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THE END OF MODERATE INFLATION

IN THREE TRANSITION ECONOMIES? *

by

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ABSTRACT

This paper examines the ending of moderate rates of inflation in three transition economies, the Czech Republic, Hungary and Poland at the end of 1998. We argue that the institutions for the conduct of monetary policy in these countries were relatively weak and that monetary policy was unsupported by fiscal policy and hampered by multiple objectives. Using a VAR model of inflation, we show that, under a variety of assumptions, foreign prices and the persistence of inflation are the key determinants of inflation in these countries. From this finding we conclude that the end of moderate inflation in the Czech Republic, Hungary and Poland was largely due to the decline in import prices in the second half of 1998, and thus it may be a temporary phenomenon.

JEL Classification: P2 and E5
Key words: Monetary and fiscal Policy, transition economies, moderate inflation and inflation targeting

I. INTRODUCTION

A number of transition economies, the Czech Republic, Hungary and Poland among them, have seemingly stabilized their economies, built up the institutions required for the functioning of a modern market economy, privatized the greater part of their productive assets, restructured their industries and integrated themselves into the global economy. Perhaps most remarkably, after being stuck at double-digit levels of inflation of a "moderate" level (see, *e.g.*, Medgyessy, 1998; Dornbusch and Fischer, 1993, Ball, 1994: Burton and Fischer, 1998), at the end of 1998 or the beginning of 1999, the inflation rates of these countries, as measured by the consumer price index (CPI), fell to single digit levels, as shown in Figure 1. Indeed, on a month-on-month basis, these countries were experiencing no inflation or even deflation at the end of 1998 and the beginning of 1999. Some observers have interpreted this outcome, which few would have predicted at the beginning of 1998, as a lesson on how to end persistent moderate inflation in other transition economies. Before we accept the policy choices made by these three countries as a guide for ending moderate inflation in other transition economies, it behooves us to examine more closely whether, indeed, the results now before us can be the direct outcome of the policies followed or whether a more cautious interpretation of these results is warranted.

During the early stages of transition, the Czech Republic, Hungary and Poland implemented stabilization programs based on nominal anchors, primarily the exchange rate but also at times the wage rate, and they relied largely on direct controls and quantitative restrictions to implement monetary policy. Subsequently, as stabilization

took hold and as their financial institutions and markets matured, all of them abandoned the pegging of their nominal exchange rates and adopted indirect methods of monetary control.[1] In this paper, we examine whether a disinflation that reduced inflation to single digit levels, even to *low* single digit levels, could be the outcome of the monetary policies and the institutional environment of these countries. We consider the instruments of monetary policy and argue that the process of transition and the building up of market economy institutions probably has not progressed sufficiently to allow indirect instruments of monetary policy to bring inflation to the levels being currently being experienced. We are also not sanguine about the ability of monetary instruments to root out moderate inflation because, as we argue below, monetary policy is overburdened by having to pursue multiple objectives and because it is inadequately supported by fiscal policy.

We also examine whether approaches such as inflation targeting can be used effectively by transition economies. Much of our argument rests on an analysis of the root causes of inflation in these economies. This analysis concludes that the principal causes of inflation are either exogenous or beyond the direct control of the monetary authorities. Therefore, we should be cautious in accepting recent inflation results as a signal that moderate inflation in these transition economies has been conquered by past monetary policies.

[1] For the Czech Republic, see Begg, 1998; for Hungary, see Szapary and Jakab, 1998 and, for Poland, Wellisz, 1997.

II. THE FRAMEWORK FOR MONETARY POLICY

A. The Institutional Basis for Monetary Policy

While we accept the notion that the long-run effect of monetary policy is to be found in the movements of prices and not of real output, there are important short-term links between the real and monetary spheres in transition economies. On the one hand, the rate of inflation does influence the decisions of firms and consumers about the level of saving and investment as well as about the specific form that these will take. At the same time, the effectiveness of monetary policy depends to a large extent on the behavior of the real sector. The effectiveness of indirect methods of monetary control now employed in the three countries under consideration also depends on the effectiveness of monetary institutions, including capital markets and the banking system.

Although there has been some tightening of the budget constraint for firms in all three countries, it is not at all evident this emerging financial discipline has been sufficient to drive loss-making firms into bankruptcy rather than leaving them in a limbo of growing indebtedness and payments arrears.. Firms continue to run losses that are sometimes covered by government subsidies, sometimes by loans from banks and sometimes by other enterprises.[2] In such circumstances, firms lack the incentives to restructure and thus to respond appropriately to changes in interest rates. Indeed, they may behave perversely, engaging in increased borrowing and in more risky investments, including leveraged takeovers of rivals, as the interest rate increases. Privatization has

[2] While explicit subsidies have been reduced, there are implicit subsidies in the form of tax-payment arrears, guarantees of loans using government-owned stock, etc. The lack of effective bankruptcy procedures and so-called creditor passivity continue to play an important part in all three economies.

also reduced the effectiveness of monetary policy by placing many firms in the hands of foreign MNCs and thus enabling them to evade home-country monetary policies through their access to parent-company funds (Hawkins and Macaluso, 1977; Estrin *et al.*, forthcoming). There is also evidence that the real sector, meaning non-financial firms, is to a large extent self -financed, as the net flow of funds has been largely from the non-financial sector to banks rather than the other way (Dittus, 1994). Moreover, there is compelling evidence that it is the less efficient and unprofitable firms that receive a disproportionate share of the loans that are made to businesses (see, *e.g.*, Bonin and Schaffer, 1994; Coricelli, 1998, Ch. 2).

