SOME BENEFITS OF REDUCING INFLATION IN TRANSITION ECONOMIES

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ABSTRACT

We apply Feldstein's (1997, 1999) analysis of the interactions between the tax system and inflation to two transition economies: Poland and Ukraine. We find that the tax-related costs of inflation in these countries are significantly smaller than in mature market economies. Our analysis points out that the tax system in these two transition economies is superior to the tax system in developed market economies, as taxes on investment income are lower. It implies that transition countries should avoid replicating other tax systems and, instead, take advantage of the unique opportunity to design and entrench the features of their tax system which are superior to those in mature economies.

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I. Introduction

We apply Feldstein's (1997, 1999) analysis of the interactions between the tax system and inflation to two transition economies: Poland and Ukraine. The goal is twofold. First, we evaluate the welfare effects of reducing inflation in these countries. Second, our analysis points out that the tax system in these two transition economies is, from the point of view of the issues discussed here, superior to the tax system in developed market economies. It therefore implies that transition countries should avoid replicating other tax systems and take advantage of the unique opportunity to design and entrench the features of their tax system which are superior to those in other countries.

The framework we use was developed by Feldstein (1997, 1999), who analysed the benefits of reducing inflation under the current US tax code. To date, this framework has been applied to developed countries only: United Kingdom (Bakhshi, Haldane and Hatch, 1999), New Zealand (Bonato, 1998), Spain (Dolado, Gonzalez-Paramo and Vinals, 1999), Canada (O'Reilly and Levac, 2000) and Germany (Tödter and Ziebarth, 1999).

Traditional approaches to evaluating the costs of inflation assume the tax system is not an issue. Instead, they typically concentrate on money market distortions (e.g. Lucas, 2000), effects on private and public contracts (Fischer and Modigliani, 1978 is a classic reference), roles of money (Konieczny, 1994) and the effects in the labour market (e.g. Akerlof, Dickens and Perry, 1996). The idea is that tax-induced distortions can be eliminated through a redesign of the tax system.

Feldstein (1997), however, points out that eliminating tax-induced costs by redesigning the tax system is impractical. Tax-system reform is a complex process with many stakeholders. Central banks have little say in the design of tax rules. Therefore, a more fruitful approach is to analyse the costs of inflation in the context of existing tax rules and the distortions they induce.

The application of the analysis to transition economies has two advantages. First, at least in terms of the issues considered here, the tax systems in transition countries are presently superior to those of developed market economies. The main difference is the limited scope of taxation of

investment income. This is clear from our estimates, which find that the costs of inflation are, under the current tax system, much smaller than elsewhere. The second reason is that, as the tax system develops, governments are tempted to find new sources of revenue and may introduce taxation on these types of income. A likely argument for introducing new taxation would be that additional revenue is needed and "that is how things are done in developed countries." Our analysis stresses this would be a mistake as the current tax system is worth preserving.

Our analysis follows two parallel strands. The first concentrates on the evaluation of the distortionary effect of taxation operating through the tax system. The second, in the tradition of Phelps (1973), evaluates the revenue consequences of reducing inflation and welfare losses resulting from replacing lost revenue with other distortionary taxes. This is important as the end result of the calculations gives the net effect on welfare while maintaining government revenue.

The plan of the paper is as follows. In the next section we briefly review the literature on the welfare costs of inflation and discuss its applicability to transition economies. In section 3 we summarize the Feldstein approach and apply it to Poland and Ukraine. Alternative scenarios are analysed in section 4. The last section concludes.

2. The Welfare Cost of Inflation – a Brief Review with Application to Transition Countries.

2.1. A Brief Review.

The literature on the welfare cost of inflation is voluminous. The standard survey is Fischer and Modigliani (1978)[1]. They analyse welfare effects of inflation from the point of view of distortions it creates in the economy, the availability of indexing institutions, whether inflation is expected or not and the relationship between inflation, its variability and welfare. We now briefly summarize their analysis.

When everything is indexed, the cost of inflation is due to the fact that interest is not paid on money balances, which distorts the money market through inflation tax on cash holdings

[1] See Driffil, Mizon and Ulph (1990), Konieczny (1994), Briault (1995) and O'Reilly (1998) for more recent surveys. The last paper provides extensive references to the literature.

(Friedman, 1969) as well as due to the effect of inflation on the cost of changing prices (the so-called menu cost – see Sheshinski and Weiss, 1977, for the basic menu cost model).

In the presence of nominal government institutions inflation has numerous detrimental effects. Due to progressive tax system, it distorts the work-leisure choice. Taxation of interest income distorts intertemporal choice of consumption; taxation of investment income distorts both consumption and investment decisions. The corporate tax code (for example depreciation deductions, calculation of the value of goods sold out of inventory) results in excessive taxes on corporate profits and distorts investment and production decisions. Nominal accounting leads to misinterpretation of firms' financial results. Nominal accounting also results in misinterpretation of savings and income and overstates the size of government deficit.

Nominal private debt contracts, in the presence of inflation, lead to declining repayment streams; in particular, they make it difficult to buy housing. If people have money illusion, inflation results in numerous misallocations as nominal misperceptions prevent making optimal pricing and purchasing decisions. In other words, inflation undermines the informational role of prices (Friedman, 1977).

Unexpected changes in the inflation rate lead to suboptimal reallocations of resources between debtors and creditors. An unexpected increase in inflation benefits debtors at the expense of creditors. It leads to redistribution of income from sellers to buyers, from households to corporations and from households to the government. In particular, it erodes the value of pensions and redistributes resources from the old to the young.

Finally, uncertainty about future inflation (which, as evidence suggests, increases with the average inflation rate – see Hess and Morris, 1996 and O'Reilly, 1998) increases uncertainty about the future and leads to shorter contracts; both are detrimental to welfare.

Konieczny (1994) analyses the welfare costs of inflation from the point of view of the roles (medium of exchange, unit of account and store of value) money plays in the economy. He argues that financial innovation, which reduces the use of currency in the economy over time,

has eliminated the role of money as the store of value and is on the way of eliminating money's role as a medium of exchange. The remaining role is that of a unit of account. It does not depend on whether money is actually held and so, over time, it is going to become the main role of money. This approach stresses the accounting distortions created by inflation. Uniquely among units of account, the value of money changes over time (while the value of a pound – *lb* – is constant in terms of weight, the value of a pound - £ - is not constant in terms of goods and services). This imposes accounting costs on economic agents and may lead to money illusion and consequent distortions. These costs are difficult to estimate but may be substantial.[2]

Why is estimation of the welfare costs of inflation difficult? The simple reason is that inflation affects the economy in many ways. Evaluation of inflation effects would require structural models of the economy that include the numerous effects of inflation. Structural models of such detail remain to be developed.[3]

2.2. The Optimal Inflation Rate.

Various approaches to analysing the welfare effects of inflation lead to different postulates as to what the optimal rate of inflation should be. From the point of view of the money market distortion it should be equal to minus the real interest rate, often called the Friedman's rule (Friedman, 1969). Arguments stressing the issue of nominal public and private contracts imply that the optimal rate of inflation rate should be zero. Unit-of-account arguments imply that the price level should be constant (Konieczny, 1994, 2001).[4] Housing market considerations, discussed below, imply that the optimal rate of inflation should be equal to minus the rate of individual real wage growth, i.e. even lower than under the Friedman's rule.

