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CENTRAL BANK INDEPENDENCE, INFLATION AND GROWTH IN TRANSITION ECONOMIES

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Abstract

In this paper, we document two empirical relationships that have emerged as the former communist countries have taken steps to transform their economies from command systems to market-based systems. First, increased central bank independence has tended to improve inflation performance. Second, high inflation has adversely affected real activity. More specifically, in the first section of this paper, we develop indices of central bank independence (CBI) for twelve transition economies and examine the relationship between CBI and inflation performance across these countries. Statistical evidence suggests that the transition economies with more independent central banks have achieved lower inflation than their counterparts. The second section of this paper studies the relationship between inflation and growth in twenty-six transition economies. We present econometric evidence indicating that reducing inflation helps stabilize economic activity, following the sharp output declines that occur during the initial stages of transition. The paper concludes that establishing an independent central bank is a concrete institutional reform that may reduce inflation and thus facilitate economic growth.

Central Bank Independence, Inflation and Growth in Transition Economies

Prakash Loungani and Nathan Sheets[1]

1. Introduction

Following the collapse of the Iron Curtain, there was initially some disagreement among policymakers and other analysts regarding the set of policies that would best facilitate economic reform in the former communist countries. Debates raged regarding the relative merits of "shock therapy" versus gradualism, the appropriate method of privatizing state assets, and the role of the domestic financial sector in reforming the real economy. Reasonable arguments could be made for a variety of approaches. Perhaps as a result, the structure of economic reform programs varied widely across the countries in transition.

Now more than five years after the initial reforms were implemented, it is possible to begin evaluating the lessons that have been learned during the transition process. In this paper, we use data from a panel of transition economies to examine two important issues: (1) the relationship between central bank independence and inflation rates, and (2) the relationship between inflation and economic growth. More specifically, in the first section of this paper we develop indices of central bank independence (CBI) for twelve transition economies and examine the relationship between CBI and inflation across these countries. We present statistical evidence

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that countries with more independent central banks have achieved lower inflation than their counterparts. The second section of the paper discusses the relationship between inflation and growth in transition economies. We present econometric evidence that reducing inflation helps stabilize economic activity, following the sharp output declines that occur during the initial stages of transition. This evidence also suggests that at high levels of inflation, which many of the transition economies have experienced, there is no short-term trade-off between output and inflation. We conclude that establishing an independent central bank is one concrete institutional reform that may reduce inflation and thus facilitate economic growth.

2. Central bank independence and inflation in transition economies

2.1 Literature review: the components of CBI

While the theoretical literature on this topic is vast, we restrict our attention to three studies that are particularly useful in thinking about the individual components that make up an index of central bank independence.

Grilli, Masciandaro and Tabellini (GMT) (1991), among others, have divided central bank independence into two components: "political independence" and "economic independence." They argue that a central bank's political independence is determined by a number of factors, including the procedures for appointing the central bank's chairman and board members, the term of office of central bank officials (a longer term suggesting greater independence), and whether the central bank's responsibility to achieve price stability is explicitly stated in the central bank charter. More broadly, political independence reflects the degree to which the central bank is allowed to pursue its main objective, presumably price stability, without interference from the

political authorities. GMT suggest that economic independence hinges on whether the central bank has power to control the quantity of credit it lends to the government, and the central bank's freedom to determine the interest rate that is charged on that credit. Economic independence also depends on the degree to which the central bank controls the instruments of monetary policy. GMT emphasize the central bank's freedom to set the discount rate and whether the central bank is responsible for bank supervision. It should be noted that political independence and economic independence are closely related. For example, the government's influence in determining the conditions at which it borrows from the central bank (classified as economic independence) may be significantly affected by the extent of the central bank's political independence.

Debelle and Fischer (DF) (1994) suggest that CBI should be discussed in terms of "goal independence" and "instrument independence." Goal independence reflects the central bank's freedom to determine the ultimate objectives of monetary policy. DF note that "a central bank with goal independence could decide that price stability was less important than output stability and act accordingly."[2] DF conclude that it is not appropriate for central banks to determine the ultimate objectives of monetary policy. In other words, DF agree with GMT that central banks are more independent (in the relevant sense) when the goal of price stability is explicitly stipulated in the central bank's charter. Instrument independence, according to DF, is the central bank's freedom "to choose the means by which it seeks to achieve its goals." Fischer (1994) states that "a central bank has instrument independence when it has full discretion and power to deploy monetary policy to attain its goals." Instrument independence, narrowly defined, is

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[2]Goal independence is more narrow than GMT's notion of political independence, since it does not consider the political forces affecting the central bank once the objectives of monetary policy have been determined.

equivalent to GMT's notion of economic independence. A broader interpretation of instrument independence would probably also include some of the characteristics GMT include under political independence, namely, the central bank's freedom to exercise the instruments of monetary policy independent of government intervention.

Finally, Cukierman (1992) suggests that the characteristics of legal CBI can be divided into four major components. The first relates to the appointment, term, and dismissal of the governor and other board members. The second considers whether the central bank is free to formulate monetary policy without interference from the government and whether the central bank has final authority in decisions pertaining to its legally stipulated objectives. The third addresses the extent to which the central bank's main objective (as specified in its charter) is price stability. The final component examines the degree to which there are limitations on central bank lending. Cukierman, in addition to this discussion of legal independence, also examines the rate of turnover of central bank governors, which he interprets as a measure of "actual" CBI. A lower rate of turnover indicates that the central bank is more insulated from political pressures, suggesting greater freedom to formulate monetary policy independent of the government's control.

