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Theory of Economic Reform
and the Case of Poland

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Abstract

This article examines the theory of economic reform in light of the actual experience Poland. Its main themes are liberalisation and stabilisation. Liberalisation in the case of transition economies implies decontrol of domestic prices and foreign trade. Liberalization may be gradual (gradualism), or immediate (shock therapy). Here, we compare the effects of these strategies using Swedar van Wijnbergen's intertemporal speculation model, taking into account the question of currency convertibility.

According to monetarist theory, budget deficits are the main cause of inflation in closed economies. Thus, stabilisation programs usually start with budget balancing. Implementation of nominal anchors for economic reform is also an important issue, because nominal anchors can help eliminate demand pressure and build credibility. Three nominal anchors, i.e. wage tax, fixed exchange rate and high interest rate are closely examined. In addition, the non-trivial task of sequencing the phases of reform is discussed. Obviously, an unsuccessful stabilisation has a strong influence on, e.g. real exchange rates and export opportunities, so how does one time the phases of reform for successful results?

Poland's "Big Bang" reform is an example of a monetarist economic reform. This analysis covers the main features of the reform, applying the credit market model of Guillermo Calvo and Fabrizio Coricelli. Calvo and Coricelli have studied the influence of tight credit on output from their empirical results, which is of particular interest in discussion of the Polish case. The paper ends with a summary of the reform outcomes to date.

Keywords: Poland, liberalisation, stabilisation, credit market

1   Introduction

With the rise of the "Chicago School" in Latin American economic policies in the 1980s, the world witnessed widespread implementation of reforms based on monetarist theory throughout the continent. Monetarist theory holds special appeal to reformers because it focuses on stability of the money supply and checking the power of the state. More recently, this theory has been applied in the transition economies of Eastern Europe to stabilise and liberalise national economies. Its attractiveness is that it offers the possibility of avoiding heavy adaptation costs. The proponents of monetarist approaches argue that, done right, stabilisation and liberalisation can be achieved without inducing either output contraction or higher unemployment. This achievement is referred to as "establishing an orthodox base for economic reform". In practice, orthodox economic reforms have generally failed to reach their set targets fast enough to prevent unwanted side-effects. When this happens, heterodox elements known as "nominal anchors" are incorporated into the reform packages. Heterodox elements usually involve temporal economic controls such as price or wage freezes (Kiguel et al. 1992, 35). They are aimed at building government credibility and lowering inflation expectations. Even so, it seems that how orthodox elements are implemented ultimately determines whether the economic reform

succeeds.

In Eastern European economic reforms, ortho-dox and heterodox elements have been combined. They build, to a large extent, on the Latin American experience. Most reform packages push for complete transition from the start, and are usually built around the following pillars:

i.   Stabilisation
ii.   Liberalisation
iii. Privatisation and restructuring.

The most urgent tasks in a reform are stabilisation and liberalisation. Stabilisation here means macroeconomic stabilisation. Targets are set to decrease inflation and control deficits in significant balances such as budget and current account (World Development Report 1996, viii). The reasons for such measures are that high inflation prevents an - economy from operating efficiently and does not support long-term economic growth. Thus, orthodox stabilisation programs consist of tight monetary and fiscal policies aimed at curbing high inflation (Kiguel et al. 1992, 36). In Eastern Europe's transition economies, this was in many cases the first time monetary policy had a significant role. Heterodox elements have generally been incorporated to achieve temporal economic control, e.g. fixed exchange rates or wage freezes. Such nominal anchors are designed to regulate aggregate demand.

Economic liberalisation refers to the loosening or elimination of government restrictions on domestic transactions, prices and markets; on external transactions and the free exchange of domestic currency (World Development Report 1996, viii). Price decontrol may be the single most important aspect of an economic reform; it influences monetary overhang and the operation of markets. Moreover, the opening up of the external sector is essential to achieving international competitiveness and economic growth. Privatisation and restructuring of the economy are also important, of course, but their impacts are generally more long range. This paper focuses on stabilisation and liberalisation and omits the third pillar of economic reform.

Both the pacing and sequencing of economic reform are tricky. Far-reaching economic reform applied simultaneously to all sectors of the - economy is called shock therapy. A gradualist approach, by contrast, may prioritise certain sectors first, implementing overall restructuring of the -

economy at a slower pace. Public officials must also consider the potential political backlash and overall adaptation costs before committing to a strategy. Sequencing of reform phases refers to combining stabilisation and liberalisation policies (Edwards 1994a, 3). For example, officials choosing a gradualist strategy may consider it less risky to decontrol foreign trade before attempting to stabilise prices. Simultaneous reforms, even those that might create synergy, may appear politically too risky. Failure in one part of the reform program could hinder progress towards other intermediate targets. In light of our current understanding of the transition process, we should therefore ask if there are tools to assist them in such decisions.

2   The theory of economic reform

Liberalisation refers to the decontrol of prices and foreign trade as well as the free exchange of domestic currency. In Eastern Europe, liberalisation had a more significant role than in Latin America, because state control was so rigid and private economic activities were often forbidden.

2 .1   Liberalisation

Thus, reformers of centrally planned economies of Eastern Europe had to start by dealing with chronic excess demand for goods and services. This was due to imperfect economic plans, bottlenecks in production, administratively set prices, and, above all, the priority given to investment goods. Reformers hoped that liberalisation of prices would quickly lead to market equilibrium determined by supply and demand, because consumers would be able to affect the supply and quality of goods. Less emphasised was the fact that liberalisation programs usually increase prices in the short run. This decreases purchasing power and may create inflationary pressures.