The distortions evident in the real sector also have their counterparts in the monetary sector. Commercial banks in the three countries face a number of problems. Relative to their bad loans, they appear to be under-capitalized. In Hungary and the Czech Republic, they have had to have some of their bad loans written off, while in Poland they have been encouraged to attempt to work out problem loans.[3] Neither approach has entirely resolved the problems of commercial banks, and much new lending in all three countries continues to go to firms that are likely to become problem borrowers in the future. In part, this is due to the fact that the banks are captives of enterprises to whom they have lent in the past and whose outstanding loans they continue to roll over through new financing rather than writing them off. In part, it is due to the fact that the commercial banks simply lack the personnel needed to make better lending decisions. Finally, the pattern of privatization in the transition economies also plays a role in the

[3] For bank reforms and behavior, see Mochrie et al. (1998), van Vijnbergen (1995) and the special issue of the *Journal of Comparative Economics* (1996) dealing with commercial banking in transition economies. It is noteworthy that in 1998 Hungary was engaged in a major rescue of

lending policies of commercial banks. Especially in the Czech Republic, the banks, although "privatized", have the state as their largest share holder, and thus the state's preferences regarding lending decisions may play a decisive role. Czech commercial banks not only lend to firms, but in many cases they are also the largest share holders of these firms, creating further incentives to continue lending to problem firms.

The existence of large problem loans has led monetary authorities to maintain high spreads between lending and borrowing rates so as to boost banks' profits and thus their ability to build up their reserves. However, in addition to discouraging savers from placing funds with the banking system and firms from borrowing from it, both of which reduce the effectiveness of monetary policy, the creation of these artificial profits in the banking sector has had three other negative consequences for the effectiveness of monetary policy. One is the emergence of small under-capitalized banks that lack the skills and perhaps even the desire to make prudent loans; many of these banks have gone under or have had to be absorbed by larger banks. However, their presence in the financial system has undermined the efficiency with which credit is allocated to non-financial firms and impeded the functioning of the inter-bank credit market. A second consequence has been the entry of foreign banks, which have been alleged to engage in "cherry picking" or selecting only the most credit worthy of the local firms for clients and leaving the less attractive borrowers for the local banks. The third consequence has been that local firms have tended to borrow abroad, thus bypassing local banks and, therefore, also domestic monetary policy.

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its two largest commercial banks while the largest commercial bank in the Czech Republic is arguably in worse condition now than it was at the beginning of the transition.

Exacerbating the manifest weaknesses of the credit markets is the fact that stock markets in the three countries do not provide a viable substitute. They are thin and subject to extreme swings in prices, often as the result of inflows and outflows of foreign capital. Moreover, these stock markets have not been very effective in raising funds through IPOs. In part this is due to the rather disappointing returns they have generated.

The foregoing discussion suggests that, to the extent that monetary policy needs to influence the behavior of banks and non-bank actors in the economy to be effective, there is reason to doubt that there has been enough progress to date to ensure that such influence will be sufficiently predictable and strong to guarantee that indirect tools of monetary policy can effectively reduce inflation. Moreover, the fact that monetary policy is to some extend dictated by the need to encourage the restructuring of firms, to recapitalize the banking system and to enable the government to finance its deficits suggests that the monetary authorities in these countries are likely to face severe conflicts in the formulation of monetary policy.

B. Coordination of Fiscal and Monetary Policy

A dispassionate view of economic policy in the three countries suggests that monetary policy has had to bear the brunt of the stabilization effort while governments have been relatively unwilling to make unpopular decisions to reduce fiscal deficits. In the case of Poland, Wellisz (1997) notes that, during the 1991-93 period,"[i] t is clear…that the monetization of the fiscal deficit acted as the 'motor of inflation'" (p. 165) while subsequently the government borrowed from commercial banks, driving up interest rates so that "fiscal policy…. is at the root of the credit tightness decried by borrowers" (p. 169). Of course, this same credit crunch constrains the monetary policies of the

National Bank of Poland (NBP). While the government's deficit is not especially high, it is expanding as a share of GDP and thus can hardly be viewed as contributing to the fight against inflation.

Much the same can be said about the contribution of fiscal policy to stabilization in Hungary, where the general government deficit reached 8.4% of GDP in 1994 (Haggard *et al.*, 1998). It was only an impending economic crisis that led to the Bokros package of reforms that, according to Kornai (1997), "…brought to an end the habitual (fiscal policy-*our insert*) conduct of decades – the policy of 'muddling through'" (p.125). Nevertheless, despite Kornai's optimistic assessment, the Hungarian deficit has grown of late, thus leaving the battle against inflation largely to monetary policy.

In the Czech Republic, officially reported fiscal deficits have been small but increasing. During the period leading up to the speculative attack on the koruna in May 1997, the government proved unable to act to tighten fiscal policy, and it was only in the aftermath of the attack on the koruna that measures were taken to reduce the deficit (Brada and Kutan, 1999). Despite this harsh lesson, the newly elected government has enacted a much more expansionary budget for 1999.

In sum, while monetary policy, at least as measured by real interest rates, has been tight in all three countries, the same cannot be said for the trend in fiscal policy. Although such a policy mix may reflect the desire of central bankers in the region to create some credibility for their institutions, it also reflects a propensity on the part of politicians to evade difficult choices and to rely on monetary policy to make up for their unwillingness to make difficult decisions regarding fiscal policy.

C. Exchange Rate Policy

The conduct of monetary policy has also been complicated by exchange rate policy and by the opening up of these countries' rather fragile financial systems to international capital flows. High interest rates and either fixed exchange rates or pre-announced crawling pegs have led to significant inflows of short-term capital. In order to avoid inflationary pressures from the inflows of foreign capital, central banks have engaged in sometimes-massive sterilization.[4] Not only has this sterilization been costly for the central banks, but it also has not been entirely successful, so that targets for monetary growth have often been exceeded, and interest rates have remained high in order to prevent sudden outflows of foreign capital. Of course, such high interest rates tend to increase costs of production, thus reducing exports and making these countries' currencies more vulnerable to speculative attack.