On the other hand, some authors argue that low inflation is detrimental and the inflation rate should be in the range of 3-4% per year. When inflation is low, real wage adjustment may be difficult as workers resist reductions in nominal wages (this argument is often called the Tobin

[2] Inability of economists to provide an adequate numerical evaluation of the costs of inflation is evident in the fact that the general public dislikes inflation even more than economists do (Shiller, 1996).
[3] A good example of the difficulty in properly estimating the effect of inflation on welfare is Lucas (2000). Even though the paper only addresses the money market distortion, it is quite complex.
[4] In a well-known paper Svensson (1999) showed that price level targeting is superior to inflation targeting. See also Ball, Mankiw and Reis (2003) and Cecchetti and Kim (2003).

effect; the best example of its application is Akerlof, Dickens and Perry, 1996). If inflation is zero and demand for loans is low the credit market may not clear as nominal interest rates cannot be negative (this argument, put forward by Summers, 1991, is called the Summers effect. It has been gaining support in recent years in view of the experience with Japanese deflation). Consumers, expecting price decreases, may delay purchases.

A different argument for targeting a positive rate of inflation is provided by the fact that the reported rate of inflation exceeds the actual rate of inflation. This is due to the substitution bias (the use of the Laspeyers' price index in the calculation of the CPI) and inadequate accounting for quality improvements and for new goods. [5]

2.3. The Welfare Cost of Inflation in Transition Countries.

Are costs of inflation different in the former planned economies? In a word, no. This opinion may be controversial but it should be noted that the welfare costs of inflation, especially under the current thinking about monetary policy, are a long-run issue. The monetary policy question is: what rate of inflation should central bank target to minimize the costs of inflation? Given the long-run perspective, former planned economies should target the same inflation rate as developed countries, unless the long-run structure of the economy is different. Therefore the differences in the costs of inflation are quantitative, rather than qualitative. The one exception is the topic of this paper. If the current superior tax code is maintained indefinitely, inflation in the former planned economies is going to be less painful.[6]

The situation is, of course, different during transition. As the structure of the economy, including the structure of institutions, both public and private, as well as public and private customs[7], changes, so do the costs of a given inflation rate. Our discussion, which follows the summary of the costs of inflation earlier in this section, concentrates on the comparison of potential welfare effects of inflation between a transition and a mature market economy.

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[5] The literature on the bias is voluminous; see, for example, the report by the Boskin commission (Boskin et al, 1996). Moulton (1996) summarizes the literature. This bias does not to exceed 1% in developed countries.

[6] Fischer and Summers (1989) argued that indexation schemes, by reducing the costs of inflation, may lead to higher average inflation rate.

[7] By private institutions we mean, for example, the housing mortgage market. Public institutions include, for example, the tax system; private customs - the use of alternative currency; public customs – tax enforcement.

As a result of currency substitution, estimates of the welfare effect of money market distortions are going to be too low, as they do not take into account the additional cost of setting up exchange in the alternative currency. For the same reason, the sensitivity of money demand to inflation rate is expected to be higher than in mature market economies. Therefore it is reasonable to expect that the money market distortion is higher in a transition economy.

In principle, the effect of inflation on the frequency of price changes may be smaller. This is because demand and cost conditions vary as the economy adjusts to the new market structure; in addition relative prices adjust from the artificial structure under the planned economy and so price changes are frequent. However, Konieczny and Skrzypacz (2000) who analyse a micro-data set of store-level prices of 55 individual goods in Poland during 1990-96 find that the price structure adjusts very rapidly, with most of the changes completed within one year of the big-bang reform in 1990. Using the same data set, Konieczny and Skrzypacz (2001) find that the effect of inflation on relative price dispersion is the same as in Israel (Lach and Tsiddon, 1992). Together with the results on the menu cost model (Konieczny and Skrzypacz, 2003) this suggests that the menu cost considerations have similar effects during transition as in market economies.

This paper concentrates on the welfare effects of inflation in the presence of nominal government institutions. A given government institution has a similar effect in a transition and in a market economy (for example inadequate depreciation deductions lead to excessive labour/capital ratio), with one caveat. Tax enforcement and tax compliance are weaker, mainly because fiscal institutions are new and are less skilled at tracking and eliminating tax avoidance. This means, on one hand, that a given tax rate has a smaller distortionary effect than in a market economy (as households and firms find ways to avoid paying taxes) but, on the other hand, the tax rates must be higher to yield the same amount of revenue. The net distortionary effect of a given revenue requirement is, therefore, ambiguous. It is reasonable to expect, however, that the detrimental effect on welfare is high. When tax compliance is low and tax avoidance is rampant, the tax structure is haphazard and so even a properly designed tax system would produce significant distortions. The same is true of the effects of nominal accounting. The greater is the ability to finesse financial results, the easier it is for firms to present a distorted picture, both to tax

authorities and to shareholders, and the more opaque is the investment picture, hindering the development of financial markets.

Nominal private debt contracts during transition are less popular than in mature market economies. This is due to the underdevelopment of the financial system, the presence of currency substitution and indexation of wages and pensions. The effects of higher inflation are, therefore, limited. Similarly, indexation limits the negative effects of unexpected inflation changes. On the other hand, the limited experience with inflation during transition leads to higher uncertainty about the future and delays the appearance of long-term contracts.

The housing market requires a separate consideration. The level of housing ownership in transition countries is low, except in countries in which dwellers were allowed to acquire property rights to their apartments (for example in Poland). Such universal property reform created distorted housing ownership as, in a planned economy, housing allocations were not done on the basis of economic considerations. In either case, the development of the housing market would improve welfare. Inflation, by raising the cost of residential mortgages, delays the development and reduces the scope of the housing market.[8]

During transition relative prices change a lot. This is due to the fact that, as already mentioned, the relative price structure inherited from the planning period did not reflect preferences or production possibilities. In addition the inflation rates were, initially, high. Indeed, Konieczny and Skrzypacz (2003) report large changes in relative prices of individual goods in Poland. The average rate of inflation for goods in the sample is 37% per year, with standard deviation of 10%; the extreme values are 73% for shaving cream and 21% for sugar. This means a tenfold change in the relative price of shaving cream in terms of sugar over the years. Even in 1996, inflation rates vary between 4% (tea) and 59% (flour). Such changes in relative prices obviously undermine the informational role of prices. As the relationship between inflation rate and relative price variability in the data is positive (Konieczny and Skrzypacz, 2001), lower inflation would mitigate the extraordinary variability in relative prices and improve their allocative role.

[8] Assuming the Fisher equation holds, a 1% increase in inflation which raises the mortgage financing rate from, say, 10% to 11% raises the value of the constant nominal payment on a fixed-rate 25 year mortgage by over 8% and so significantly reduces housing affordability.