Combining suggestions from these studies, we consider three components of CBI in our own empirical work. The first is goal independence, as articulated by DF, which is solely determined by whether a country's central bank charter stipulates price stability as the primary macroeconomic objective of the central bank. The second is economic independence as defined by GMT, which is equivalent to a narrow interpretation of DF's instrument independence. The third category is political independence. This potentially encompasses a variety of factors, including the appointment and dismissal procedures for central bank officials, the extent to which

the government participates in the central bank's board meetings, and the term of office of board members.

2.2 Literature review: the empirical evidence

The broad empirical literature examining the relationship between CBI and macroeconomic performance may be summarized as follows.[3] Among ***industrialized countries***, the basic finding is that average inflation performance is negatively correlated with the degree of central bank independence. Debelle and Fischer present evidence that political independence does not play a significant role in generating this negative correlation. Among ***developing countries***, empirical studies have found little correlation between inflation and measures of legal CBI. There is, however, a correlation between inflation performance and Cukierman's measure of the turnover of central bankers, with higher turnover associated with higher inflation.

Overall, these findings are often summarized by the statement that *statutory* CBI is important in determining an industrialized country's inflation performance; whereas for a developing country, it is the *actual* independence of its central bank, as reflected in the turnover rate of central bankers, that is important.

2.3 Measures of statutory CBI and TURNOVER in the transition economies

We now develop several empirical measures to assess the degree of central bank independence in the various transition economies. Due to data constraints, the analysis is limited to twelve countries: Albania, Armenia, Bulgaria, the Czech Republic, Estonia, Hungary,

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[3]See Fischer (1995b, p. 204-5).

Kazakhstan, Lithuania, Poland, Romania, Russia, and Ukraine.[4] To construct measures of statutory CBI, we have classified the characteristics of these twelve central banks based on the 14-question "test" reported in Table 1.[5] As noted previously, we group these 14 questions into three categories: goal independence, economic independence, and political independence.

Two of the questions in Table 1 require further comment. First, the extent to which the central bank is subject to government directives in executing monetary policy (question 5) is extremely broad, spanning both economic and political independence. We have chosen to include it as part of economic independence; if the central bank must obey government directives, the government effectively controls the instruments of monetary policy. Second, it is not obvious what constitutes a "binding" limit on the level of direct financing the central bank may provide the government (question 3). We set this limit at 10 percent of expected annual budgetary revenues; this choice suggests lower economic independence for central banks in countries such as Armenia, where the government can borrow up to 25 percent of expected annual revenues from the central bank.

Table 2 presents the results of applying this test to the central banks in the twelve transition economies, as well as to the Bundesbank. The test is scored in the following manner. Each "yes" response to question 1, questions 3-4, and questions 7-8 scores one point. Every "no" response to questions 5-6 and questions 9-14 also scores a point. Each "yes" response to the

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[4]The data come from Hinton-Braaten (1994) and LeWarne (1994), who extract the relevant information from central bank charters, national constitutions, and legislation. For a detailed discussion concerning what is contained in these statutes see Hinton-Braaten.

[5]Tables are presented at the end of the text.

three subparts of question 2 is worth one-third of a point. Ambiguous answers receive half a point. A higher score signifies greater CBI.

We briefly highlight three characteristics of these scores. First, in none of these countries does a government official sitting on the central bank's board have power to veto central bank policy (question 14). Second, in every country for which information is available, the central bank is allowed to conduct open market operations, set reserve ratios, and determine the discount rate (question 2). Third, only Estonia has placed a total prohibition on direct central bank lending to the government (question 4), reflecting the structure of its currency board arrangement. Other central bank characteristics vary significantly across the twelve countries.

The last two rows of Table 2 deserve particular attention, since it is here that we address the challenging task of choosing weights to place on each of the 14 questions, in order to construct indices of legal central bank independence. We pursue two approaches. Our first index, which we term "CBI-DF", takes Debelle and Fischer literally. It places equal (one-half) weights on goal independence and economic independence, with questions within a category receiving equal weight. This measure assumes that if price stability is clearly established as the central bank's main objective and the central bank controls the instruments of monetary policy, the central bank is effectively independent.

Our second index, which we call "SIB", is obtained by assessing the similarity between the characteristics of a given central bank and the characteristics of the German Bundesbank. We construct this alternate index for two reasons. First, the Bundesbank is often considered the archetype of an independent and effective central bank. During the 1970-92 period, for example, the average annual inflation rate in Germany was 3.4 percent, compared with 6 percent in the

United States and 5.2 percent in Japan. Second, the Bundesbank has served as the "principal model for central banking" in many countries in transition, particularly the countries of Eastern Europe.[6] For example, Vladimir Jindra, an adviser to the Chairman of the Central Bank of Czechoslovakia, stated in 1991 that the "German Bundesbank served as a model for the statute on the [Czechoslovak] central bank, largely because of the high degree of autonomy that the Bundesbank enjoys and its outstanding record in safeguarding the stability of the German currency." The SIB index, therefore, includes only the subset of questions for which the Bundesbank scores a point; it thus eliminates question 4 and questions 9-12 for which the Bundesbank scores a zero. We make no *a priori* judgment concerning which of the characteristics possessed by the Bundesbank are most important, so each of the remaining nine questions is given equal weight.

