.7
Direct investment in Hungary	0.9	4.4	3.9	6.1	2.8	10.2	4.4	4.6
Equity capital	0.9	4.4	3.9	6.1	2.8	10.2	4.0	4.0
o/w privatization 1/	0.0	1.0	1.4	3.1	0.2	6.8	1.3	0.6
other	0.9	3.4	2.6	2.9	2.5	3.4	2.7	3.4
Intercompany loans	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.6
Direct investment abroad	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	-1.0
Equity capital	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.6
Intercompany loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3
				(In percent of Non-government GFCF)				
Direct investment, net	4.7	24.3	23.9	37.5	15.5	61.0	23.7	18.3
Direct investment in Hungary	4.7	24.3	23.9	37.7	16.2	61.6	23.6	23.0
Equity capital	4.7	24.3	23.9	37.7	16.2	61.6	21.3	20.0
o/w privatization 1/	0.1	5.5	8.4	19.4	1.5	41.0	6.9	3.0
other	4.5	18.8	15.5	18.3	14.7	20.6	14.4	17.0
Intercompany loans	0.0	0.0	0.0	0.0	0.0	0.0	2.3	3.0
Direct investment abroad	0.0	0.0	0.0	-0.2	-0.7	-0.6	0.0	-4.8
Equity capital	0.0	0.0	0.0	-0.2	-0.7	-0.6	0.0	-3.2
Intercompany loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.6
Memorandum items:				(In billions of U.S. dollars)				
Gross Fixed Capital Formation	8.0	7.4	7.9	7.7	8.9	9.0	9.6	10.4
Non-government	6.7	6.0	6.1	6.2	7.1	7.4	8.4	9.1
Government	1.3	1.4	1.7	1.5	1.8	1.6	1.2	1.3
GDP	33.1	33.4	37.2	38.6	41.7	44.7	44.9	45.2

Source: National Bank of Hungary and the State Privatization Company.

1/ Privatization revenues in foreign currency for 1990 to 1994, from the State Privatization Company, which may not accurately reflect reciepts from non-residents. BOP data on reciepts from non-residents for 1995 to 1997. Note that receipts of US$969 million are excluded in 1997, as these are classified as portfolio investments.

2/ Included under equity capital until 1996.

gas company MOL has become the most active outward investor, but FDI activity also includes pharmaceuticals and ceramics. The knowledge of Hungarian enterprises of markets in other transition economies may place them in an advantageous position in acquisitions when these countries implement cash privatization programs. In particular, foreign–owned companies resident in Hungary may become important direct foreign investors, though these outflows could be funded by higher direct investment inflows. It is expected that outward FDI net of such "intermediation" activity will remain modest compared to inward FDI in the medium–term.

Measurement Issues in the Current Account and FDI

9. As in many countries the BOP in Hungary is on a cash rather than accrual basis, which is problematic with respect to the stocks and flows of FDI as there are often no related cash payments, as retained earnings of foreign investors are a form of FDI and FDI capital is sometimes provided in kind. From 1999, the National Bank of Hungary plans to survey enterprises for supplementary information to improve the BOP information on FDI.

10. The Hungarian BOP data on FDI records cash flows related to equity purchases and sales where the nonresident party holds more that 10 percent of paid in capital in an enterprise. FDI financed by retained earnings is not captured, though retained earnings are an important source of FDI in other countries. For example, in New Zealand of the NZ$15.5 billion in total income on FDI in equity over 1992 to 1996, NZ$7.0 billion were reinvested. Table 35 presents estimates of the cumulative retained earnings of foreign investors in Hungary, where "paid dividends" are used to proxy earnings.[114] The profit accruing to the foreign investor is calculated using the share of foreign capital participation at the end of the previous year. Retained earnings accruing to the foreign owner are then calculated by subtracting repatriated dividends. Cumulating these estimates of retained earnings over 1990 to 1997 gives an estimate of US$1.8 billion of FDI from retained earnings.

11. The estimate of US$0.6 billion in retained earnings of foreign owners in 1997 is 1.3 percent of GDP. The omission of these income flows to nonresidents from the BOP international investment income account means that the reported current account balance may understate the deficit on an accrual basis by about 1.3 percent of GDP, though this should be considered a rough estimate only.