Stock disequilibrium was a typical phenomenon in Eastern Europe's centrally planned - economies. Stock disequilibrium, sometimes referred to as monetary overhang or repressed inflation, manifests itself as long queues and rationing of goods. It is usually the result of continued monetary

financing, price controls and decreasing factor productivity (Edwards 1991, 7–8). Eventually, socialist economies that allowed stock disequilibrium to persist found themselves in a vicious circle. The money supply continued to increase, administrative prices no longer curbed excess demand, and inputs resulted in ever lower levels of output.

Monetary overhang can be described by the following equation:

$$(2.1) \qquad (M/Py) > (M/Py)^*,$$

in which actual real money stock exceeds the desired money stock. M is nominal money balance, P is the domestic price level and y the domestic real output (Edwards 1991, 8). The demand for real money is smaller than the real stock of money possessed by economic agents. In other words, the excess demand in the commodity market is reflected in excess supply in the money market.

This state of the economy can also be described with the help of quantity theory

$$(2.2) \qquad V = PY/M.$$

where V is the velocity of money and Y is real production. As monetary overhang gets worse, the velocity of money falls with the increase in money supply, while production remains stable and prices administratively set.

In practice, the most efficient and fastest way to eliminate the repressed inflation is monetary reform (M) or price adaptation (P). Implementation of monetary reform is generally more difficult than price adaptation, but there are also problems with the price adaptation. For one, it may be unlikely that the price level increases only once and without further inflationary pressures. Multiperiod contracts and indices set in motion inflationary pressures in following periods. Dornbusch and Wolf (1990) have argued that attempts to eliminate monetary overhang by price adaptation only lead to unstable states, and even hyperinflation (Edwards 1991, 10–12).

The second phase of liberalisation involves opening up foreign trade. Liberalisation of the trade sector involves abolishing import and export controls as well as promoting international competitiveness. A related matter is the convertibility of domestic currency, i.e. the end of exchange rate

controls and unification of exchange rates.

The decontrol of the foreign trade is also important in the elimination of repressed inflation and inflationary pressures. For instance, Chile's - economic reform in the 1970s left foreign trade untouched, which contributed to the overpricing of goods and led to increased inflation. The opening up of foreign trade aims at preventing state firms from exploiting their monopoly power in the market. In addition, it abolishes the former state's monopoly in foreign trade.

In theory, the opening up of foreign trade increases efficiency and allocates resources to sectors with comparative advantage. Open economies also tend to grow faster than closed economies. In practice, the primary step in opening up trade is abolishing quotas and tariffs. In Eastern Europe's case, Western countries were also able to strengthen their position as trading partners because of their improved accessibility (Edwards 1994b, 11–23).

A third aspect in liberalisation of an economy is exchange rate decontrol, after which there is only one market-determined exchange rate. When currency was not convertible, exporters and importers faced different prices due to restrictions in the exchange rate market. Currency convertibility spurs exports, e.g. by eliminating the requirement to sell export revenues at an undervalued official rate to the central bank. In addition, every importer is in the same position in terms of access to foreign currency (Sachs 1993, 50–52).

2.1.1 Comparison of gradualism and shock therapy

Whether reformers choose a gradualist approach or shock therapy, they must decide which approach will incur lower adaptation costs in terms of output contraction and unemployment. In weighing their decision they must remember to take into account intertemporal speculation and the possible consequences for their political career.

2.1.1.1 Price decontrol

Swedar van Wijnbergen has developed a model of intertemporal speculation (1991 and 1992) with the goal of demonstrating that the costs of intertemporal speculation, hoarding and disruption of the poli-

tical economy generally argue against gradualist decontrol of prices. Wijnbergen deals specifically with the mechanisms of intertemporal speculation that can destroy economic reforms. For example, price controls are often imposed on goods such as grain[1] that are easy to store and therefore readily subject to intertemporal speculation.

On the other hand, he notes, the low supply response of some markets means that supply does not react to the higher liberalised prices. The - amount of goods supplied in the market does not necessarily increase. This feature is particularly relevant in Eastern Europe, where experience with price-responsive markets was limited. Moreover, shortages create rents and so the political pressures to continue price control can be quite high.

Wijnbergen presents a two-period model of a small country that is decontrolling domestic prices. The country is assumed to be a price taker in international markets and only produces two goods: tradables and nontradables. Output produced today can be sold today or stored for tomorrow. Tomorrow's output cannot be stored, however, because the model consists of two periods. Shock therapy or a "cold turkey" approach to price liberalisation implies that transition to market prices is immediate. Gradualist decontrol refers to transition to market prices in the second period with a small increase in controlled prices today. If the gradualist reform program is abandoned tomorrow, prices will be maintained at today's level. In the case of shock therapy, prices will revert to pre-decontrol levels.

Under both types of reforms, producers of non-traded goods seek to maximise their income given the real interest rate and their expectations of the second-period prices in the first period. Producers are conscious that the aggregate quantities of goods produced and sold will affect the collapse probability of the reform. On the other hand, they are too many for any individual agent to believe that he could affect this probability. Therefore this factor is kept exogenous in the model.