In sum, the foregoing discussion suggests that monetary policy in the three countries considered in this paper as yet rests on relatively weak financial markets and institutions and that it operates in an environment where the agents it seeks to influence may react to monetary policy in undesirable ways or not at all. Moreover, monetary policy is unsupported by fiscal policy and has to promote a multitude of often-conflicting objectives.

[4] For the Czech case, see Begg (1998), for Hungary, Szapary and Jakab (1998), and Wellisz (1997) for the Polish case.

III. CAUSES OF INFLATION AND POLICIES FOR DISINFLATION

A. Causes of Inflation

In order to understand the role that monetary policy can play in reducing the rate of inflation, it is worthwhile to seek out the root causes of inflation in transition economies. As the discussion below shows, there are some causes that are specific to the transition economies and that do not appear to be easily combated by means of indirect monetary tools. Most important, it does not appear that the growth of the money stock is the main source of inflationary pressures in the short run.

1. *Undervaluation of the Exchange Rate*. Some observers, such as Desai (1998) and Richards and Tersmann (1996), argue that inflation in transition economies is largely the result of the initial over-depreciation of their currencies. This inflation is not the outcome of the usual wage-price spiral induced by devaluation, but, rather, it is the result of the workings of the law of one price, or commodity arbitrage, which creates domestic inflation to as to reestablish purchasing power parity. Wellisz (1997) describes the process in the case of the Polish crawling peg thus: "As long as the rate of slide is set so as to result in the continuing real overvaluation (*sic!* – although the subsequent sentence indicates that this should be *undervaluation*) of the zloty, international prices exercise an upward pull on domestic prices" (p. 168).

2. *Large Relative Price Changes*. A characteristic of transition economies is that their relative prices were badly distorted. Given the downward stickiness of prices, the bulk of price readjustment in the course of transition thus occurs as some prices increase by large amounts and others either remain constant or increase by relatively smaller amounts.

These large price changes, usually price increases due to the downward inflexibility of prices, have a disproportionate effect on the price index.

Pujol and Griffiths (1998) find that sectoral price changes in Poland during 1989-1995 were, indeed, quite skewed, suggesting that, in this period, some sectors were experiencing relatively large price changes while the price changes of other sectors were closely bunched. Moreover, the standard deviation of sectoral price changes around the mean was quite large, and this high standard deviation did not decline much over their sample period. However, Coorey *et al.* (1998) find that the variance of relative prices does have a significant impact on the rate of inflation in 21 transition economies, but only when they consider the period immediately following the initial period of price liberalization when there was a burst of inflation and a period of large relative price changes. For the period of late transition, neither the variance nor the skewness of sectoral price changes had a significant impact on the rate of inflation, suggesting that perhaps it was the initial burst of inflation and relative price realignment that drove the results obtained by Pujol and Griffiths .

3. *The Freeing of Controlled Prices*. A variety of prices, mostly having to do with government and municipal services, utilities and rents, and energy were not fully liberalized during the initial price liberalizations. Instead, governments either froze these prices or adopted a program of phased liberalization. In some cases, controlled prices were to be increased in an *ad hoc* manner until they reached equilibrium, and then decontrolled. In other cases, increases were based on a formula whereby prices would increase by a factor equal to the previous years' inflation plus some pre-specified percentage, so that they would outpace inflation, but only by a limited amount, and thus move toward

equilibrium at a controlled pace. Often rents and municipal services were priced on a cost-plus basis (see Czech National Bank, 1998, Table 3b).

Such a price setting pattern leads to the persistence of inflation because a part of the consumer price index (CPI) market basket consists of goods whose prices by definition must grow at rates that exceed the past inflation rate. Consequently, changes in the prices of regulated goods are both inimical to reductions in the rate of inflation and exogenous as far as monetary policy and its impact on inflation are concerned. The existence of these goods makes it extremely difficult to reduce inflation quickly because the burden of slowing price growth below the rates of past inflation falls on those goods in the consumer price index whose prices are not set in this way. Moreover, as prices of controlled goods are freed up, large one-time increases move the CPI upward in a way that disguises the broader tendencies in prices.

4. Wage-Pull Inflation. Nominal wages in the three countries have grown more rapidly than has the CPI, so that real wages have grown steadily since the early transition. Productivity gains have been alleged to be lower than the gains in real wages. Some observers (Begg, 1998; Drabek, 1999) argue that real wage growth is the result of poor corporate governance, which leaves managers with few incentives to resist workers' demands for wage increases. Excessive backward-looking indexing of wages is often institutionalized. In the Czech Republic, tripartite negotiations between the government, labor unions and representatives have set real wage floors. In Hungary, in similar negotiations, the unions have regularly and successfully rejected government inflation forecasts in favor of projections based on past inflation. Moreover, in some countries, the

Czech Republic in particular, it is the government sector that has set the pace for large wage increases.

B. What Kind of Monetary Policy for Disinflation?

Whatever institutional and environmental obstacles the monetary authorities face in their efforts to reduce inflation to single-digit levels, they also have to decide what kind of monetary policy to implement. In the early transition period, monetary policy was implemented within the context of a heterodox stabilization program utilizing multiple nominal anchors. However, the alleged use of nominal anchors, especially of the nominal exchange rate, was discarded fairly early in Poland, later in Hungry and only on 1997 in the Czech Republic.[5] The abandonment of the nominal exchange anchor left central banks with the need to determine some other target for monetary policy. The money stock was regarded as an unsatisfactory target because velocity was perceived as being too variable. Interest rates, too, were problematic, in part because of the tenuous links between interest rates and the behavior of economic agents and the constraints on interest rates, both of which we have discussed above.