The SIB index suggests that a binding limit on central bank lending to the government (question 3) *is* necessary for CBI, but a total prohibition of lending to the government (question 4) is unnecessarily stringent. SIB also ascribes more importance to dismissal procedures (question 6) and the length of the term of office of central bank officials (questions 7-8) than to appointment procedures (questions 9-11). Appointment procedures may be less important for the countries in transition than for other countries, since basic institutions are rapidly evolving and central bankers continue to accumulate fundamental human capital. The incentives and safeguards that face central bankers once they are in office are probably more important than the procedures for appointment. Finally, SIB suggests that the mere presence of a government official at the central bank board meetings does not significantly reduce the independence of the

[6]See Hinton-Braaten (1994, p. 1).

central bank. Relative to CBI-DF, SIB transfers weight from goal independence and economic independence to political independence.[7]

In measuring the turnover rate of central bankers, we are faced with the difficulty that many transition economies have experienced significant political turmoil. A high exit rate of central bank governors may be a reflection of the overall instability of governments in the country, instead of an attack on central bank independence. To remedy this problem, we measure the turnover of central bank governors, relative to the turnover of finance ministers.[8] Hence our measure, which is called TURNOVER, is the number of central bank governors the country had during the 1989 to 1992 period, divided by the number of finance ministers during the same period.

Table 3 reports our CBI-DF and SIB indices, along with the TURNOVER measure and the inflation rate in 1993. A higher CBI-DF or SIB score indicates greater central bank independence. The least independent central bank and the lowest rate of inflation across the twelve countries each receive a rank of "one," and the most independent central bank and the highest rate of inflation across the twelve countries each receive a rank of "twelve" (or "eleven" in the case of a tie).

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[7]Siklos (1994) builds indices of legal CBI for four central European countries. He augments Cukierman's measure of CBI (discussed above) with characteristics that he believes are of particular importance for the transition economies, e.g., choice of exchange rate regime, development of the domestic financial system, and the level of external debt.

[8] Cukierman, Kalaitzidakis, Summers and Webb (1993) attempt to develop a measure of turnover that is "independent of political instability" (p. 113) by ignoring any change in central bank governors "that occurs within six months of a change in regime, a coup, a change of party, or a change in head of government."

The most striking result in Table 3 is that the National Bank of Bulgaria and the Czech National Bank possess all of the independence-enhancing characteristics of the Bundesbank. As mentioned previously, this largely reflects that the structure of the Bundesbank has served as a model for central banks in the region. According to the CBI-DF measure, the central bank of Estonia possesses all the characteristics necessary for independence--outscoring even the Bundesbank. Both indices suggest that the central bank of Lithuania, as it was structured until April 1994, was the least independent of the central banks under consideration.[9] There are meaningful differences in the rankings obtained from SIB and CBI-DF. Notably, Hungary rises from second in CBI-DF to ninth in SIB; Ukraine falls from fifth in CBI-DF to second in SIB; and Estonia declines from twelfth in CBI-DF to eighth in SIB.

Finally, our TURNOVER index essentially divides the sample into three groups. In Estonia, Lithuania, Romania, the Czech Republic, and Albania, finance ministers have turned over more frequently than central bank governors, suggesting that the central bank may be somewhat insulated from the political process. In six other countries (Armenia, Bulgaria, Hungary, Kazakhstan, Poland, and Russia) the finance minister and central bank governor have turned over at a one-to-one ratio. Finally, in Ukraine during the period under consideration, the average tenure of central bank governors was only half the average tenure of finance ministers.

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[9]In April 1994, Lithuania shifted to a currency board arrangement, citing the advantages of minimized political influence in the setting of monetary policy. Subsequent to the change in central bank structure, inflation in Lithuania fell sharply, from 390 percent in 1993 to 72 percent in 1994. This is an interesting case study, suggesting that removing monetary policy from the control of the political authorities may, in fact, improve economic performance.

2.4 CBI and inflation performance: empirical evidence

We now consider the relationship between our indices of central bank independence, turnover, and inflation in the transition economies. As a preliminary, however, we emphasize that CBI alone is not sufficient for improved inflation performance. An independent central bank may fail to achieve the mandate for price stability outlined in its charter for at least two reasons. First, a central bank with statutory independence may still, in practice, be dominated by the government. For example, a personally weak central bank chairman may be hesitant to pursue anti-inflationary policies if such polices contradict the desires of the political leadership, even if the central bank is legally empowered to do so. Second, if the rule of law is not well established, the independence of the central bank may not be respected by the government. Our econometric analysis of the relationship between CBI and inflation performance is actually a joint test of two hypotheses: 1) Central bank governors in the transition economies are willing to use increased independence to pursue anti-inflationary policies; 2) The government respects the central bank's independence.

In Table 4, we present the matrix of correlation coefficients for the following four variables across the twelve countries: 1993 inflation, CBI-DF, SIB and TURNOVER. We focus on inflation performance in 1993 because the central bank statutes used in our analysis were all in place by the end of 1992 and can thus be taken as exogenous to 1993 inflation.[10] To reduce the influence of outliers, all variables are measured in logs.

[10] We currently do not have sufficient data on subsequent changes in central bank statutes to extend our analysis to inflation performance in 1994.

As shown in the first row of Table 4, both SIB and CBI-DF have a negative correlation with inflation performance; that is, the higher the degree of central bank independence, the lower the inflation rate. However, while the correlation between SIB and inflation is strong -- the point estimate is -0.65 -- the correlation between CBI-DF and inflation is much weaker, about -0.25. A higher turnover rate of central bankers is positively correlated with inflation, as conjectured, with a point estimate of about 0.4.

The regressions reported below are consistent with these general conclusions.[11] CBI-DF is not significantly related to inflation performance (regression 1), but SIB is strongly significant (regression 2). The regression R^2 when SIB is included reaches 0.61, compared with 0.24 when CBI-DF is included. (The relationship between SIB and inflation performance is displayed graphically in Figure 1.)

Cross-country regressions
Dependent variable: Inflation rate in 1993

#	Intercept	CBI-DF	SIB	Turnover	R^2
1	5.15	-0.91 (0.97)	.	2.03 (1.38)	0.24
2	3.81	.	-4.06 (1.27)	2.05 (0.99)	0.61

Note: All variables are measured in logs.
Numbers shown in parentheses are standard errors.