In general, higher prices increase production in Wijnbergen's model. This, he argues, is why gradualist approaches fail. The optimal inventory level will be decreased when the probability of collapse

is high and speculation does not create rents. The high probability of collapse implies that the government lacks credibility and is therefore likely to abandon price decontrol. Speculation then becomes unprofitable because prices will not increase in the second period. In short, economic agents do not expect price decontrol to succeed or prices to rise. Consequently, supply increases in the market already in the first period. If the government starts price decontrol with a gradual program, it will not succeed because of high probability of collapse.

He concludes that the more radical the program, the lower its probability of collapse and the fewer problems with shortages. Higher prices increase the supply in the market beyond the production response because the amount of stored goods also falls. In other words, a higher initial price decreases the number of stored goods and incentives for speculation. With a lower probability of collapse, more radical economic reforms decrease excessive inventories, support stronger production growth and cause smaller problems with shortages. Price liberalisation also helps eliminate monetary overhang.

2.1.1.2 Liberalisation of foreign trade

Earlier, economists argued for gradual decontrol of foreign trade based on the need of firms to restructure their production to meet the new international challenges. This line of argument was criticised after gradualist trade liberalisation policies failed to achieve credibility. Firms, however, do not change their production structures as long as they have the possibility to thwart reform through lobbying. Fast reforms, which deny firms this option, are thus more credible and easier to maintain (Edwards 1994b, 13–14).

Michaely et al. made empirical studies of trade reforms in 19 developing countries. They analysed experiences with both shock therapy and gradualist reforms, and the influence of reform on employment. They found that radical reforms were more credible and caused greater adjustment in the private sector. Moreover, wide and rapid reforms were easier to maintain (Michaely et al. 1991, 2 & 32–41).

Unemployment may be a political constraint to trade liberalisation. The opening up of trade generally forces restructuring of the economy, with so-

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[1] In a centrally planned system all prices where controlled not only agricultural prices.

me sectors growing and others declining. Growth sectors, hopefully, generate so many new jobs that they offset increased unemployment in other sectors (Michaely 1991, 71–84). The evidence suggests that shock therapy, as in the case with price decontrol, is also the optimal way to open up foreign trade.

2.1.2   Sequencing

Sequencing refers to the order in which different phases of the reform are implemented. Since the end of the 1980s, the emphasis has been on quick macroeconomic stabilisation. High inflation results in the fluctuation of relative prices and the real exchange rate appreciation. One important issue is the degree of economic instability caused by reform measures (Edwards 1994a, 3–6).

Sequencing demands careful combination of stabilisation and liberalisation elements to prevent the real exchange rate from appreciating excessively. The opening up of foreign trade and the elimination of trade regulations calls for a depreciated real exchange rate. If the stabilisation policy is too slow and domestic inflation exceeds international levels, the real exchange rate may appreciate (Edwards 1994a, 5). Real exchange rate appreciation, in turn, may cause difficulties in export and drive the current account into the red, thereby jeopardising the entire economic reform.

In any case, the unification of price and trade liberalisation is a necessary part of reforming a centrally planned economy where large state firms have traditionally enjoyed monopoly and oligopoly power. Without restructuring of enterprises, decontrolling prices only reinforces monopoly pricing, while restructuring of enterprises alone is impossible without market pricing and competition. Thus, simultaneous trade opening and price decontrol are needed to create competition in the domestic market (Sachs 1993, 50–51).

2.2   Stabilisation

High inflation is generally symptomatic of economic instability. In a closed economy, the main cause of high inflation is usually a monetarily financed budget deficit (Edwards 1991, 29–30). Mo-

netary financing, in turn, creates demand pressures. Together with inflationary inertia, continuous high inflation is assured. Thus, stabilisation programs usually include both heterodox and orthodox elements to curb inflation. The orthodox aspect consists of tight monetary and fiscal policies aimed at regulating aggregate demand. Heterodox elements are added to the program to bring inflation faster down than would be possible using orthodox elements alone. Heterodox elements are usually temporal economic controls such as price freezes or fixed exchange rates. These controls are invoked to regulate aggregate demand, eliminate inflationary inertia and add credibility to the program (Blejer et al. 1988, 867–868).

2.2.1   Budget

The only way to balance the budget in transition countries was to cut subsidies and expenditures because there were no monetary instruments to finance budget deficits. The elimination of this cashflow problem has been the crucial factor in successful economic reforms. According to empirical research, budget balancing is a necessary (but not the only) condition for slower inflation in the short or medium run (Kiguel et al. 1992, 45). The budget deficit is the main factor in money supply growth when the budget deficit is financed by issuing money (Blejer et al. 1988, 869).

Monetary financing of the budget deficit affects economy in many ways. First, it creates inflationary pressures that depend on the size of the deficit, the economic growth and elasticities in money demand. Second, in a situation where the exchange rate is fixed and money supply growth exceeds money demand growth, there is danger of a balance of payment crisis. In other words, money supply growth increases domestic demand for goods, import, cash and deposits. Increases in imports turn the current account into a deficit, credits increase and international reserves decrease. Higher demand for domestic goods also leads to increases in prices and sets the real exchange rate appreciation in motion (Edwards 1994a, 10).

High foreign indebtedness can, of course, destroy planned economic reforms. If the state tries to pay back its loans or interests, its expenditures can easily exceed budget revenue performance (Edwards 1994a, 15). Debt restructuring, thus, affects

the credibility of the economic reform. If the restructuring is only timetable for paying back debts, there is a danger that the state will use monetary financing simply to take care of liabilities without concentrating on the long term. This is why credit forgiveness needs to be included in debt restructuring negotiations (Crombrugghe et al. 1993, 9). An economic reform must also take into account the impact of a major devaluation. It may very well increase the absolute amount of foreign debt and impose additional inflationary pressures on consumer and producer prices when import prices increase.