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[114] While dividends are typically only a fraction of earnings, some FDI enterprises made losses, so the estimate is not overly conservative, but is only approximate.

Table 35. Estimate of Retained Earnings of Foreign Owners of Hungarian Companies 1/

	1990	1991	1992	1993	1994	1995	1996	1997
				(In billions of Forint)				
1. Paid dividends by FDI enterprises	12.4	15.4	25.1	34.3	59.7	74.9	143.5	262
				(In U.S. dollar millions)				
2. Paid dividends by FDI enterprises	196	206	318	373	568	596	940	1403
3. Repatriated dividends, BOP	24	32	44	56	117	194	257	437
4. Net dividend to foreign owners (2*7)	67	93	179	222	338	395	666	1031
5. Retained earnings, estimate (4-3)	43	61	135	166	221	201	409	594
6. Cumulative retained earnings	43	104	239	405	626	828	1236	1830
				(In percent)				
7. Foreign share in total capital	34.0	45.1	56.3	59.5	59.6	66.3	70.8	73.5

Sources: Central Statistical Office, National Bank of Hungary.

1/ Data are for foreign investment enterprises, with any share of foreign partcipation.

EVALUATING HUNGARY'S EXTERNAL DEBT BURDEN

Debt Definition

1. External debt data in this chapter is intended to cover all nonequity claims of nonresidents on residents of Hungary. Thus nonresident holdings of Hungarian forint denominated securities are included, as these holdings could become a claim on foreign reserves if they were sold, as happened in August-September 1998. Intercompany loans (nonequity claims on Hungarian companies by a direct investor in that company) are also included in gross foreign debt.[115] These loans have risen as a share of enterprise foreign debt, from 17 percent at end 1995 to 31 percent at end 1997. These "loans" range from being close to equity, e.g. long–term debt to the majority foreign owners of a company, through to standard trade credits except that the lender has a small—though at least 10 percent—equity participation in the borrower. The recorded maturities on these liabilities, of US$127 million in 1996 and US$322 million in 1997, were only 14 percent and 23 percent respectively of intercompany loans outstanding at the end of the previous year, implying a long-term average maturity. While some of these liabilities may be readily rescheduled, others could be a source of demand for foreign currency in the event of external pressures, so the most prudent treatment is to include intercompany loans in foreign debt.

Debt Data Quality

2. The official BOP data on debt is advanced, with International Investment Position (IIP) data provided on a monthly basis with a sectoral break–down.[116] The BIS International Banking Statistics provide a basis for evaluating the official IIP debt data, as it should be the case that the survey of BIS banks covers a significant subset of the debt of a country. Table 36 provides a comparison of BIS data with the IIP data, finding that foreign parties not covered by the BIS survey hold more than half of Hungary's foreign debt. Nevertheless, the BIS surveyed institutions hold the majority of short–term non–intercompany debt claims on Hungary.[117] The BIS data on claims on the public sector slightly exceed the IIP data on government foreign debt, but this may reflect the inclusion of government guaranteed debt in the BIS data. The BIS data on holdings of Hungarian bonds and notes is significantly above the IIP data on debt in bonds and notes by almost US$1 billion, but this may reflect some differences in debt instrument classification. Overall, the BIS data in mid-1997 do not provide clear evidence of weaknesses in the official data on Hungarian foreign debt.

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[115] Desk economists report that the Czech Republic includes intercompany loans in gross foreign debt, but the treatment in Poland and Slovenia is uncertain.

[116] At this stage in the implementation of the Fifth Balance of Payments manual, 37 countries are publishing IIP data, many on an annual basis only, but some on a quarterly basis.

[117] The comparison must allow for scheduled maturity payments on medium and long–term debt as the BIS classification is on a residual maturity basis.

Table 36. Debt statistics comparison, at end-June 1997
(In millions of U.S. dollars)

International Investment Position (NBH)		International Banking Statistics (BIS)		Deviation
Gross foreign debt, ex. intercompany loans	23447	Total claims	10851	12596
Short-term plus maturities	5663	Up to one year 1/	4018	1645
Short-term	3396			
Maturities on public MLT debt 2/	2268			
By sector:		By sector:		
NBH and credit institutions	17439	Banks	5481	11958
Government	2241	Public sector	2400	-159
Enterprises and other	3767	Non-bank private sector	2968	799
By instrument:		By instrument:		
Other foreign liabilities	11415	External loans and deposits	5319	6096
Bonds and notes	11943	Bonds and notes	12900	-957

Sources: NBH Statistics Department, and International Banking Statistics, BIS.
1/ Data is on a residual maturity basis, including all claims falling due in the next year.
2/ Assumes that one-half of maturities due in 1998 fall due in the first two quarters.