[11]Given the limited data, we have not attempted in these regressions to control for exchange rate policy, international trade patterns, or the conditions facing each country at the beginning of the transition period. As more data become available, it will be possible to do broader analyses of the determinants of inflation in these countries.

The coefficient on TURNOVER has the anticipated sign in the regressions above, and the point estimate is stable across the two regressions. The estimated impact is significantly different from zero in the second regression, indicating that TURNOVER may also have some ability to explain inflation.

This evidence suggests two conclusions. First, the factors that determine political independence, which CBI-DF does not include, are important in generating the negative correlation between central bank independence and inflation in transition economies. This result differs from regression evidence presented by Debelle and Fischer. Using data from 17 industrial countries, they conclude that the political independence component of CBI is not significantly related to inflation performance. Their evidence, coupled with the statistical evidence we have presented, suggests that political independence is more important for central banks in transition economies than for those in industrial countries, an observation that will be discussed in detail below. The econometric evidence also suggests that our measure of the relative turnover of central bank governors is positively correlated with inflation rates. This is consistent with the findings of Cukierman (1992), and others, for developing countries. Taken together, these results indicate that central bank independence, appropriately defined, has a negative correlation with inflation. In the following section, we examine the source of this correlation in greater detail.

2.4 CBI and inflation: interpreting the evidence

We begin this section by discussing two benchmark interpretations of the correlation between central bank independence and inflation. The "strict causality" view suggests that an increase in CBI is sufficient to improve a country's inflation performance, regardless of other

social and political pressures. This view seems unrealistic. A government that is determined to debauch the national currency will find a way to achieve its task, no matter how much independence has been granted to the central bank. This observation, however, does not mean that CBI is unimportant. An independent central bank may still be a powerful and effective opponent of inflation, as will be discussed below. A second interpretation of the CBI-inflation relationship suggests that the correlation between CBI and inflation arises because both variables are related to some third factor, e.g., the degree of a country's aversion to inflation. Countries with high inflation aversion will have a more independent central bank and lower inflation than other countries.[12] Balcerowicz and Gelb (1994) observe, however, that most transition economies have gone through periods of "extraordinary politics," during which there is sufficient political consensus to implement enduring institutional reforms. Establishing an independent central bank during such a period may improve a country's inflation performance in subsequent periods. As noted by Fischer (1995b, p. 205), "Unless laws are totally irrelevant to performance, anyone wanting to reduce inflation would still be well advised to support actively the cause of CBI."

We now consider in detail three major channels through which increased CBI may improve inflation performance in the transition economies.[13] First, increased CBI helps insulate

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[12]See Posen (1995a,b).

[13]The rationale for central bank independence in the transition economies does not hinge on the need to limit Barro-Gordon (1983) central bankers from attempting to exploit too often the short-run trade-off between output and inflation. We show in the third section of this paper that at the high levels of inflation experienced by many transition economies, there is no trade-off between output and inflation; in fact, there is strong evidence that *reducing* inflation tends to stimulate growth in these countries. For this reason, the relationship between CBI and inflation in the transition economies tends to arise from factors other than those identified in industrial countries.

the central bank from politically powerful but economically weak sectors of the economy. As is well-known, the command system was characterized by an inordinate emphasis on manufacturing and heavy industry, and the movement to a market-based economy has required these sectors to contract. In many transition countries, however, the managers of industrial firms, despite their declining economic importance, have maintained political influence. They have successfully lobbied the government and the central bank for loans at below market rates. Such loans have been a prime source of inflation. In addition, these loans have allowed inefficient industrial enterprises to continue consuming resources, rather than freeing those resources for use in emerging sectors (such as services, retail, and finance). The more independent the central bank, the more insulated it is from demands to issue politically motivated credits to inefficient sectors. This alone constitutes a major step toward lower inflation and macroeconomic stabilization.

The previous argument suggests a second reason why a more independent central bank helps lower inflation. The process of transition entails a redistribution of social resources. In addition to the industrial sector, other segments of society (e.g., pensioners, government employees, and the military) were in many ways economically better off under the old regime. These groups commonly petition the government for dramatic increases in expenditures, leading to larger budget deficits and higher inflation. Conversely, in most transition economies, there are few (if any) domestic coalitions that lobby the government to cut its budget deficit and reduce inflation. A central bank with a clear mandate for price stability and political independence may help offset the inflationary bias in the political process. This rationale for central bank independence should decline in importance, as the financial sector in these countries develops.

In the industrial countries, the financial sector tends to be the most influential advocate of price stability, as argued by Posen (1995a,b).

Central bank financing of the government's fiscal deficits has been another major source of inflation in the transition economies. The establishment of a statutorily independent central bank and the creation of binding limits on central bank lending to the government may not instantly solve large fiscal imbalances. The experience of Poland suggests, however, that an independent central bank, which publicly resists giving the government cheap fiscal financing, may provide strong incentives for the government to limit the size of the budget deficit. In addition, as the central bank's opposition to providing financing to the government increases, the government has motivation to develop non-inflationary sources of fiscal financing, such as a government securities market.