Consequently, an approach that was adopted explicitly by the Czech National Bank (CNB) and sometime later by the Polish monetary authorities is inflation targeting. The CNB's new policy approach was announced in December 22, 1997. The concept of net inflation, which excludes from the computation of the rate of inflation the increases in the prices of price-regulated goods, is a key component of the new policy because all inflation targets are set in terms of net inflation. The Bank set two targets, a "control"

[5] Although the use of the exchange rate as a nominal anchor was seen as a key element of credibility for the transition economies' stabilization programs, in practice the exchange rate never served that role. For the Czech case, see Janackova (1996). Wellisz (1997) aptly sums up the Polish experience.

target of 5.5-6.5% net inflation at the end of 1998 and a three–year target of 3.5-5.5% net inflation by the end of 2000 (Czech National Bank, 1998) . In Poland, the Monetary Policy Council set a target of 8-8.5% growth of the CPI in1999 and 4% for 2003. Both central banks have stressed the advantages of inflation targeting over more traditional approaches to monetary policy. One such advantage is the greater transparency of inflation targeting relative to policies that target either monetary aggregates or the exchange rate. In their adoption of inflation targeting, the CNB and the NBP are joining a number of central banks in developed market economies such as Canada, the United Kingdom, Germany and New Zealand all of which use inflation targeting (Mishkin and Posen, 1997).

The essence of monetary policy in countries following inflation targeting is to set inflation targets and then to pursue them without regard to output or employment objectives targets (McDonough, 1997). This requires that the central bank must have considerable independence in conducting its monetary policy, including the absence of what Masson *et al.* (1997) call fiscal dominance, the reliance of the state on either central or commercial bank financing. The central bank must also forego any nominal targets other than the price level. Moreover, the central bank must be able to calibrate the functional relationship between its policy instruments and future inflation.

In order to evaluate the feasibility of using inflation targeting, or even of more traditional and backward-looking approaches to monetary policy, in these transition economies, we estimate a vector autoregressive (VAR) model of the price level for each country. This model shows which causal factors are the most important sources of continuing inflation these countries and thus the feasibility of reducing inflation by means of monetary policy.

IV. METHODOLOGICAL ISSUES

A key issue in economic modeling is whether the time series under investigation are nonstationary or stationary around a deterministic trend. Recent work using the VAR specification imposes the assumption that the series under consideration are difference-stationary (DS) (e.g., Feldstein and Stock (1994)), that is, that the original series are nonstationary. Several studies, however, question this assumption due to the low power of stationarity tests (Dejong, *et al.* (1992), Dejong (1992), Dejong and Whiteman (1991 a, b), and Rudebusch (1993)). These studies suggest that it is difficult to distinguish between DS as the null and trend-stationary (TS) as the alternative hypothesis.

This distinction is important in understanding whether shocks to inflation have permanent or transitory effects. For example, if variables are nonstationary, and consequently best represented by the DS model, then shocks to explanatory variables produce permanent shifts in inflation. This is because such shocks affect the stochastic trend component of the price level and thus cause a permanent change in the inflation rate by affecting it for all future horizons. On the other hand, if a TS model best represents the time series, then fluctuations around a trend level of these series are stationary or mean reverting. In such a model, shocks to explanatory variables have only a transitory impact on inflation as the price level returns to its trend level and the long-term inflation rate remains unchanged.

Note that under either specification there may be some persistence in the inflation rate. For a DS model, this persistence would be permanent whereas it would be only transitory under a TS model. Dornbusch and Fischer (1993) provide some indirect evidence on the appropriate specification from 12 moderate-inflation countries, including

Hungary. They find that inflation persisted at moderate levels for more than a decade, thus providing some supporting evidence for the appropriateness of a DS specification for countries experiencing moderate inflation. Nevertheless, given the uncertainty about the existence of a unit root in economic time series and the sensitivity of the results to the different specifications used (Hafer and Kutan (1997)) we model the relationship between inflation and its potential determinants using both the TS and the DS specification. To do so, we estimate two VAR systems. One system uses the log-levels of the variables along with a deterministic time trend. The other uses the log-difference of the series and excludes the trend term. The first system represents the TS specification, and the second one represents the DS specification.

V. DATA AND CAUSALITY TESTS RESULTS

A. Data

A data set consisting of monthly observations for M2, the broad nominal money supply, the consumer price index (CPI), nominal average wages, and import prices is used in the analysis. Because no monthly data are available for import prices, following previous studies, (Laursen (1998)), this series was constructed using the exchange-rate-adjusted foreign wholesale price index. Specifically, the German wholesale price index, adjusted for changes in the domestic currency (forint, koruna, zloty)/DM rate, was used as a proxy for import prices in all the estimations. The domestic currency/DM exchange rate is obtained using the $/domestic currency and DM/domestic currency rates assuming arbitrage. The sample period runs from 1990 to 1998 for Hungary and Poland, and 1993 to 1998 for the Czech Republic. All data are taken from the Harver data set, which is based on OECD data, of the Federal Reserve Bank of St. Louis, except wages, which were

compiled from various issues of *PlanEcon Reports*. The data were seasonally adjusted using the multiplicative (ratio-to-moving average) seasonal adjustment technique. All estimations were carried out using the E-Views 3.1 software package.

B. Causality Test Results

Given the ongoing methodological debate discussed in the preceding section, two VAR systems were estimated. One system used all variables in log-levels and included a time trend. This system represents the trend-stationary specification. Under this specification, the dependent variable is the price level (CPI). This and other series are assumed stationary around a trend, so the shocks to the instruments of monetary policy have only transitory impact on the price level and thus on inflation. The other system uses first-difference of the data but excludes the time trend. This system represents the difference-stationary specification. Under this specification, series possess stochastic trends in the sense that the shocks to the system are not mean reverting over time. Series need to be first-differenced to make them stationary, so that the statistical inferences made under OLS would be valid. Each specification, TS or DS, includes a constant term.