One potential benefit of inflation is the effect of relative price variability on consumer search. Benabou and Gertner (1993) show that higher variability of relative prices induces customer search for the best price. As inflation increases, in the presence of menu costs price changes become bigger and, as long as they are not synchronized, relative price variability increases. This raises the incentives to search for the best price. As a result demand elasticity increases and monopolistic markups fall. Welfare rises if search costs are not too high. These effects may be important in a transition economy. Konieczny and Skrzypacz (2000) find evidence of search for the best price while Konieczny and Skrzypacz (2003) find strong empirical support for a menu cost model with consumer search for the best price. There are no empirical studies, however, which analyse the effect of inflation on markups in transition countries.

In a transition economy, especially under conditions of high inflation, there are multiple units of account: the local currency, the US dollar and, nowadays, the Euro. While the use of the alternative accounting units reduces the speed of erosion of the unit of account, it requires recalculations during transactions. These are costly and may lead to mistakes.[9] It is likely that these costs are significant in transition countries, but they yet remain to be evaluated.

2.4. The Optimal Rate of Inflation in Transition Countries.

Obviously, the long-run optimal value of inflation should not differ much in former planned economies and in market economies. During transition, however, there are important differences. Labour market flexibility is substantial, given the high rates of unemployment and large structural changes, so the Tobin effect is not important. Given the higher risk of transition country bonds, as well as high demand for credit due to restructuring needs, one can expect that real interest rates in transition economies are going to exceed those in market economies for a long time; hence the Summers effect is not important either.

[9] Konieczny (2001) provides an example of the dangers of using different units of account. The Mars Climate Orbiter sent by NASA in 1998 to study Mars climate came too close to Mars and crashed in September 1999. An investigation established the cause: some teams of engineers were using metric measures, some were using imperial measures. The significance of this example is underscored by the fact that people who made the mistake were the proverbial rocket scientists.

On the other hand, the bias in the calculation of the CPI is substantial. In a series of papers Filer and Hanousek (2000, 2002, 2003a and 2003b) analysed the bias in the Czech Republic and in Romania. They find that an additional reason the reported rate of inflation overstates the actual one is due to dramatic quality improvements in consumption goods as household switch from low quality, outdated planned economy goods to modern products. They estimate the bias to be in the range of 4-5% per year. While these results have been criticized since they are based mostly on interviews, the studies are very well done and the evidence is overwhelming. It is clear that the results are not restricted to the countries they study and similar effects arise in other transition economies. This means that even relatively high reported inflation in these countries implies a stable or even falling price level.

3. Welfare Effects of Reducing Inflation – Replicating Feldstein's Calculations.

We now turn to the discussion of the Feldstein's approach and its application to Poland and Ukraine. To make our results comparable to other studies, we consider the per-year welfare benefits of reducing inflation permanently by 2%. This is dictated by the approach in the original Feldstein's contribution, which has been followed in all studies. Feldstein assumed that the bias in the reported inflation rate in the US is 2%. As the long-run reported average inflation rate in the US (1960-94) was about 4%, this implied the actual inflation rate of 2%. The reduction in inflation by 2% meant, therefore, the benefit of achieving actual (rather than reported) price stability. As the calculations are symmetric and, approximately, linear, the results reported below are roughly double the per-year welfare cost of a permanent increase in inflation by 1%.

Inflation, operating in conjunction with the tax system, has four basic effects on welfare. It distorts:

- the intertemporal consumption choice (i.e. saving for old age),
- the money market,
- the real cost of servicing government debt, and
- the housing market.

We consider each effect in turn.

3.1. Intertemporal Allocation of Consumption

In developed countries, the main channel through which the tax system-inflation interactions affect welfare is through distorting the intertemporal consumption choice. It operates by reducing the real return on investment. As a result savings fall, which leads to lower than optimal retirement consumption. It is important to note that this distortion is created by the tax system regardless of whether inflation is, or is not, present (as long as the real interest rate is different from zero). Inflation makes matters worse by enhancing the distortion, since it increases the difference between the before-tax and after tax real rates of return.

To make the analysis as simple as possible, consider a two-period overlapping generations model. Individuals work when they are young and divide their income between consumption and saving for old age. Savings are invested at the real rate r. Therefore, consumption in old age is related to savings by the following equation:

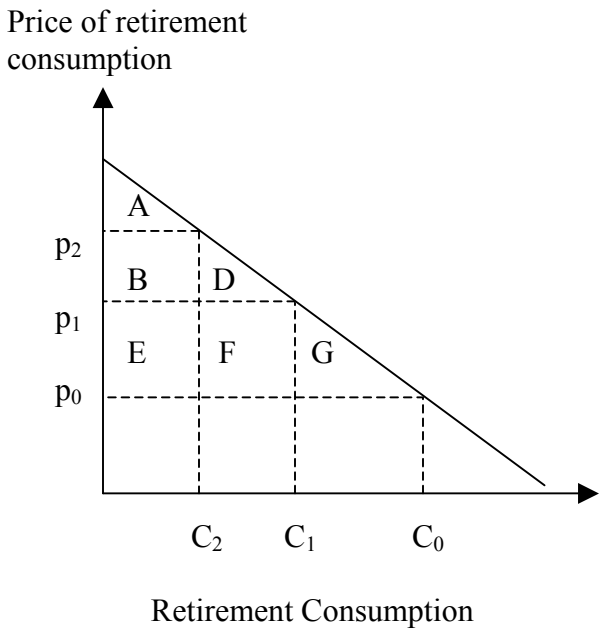
$$C=S(1+r)^{T} \tag{1}$$

where T is the length of the period between saving while working and dissaving in the old age. Define: $p=(1+r)^{-T}$. Then:

$$S = pC \tag{2}$$

The tax system and inflation distort the choice between current and old age consumption by affecting the relative price of old-age consumption, p. This is illustrated in Figure 1 below, which shows the individual's compensated demand for retirement consumption as a function of the price of retirement consumption at the time of the savings decision.

Figure 1. Individual compensated demand for retirement consumption as a function of the price of retirement consumption (at the time of the savings decision).



Assume, first, there are no taxes or inflation. This would enable individuals to save at the best available real interest rate, r_0, which corresponds to the relative price of old-age consumption of p_0. At that relative price the demand for old-age consumption is C_0. Consumer surplus is equal to the sum of the areas A+…+G. In the presence of distortionary taxes and inflation, the real interest rate is r_2, the relative price of old-age consumption is p_2 and the demand falls to C_2. Consumer surplus is reduced to the area A, while the value of tax revenue is B+E. The deadweight loss is equal to the triangle D+F+G. A reduction of inflation reduces the burden of distortionary taxation (discussed below), so the real after-tax interest rate increases to r_1, *while* the relative price of old-age consumption falls to p_1 and demand increases to C_1, i.e. closer to the optimum value. As a result, deadweight loss falls by D+F, while tax revenue changes by the area F-B (which may be positive or negative).

The importance of the Feldstein's approach for estimating the welfare costs of inflation is obvious. In traditional analyses of the costs of inflation, the comparison is with the optimal rate of inflation. Therefore, welfare changes are depicted by the 'Haberger triangles', which are second order, i.e. small. On the other hand, in the presence of distortionary taxes, the initial

situation is not optimal and welfare changes are first order. In Figure 1, these changes correspond to the area of a trapezoid, rather than a triangle. Thus, welfare changes are potentially large.