3. Inflation and growth in the transition economies

3.1 Theoretical background

Fischer and Modigliani (1978), Fischer (1994), and Briault (1995) outline a variety of channels through which inflation may adversely affect real activity.[14] We highlight three. First, as inflation rises, causing agents to economize on real balances, it may become necessary to make more trips to the bank or ATM--so-called "shoe-leather costs." Fischer notes that "when

[14] In the early theoretical literature it was argued that higher anticipated inflation would motivate increased accumulation of physical capital, as agents substituted away from real balances. The larger stock of physical capital, in turn, would *facilitate* growth. Stockman (1981) presented a counter-example: if there is a cash-in-advance constraint on the purchase of investment goods, then an increase in inflation could lead to a decrease in investment and thus reduce growth.

inflation reaches the triple digit range, the social costs of attempting to economize on currency become high." Second, if the tax system is less than fully indexed, further inefficiencies may be introduced. For example, the taxation of nominal interest earnings may seriously distort the incentives to save and invest. Third, a higher level of inflation is often associated with higher volatility of inflation and thus increased economic uncertainty. Fischer and Modigliani suggest that, in response, agents may be reluctant to make long-term commitments, which (among other things) may sharply reduce investment. As a corollary, Briault points out that in high inflation environments, it may be difficult for agents "to perceive and to react to changes in relative prices." These noisy price signals may cause an inefficient allocation of economic resources.

3.2 A review of the empirical evidence

A number of cross-country empirical studies have identified a significant negative relationship between inflation and growth, particularly for countries with high inflation. In this section, we provide a brief overview of this literature.[15] Kormendi and Meguire (1985), in a seminal paper, regressed the mean growth rate of aggregate GDP for each of 47 countries from 1950-77 on macroeconomic variables for each country, including the mean growth rate of inflation (MDINF). They found that a one percentage point decline in MDINF increased average growth by 0.85 percentage points and increased the average ratio of investment to national income by 2.2 percentage points. Kormendi and Meguire conclude that inflation significantly reduces growth, particularly by reducing investment. Fischer (1993) finds similar results. Working with a panel of approximately 80 countries from 1961-88, he reports that a ten

[15]For an extensive examination of the literature see Briault (1995).

percentage point decline in inflation increases both the growth rate of GDP and the growth rate of the capital stock by about 0.4 percentage points. Levine and Renelt (1992) analyze data from 101 countries spanning the years 1960-89. The "fast-growers" in their sample, i.e., countries with growth higher than the sample mean, experienced average annual inflation of 12.34 percent, while the "slow-growers" registered inflation of 31.13 percent.[16] Finally, Ericcson, Irons, and Tryon (1993) present graphical and regression-based evidence that when countries in Africa and Latin America--the high inflation continents--are excluded from a cross-sectional regression, the relationship between growth and inflation disappears. Similarly, Barro (1995) using data from over 100 countries for the 1960-90 time period finds that the relationship between growth and inflation is statistically significant only when a country's decadal inflation rate exceeds 15 percent. Barro's results, coupled with the Ericcson, Irons, and Tryon results, suggest that inflation may significantly reduce growth only when it exceeds some threshold.

3.3 Evidence for the transition economies

In this section, we use data from the twenty-six countries listed below for the years 1991-94 to study the relationship between inflation and growth in transition economies.

1. Albania	8. Estonia	14. Lithuania	21. Slovenia
2. Armenia	9. Georgia	15. Moldova	22. Tajikistan
3. Azerbaijan	10. Hungary	16. Mongolia	23. Turkmen.
4. Belarus	11. Kazakhstan	17. Poland	24. Ukraine
5. Bulgaria	12. Kyrgyz R.	18. Romania	25. Uzbekistan
6. Croatia	13. Latvia	19. Russia	26. Macedonia
7. Czech Rep.		20. Slovak R.	

[16]Levine and Renelt also report, however, that the relationship between growth and inflation in cross-section regressions is not robust in the sense defined by Leamer (1985). Their evidence indicates that only three variables robustly affect growth: the share of investment in GDP, real GDP per capita in 1960, and secondary school enrollment rate (a proxy for human capital); sixteen other variables fail this test of robustness.

The data come from the IMF's May 1995 World Economic Outlook and the EBRD's April 1995 Transition Report Update. We note that for the period under consideration, average inflation in all twenty-six countries exceeded Barro's 15 percent threshold. Hungary registered the lowest average inflation rate during the period -- 24.6 percent. None of these countries experienced a year in which annual inflation was less than 10 percent.

We now pool the data and run regressions of real GDP growth on lagged inflation, lagged real GDP growth and year fixed effects. The results from these regressions are shown in Table 5. For the regression reported in column (1), lagged inflation enters with a negative coefficient, and the estimate is significantly different from zero at a 6 percent level of significance. The estimate of the year fixed effect for 1992 is negative, large in magnitude, and statistically significant. This suggests that all transition economies were affected by some common adverse shocks, such as the collapse of previous trading relationships. The negative correlation between inflation and growth thus arises even after the impact of these common "supply shocks" has been accounted for through the inclusion of year fixed effects.

When a second lag of inflation is added to the regression, as in column (2), it too enters with a negative sign, and the estimated impact is larger than that of the first lag. The results of an F-test resoundingly reject the null hypothesis that the two inflation terms can be omitted from the regression without loss of explanatory power. In the regression reported in column (3), the independent variable is the average inflation rate over the two previous years. This enters with

the expected negative sign, and the estimate is statistically significant at the 1 percent level. The strong negative relationship between inflation and growth is depicted graphically in Figure 2.[17]

In summary, the data clearly suggest that the countries that were more successful in reducing inflation enjoyed more robust real GDP growth in the following years. Given that the transition economies have experienced high inflation, i.e., generally far above Barro's 15 percent threshold, these results are fully consistent with the empirical literature discussed previously.

3.4 Interpreting the relationship between inflation and growth

In examining the relationship between inflation and growth in the transition economies, we do not minimize the role of the channels identified by Modigliani, Fischer, and others. Indeed, the inflation-investment channel appears to have played an important role in these countries. High and variable inflation has discouraged domestic investment and driven capital abroad, depressing domestic economic activity. We suggest, however, that an additional (and complementary) channel has been extremely important in the transition economies. Namely, high inflation has tended to discourage the emergence of the private sector. We now develop this argument in detail.