2.2.2   Wage tax

The nominal anchors of an economic reform refer to intermediate targets which aim at stabilising price levels (Rautava 1992, 78). A wage tax as a nominal anchor aims at reducing the adaptation costs of stabilisation and cost inflation. The objective of the wage tax is to influence inflationary inertia that might prevent a decrease in inflation or undermine credibility of the government. Inflation inertia is formed by informal and institutionalised or indexed inflationary expectations (Blejer et al. 1988, 868).

Thus, a wage tax seeks to dampen informal inflationary expectations and halt further increases in cost inflation. Fast increases in prices and the cuts of subsidies lead to requests for wage compensations. When workers are insecure about the future privatisation of the state enterprises, they have an incentive to ask for further wage increases and thus transfer money from investments to wages. The wage tax was intended to control this development until at least 50 % of the economy was in private hands. Moreover, is was intended to give credibility to the government and its exchange rate and monetary targets. Naturally, a wage tax distorts the wage structure and decreases productivity and incentives (Ahmad et al. 1992, 7–8). This is particularly relevant to out discussion here as the Workers' Council gained considerable influence in Poland during reforms in the 1980s.

Inflationary expectations and credibility are closely related. To maintain credibility, economic agents should be convinced that tight monetary and fiscal policies will continue. High unemployment or other intractable problems can reduce the govern-

ment's credibility to carry out economic reforms. This makes it harder to lower inflationary expectations. Long inflationary history and earlier unsuccessful reforms can also ruin credibility. Due to prevailing pessimism inflationary expectations reduce slowly, which decreases the flexibility of the economic policy and lengthens the reaction time to policy changes. Adaptation costs rise due to output contraction and higher unemployment. At this point, implementation of traditional monetary and exchange rate policies starts to get expensive. A heterodox stabilisation program, therefore, seeks to eliminate the rigidness of multiperiod indices and inflationary expectations (Blejer et al. 1988, 868).

2.2.3   The exchange rate anchor

The government can add credibility to the economic reform by using a fixed exchange rate. If the government wants to maintain a fixed exchange rate, however, it forfeits other options, such as devaluation, as means to decrease the unemployment rate. Nominal anchors make the targets of the fiscal policy more credible and create no additional inflationary pressure in the private sector. If the government is capable of maintaining a fixed exchange rate, its economic reform will be seen as credible (Edwards 1994a, 29).

A fixed exchange rate aims at disciplining authorities in charge of monetary and fiscal policies as well as producers. It sets ceilings for credit and budget deficits (Edwards 1991, 20). If the money supply increases in the economy, devaluation pressure on the fixed exchange rate emerges, generating losses in international reserves (Edwards 1994a, 45).

An undervalued exchange rate can be an efficient nominal anchor (Edwards 1994a, 32). Yet, there is the very real risk that inflation might not decrease quickly enough. This, in turn, could lead through the real exchange rate appreciation to decreases in international competitiveness. The loss of international competitiveness is then detrimental to export sector whose lowered output creates additional adaptation costs (Berg et al. 1992, 135). Conversely, excessive devaluation creates added inflationary pressures because import prices increase in terms of domestic currency.

The problems with a fixed exchange rate anchor do not stop here. In most economic models

where the fixed exchange rate has been used as an anchor, the aim has been to stabilise domestic prices and real wages. In circumstances where high fluctuations in export and import prices can cause the real exchange rate to appreciate, a floating exchange rate may be preferred because it absorbs shocks better. On the other hand, a fixed exchange rate is more suitable when inflationary inertia keeps the unemployment rate high or wages are sticky, so that the temptation to devalue is large (Edwards 1994a, 29–33).

It is also possible that even the heterodox elements fail to dampen inflation expectations. In any case, there are two aspects that support the heterodox program. First, let us assume that internal and external balances have been achieved. Then the government can prove with the nominal anchor that the economy can operate efficiently without inflation. Consequently, economic agents accept low inflation as a realistic alternative. Second, as long as the government can maintain the combined target of the exchange rate and wage policies, there is no need to devalue the domestic currency to achieve goals such as improved competitiveness (Blejer et al. 1988, 869).

3 Economic reform: the case of Poland

Before economic reform in January 1990, high inflation plagued the Polish economy. Monetary financing of the budget deficit, price controls and decreasing factor productivity all contributed to this situation. Indeed, output growth had already stagnated in Poland years ago. The large industrialised sector and high international indebtedness made it hard to implement economic reform.

Poland's reform drew from the experiences in Latin America. The backbone of Polish economic reform was stabilisation, i.e. the tight monetary and fiscal policies. These were implemented through credit rationing, raised interest rates and budget balancing. Heterodox elements, wage policy and an exchange rate anchor, were introduced to regulate aggregate demand and create credibility. Decontrolling of prices and opening up of the foreign trade were see the most important issues in liberalisation.

3.1   The Polish economy in 1989

Poland's macroeconomic indicators are shown in Table 1. Inflation reached the annual level of 640 % in 1989. Increases in the general price level were quite moderate during the first months, but accelerated significantly in the second half of the year. In October 1989, the monthly inflation rate was 54.8 %, which by most definitions is hyperinflation.[2] Partial liberalisation of agricultural prices, the widening of the budget deficit and a recently implemented wage indexation all had serious inflationary effects (Berg et al. 1992, 128–129). Wage indexation adjusted employee income by a coefficient of 0.8 % for every 1 % increase in consumer prices. This pushed wages up automatically (Sachs, 1993, 37).