Assume further that the fiscal authority wants to keep tax revenues constant. This requires other taxes be altered to offset the change in tax revenues resulting from lower inflation (Phelps, 1973). Usually, it is assumed that new taxes are lump-sum and nondistortionary. Clearly, this assumption is not justified. In all countries, the scope of lump-sum taxes is highly limited and they do not raise significant amounts of revenue. Therefore the taxes imposed to offset the change in revenue due to lower inflation must be distortionary.

Let λ denote the deadweight loss per unit of alternative taxes. The required compensating change in taxes is equal to the area B-F (see Figure 1). Thus, the total gain[10] from reducing inflation is:[11]

(3) $$G_1 = D+F + \lambda (F-B).$$

Using Figure 1, the areas represented in equation (3) can be approximately expressed in terms of prices and consumption as:

(4) $$G_1 = [p_1 - p_0 + (p_2 - p_1)/2]*(C_1 - C_2) + \lambda [(p_1 - p_0)*(C_1 - C_2) - (p_2 - p_1)C_2].$$

We now turn to expressing equation (4) in terms of observable magnitudes. The change in consumption can be approximated as:

(5) $$C_1 - C_2 = (dC/dp)(p_1-p_2) = C_2(p_2/ C_2)\,(dC/dp)(p_1-p_2)/ p_2 = p_2\, C_2\, \varepsilon_{C_p}\, (p_1-p_2)/ p_2^2 =$$

$$= \quad S_2\, \varepsilon_{C_p}\, (p_1-p_2)/ p_2^2$$

[10] It should be noted that, since the sign of revenue change is ambiguous, it is possible that a reduction of inflation would reduce welfare. This is more likely if the compensated demand curve is steep and the deadweight loss from other taxes is large.

[11] If, for example, tax revenue falls as inflation decreases (i.e. F<B), other taxes have to be raised by the amount equal to B-F. The compensating increase in other taxes lowers welfare by the amount equal to the deadweight loss of the new taxes, λ (F-B). Hence, if F<B, the second term in (3) is negative.

where ε_{C_p} is the compensated elasticity of retirement consumption with respect to its price, evaluated at the initial inflation rate. This elasticity is not directly observable. Using the Slutsky decomposition and the fact that $S=pC$ we get:

(6) $$\varepsilon_{C_p} = \eta_{C_p} + \sigma = \eta_{S_p} + \sigma - 1$$

where η_{C_p} is the uncompensated elasticity of retirement consumption with respect to its price, σ is the propensity to save out of exogenous income and η_{S_p} is the uncompensated elasticity of savings with respect to the price of retirement consumption. Differentiating $p = (1+r)^{-T}$ and converting the result into elasticities we get:

(7) $$\eta_{S_p} = -(1+r)\ \eta_{S_r}/rT$$

where η_{S_r} is the uncompensated elasticity of savings with respect to its rate of return.

The value of S_2 is equal to the value of savings made by young people for retirement. National savings, S_N, are equal to the savings of the young minus dissavings of the old. Consider an overlapping generations model with savings proportional to income. Let n denote the rate of population growth and g denote the rate of real wage growth. Then the ratio of the income of (old) dissavers to the income of (young) savers is $(1+n+g)^{-T}$. Therefore, dissavings of the old equal $S_2\ (1+n+g)^{-T}$ and so $S_N = S_2 - S_2\ (1+n+g)^{-T}$. This implies that the savings of the young, S_N, are related to the national savings by the following equation:

(8) $$S_2 = S_N / (1-(1+n+g)^{-T}).$$

Finally, we assume that the propensity to save out of exogenous income is equal to the propensity to save out of wage income. So:

(9) $$\sigma = S_2/(\alpha * \text{GDP})$$

where α is the share of wages in GDP.

Inserting these results into (4) we obtain the expression for G_1 in terms of observable variables:

(4') $$G_1 = \left[\left(\frac{p_1 - p_0}{p_2}\right) + \left(\frac{p_2 - p_1}{2p_2}\right)\right]\left(\frac{p_1 - p_0}{p_2}\right) \times S_2\left[1 + (1 + r_2)\eta_{S_r} / r_2 T - \sigma\right]$$

$$+ \lambda \times S_2 \times \left[\frac{p_1 - p_0}{p_2}\frac{p_2 - p_1}{p_2}\left(1 + (1 + r_2)\eta_{S_r} / rT - \sigma\right) - \frac{p_2 - p_1}{p_2}\right]$$

with S_2 and σ given by equations (8) and (9), respectively.

We now turn to the estimates of the parameters in equations (4'), (8) and (9) for Poland and Ukraine. This is a difficult task as both economies are undergoing the transition process. The most important problem is the lack of a steady state. Many macroeconomic variables, as well as institutions, are in a state of continuous change. This fact is of particular importance for our study as the time horizon we consider is a generation. It is clear that the tax rules, inflation rates, profit rates, retirement arrangements or even rates of population growth will change in the next 20-30 years. While some of these variables may be relatively close to the long-run values, some are certainly not (e.g. the return on equity, which has often been negative in both Poland and Ukraine in recent years). The second problem is that, in many cases, the data we need are not available over longer periods of time. In practice this means that, if we wanted to use all data for the same period, we would only be able to calculate averages over 3 years in Poland and 2 years in Ukraine. As the numbers often vary significantly year to year, our results would not be representative. Therefore we decided, whenever practical, to use the averages for the longest consecutive period of observations we have.

We start with the numbers for Poland. As the first-best rate of return on savings, r_0, we took the real return on equity in industry, construction, trade, repairs, hotels and restaurants in the private sector, during the period 1997-2001. The resulting value is 4.65%.[12] The rate is treated as the proxy for the rate of return on equity (in the sense that we assume that individuals are able to save for retirement consumption at this rate, which is standard in the literature). It is strikingly

[12] Source: the Central Bureau of Statistics (GUS).

low; for example the corresponding number for the U.S., used by Feldstein, is 9.2%. It is likely that in the next 20-30 years, the real return on capital in transition countries will be no lower than in developed countries, given the restructuring needs and higher risk. It is easy to show that the relationship between the benefits of lowering inflation and r_0, summarized in equation (4') is, ceteris paribus, positive and so the numbers presented here underestimate the actual gains. Assuming that the average time between saving for retirement and using up these savings for retirement consumption, is T=30 years,[13] this corresponds to $p_0 = 0.26$.

In order to calculate the net-of-tax rate of return, we need to analyse personal and corporate income taxes. These have been changing in Poland and are, generally, different than for regular income. In March 2002, taxes on interest earnings were introduced. At present, the interest tax is 20% (about equal to the lowest positive marginal income tax rate) and the dividend tax rate is 15%. There exist various temporary waivers on some forms of taxation of investment income. These are scheduled to expire in 2004. At present, capital gains are tax-exempt; a capital gains tax at the rate of 20% is to be introduced in 2004. We therefore present two scenarios. In the first, we assume that capital gains tax rate is 0; in the second, the capital gains tax is assumed to be 20%. The average rate of corporate income tax is 25.475% (the average rate 1998-2001).[14]

The combined effect of taxes reduces the rate of return, r_2, to 3.09% under Scenario 1 and 2.95% under Scenario 2. This corresponds to $p_2 = 0.4$ under Scenario 1 and $p_2 = 0.42$ under Scenario 2.