The first stage of transition from a command economy to a market-based economy has usually entailed the liberalization of prices and some degree of trade liberalization. Price liberalization has generated significant increases in the price level, reflecting "monetary overhang," as well as large changes in relative prices. The change in relative prices, coupled

[17]Growth rank across these countries is graphed against inflation rank. Higher growth corresponds to a higher growth rank, while lower inflation corresponds to a lower inflation rank.

with increased competition from foreign imports, has generated sharp contractions in some sectors. The industrial sector, as mentioned above, has been particularly affected. The first stage of transition has thus been characterized by high inflation and significant declines in real activity.

In the second stage of transition, the government must decide whether to provide subsidies to the firms that were hurt during the first stage. These subsidies, often in the form of monetized credits, have several negative consequences, which may slow (and even reverse) the progress of reform. First, subsidies allow inefficient firms to continue consuming labor, materials and financial resources, rather than releasing those resources to emerging sectors. Second, such subsidies are highly inflationary. Given the scarcity of available resources and the macroeconomic instability caused by high inflation, there is little opportunity or incentive for the private sector to develop. The economy is caught in a sort of limbo, with limited private sector production and an increasingly inefficient state sector consuming resources and actively opposing reform. When the government has chosen to subsidize unprofitable firms, the second stage of transition has been characterized by continuing declines in output and high inflation. Conversely, to the extent that governments have refrained from issuing subsidies, allowing restructuring to continue in a manner consistent with market signals, inflation has fallen. In either case, this stage of transition entails considerable social pain, as the industrial sector contracts and unemployment rises, but delaying restructuring has only intensified the length and painfulness of the process.

The decline in inflation marks the beginning of the third stage of transition. Increased macroeconomic stability, due to lower inflation, helps create an environment conducive to entrepreneurial activity, investment, and private sector development. In the transition economies

that have achieved positive growth, the private sector has been the main engine of the rebound. Poland represents a good example of this. The Polish government has been slow to privatize state-owned enterprises, but the relatively stable macro environment (despite some political turmoil) has generated an explosion of small-scale economic activity, which has allowed Poland to register positive growth each year since 1992. More generally, the table below provides statistical evidence that across the transition economies considered in this section the private sector's share of 1994 GDP was negatively correlated with the average inflation rate over the two preceding years. The coefficient on inflation is significant at the 8 percent level. This evidence further suggests that high inflation retards transition by discouraging the development of the private sector.

Cross-country regression Dependent variable: Private sector share of GDP in mid-1994				
#	Intercept	Average inflation rate, 1991 and 1992	GDP growth in 1993	R^2
1	47.11	-0.009 (0.005)	0.256 (0.345)	0.33
Note: Numbers shown in parentheses are standard errors.				

4. Conclusions

In this paper, we have documented two important lessons that have emerged during the transition process. First, increased central bank independence tends to improve inflation performance. Second, high inflation adversely affects real activity in subsequent years. These results suggest that the establishment of an independent central bank is an institutional reform

that should be implemented early in the reform process. Insulating the central bank from political pressures appears to be a particularly important characteristic of CBI in these countries. Transition economies that contemplate reducing the independence enjoyed by their central banks (such as Poland in recent months) should thus be aware that the eventual result of such actions may be higher inflation. A second message suggested by this analysis is that stabilizing inflation and stimulating real activity are compatible objectives for policymakers in the transition economies. The evidence indicates that reducing inflation to relatively low levels prepares the way for a rebound in output.

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Table 1
BODART TEST ON CENTRAL BANK INDEPENDENCE

No.	Test questions
Independence in choosing goals	
1.	Does the central bank law stipulate price stability as the central macroeconomic objective of the central bank?
Economic independence	
2.	Does the central bank control the "instruments" of monetary policy? ["Instruments" are (i) open-market operations, (ii) reserve requirements, (iii) discount rates]
3.	Is there any binding legal limit imposed on the direct financing of the government by the central bank?
4.	Is the government allowed to receive any direct financing from the central bank?
5.	Is the central bank subject to government directives in the execution of monetary policy?
Political independence	
6.	Can the governor of the central bank be dismissed by the executive branch or the parliament if there is conflict regarding monetary policy?
7.	Does the term of office of the central bank governor exceed the election cycle?
8.	Does the term of office of central bank board members exceed the election cycle?
9.	Is the governor appointed by the executive branch?
10.	Are any of the other central bank board members appointed by the executive branch?
11.	Is the number of central bank board members appointed by the executive greater than the number appointed by other bodies?
12.	Does a government official or representative sit on the central bank board?
13.	Does a government official or representative sit on the central bank board with a vote?
14.	Does a government official or representative sit on the central bank board with a veto?

Table 2
TEST SCORES

	Goal ind.	Economic independence				Political independence								
	Q #1	Q #2	Q #3	Q #4	Q #5	Q #6	Q #7	Q #8	Q #9	Q #10	Q #11	Q #12	Q #13	Q#14
Albania	1.0	1.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0
Armenia	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.5	0.0	1.0	1.0	1.0	1.0
Bulgaria	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	1.0	1.0	1.0
Czech Repub.	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
Estonia	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.5	0.0	1.0	0.0	0.0	1.0
Hungary	0.0	1.0	1.0	0.0	0.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
Kazakhstan	0.5	1.0	0.0	0.0	0.0	0.5	1.0	1.0	0.5	0.0	1.0	0.0	0.0	1.0
Lithuania	0.0	1.0	0.0	0.0	0.0	0.5	0.0	1.0	0.5	1.0	1.0	0.0	0.0	1.0
Poland	0.5	1.0	1.0	0.0	0.0	0.5	1.0	0.0	0.5	0.0	1.0	1.0	1.0	1.0
Romania	1.0	0.0	0.0	0.0	0.0	0.5	1.0	1.0	0.5	1.0	0.0	1.0	1.0	1.0
Russia	0.5	1.0	0.0	0.0	0.0	0.5	1.0	1.0	0.5	1.0	1.0	0.0	0.0	1.0
Ukraine	0.5	1.0	0.0	0.0	1.0	1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
Germany	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
Wt. given to Q. in CBI-DF	1/2	1/8	1/8	1/8	1/8	0	0	0	0	0	0	0	0	0
Wt. given to Q. in SIB	1/9	1/9	1/9	0	1/9	1/9	1/9	1/9	0	0	0	0	1/9	1/9