It is important to note that the standard causality tests based on the level, *i.e.*, TS, specification are valid only if the series are trend-stationary, or if they are difference stationary and cointegrated. In other words, if the series are nonstationary but they are not cointegrated, then standard F-statistics are not valid for the level specification because they do not have the correct distribution (Sims, Stock and Watson (1990)).

Because the VAR results are sensitive to the lag length, we use the Akaike's information criterion to select the optimal number of lags in the estimated VARs. All VAR specifications also include two (0,1) dummy shift variables to capture administrative

price increases for fuel and electricity as well as the introduction of, or rate changes in, VAT and excise taxes for all three countries. In addition, a dummy variable is used to account for the May 1997 currency crisis in the Czech Republic. Anticipating the discussion of our results, note that all the dummy variables were significant at the 10 percent level or better. By accounting for the impact of administrative price changes at the outset, we are more likely to capture the impact of monetary policy instruments on inflation. In this sense, our dependent variable corresponds to the so-called "core-inflation" used in earlier studies of inflation in transition economies (Laursen, 1998).

Tables 1 through 3 report the causality test results for the Czech Republic, Hungary, and Poland, respectively. Because our focus is on the relationship between the instruments of monetary policy and inflation, the tables report only results for the inflation rate. According to the results in Table 1, both import prices and own past lags are significant determinants of Czech inflation at the 10 percent level or better, regardless of the TS or DS specification employed. The outcome on the significance of money and wages depends on the stationarity assumption used, however. Only when the difference-stationary assumption is imposed on the data does money become a statistically significant cause of inflation at the 5 percent level. On the other hand, wages are statistically significant at the 10 percent level only if one assumes trend stationarity.

The causality results that are reported in Table 2 for Hungary paint somewhat a different picture. Both import prices and own lags significantly affect inflation behavior in Hungary at the 5 percent level of better regardless of the specification used. On the other hand, movements in wages and in broad money do not Granger-cause price movements for either specification.

The test results reported in Table 3 for Poland again indicate that both import prices and past inflation, but not wages, are significant determinants of inflation in Poland, a finding that holds for both specifications. The significance of money is sensitive to the stationarity assumption is used, however. Only under DS specification, money supply movements Granger cause inflation at the 5 percent level. This means that M2 growth rate has a permanent impact on inflation if one believes that series are best represented by the DS model.

Overall, the causality tests results show that both import price changes and past inflation have significantly influenced the consumer price level and inflation over time in all these three countries. With respect to import prices, whose movements are dominated by exchange rate changes over much of this period, the results suggest that exchange rate policy has been a major factor on affecting inflation rate in the region. To the extent that inflationary expectations are assumed to be adaptive, the significance of own past price lags in our estimates implies that inflationary expectations have been very persistent, playing an important role in inflation behavior.

Although the statistical significance of import prices and past inflation is robust across countries and for both specifications, this is not the case for wages and the money supply. The results indicate that wage movements have played no statistically significant role in either Polish or Hungarian inflation, regardless of whether we use the TS or DS model. The significance of wages in the Czech Republic is sensitive to the specification used. Only under the TS model do wages have a statistically significant impact on inflation at the 10 percent significance level. This finding suggests that wage changes have only a temporary impact on inflation in the Czech Republic during our sample period.

Thus, we can conclude that changes in nominal wages did not have a significant permanent impact on inflation in any of the countries in our sample.

Changes in broad money supply, M2, are significant for both the Czech Republic and Poland but only using the DS model. This is consistent with the expectation that, in the long run, inflation is, indeed, a monetary phenomenon. Assuming that the DS model better captures the true underlying data generating process for inflation and the other variables in our system, we find that the M2 growth rate had a permanent effect on inflation in both countries during the 1990-98 period.

VI. VARIANCE DECOMPOSITIONS

The foregoing tests determined the extent to which import prices, wages, broad money (M2), and past inflation are statistically significant in explaining the behavior of current level of inflation. A natural question to ask is whether a change in these variables is economically significant in affecting inflation, that is, does a shock to the money stock or to import prices generate a relatively large change in inflation. To address this question, variance decompositions from the different VAR models are calculated, using the Cholesky decomposition procedure. Two orderings are used. One ordering is prices (CPI), wages, import prices and money (M2). As a check on the results, an alternative ordering of money, import prices, wages and prices also is used. Again, Akaike's criterion is used to select the number of optimal lags in the estimated VARs.

Tables 3 through 6 report the variance decompositions, using up to twelve-month horizon. Results are reported for up to four horizons, for each of the two possible orderings, and for the TS and DS specifications. Looking first at the results for the Czech Republic in Table 4, the variance decompositions generated by the first ordering, CPI,

wages, import prices, M2, in the upper part of the table in panel A, indicate that shocks to M2 account for about 10.7 and 7.7 percent of the variation in inflation over a 12-month horizon under the DS and TS assumptions, respectively. The wage shocks play a larger role in inflation variation under the TS specification, 14.8 percent versus 7.8 percent, which is consistent with the evidence from the causality test results in Table 1. The limited impact of money stock and wage shocks on the rate of inflation in Table 3 stand in stark contrast to the strong impact from shocks to the import prices. Over a time horizon of one year, this variable accounts for 29.9 and 23.3 percent of the variation in inflation under the DS and TS models, respectively. Finally, the own past shocks, representing persistence in inflation over time, account for 51.6 and 54.2 percent of variation in inflation at the end of 12-month horizon under the DS and TS models, respectively. Changing the ordering of the variables, as shown in the lower part of Table 4 in panel B, does not materially change the results.