Debt Ratios

3. Debt ratios to both GDP and exports are commonly used when evaluating the burden of foreign debt. Many papers suggest that ratios to exports are the more informative indicators, including Milesi–Ferretti and Razin (1996). Manzocchi (1997) argues that the attractiveness of Hungary as a destination for capital inflows despite its relatively high initial foreign debt was related to the rapid growth in the export base.[118] These studies would suggest giving most weight to the sharp reduction in Hungary's debt–to–exports in evaluating its debt burden. However, the recent expansion in Hungarian exports includes a change in export composition towards manufactures which have a high share of imported inputs. Thus the improvement in the net capacity of Hungary to generate foreign exchange through trade is overstated by the 128 percent rise in gross exports in U.S. dollar terms from 1994 to 1997, as imports also rose by 75 percent in this period.[119] For comparisons of Hungary's debt burden over time this chapter uses ratios to GDP to avoid this export composition distortion. Net rather than gross debt is the focus of the analysis, as net debt is most clearly linked to the current account deficit and it also indicates income sensitivity to foreign interest rates. Gross debt data can also be distorted by transactions that result in offsetting assets and liabilities.

4. Debt ratios are static comparisons, but it may be the case that some countries are more able to manage a certain debt ratio if their GDP or export growth will be higher than other countries. Various indicators that allow for these dynamics have been proposed, for example Manzocchi (1997) encourages use of the growth–adjusted debt–to–export ratio:

Growth–adjusted debt–to–export ratio = debt / exports [1 – (export growth / interest rate)]

A similar growth adjustment can be made for ratios to GDP. This type of adjustment was not made, as the countries of most relevance to Hungary face broadly similar potential GDP growth rates and interest rates, see for example EBRD (1997).

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[118] The IBCA upgrade of Hungary's long–term foreign currency debt to BBB from BBB– in June 1997 described the fall in net foreign debt relative to exports since 1994 as "unparalled in any rated emerging market in recent times."

[119] It is not possible to calculate the contribution of manufactures, especially machinery and transport equipment, to overall export and import growth, as CSO data on the commodity composition of trade covers trade in the free–trade zones in 1997, but not in previous years. One approach to correcting the debt–to–export ratios was prevented by the lack of trade data on a Broad Economic Category basis, i.e. consumption, capital, and intermediate goods.

IX. Exchange Arrangements and Capital Account Liberalization[119]

230. This chapter outlines the exchange arrangements of Hungary, the treatment of current international payments and receipts, and the present structure of capital controls. A more detailed description can be found in the IMF publication *Annual Report on Exchange Arrangements and Exchange Restrictions.*

231. The currency of Hungary is the Hungarian forint. Since March 13, 1995 a crawling peg exchange rate regime has been in place. From January 1, 1999 the central parity is fixed against a basket composed of the euro—formerly the deutsche mark—with a 70 percent weight, and the U.S. dollar with a 30 percent weight. A fluctuation band of 2.25 percent on either side of the central parity has been maintained since December 23, 1994. The monthly rate of devaluation is preannounced by the National Bank of Hungary (NBH), and was set as follows:

Monthly Rate of Crawl (Percent)	Date of Introduction
1.9	March 13, 1995
1.3	July 1, 1995
1.2	January 1, 1996
1.1	April 1, 1997
1.0	August 15, 1997
0.9	January 1, 1998
0.8	June 15, 1998
0.7	October 1, 1998
0.6	January 1, 1999

232. The NBH is vested with authority to enforce foreign exchange regulations under the Act on Foreign Exchange of 1995. In accordance with UN Resolution No. 661 and Executive Board decision No.144–(52/51), Hungary maintains payments restrictions against Iraq.

233. Hungary accepted the obligations of Article VIII, Sections 2, 3, and 4 of the Fund's Articles of Agreement with effect from January 1, 1996. Hungary's exchange system is free of restrictions on payments and transfers for current international transactions. The limit on purchases of foreign exchange for tourism was abolished on January 1, 1997. Purchases for import payments only require a declaration regarding the use of the foreign exchange.