Table 3
CENTRAL BANK INDEPENDENCE AND INFLATION PERFORMANCE

COUNTRY	CBI-DF index		SIB index		Turnover		1993 inflation	
	score	rank	score	rank	rate	rank	rate	rank
Albania	0.750	9	0.778	10	0.800	5	85	5
Armenia	0.625	8	0.556	5	1.000	6	3732	11
Bulgaria	0.875	10	1.000	11	1.000	6	73	4
Czech Republic	0.875	10	1.000	11	0.667	4	21	1
Estonia	1.000	12	0.667	8	0.500	1	90	6
Hungary	0.312	2	0.722	9	1.000	6	22	2
Kazakhstan	0.375	3	0.500	2	1.000	6	1517	10
Lithuania	0.125	1	0.333	1	0.500	1	390	8
Poland	0.500	5	0.611	7	1.000	6	35	3
Romania	0.500	5	0.556	5	0.500	1	256	7
Russia	0.375	3	0.500	2	1.000	6	896	9
Ukraine	0.500	5	0.500	2	2.000	12	4735	12
Germany	0.875	.	1.000	.	.	.	.	.

Table 4
CORRELATIONS AMONG RANKS OF CBI INDICES, TURNOVER AND INFLATION

	CBI-DF	SIB	TURNOVER
INFLATION	-0.25	-0.65	0.41
CBI-DF		0.79	0.06
SIB			0.03

Table 5
INFLATION AND GROWTH IN TRANSITION ECONOMIES

Dependent variable: Real GDP growth				
Independent variables	(1)	(2)	(3)	(4)
Real GDP growth last year	0.4350 (0.1306)	0.4014 (0.1121)	0.4089 (0.1120)	0.3882 (0.1066)
Inflation rate last year	-0.0033 (0.0018)	-0.0023 (0.0015)	.	.
Inflation rate two years ago	.	-0.0076 (0.0043)	.	.
Average inflation over the two previous years (AVINF)	.	.	-0.0065 (0.0025)	0.0066 (0.0058)
Interaction of AVINF and "High inflation" dummy	.	.	.	-0.0129 (0.0052)
Year dummy for 1992	-13.28 (3.66)	.	.	.
Year dummy for 1993	-0.61 (3.50)	-4.77 (3.71)	-2.65 (3.12)	-1.46 (3.00)
Intercept	1.09 (2.84)	4.79 (3.11)	2.97 (2.59)	0.67 (2.63)
R^2	0.35	0.49	0.48	0.54
Number of observations (number of countries x no. of years)	78 (26 x 3)	52 (26 x 2)		52 (26 x 2)