The fiscal deficit was 7.2 % of GDP in 1989. The deficit was financed by issuing money. The amount of narrow money increased by 13.5 % in relation to GDP (Calvo et al. 1992, 180). Monetary financing of the budget deficit contributed to the acceleration of inflation at the end of 1989.

In addition to this flow problem, monetary overhang existed in the Polish economy. While there are no systematic measures of shortages and queues in the goods market, the widening of the gap between the black market exchange rate and the official exchange rate may indicate deteriorating monetary imbalances. The premium between the black and official exchange rates was 400 % on average in 1989. In other words, shortages and the problem of monetary overhang worsened in 1989 (Berg et al. 1992, 129). In December, the premium decreased to one tenth of the year's average. This was due to hyperinflation in October that eliminated most of the monetary overhang (Calvo et al. 1992, 180).

Still in 1989, unemployment was an unknown concept in Poland. At the same time, the productivity of labour was very low. Moreover, output did not grow at all in 1989 (Calvo et al. 1992, 180).

International reserves and the chronic current account deficit also limited the government and the central bank actions in the external sector. The level of international reserves accounted for only 2.5 billion dollars in Poland. The chronic current ac-

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[2] Clague, for example, defines hyperinflation as that exceeds 50 % a month (Berg et al. 1992, 143).

Table 1   **Macroeconomic Indicators in Poland in 1989**

Inflation 640 % (December–to–December)	
Output growth	0 % in 1989
Rate of unemployment	0 % in 1989
Current account	1.8 billion dollars in deficit
Gross external debt, gross	40.6 billion dollars
International reserves	2.5 billion dollars
Black market exchange rate premium	400 % on average in 1989, 40 % at the end of the year
Fiscal deficit	7.2 % of GDP
Seigniorage	13.5 % (change in M1/GDP)
Structure of foreign trade	64 % of export and import in convertible currencies 36 % of export and import inside Comecon

Source: Calvo & Coricelli 1992

count deficit and particularly earlier unsuccessful economic reforms resulted in a huge amount of foreign debt. In 1989 the foreign debt was 41 billion dollars, equivalent to 44 % of the Polish GDP (Balcerowicz 1994, 76). By 1989, foreign trade was directed mainly towards Western economies. Exchange of goods and services in convertible currencies accounted for 64 % of the total trade.

3.2   The economic reform

3.2.1   Stabilisation

The Polish economic reform contained orthodox and heterodox elements. It has been characterized as a shock therapy reform, and Poland is often credited with pioneering the role of monetary policy in stabilising a former socialist country.

The central bank increased its refinancing rate significantly and set credit ceilings. This was the first time prices and money supply were used as combined policy instruments in Poland. High interest rates and credit ceilings targeted to lower inflation through a decrease in money supply. The refinancing rate rose from 7 % to 36 % and the objec-

tive was to maintain positive real interest rates in 1990. Credit rationing was introduced to stabilise the exchange rate and domestic price level (Sachs 1993, 46 and 49). In other words, loose monetary policy increases the money supply which in turn speeds up domestic demand and inflation. In addition, an increase in the money supply gives rise to devaluation pressures that can generate losses in international reserves due to the fixed exchange rate. This is specifically the reason a nominal exchange rate was chosen to anchor the economic reform, because it requires tight monetary and fiscal policy.

These monetary policy instruments could also be considered heterodox because of their tightness. Thus, the Polish economic reform had a third nominal anchor in addition to the exchange rate and wage tax. High interest rates aimed at spurring economic agents to change dollar deposits into zloty deposits, while at the same time supporting the fixed exchange rate and creating the threat of a bankruptcy to firms (Calvo et al. 1992, 181 & 200).

During the first days of the reform, the government abolished or reduced most subsidies to firms and households (Sachs 1993, 49). Balancing of the budget targeted at eliminating the flow imba-

lance. Because the government had little chance to finance the budget deficit from capital or money markets, cutting budget expenditures became its single most important instrument.

A wage tax, *popiwek* in Polish, was introduced to prevent excessive increases in wages. Liberalisation of prices brings about wage compensation requirements that must be forced back by setting a tax on wage bill increases when they exceed a statistical norm. The permitted increase was set at 30 % of the rate of inflation in January, 20 % in February, March and April, and 60 % for the rest of the year, except in July when the permitted increase was 100 %. The wage tax was from 200 % to 500 % when wages exceeded the statistical norms (Calvo et al. 1992, 181). Popiwek may have been crude medicine, but was necessary to counteract the power of Workers' Councils in enterprises decision-making.

Directing the wage control towards the total labour costs gave some degree of freedom in wage determination. **Total labour costs in the first period could not exceed the labour costs modified according to both wage and retail price indices.** The wage tax was implemented both in the private and public sectors in Poland (Sachs 1993, 55–56). The above system may seem surprising. In section 2.2.2 the emphasis was on the wage policy as an instrument in eliminating inflationary expectations. According to that theory, the most important issue was abolishing indexation to prevent inflationary expectations from emerging in the coming periods. The Polish economic reform included the wage tax despite the danger of inflationary pressures because of the Workers' Council system and the huge - amount of state enterprises. In addition, the wage increases were set according to inflation expectations, not according to the previous inflation rate.