We now turn to analysing the effects of reducing the rate of inflation by 2%; as already mentioned, this follows the standard procedure in the literature. There are three effects from lowering the inflation rate. Firm profits change due to the effect of lower inflation on the value of depreciation as well as on the cost-of-goods and on interest payment deductions. For individuals, there is a decrease in taxes on capital gains, as well as on interest earnings.

[13] The value of 30 years has been used in most studies. It may appear excessive in case of Poland, as the average age of stopping work is relatively low. But it is mostly due to people stopping working due to disability. What matters for saving decisions is the expected time to retirement when the saving decision is made.

[14] Source: the Ministry of Finance.

A lower inflation rate increases the value of depreciation allowances and reduces the cost of intermediate goods. In the absence of relevant estimates, we follow Feldstein in assuming that a 1% drop in inflation reduces the corporate tax rate by 0.57%. With a marginal corporate tax rate of 0.37 (average 1992-2001),[15] the total gain from this source is 0.02*0.57*0.37 = 0.42%.[16] On the other hand, the value of tax deductions of debt interest to firms falls. The average debt-to-capital ratio in Polish industry in 1997-2000 was 59%, so the increase in the tax burden is 0.02*0.59*0.34=0.43%. Hence, the two effects almost exactly offset each other.

Following Feldstein, we assume that the real value of a company is independent of inflation.[17] Under this assumption, a decrease in inflation reduces capital gains. For a 2% decrease in inflation, the value of the company increases by 2% less than it would have changed otherwise. As the value of nominal liabilities is not affected by the change in inflation, this raises the return on assets by 2% times $1/(1-x)$, where x is the debt-to-capital ratio. The total effect on the individual rate of return net of tax is this amount multiplied by the share of equity in individual portfolios times the tax rate on capital gains. The average debt-to-equity ratio in Polish industry in 1997-2000 was 59%. The share of equity in individual portfolios is assumed to be 0.2. This results in an increase in individual return on equity by 0.02*2.44*0.2*0.1=0.098% in Scenario 2 and zero in Scenario 1.

Lower inflation reduces nominal interest earnings, which reduces the taxes paid on such earnings. As a result, real after-tax earnings increase. To compute the effect of lower interest earnings on individual returns, assume that the Fisher equation holds (a good approximation for Poland). With 80% of assets held in interest earning form, the individual return increases by 0.02*0.2*0.8=0.32%.

The sum of these three effects increases, due to lower inflation, the after-tax rate of return on investment to 3.40 under scenario 1 and to 3.45 under scenario 2. This lowers the prices of retirement consumption to 0.37 and 0.36, respectively.

[15] Source: Ministry of Finance.
[16] All welfare and revenue numbers are in percent of GDP.
[17] This leads to an underestimate of the benefits of reducing inflation; there is voluminous literature on the negative effect of inflation on profits and markups.

The average rate of population growth in 1991-2001 was 0.1%, the average rate of wage growth in 1995-2001 was 3.4% and the average value of savings in 1995-2001 was 8.98% of GDP. With the wage share of GDP of 0.59 (average 1995-2001),[18] this implies that S_2 = 9.0 % of GDP and the propensity to save out of exogenous income, σ =15.2%.

The uncompensated elasticity of savings with respect to their rate of return has been very difficult to estimate and no commonly agreed estimates exist – even for the US economy. Similarly, the evaluation of the deadweight loss of other taxes is beyond the scope of the present research. We follow the lead of Feldstein and others and assume η_{S_r} =0.4 and λ =0.4.

The Ukrainian economy had been almost continually shrinking until January 2000. This is clearly unsustainable. Therefore, for most of the data, we chose the period 1999-2001, which encompasses one year of decline and two years of growth. As the return in the stock market and firm profits are both negative, we took as the pre-tax rate of return the average rate of return on equity in profitable firms in 1999 - 2001. This rate is r_0= 8.04%[19], which is reasonably close to the U.S. value. We assume that the average time between saving and retirement T=22.5 years. This period is shorter than in other countries for two reasons. First, the average life expectancy in Ukraine is relatively low. Second, given the low level of starting wages, it is unlikely large savings are accumulated at the beginning of the working life. Under these assumptions p_0=0.176. The average corporate tax rate is 43.8%[20] and individual tax rate on income is 20%,[21] implying the after-tax return r_2= 3.62% and p_2=0.450.

To calculate r_1 and p_1, we proceed as before. Given the marginal corporate tax rate of 30%[22] and assuming as before that the profit tax rate increases by 0.57% for 1% of inflation increase, the reduction of inflation by 2% raises the return on equity by 0.02*0.057*0.3=0.34%. The average debt-to-capital ratio in Ukrainian industry was 5.6% (the ratio of credits granted to non-financial

[18] Sources: GUS and the Ministry of Finance.
[19] Source: Statistical Yearbook of Ukraine 2000, State Statistics Committee of Ukraine, Kiev, 2001.
[20] Source: the Ministry of Finance, Statistical Yearbook.
[21] Source: ДЕКРЕТ КАБИНЕТА МИНИСТРОВ УКРАИНЫ О подоходном налоге с граждан (Cabinet of Ministers Decree on Individual Income Tax), April 1993.
[22] Source: the Ministry of Finance.

sector to working capital; the low value reflects the relative underdevelopment of credit markets in Ukraine), so the reduction in the debt interest deduction is, assuming the Fisher equation holds, 0.02*0.0056*0.3=0.03%. There are no taxes on capital gains. Adding these effects, we get r_1= 3.86%, so p_1=0.426. The average rate of population growth in 1991-2001 was –0.45%. For the rate of growth of real wages we took 4.5%, i.e. the median rate for FSU countries in the first two years of growth.[23] The average value of savings in 1996-2000 was 5.50% GDP.[24] Using equation (8) this implies S_2 = 9.33% of GDP. The share of wages in income was 0.43.[25] From equation (9) this implies σ =21.60%.

Using equation (4') we obtain the welfare effects, operating through the intertemporal distortion of reducing inflation by 2%. They are summarized in Table 1. For comparison, we include the original Feldstein's estimates in the first column.

Table 1. Welfare effects of reduced inflation on intertemporal distortion (% of GDP)

Welfare effect	Feldstein	Poland 1	Poland 2	Ukraine
Distorting the price of retirement consumption	1.038	0.320	0.516	0.370
Replacing lost revenue due to lower taxes on investment income	-0.113	-0.197	-0.326	-0.053
Total, % of GDP	0.926	0.123	0.189	0.317

The remarkable feature of Table 1 is that the benefits of reducing inflation in the two countries are quite small. They are between 1/3 and 1/8 of the benefits in the US (the benefits in other developed countries are similar to the US numbers – see the references in the Introduction).