Figure 1
Central bank independence & inflation

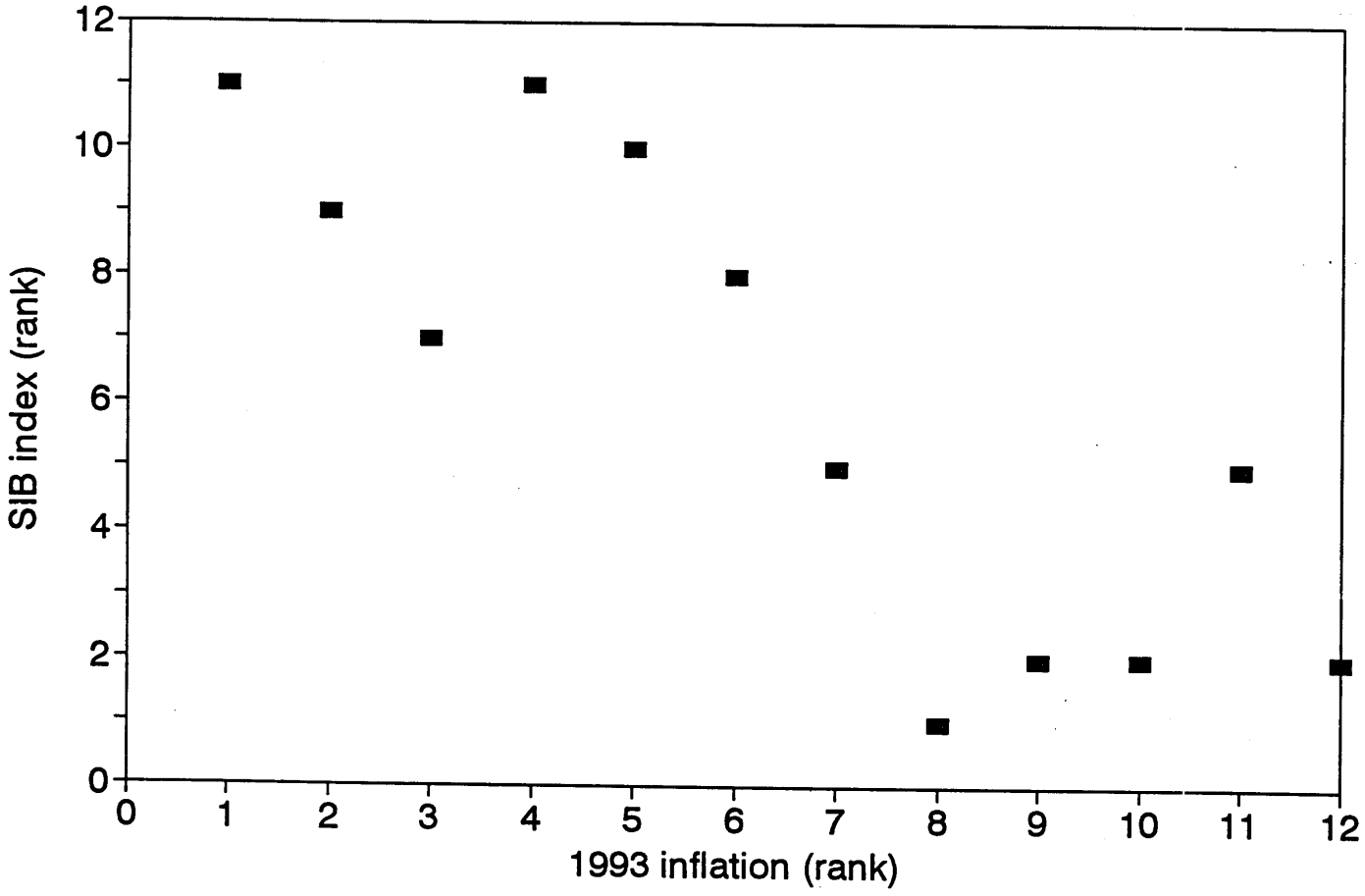
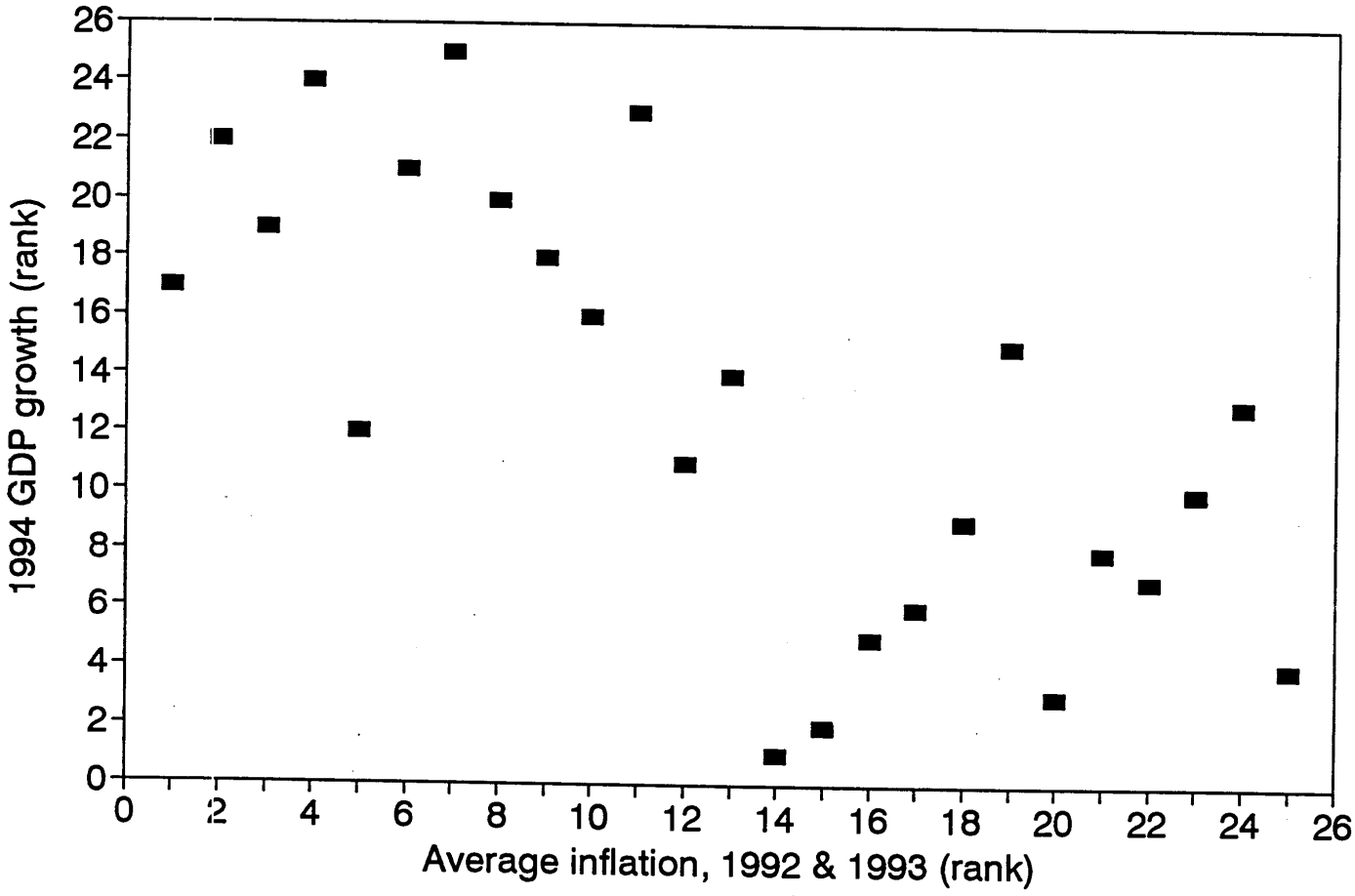


Figure 2
Inflation & GDP growth



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