Poland did not pay back its foreign debt or pay interest on it in 1990. It tried to decrease the expenditure pressures on the state budget in 1990. The Polish authorities negotiated with Paris and London Clubs to restructure the foreign debt. Agreements that cut the net present value of loans by 50 % were concluded in 1991 and 1993 (Balcerowicz 1994, 94).

3.2.2   Liberalisation

Liberalisation aims at decreasing or abolishing state control in the economy. This is achieved by liberalising prices, opening up foreign trade and implementing partial currency convertibility.

In Poland, the price adaptation approach was chosen to eliminate repressed inflation or monetary overhang from the economy. The main arguments for this method were high implementation pace of price adaptation, estimation problems in scale of monetary overhang and synergy between credibility and high pace. Wijnbergen's models from 1991 and 1992 support this synergy because a more gradual price liberalisation leads to shortages in the goods market and to higher probability of collapse in the economic reform.

Simultaneous price liberalisation and opening of the foreign trade were targeted at creating international competition. Opening of trade meant abolishing quotas from Western imports and the implementation of a 4 % unified custom tariff (Calvo et al. 1992, 181). In addition, the zloty was devalued 31.6 % against the dollar. The devaluation unified the black market exchange rate and the official exchange rate (Calvo et al. 1992, 176). In any case, the devaluation was stronger than the premium between the two exchange rates. The excessive devaluation aimed at easier maintaining of the fixed exchange rate and international competitiveness.

In Poland the monetary policy had to be especially tight because international reserves were at a low level. If devaluation pressures emerged, the central bank would lose reserves while trying to maintain a fixed exchange rate. The central bank received assistance from abroad when leading Western countries established a stabilisation fund to help in the fight against devaluation of the zloty. The fund consisted of loans and allowances to support the zloty (Sachs 1993, 53–54).

4 The Polish economic reform and its success

4.1 The Polish economy 1990–1994

The 1990 economic reform curtailed inflation and eliminated monetary overhang. When the price controls were abandoned, inflationary pressures pushed consumer prices up 80 % in January. This increase exceeded 50 % a month, i.e. hyperinflation. In February, inflation decreased to 24 % a month and stayed at single digit level the rest of the year. Chart 1 depicts the monthly inflation in 1990.

At first, farmers attempted to hoard goods in the hope of higher prices. This speculation decreased supply in the market. After a couple of weeks, however, agricultural prices peaked and then started to fall. Speculation ended and agricultural products flew into the market (Sachs 1993, 57–61). Price liberalisation succeeded in eliminating the chronic excess demand.

However, the initial increase in consumer prices and inflation rate exceeded expectations in 1990. Consumer prices rose persistently by 586 % a year. Partially, this may be explained by the increase in service prices that rose faster than prices for other goods excluding agricultural and energy sectors (Berg et al. 1992, 133). Before reform, the service sector was underdeveloped. Now demand pressure increased prices significantly. At the end of the year, inflation sped up when monetary and fiscal policies were loosened.

The budget deficit turned into a 3 % surplus in 1990, which decreased the need to use the monetary financing. Subsidies to firms and households were cut by 7 % of GDP. With the help of foreign debt restructuring and partial forgiveness, further cuts in the state budget became possible (Crombrugghe et al. 1993,6–9). Budget revenues grew significantly because firms' profit taxes increased when the prices were decontrolled and wage control was implemented (Sachs 1993, 66).

The new private sector, particularly services, grew quickly. Initially, the size of the private sector was underestimated, as official statistics and the tax system did not include it. The number of registered small firms rose by 710,000 from the end of 1989 to July 1992 (Sachs 1993, 63). This increase did not compensate for the strong recession in other parts of the economy. GDP decreased approximately by 12 % (Table 2) in 1990 and output collapse was even greater, 23 % in the industrialised sector. Output fell significantly at the beginning of the year, but began then to grow slowly (Calvo et al. 1992, 184). The unemployment rate increased to 6 %; a lower rate than might have been expected given the output collapse. This can be explained in part by rigidness in the labour market (Calvo et al. 1992, 186). Rigidness was due to rewarding employees with other benefits in addition to wages in state owned enterprises. Moreover, enterprises that had manufactured goods many years under the soft budget constraint were unable to reduce inputs in production quickly when demand and supply for goods decreased suddenly[3]. Workers' Councils were also able to oppose layoffs in state enterprises. This delayed privatisation in Poland and added pressure to budget expenditures.

One of the most striking phenomena was that wage increases remained under the statistical norm during the first six months in 1990. In the second half of the year, wage increases exceeded the norm as a result of more relaxed monetary policy (Coricelli et al. 1992, 27). Thus, heterodox wage control was not binding and failed to anchor the economic reform. Actual wages and norms appear in Chart 2. The loosening of monetary and fiscal policies can be seen in the wage increases which exceed the norm. This in turn had an effect on the monthly inflation rate (Chart 1).

Export and import with Western countries grew notably in 1990. The real amount of exports increased by 29.4 % and import by 3.3 %. The current account remained in surplus with both Western and Comecon countries in 1990 (Berg et al. 1992, 135–137). The excessive devaluation was the main force behind the strong export growth.

In spite of real exchange rate appreciation, partial convertibility was maintained in 1990. This convertibility was based on nominal, not real, devaluation. Nominal devaluation of the zloty changed the price level to reflect aggregate demand, especially the money supply. The premium between the black market and official exchange rate was more due to chronic excess demand than weak purcha-

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[3] See discussion about causes of supply decrease in section 3.2.