There are two reasons for the difference. In the case of Poland, the first is the low rate of return on retirement consumption. As a consequence, the level of savings and of retirement consumption is low and changes in the rate of return have relatively small effects. This effect is not dominant, as can be seen by comparing the results for Ukraine and the US. While the before-

[23] We chose this rate, because changes in Ukrainian real wages were unsustainable. Initially, wages fell steadily. In recent years, they increased at a very rapid rate (20% in 2001).
[24] Savings include change in net credits granted to households, net deposits, cash, investments and change in inventories made by households, net sales of foreign currency. Source: Financial Week, various issues, website of State Statistics Committee of Ukraine, NBU Bulletins, Statistical Yearbook and State Statistics Committee of Ukraine' annual publications on National Accounts.
[25] Financial Week, various issues, website of State Statistics Committee of Ukraine.

tax prices of retirement consumption are similar, the benefits of reducing inflation in Ukraine are three times smaller than in the US.

The more important reason is the difference in the tax structures. In developed market economies, most, if not all, forms of investment income are taxed. Such taxes are rare in transition economies. Dividends and capital gains are usually, and interest income often, free from income tax. Thus, the choice between current and future consumption is less distorted than in market economies. This underlies our initial claim that some features of the tax system in transition economies are superior to analogous arrangements in market economies. This is clearly seen by comparing scenarios 1 and 2 for Poland. The only difference is the capital gains tax, which is scheduled to be introduced in 2004. It raises the benefits of reducing inflation (or, equivalently, the costs of inflation) by 50%.

Does this mean that the intertemporal distortion is unimportant in Poland and Ukraine? The answer depends on the time horizon. In the short run, the answer is probably yes. Over a longer period, the situation could change. History shows that governments, especially those faced with revenue shortfalls, often follow the "Willie Sutton" approach to taxation.[26] The temptation to introduce taxes on investment earnings is strong in many countries. This is clearly the case in Poland where, over the last two years, the scope of taxes on investment income has been continuously expanding.[27]

3.2. Money Markets

Inflation affects the demand for money through its effect on the nominal interest rate. A decrease in the rate of inflation reduces the nominal interest rate and raises the demand for money. This has two effects. First, the level of the money stock is closer to the optimal value, i.e. the value of money holdings at the nominal interest rate of zero (Friedman, 1969). Second, there are several

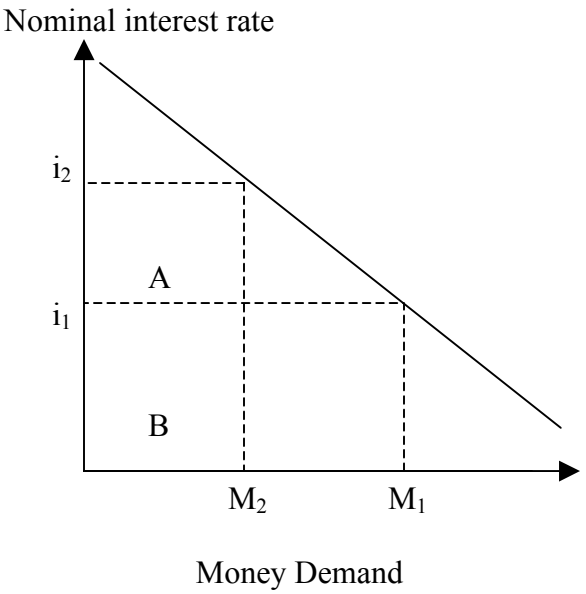
[26] Willie Sutton, a US bank robber noted for his daring escapes from high-security prisons, long allowed an apocryphal quote attributed to him to become part of American legend. Supposedly, when asked by a reporter why he robbed banks, he responded, "Because that's where the money is." He ultimately admitted he made the story up.
[27] It is worth noting that the recent US tax reform, when fully introduced, will significantly reduce (or eliminate) dividend taxation, reducing the intertemporal distortion. Hence the welfare effects in the US will fall below Feldstein's estimates.

effects on government revenue that need to be offset by a change in distortionary taxes (Phelps, 1973):

- seigniorage revenue falls;
- the value of private capital stock declines as money balances increase (with the corresponding drop in revenue and an increase in distortionary taxes), and
- the government replaces a part of its debt with cash.

At the initial inflation rate the nominal after-tax return on equity is equal to the sum of the inflation rate and the real interest rate: $i_2 = \pi_2 + r_2$ and money holdings are M_2 .[28] Reducing the inflation rate by 2% reduces the nominal return to $i_1 = \pi_1 + r_1$ and increases money holdings to M_1. As the cost of producing money is, effectively, zero, the increase in consumer surplus is equal to the sum of the areas A and B in Figure 2.

Figure 2**.** Money demand as a function of the nominal interest rate.



This gain is:

$$(10) \qquad g_1 = A + B = (i_2 + i_1)(M_1 - M_2)/2 \approx -(i_2 + i_1)(i_1 - i_2)\varepsilon_M M_2 / 2i_2$$

[28] We define the monetary aggregate as non-interest bearing assets, i.e. M0.

The change in seigniorage, evaluated at the initial values, is:

$$t_1 = \frac{d(M\pi)}{d\pi} = M_2\left(1+\frac{\pi_2}{i_2}\frac{di}{d\pi}\frac{dM}{di}\frac{i}{M}\right) = M_2\left(1-\frac{\pi_2}{i_2}\frac{di}{d\pi}\varepsilon_M\right) \quad (11)$$

where the after tax nominal interest rate is the opportunity cost of holding money and so the effect of inflation on the nominal interest rate takes into account the effect of inflation on the real rate of return, calculated in the previous section.

Following Feldstein (1997) we assume that the lower rate of inflation leads to portfolio reallocation. This reduces government revenue by the amount equal to the change in capital, $M_1 - M_2$, times the average tax rate on capital:

$$t_2 = (r_0 - r_1)(M_1 - M_2) \approx (r_0 - r_1)(i_1 - i_2)\varepsilon_M M_2 / i_2 \quad (12)$$

Finally, the government replaces some of its debt with the extra cash it has printed. This reduces the cost of servicing government debt by the real after-tax rate of interest on government debt, r_{ng}, times the change in the money stock:

$$t_3 = r_{ng}(M_1 - M_2) \quad (13)$$

The total effect on welfare is:

$$G_2 = g_1 + \lambda(-t_1 - t_2 + t_3) \quad (14)$$

We consider, as the initial level of inflation, 11% in Poland (the average 1997-2000) and 12% in Ukraine (in 2001).[29] The estimated elasticity of demand for M0 in both countries is 0.3.[30] The

[29] Source: IMF. Note that the inflation rate in both countries has been falling rapidly and, at present, it is around zero in Poland and under 4% in Ukraine. Using these numbers would not change the qualitative results or their interpretation.

[30] Own estimates. For Ukraine, Banaian et al. (1997) provide a range of estimates between 0.3 and 0.4.

ratio of M_0 to GDP is, in Poland, 8.51% (average 1997-2000)[31] and, in Ukraine, 7.1% (in 2001).[32] The average nominal interest rate on government bonds in Poland in 1997-2000 was 17.2%; in Ukraine the nominal rate in 2001 was 16.7%. Using these numbers, the estimated effects on welfare, assuming as before that η_{S_r} =0.4 and λ =0.4, are presented in Table 2.