Comparing our decomposition results with those of the causality test results, we conclude that nominal wage and money supply changes have not had a significant role in explaining the behavior of inflation in the Czech Republic. At best, changes in wages and M2 can explain 18.0 (under the TS model) and 10.7 percent (under the DS model) of the total variation in inflation rate during the entire sample period. On the other hand, past inflation, which serves as a proxy for the persistence of inflationary expectations, and growth of import prices have been the main causes of inflation in the Czech Republic, jointly explaining about 75 percent of inflation variation during the 1993-98 period.

The decomposition results for Hungary are reported in Table 5. When the panel A ordering is used, M2 shocks account for 5.6 and 4.3 percent of the variation in inflation

over the 12-month horizon, depending on whether the difference-stationary or trend-stationary assumption is used. The effect of wages is relatively weak, accounting for 9.4 and 18.5 of the variation in inflation under the DS and TS models, respectively. Over the 12-month horizon, the import price shocks account 7.4 and 51.6 percent of inflation variation depending upon the DS and TS assumption is used, while own past innovations account 77.6 and 25.6 percent variation in inflation under the DS and TS specifications, respectively. The results are robust to re-ordering. Switching to the alternative ordering in panel B does not qualitatively change the results.

Note that the effects of changing the stationarity assumption are more marked for Hungary than for the Czech Republic. If one assumes trend-stationarity, shocks to import prices have a very small impact on inflation in panel A, about 7 percent. When one imposes difference stationarity on the data, however, the impact of shocks to import prices is increased to about 57 percent. These results are again robust to the re-ordering in panel B. This finding suggests that the impact of import price shocks on inflation can be best described as transitory. Similar results hold for past innovations in the rate of inflation. Under the TS specification, the past own shocks account for about 25 percent of total variation in inflation; but this effect jumps up to about 77 percent under the DS specification, suggesting that the impact of past inflation shocks on current inflation are permanent and much larger under the DS model than for the TS model.

Finally, Table 6 presents the variance decompositions for Poland. Using the panel A ordering, the effect of an M2 shock on inflation is about 11 and 2 percent under the DS and TS assumptions, respectively. Wage shocks have a very limited role in explaining inflation variation regardless of the specification used. Again, import prices and own

price shocks have the strongest impact on inflation variation in Poland. The results for the import price shocks are also sensitive to the stationarity assumption employed, however. The effect of an import price shock falls from 35.0 percent to 22.6 percent when we impose the difference-stationary assumption. Using the alternative ordering produces similar results.

Overall, the variance decomposition results indicate that import price shocks and own past innovations, meaning the persistence of expectations regarding the rate of inflation, have played the most important role in explaining the dynamics of inflation in all the countries in our sample. The relative effects of the explanatory variables on inflation also are affected significantly by the stationarity assumption employed, while re-ordering of the variables in the estimated VAR systems did not change the results qualitatively. For example, if one assumes trend-stationary, shocks to import prices have a much larger impact on inflation than do shocks under difference-stationarity, and this result is quite robust with respect to the ordering of the variables. Again, the result that import prices have a larger role under the TS specification in explaining inflation variation, in particular for Poland and Hungary, suggests that the import price changes have a significant but transitory impact on inflation.

VII. POLICY IMPLICATIONS

In the three countries we examine, nominal wage growth and the money supply are quantitatively unimportant contributors to the inflationary process in the short run. Because these two factors, which are relatively easy for monetary authorities to influence, have so little short-term impact on inflation, monetary policy may be quite impotent in combating moderate inflation.

In the TS specification, the dominance of import prices suggests that changes in import prices brought about by changes in the nominal exchange rate may be the principal source of transitory shocks to inflation. This may explain why the Czech Republic, which maintained a nominal peg the longest and which, by virtue of the peg's design, actually experienced significant periods of appreciation *versus* the DM, had the lowest inflation rate of the three countries.[6]

Our findings regarding the role of foreign prices in determining inflation also explain the sharp decline in inflation in the three countries at the end of 1998. Import prices measured on a month-on-month basis fell by as much as 10 percent by year end 1998. Tradables account for about 70 percent of the CPI in these three countries. Thus the importance of foreign prices in propagating or, in this case, ameliorating inflation implied by our econometric results well explains the precipitous decline in the rate of inflation in these countries.

At the same time, the important role of the exchange rate in influencing inflation in this specification might suggest that nominal appreciation or at least a fixing of the nominal exchange rate is the appropriate policy. There are two problems with this. First, such a policy stance would hardly differentiate a forward-looking inflation targeting policy form the old one of a nominal exchange rate anchor. Second, it implies a real appreciation of the transition economies' currencies, an appreciation that seems incompatible with current account equilibrium, with promoting export-led growth and with preventing massive capital flows.

[6] The Czech koruna was pegged to a basket made up of the US$ and the DM. Given fluctuations in the $/DM rate, the koruna's value *versus* the DM actually fluctuated significantly during the period when it was pegged.

The longer-term implications seem to be equally disappointing for monetary policy advocates. The other main source of current inflation is its past path, which can be interpreted to represent the inflationary expectations of the population. Masson *et al.* (1997) offer some insights on why inflationary expectations may persist. Among the causes of the persistence of inflationary expectations they cite are:

-symptoms of fiscal dominance, meaning the government's use of the central bank or of commercial banks to finance its deficit (p.8);

-poor starting conditions, especially levels of inflation in excess of 10% (p. 20);

-a failure to eradicate the fiscal roots of inflation (p.22).

These factors can be found to a greater or lesser extent in each of the three countries we have examined. Moreover, the monetary authorities can resolve none of them. Indeed, with the exception of the second factor, the responsibility for creating the appropriate conditions rests squarely with the governments of these countries. Given the importance of foreign prices and their current decline, a window of opportunity exists to seize this opportunity to lower current inflation and inflationary expectations. Such a lowering of expectations could set of a virtuous cycle of falling inflation due to the importance of the persistence of inflation for its future course. The opportunity to seize this opportunity is seemingly more in the hands of the governments rather than in the hands of the central banks of these countries.