Chart 1   **Consumer Price Inflation a Month in Poland in 1990 (%)**
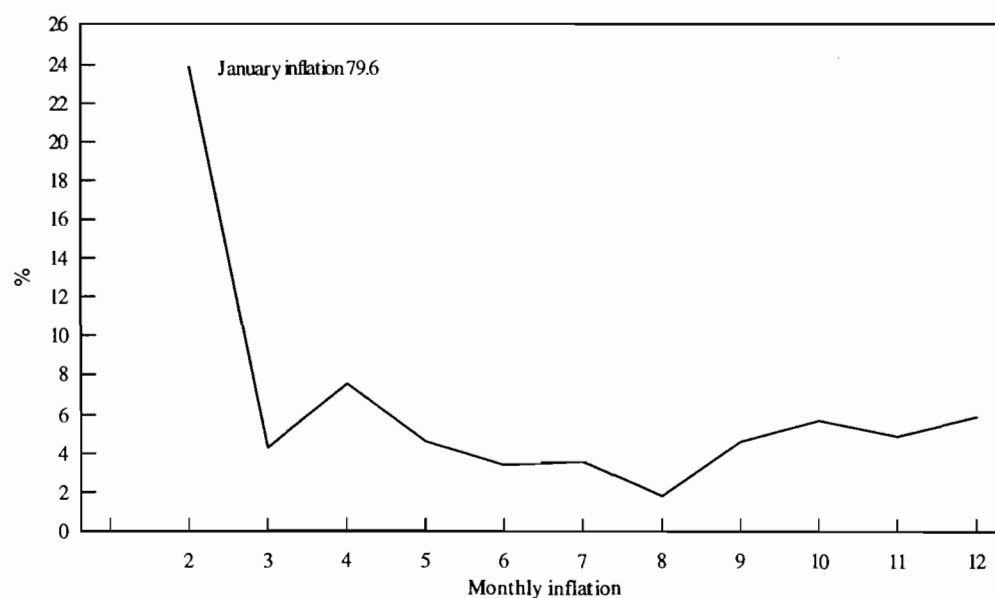
Source: Berg et al. 1992

Table 2   **Macroeconomic Indicators in Poland in 1990–1994 (%)[4]**

Poland	1990	1991	1992	1993	1994
Inflation[a]	585.8	70.3	43.0	35.3	32.2
GDP	−11.6	−7.0	2.6	3.8	6.0
Unemployment[b]	6.3	11.8	13.6	16.4[b]	16.0
Budget[c]	0.5	−5.9	−6.8	−4.1	−3.0
Current account[c]	5.7	−0.7	−3.0	−4.7	−4.3

a = Consumer Price Inflation
b = A new labour estimate was introduced in December 1993. When counted with the old estimate, unemployment was 15.7 % in 1993.
c = Budget and current account deficits or surpluses are given as percentages of GDP. Negative numbers refer to a deficit; positive numbers to a surplus in the budget or the current account.

Sources: IMF: World Economic Outlook, May 1992, 1993, 1994 and 1995. The Vienna Institute Monthly Report 1996/4. UN: Economic Survey of Europe from 1992–1993 and 1994–1995.

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[4] Data may not be completely reliable, but do give some idea of size.

Chart 2   **Wage Policy in Poland in 1990**
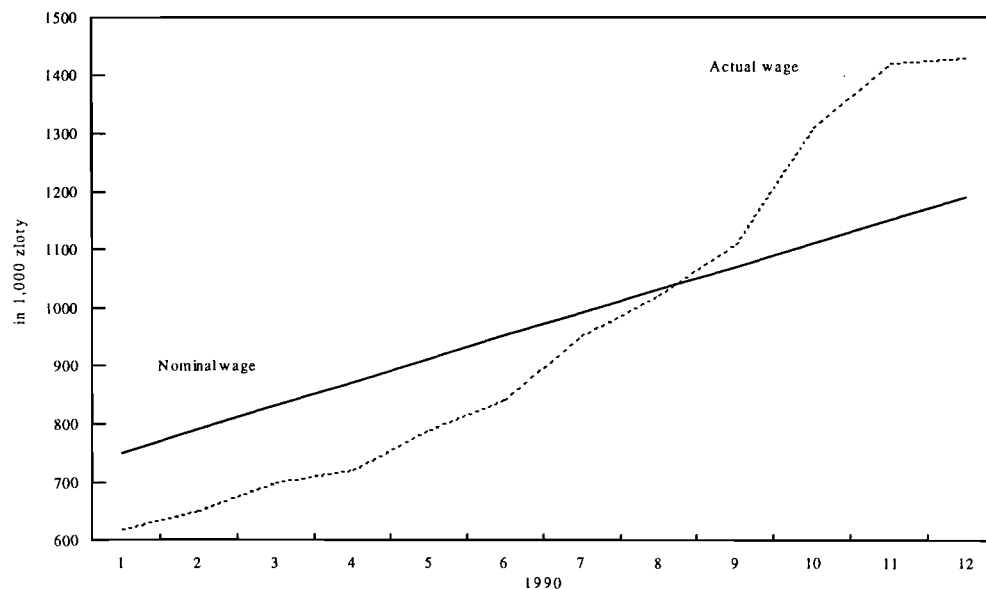
Source: Coricelli et al. 1992

sing power parity of the zloty (Berg et al. 1992, 133–134).

The real exchange appreciation did not create difficulties in the export sector and the current account was in a surplus. Therefore, international reserves at the central bank rose by US$ 2.2 billion in 1990. The stabilisation fund established by Western countries went untouched (Sachs 1993, 54).