Table 2. Welfare effects from lower inflation in the money market (in % of GDP)

Welfare effect	Feldstein	Poland 1	Poland 2	Ukraine
Money market distortion	0.016	0.040	0.036	0.035
Replacing seigniorage loss	-0.046	-0.055	-0.057	-0.045
Replacing revenue loss from change in capital	-0.006	-0.002	-0.002	-0.004
Reduction in real cost of debt service	0.002	0.014	0.014	0.013
Total	-0.034	-0.001	-0.008	-0.001

Compared to the US, the gain from reducing the money market distortion in Poland and in Ukraine is much higher. This is due to the higher elasticity of money demand with respect to the interest rate and higher money balances. The latter is caused by a less developed payment system and greater role of cash. Seigniorage loss is similar in all countries and the remaining numbers are small. Overall, the money-market effect of a lower inflation rate is to reduce welfare, but the size of the change is small relative to the effect on intertemporal distortion.

3.3. Debt Servicing

Lower inflation increases the real cost of servicing government debt. The reason is that, with inflation, the nominal interest payments are taxed. If the real before-tax interest rate is invariant with respect to inflation, lower inflation reduces the nominal interest rate on government debt and reduces the real value of taxes on interest payments to individuals. Assuming that the debt-to-GDP ratio remains constant, the increase in the real value of interest payments is equal to the product of the change in inflation times the marginal tax rate on interest payments, θ_i, times the ratio of debt, *B*, to GDP. Hence the welfare effect of the change in taxes required to offset the change in real government revenue is:

$$G_3 = -\lambda * 0.02 * \theta_i * B / GDP \tag{15}$$

[31] Source: NBP and Ministry of Finance.
[32] Source: IMF.

For Poland the benefit in scenario 1 is –0.041, in scenario 2 it is –0.056. These are about half of the US value. As interest payments are not taxed in Ukraine, the effect there is zero.

3.4. Demand for Owner-Occupied Housing

In any tax system owner-occupied housing receives preferential treatment as there is no tax on its implicit rental value. This means that the amount of owner-occupied housing is suboptimal. In addition, many tax systems allow the deduction of mortgage interest from taxable income, further promoting owner-occupied housing. The scale of this distortion depends on the structure of the economy. For example, Dolado, Gonzales-Paramo and Vinals (1999) find that this effect to be very important in Spain, mainly due to the high level of house ownership.

Given widespread privatisation of apartments in some transition economies in recent years, these distortions are potentially important. However another factor affecting their role is the level of activity, and freedom of choice, in the housing market. There is very little of either in transition economies. Housing markets are thin, with very low volume of apartments traded, and virtually all privatised apartments ended up in the hands of their occupants. For both reasons, economic factors have little effect on the amount and the distribution of owner-occupied housing, so we decided not to take these effects into account.

One reason for the slow development of housing markets in transition economies is the historically high inflation rate and, consequently, high nominal interest rates. As a typical mortgage entails a constant nominal payment stream, higher inflation has two effects. First, mortgage repayments (interest plus principal) are, initially, high. A numerical example is useful to highlight this issue. In developed countries, the average value of the main residence is about three times annual before-tax income (in transition economies this value is likely to be higher, given the low level of income). Assume that a household borrows 100% of the value of the residence using a standard 25-year mortgage. Let the real interest rate on mortgage debt be 3%. If the inflation rate is 2%, the nominal interest rate on mortgage debt is 5% (as it is the case now in the US) and the value of mortgage payments in the first year is about 21% of pre-tax income. If the inflation rate is 7%, the nominal interest rate is 10% and the value of mortgage payments

in the first year is 33% of pre-tax income. Not surprisingly, reducing inflation greatly increases housing affordability.[33]

It is important to note that housing considerations imply the optimal inflation rate should be even lower (or, equivalently, deflation should be higher) than under the Friedman's rule. The reason is straightforward. Permanent income considerations imply that household welfare is maximized if their spending on housing services is a constant proportion of their income. This means that real payments on a mortgage should increase in line with real income. Given that nominal mortgage payments are constant, this means the inflation rate should be minus the real individual income growth over one's lifetime. Individual income grows faster than national income due to learning-by-doing and on-the-job and off-the-job training. It is likely to exceed the value of the steady-state real interest rate.

To see the significance of these considerations let the real interest rate be 3% per year. Assume, conservatively, that the rate of individual real income growth is also 3% per year. Consider the effect of reducing inflation from 4% to 2%. First-year payments are 25.4% and 21% of pre-tax income in that year, respectively. By the end of the mortgage term, in year 25, payments will have declined to 13% and 9.5% of first-year pre-tax income, respectively, or 4.8% and 3.6% of year 25 income. In other words, while the reduction in inflation increases housing availability, even at the low inflation rate the last year's payment constitutes a six time smaller portion of household income than the first year's payment. On the other hand, with inflation equal to minus the rate of increase in household income spending on housing is a constant 12% portion of household income. This means that, if kick-starting the housing market is important in a transition country, it should target a lower inflation rate than developed market economies do.

3.5. Summary of the Results.

The results are summarized in Table 3.

Table 3. Summary of the Results, (in % of GDP)

[33] With inflation rate of 4%, first-year payments are 25.4% of income. A 2% reduction of inflation reduces the value of first-year payments by 18%.

Welfare effect	Feldstein	Poland 1	Poland 2	Ukraine
Intertemporal distortion	0.926	0.123	0.189	0.317
Money-market distortion	-0.034	-0.001	-0.008	-0.001
Debt service effect	-0.100	-0.041	-0.056	0.000
Total	0.792	0.080	0.125	0.316

Note: Feldstein's calculation also includes a benefit from reducing housing market distortions, equal to 0.22% of GDP

It is clear from Table 3 that the effects of reducing inflation in Poland and Ukraine are much smaller than in the US.[34] The basic thrust of Feldstein argument is that future benefits of reducing inflation (which are permanent and equal to about 1% of GDP) vastly exceed the current costs of disinflation. This argument clearly does not apply in the cases of Poland and Ukraine. While estimates of the costs of disinflation for these countries are not available, the benefits of disinflation for the US can be substituted with values computed for Poland or for Ukraine. Under this assumption, for Poland the present value of the benefits is smaller than the present value of disinflation costs; for Ukraine the relationship between these two values is ambiguous.[35]

It is clear, however, that at present the Feldstein channel is not very important in Poland and Ukraine. Thus, central bank considerations about inflation should concentrate on other issues. On the other hand, if the fiscal authorities follow the "Sutton" approach to taxation and introduce taxes on investment income, these considerations will become important. We now turn to this and other issues.

4. Alternative Scenarios

As discussed above, there are two basic reasons why the benefits of reducing inflation are low in Poland and in Ukraine. The first is the low rate of return on savings, the second is the superior tax structure. We discuss them in reverse order.

[34] It is important to note that, as all results are positive, the deadweight loss from taxing investment income exceeds the deadweight loss from other taxes.

[35] For the US, the stream of benefits grows at a rate 2.5% (average rate of growth of GDP) and is discounted at the rate of 5.1% (average after-tax S&P return, see Feldstein, 1997). Thus, the present value of the benefit is almost 40 times higher than the value in the last row of Table 3. The cost of reducing inflation by 2% is generally perceived to be between 4% and 10% of GDP.