Our results suggest that the decline in inflation experienced by the three countries at the end of 1998 (Figure 1) is the result of external deflation that stems from exogenous declines in global commodity and energy prices and from a general global deflation. In 1998, this trend of global deflation was augmented by relatively favorable exchange rates

between these three countries' currencies and those of their major trading partners. Thus, the sharp decline in inflation observed at the end of the 1998 in the three countries should be seen as an exogenously caused event rather than the outcome of monetary policy.[7] These exogenous factors could well reverse themselves relatively quickly, as energy prices are already beginning to do. Even so, to the extent that the current fall in inflation translates itself into a permanent change in inflationary expectations, inflation may indeed remain low in the transition economies.

[7] There is, of course, nothing wrong with taking advantage of such fortuitous exogenous shocks. As Burton and Fischer (1998) note in their survey of countries that have successfully ended moderate inflation, "… it is important to capitalize on favorable exogenous shocks…." (p. 34).

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Figure 1: Inflation (CPI)

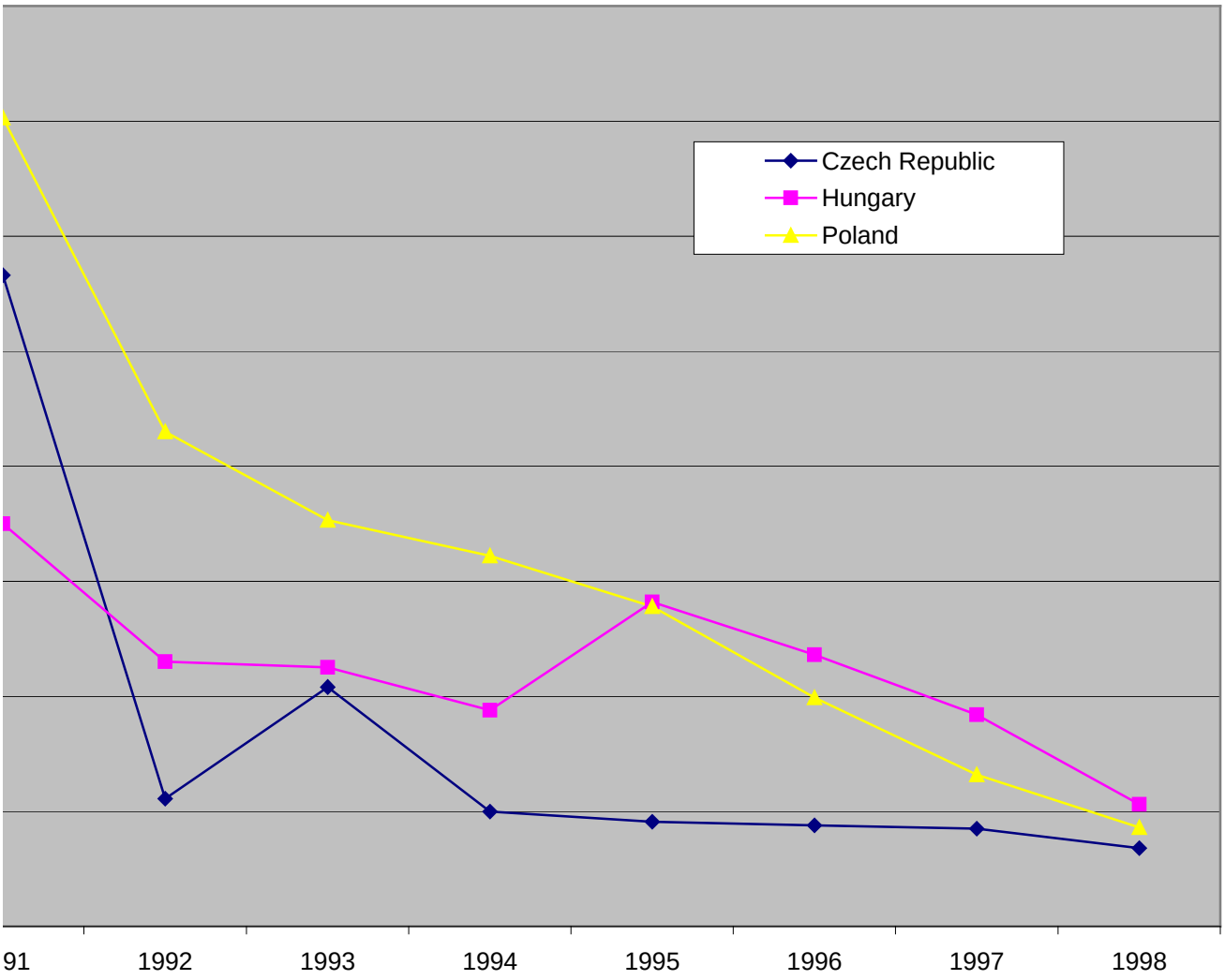

Table 1: Causality Test Results: F-Statistics – The Czech Republic

Monthly Data: January 1993 – June 1998

		Independent Variables			
Stationary Assumption	**Dependent Variable**	Money	Wages	Import Prices	Own Lags
DS	Inflation rate	2.82 (0.05)**	1.37 (0.26)	11.64 (0.00)*	2.10 (0.10)***
TS	Price level (CPI)	1.87 (0.15)	2.36 (0.08)***	8.92 (0.00)*	8.36 (0.00)*

Notes:

1. DS represents difference-stationary while TS indicates trend-stationary. The optimal lag length in estimated VARs is chosen based on the minimizing the Akaike's information criterion and it is 3 and 4 for the TS and DS specifications, respectively.
2. All VAR estimations included three (0,1) dummy shift variables to capture the May 1997 currency crisis, the administrative price hikes for fuel and electricity, and VAT and excise taxes. The results (not reported) showed that all the dummy variables were significant at the 10 percent significance level or better.
3. Since there is no quarterly data available for import prices, following previous studies (e.g., Laursen, 1998) this series was constructed using the exchange rate adjusted foreign wholesale price index. Specifically, German wholesale price index adjusted for changes in the koruna/DM rate was used as a proxy for import prices in all the estimations here and that follow. The koruna/DM exchange rate is obtained using the $/koruna and DM/koruna rates assuming arbitrage.
4. The values in parentheses are the p-values for the statistical significance of the variables.