234. Export proceeds and current transfers in convertible currencies must be immediately repatriated to Hungary and surrendered by deposit in a foreign exchange account at a

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[119] Prepared by Craig Beaumont.

domestic bank. Foreign exchange receipts not resulting from an international transaction must be immediately converted into domestic currency. Current transfers to resident natural persons are exempted from the surrender requirement.

235. Hungary maintains capital controls, with restrictions primarily on short-term capital flows, so as to contain potential speculative pressures on the forint, and reduce the risk that capital inflows might stimulate an unsustainable current account deficit. To enforce these capital controls, Hungarian residents must obtain permission to hold foreign exchange accounts abroad. The following outlines the key restrictions on capital flows by asset type:

i. Debt securities: residents may freely transact in bonds with original maturity greater than one year issued by OECD governments or OECD-based enterprises, but transactions must be made through a resident brokerage company. Nonresidents may freely transact in Hungarian bonds of original maturity greater than one year. For other transactions foreign exchange authorization is required.

ii. Money market instruments, open-end funds, and derivatives: transactions between residents and nonresidents require foreign exchange authorization. However, as an exception, foreign investors have been allowed to trade on the Budapest stock exchange in futures contracts for the stock exchange index (BUX) or the shares of individual companies.

iii. Credit operations: credits from residents to nonresidents require foreign exchange authorization, except credits between close relatives, or long-term credits from a resident to a nonresident enterprise in which they have greater than 10 percent participation, in which case the credit is treated as outward FDI—see below. Residents must obtain authorization to receive credits from nonresidents, except for medium- and long-term loans to enterprises.

iv. Equity securities: transactions in shares of OECD-based enterprises are free of controls, but residents must use a resident brokerage company. For other transactions foreign exchange authorization is required.

v. Direct investment: outward FDI (acquisition of holdings in nonresident companies of greater than 10 percent) is free of controls. Inward FDI is also free of exchange controls.

236. Specific provisions apply to certain institutions:

i. From January 1, 1997 banks were permitted without prior approval to make short-term foreign exchange denominated loans to nonresidents, or to purchase foreign short-term securities, but the total of loans and security holdings may not exceed 50 percent of total liabilities in foreign exchange. Medium- and long-term loans to nonresidents still require foreign exchange authorization. Banks must report all foreign borrowing to the NBH.

ii. Insurance companies are governed by the Law on Insurance Companies and Insurance Activities 1995 and regulated by the independent Insurance Authority. Payments for insurance services, which are current transactions, are free from exchange restrictions; however, nonresident insurance companies cannot operate cross-border. Resident insurance companies face restrictions on portfolio composition, including a ban on foreign investment.

iii. Private pension funds participating in the compulsory second pillar are subject to legislated portfolio restrictions, which initially limit foreign investments to 10 percent of funds, rising to 30 percent by 2002. For the pension funds in the voluntary third pillar, the limit on foreign investment is fixed at 20 percent of funds.

237. Hungary has been liberalizing its capital controls over time, consistent with the commitments it made when joining the OECD in December 1995 to come into compliance with the OECD Code of Liberalization of Capital Movements. Though there is no specific date for compliance to be achieved, the Hungarian authorities consider that full capital account liberalization might be achieved within two or three years, with short-term capital movements likely liberalized last. The final step in liberalization would also include ending the obligations to repatriate foreign exchange earnings, as this would *de facto* give residents the right to open accounts abroad. This movement towards capital account liberalization is also consistent with adoption of the EU *acquis communautaire*, which includes the freedom of intra-EU capital flows. However, countries seeking EU accession have previously obtained transitory periods in the case of short-term capital flows.

238. A number of measures liberalizing capital transactions came into effect on in January 1, 1998. The requirement that resident transactions in foreign securities be restricted to companies with an investment grade rating was removed. Nonresident companies from within the OECD, and with an investment grade credit rating, may issue Forint-denominated bonds carrying a maturity of more than one year. Restrictions on direct investments in branches of foreign companies were eliminated, as was the requirement for foreign exchange authorization for outward FDI to non-OECD countries. Residents were also permitted to acquire or build real estate abroad without foreign exchange authorization, though transactions must be reported within eight days.