To determine the importance of the tax structure, we replace the tax rates in Poland and Ukraine with US values. For Poland, this involves a significant increase in all tax rates, with the exception of the marginal corporate tax rate. For Ukraine, it means a significant increase in investment taxes.

Table 4. Tax Rates

	Feldstein	Poland 1	Poland 2	Ukraine
Avg. corporate tax rate	41.0	25.5	25.5	43.8
Marginal corporate tax rate	35.0	36.6	36.6	30.0
Dividend tax rate	25.0	15.0	15.0	0.0
Interest income tax rate	25.0	20.0	20.0	0.0
Capital gains tax rate	10.0	0.0	20.0	0.0

When the tax rates in Poland and Ukraine are replaced with US values, the resulting benefits from reducing inflation are, disregarding housing market effects, as shown in Table 5.

Table 5. Summary of results (% of GDP), US tax rates

Welfare effects	Feldstein	Poland	Ukraine
Intertemporal distortion	0.926	0.643	0.750
Money market distortion	-0.034	-0.008	-0.018
Debt service effect	-0.100	-0.094	-0.030
Total	0.792	0.540	0.702

As the results in Table 5 show, if tax rates in Poland and in Ukraine were the same as in the US, the welfare effects would be similar. The differences in the corporate tax rates and personal tax rates are about equally important. With corporate tax rates equal to US values and personal tax rates at present values, the total effect in Poland under scenario 1 would be 0.286, while in Ukraine it would be 0.324. With personal tax rates equal to those in the US and corporate tax rates equal to current values, the total result would be 0.252 in Poland and 0.350 in Ukraine.

Table 5 underlies the main point of the paper. Under current tax code, the detrimental effects of inflation are significantly smaller than in developed market economies (estimates for other countries - see the papers listed in the introduction – find effects similar to those in the US). As we argue below, in the long run transition countries are not likely to be able to choose their

inflation rate and so, to avoid distortions created by inflation, they should maintain the current tax code.

Finally, we turn to an alternative assumption about the rates at which individuals save for retirement. For developed countries, Feldstein and other authors assume that the rate is the average rate of return on equity. In fact, households typically hold a combination of equity and bonds in their portfolios. The underlying assumption for the use of the equity return, rather than a weighted average, is that the portfolio composition is on the internal point of the "savings-possibilities" curve. The holding of bonds, which have historically had a lower return than equity, is due to their superior risk characteristics. In the optimum portfolio, these risk characteristics compensate for the lower rate of return. Therefore, bonds and equity are assumed to be equivalent and no distinction is made between either type of asset.

For transition economies this assumption is, at present, not justified. Equity markets are thin, which makes it impossible for households to hold all their assets in the form of equity. In other words, the current portfolio composition is a corner solution to the household optimisation problem. From the standpoint of household savings decisions, the two assets are not equivalent.

We therefore take a different approach and assume, more realistically, that all savings are in the form of interest-earning assets. This change in saving assumptions has two effects. First, the rate of return on savings is affected. Second, and more important, it makes the return on all savings taxable in both countries. Hence this experiment is, in a sense, similar to the preceding one in that it removes the benefits of the tax code in Poland and Ukraine from the picture.

For Poland, we use the interest rates on both government bonds (1-year, average 1997-2001) and bank deposits (3-year deposits, average 1997-2001). For Ukraine, we only use interest rates on government bonds (average 1995-2000, excluding 1998).[36]

[36] We exclude 1998 to avoid the effects of the Russian crisis, which drove up real interest rates in Ukraine. The effect of this exclusion is small.

The results are presented in Table 6. They are dramatic. Under the alternative savings assumptions, the welfare effects are two to three times higher than before and between a half and three-quarters of the US numbers. Clearly, savings assumptions matter.

Table 6. Alternative Savings Assumptions.

Country	USA	**Poland**		**Ukraine**
Saving assumption	Stocks in S&P	**Government bonds**	**Bank deposits**	**Government bonds**
Interest rates				
r0 in %	9.2	**6.6**	**5.5**	**13.6**
r1 in %	4.6	**3.9**	**3.0**	**7.0**
r2 in %	4.1	**3.5**	**2.6**	**6.6**
Welfare effects of:				
Intertemporal distortion	0.926	**0.616**	**0.689**	**0.504**
Money market distortion	-0.034	**-0.007**	**-0.005**	**-0.014**
Debt service effect	-0.100	**-0.056**	**-0.056**	**-0.071**
Total	0.792	**0.553**	**0.628**	**0.419**

5. Conclusions.

The results presented here should be considered illustrative, for several reasons. The calculations apply to a long time horizon and so should be based on parameters obtained from economies in stationary equilibrium. Neither condition applies in the cases of Poland and Ukraine. Thus, if we based our calculations on parameters obtained for another time period, the results would be different. For example, the inflation rates at present in both countries are much lower than the values we used. The alternative scenarios show that the results crucially depend on the assumptions used. As the time frame for the calculations is a generation, it is clear that both the parameter values, as well as savings assumptions, are different from what can be expected to prevail in the future.

For these reasons, it seems inappropriate to take the present calculations at face value. Rather, they should be understood as an exercise that helps to understand several important features of transition economies.

The most important policy conclusion here is a warning pertaining to the welfare consequences of taxing investment income. This discussion has so far been avoided in most transition countries, but the recent introduction of interest taxation in Poland suggests that, as has happened elsewhere, the "Sutton" approach to taxation may, eventually, prevail. It is clear that transition countries have high revenue needs, which induces the fiscal authority to search for a new source of revenue. What the current paper points out, however, is that they have the benefit of designing institutions without the burden of the past. This often leads to superior institutions. For example, Cukierman, Miller and Neyapti (2002) find a high degree of central bank independence in transition economies.

The distortionary effects of inflation discussed here can, in principle, be eliminated (or, in the case of the housing market, reduced) by eliminating inflation. This is the basic argument of Feldstein (1997, 1999): given the fiscal structure, design the monetary policy so as to maximize consumer welfare. For transition economies the choice, however, is the reverse: given the monetary policy, design optimally the fiscal code. The reason for this situation is straightforward. For accession countries, like Poland, the next goal is to adopt the Euro. This goal will be realized within the time framework discussed here (a generation). Therefore, the European Central Bank will set the rate of inflation in Poland. While the professed goal of the ECB is price stability, in practice it means inflation around 2%. Recent concerns about the possibility of deflation in the US and in Germany are likely to ensure that actual price stability will not be targeted in the foreseeable future. Moreover, given the large productivity gap between accession countries, their rate of inflation will be higher than in the rest of the European Union due to the Olivera-Tanzi effect. Combined with the segmentation of credit markets (Feldstein and Horioka, 1980) the interest rates in accession countries will be higher than in the rest of the Euro area. Other countries, for example Ukraine, will be able, in principle, to choose the long-run inflation rate independently. In practice, it is not likely they will target a rate of inflation lower than in the European Union, in particular because, as evidence in Filer and Hanousek (2000, 2002, 2003a,b) suggests, the bias in inflation measurement is large in transition countries.

On the other hand, the choice of fiscal policy is up to the fiscal authorities in these countries. The European Union leaves member countries, at present, wide latitude to set their own tax rules. Thus the optimal policy is to avoid the temptation and not tax investment income.

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