Table 2: Causality Test Results: F-Statistics – Hungary
Monthly Data: December 1990 – June 1998

		Independent Variables			
Stationary Assumption	**Dependent Variable**	Money	Wages	Import Prices	Own Lags
DS	Inflation rate	0.79 (0.58)	1.62 (0.16)	2.92 (0.01)*	2.33 (0.04)**
TS	Price level (CPI)	0.55 (0.76)	1.50 (0.19)	2.78 (0.02)**	25.28 (0.00)*

Notes
1. See Table1.
2. Lag length for both specifications was six based on the Akaike's criterion. Sample period for Hungary starts in December 1990 because there was no monthly published data available prior to this date. The National Bank of Hungary has also stopped publishing figures for M2 in the end of 1997. The figures for 1998 were compiled using the individual components of M2 published by the Bank.

Table 3: Causality Test Results: F-Statistics – Poland
Monthly Data: January 1990 – June 1998

		Independent Variables			
Stationary Assumption	**Dependent Variable**	Money	Wages	Import Prices	Own Lags
DS	Inflation rate	2.29 (0.04)**	1.05 (0.40)	6.86 (0.00)*	37.1 (0.00)*
TS	Price level (CPI)	1.68 (0.13)	0.37 (0.89)	2.13 (0.06)***	82.58 (0.00)*

Notes:
1. See Table1.
2. Lag length for both specifications was six using the Akaike's criterion.

Table 4: Variance Decompositions for Inflation: The Czech Republic

Panel A: Ordering- CPI, Wage, Import Price, Money

% of inflation explained by innovations in:

Horizon	Money		Wages		Import Prices		CPI	
	DS	TS	DS	TS	DS	TS	DS	TS
3	11.8	1.7	0.8	3.7	18.9	9.6	68.3	85.0
6	11.5	3.6	7.4	8.7	26.3	24.2	54.7	63.4
9	10.9	6.7	7.3	13.3	29.7	23.3	52.1	56.7
12	10.7	7.7	7.8	14.8	29.9	23.3	51.6	54.2

Panel B: Ordering – Money, Import Price, Wages, CPI

% of inflation explained by innovations in:

Horizon	Money		Wages		Import Prices		CPI	
	DS	TS	DS	TS	DS	TS	DS	TS
3	10.3	2.1	0.7	15.8	22.8	10.8	66.2	66.2
6	10.7	4.0	4.5	20.8	30.2	21.3	54.5	54.5
9	10.0	7.0	4.9	18.2	32.3	28.9	52.6	52.6
12	9.9	6.9	5.2	18.0	32.7	31.8	52.1	52.1

Table 5: Variance Decompositions for Inflation: Hungary

Panel A: Ordering- CPI, Wage, Import Price, Money

% of inflation explained by innovations in:

Horizon	Money		Wages		Import Prices		CPI	
	DS	TS	DS	TS	DS	TS	DS	TS
3	2.3	0.3	6.2	1.4	1.7	1.4	89.8	96.9
6	3.3	10.2	8.6	5.9	4.4	19.5	83.6	64.3
9	4.6	6.1	9.0	16.3	6.5	43.2	79.8	34.4
12	5.6	4.3	9.4	18.5	7.4	51.6	77.6	25.6

Panel B: Ordering – Money, Import Price, Wages, CPI

% of inflation explained by innovations in:

Horizon	Money		Wages		Import Prices		CPI	
	DS	TS	DS	TS	DS	TS	DS	TS
3	6.4	7.8	7.8	1.3	3.6	8.8	82.1	82.1
6	7.4	10.6	9.4	6.3	5.2	30.8	78.0	52.2
9	7.7	6.9	9.6	18.8	7.3	41.2	75.3	33.1
12	9.1	6.6	10.0	21.6	7.7	45.2	73.1	26.5

Table 6: Variance Decompositions for Inflation: Poland

Panel A: Ordering- CPI, Wage, Import Price, Money

% of inflation explained by innovations in:

Horizon	Money		Wages		Import Prices		CPI	
	DS	TS	DS	TS	DS	TS	DS	TS
3	11.5	3.2	0.3	1.0	14.6	14.7	73.7	81.0
6	11.3	2.2	2.9	0.8	20.9	27.2	64.8	69.0
9	11.3	2.2	4.3	1.0	21.7	33.7	62.7	63.1
12	11.1	1.9	5.5	1.7	22.6	35.0	60.7	61.5

Panel B: Ordering – Money, Import Price, Wages, CPI

% of inflation explained by innovations in:

Horizon	Money		Wages		Import Prices		CPI	
	DS	TS	DS	TS	DS	TS	DS	TS
3	16.4	3.0	0.5	0.5	13.0	13.1	70.0	83.5
6	16.5	2.5	3.2	0.4	18.5	25.0	61.7	72.1
9	17.4	2.4	4.3	0.6	19.3	31.5	59.1	65.5
12	17.5	2.5	5.3	1.4	20.0	32.7	57.2	63.3