In the money market, banks had apparently too high lending rates because the amount of bank credit did not reach the set credit ceiling. In other words, credit rationing was not binding in 1990 (Calvo et al. 1993, 38). The loosening of the monetary and fiscal policies resulted in negative interest rates in the second half of 1990 (Chart 3). However, interest rates remained at a positive level between February and June.

The later economic development after the Big Bang economic reform is the object of our analysis here. We focus on three macroeconomic variables: economic growth, the inflation rate and the external sector. The Polish economic growth did not reduce unemployment significantly until 1994 (Table 2). The continuous structural change in the economy that reallocates employees from the public to the private sector has kept the unemployment rate high (Coricelli et al. 1995, 82).

Second, inflation was relatively high during the period 1991–1994 (Table 2), although the long-term trend was decreasing. The end of Comecon in 1991 increased energy prices and caused a collapse in budget revenues from the enterprise sector. Consequently, budget deficits became significant. Large budget deficits increased the inflationary pressures in 1991–1992. Budget balancing policies succeeded better in 1993–1994, although inflationary pressures persisted (Sachs 1993, 65–66).

Third, the fixed exchange rate between the zloty and the dollar was maintained until May 1991 when the zloty was devalued by 14 %. The zloty was pegged to a currency basket after the devaluation. In October 1991, the exchange regime was changed to a crawling peg system that could be modified according to the inflation rate (Balcerowitz 1994, 80). The objective was to prevent excessive appreciation of the real exchange rate and possible current account problems. The current account has remained in deficit except in 1990. One way to prevent the current account deficit from deepening was an increase in tariffs. In July 1991, an average import tariff of 15 % was implemented (Crombrugghe et al. 1993,15).

Chart 3   **Real refinancing rate and real lending rate**
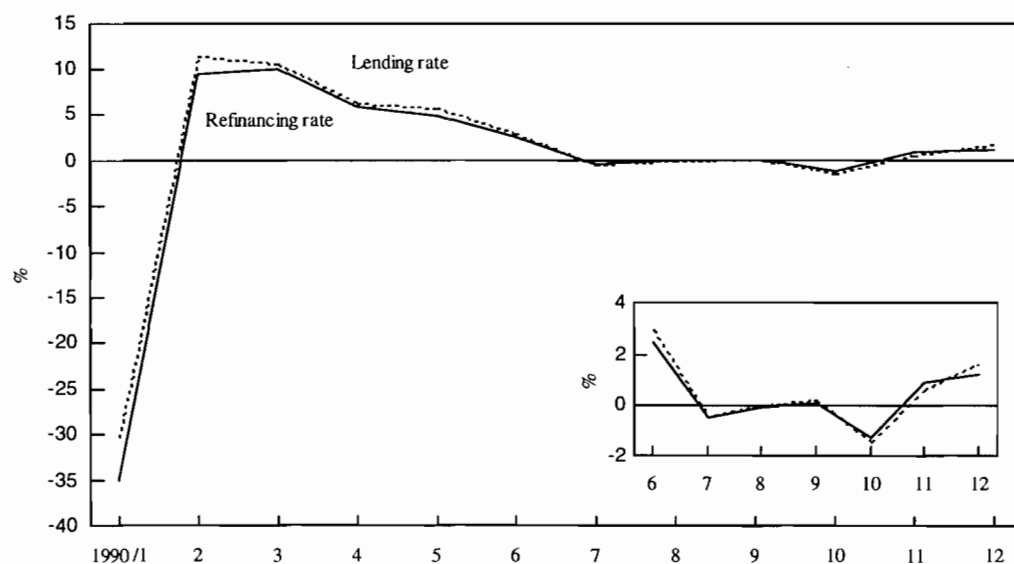
Source: Calvo and Coricelli 1992

4.2   Success and failure of the Polish economic reform

Polish economic reform held surprises. First, inflationary targets were not achieved and output collapse was rather small. Second, implemented nominal anchors failed to stay binding. Only the fixed exchange rate could be maintained in 1990. Wage increases held below the (CPI??) at the beginning of 1990 but exceeded it in the second half of the year. Real interest rates turned negative in the autumn.

4.2.1   Demand factors

The first model explaining the decrease in production focuses on household demand factors. Two main factors in declining demand are (i) a decrease in real wages and wealth of households and (ii) a sharp increase in interest rates. It was estimated that real wages decreased by 30 %. This was calculated by comparing real wage income in November

1989 and January 1990[5] (Sachs 1993, 60). In addition, the real amount of money at a household's disposal decreased, while the interest rate remained positive from February to June. However, the main emphasis of the stabilisation program was on price liberalisation. Thus, prices are flexible, and real wages and wealth are endogenously determined. These endogenous factors in the transformation process cannot be regarded as exogenous variables. The same is true with interest rates. Although the central bank controlled the refinancing rate to the commercial banks, the banks set the interest rate on lending and deposits themselves (Calvo et al. 1992, 196).

Moreover, price rigidity combined with the monopoly structure of Polish industry partly, at least, caused a decrease in aggregate demand. Such price rigidity typically causes traditional Keynesian recessions. Here nominal sticky prices provide a better explanation, assuming managers of firms follow a rigid cost-plus formula in a new demand

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[5] Before the economic reform prices were administrative and inflationary effects were negligible. Thus, real wages cannot be used as estimates of living standard in the transformation process.

situation (Calvo et al. 1992, 196).

According to Berg and Sachs, demand factors caused the recession that followed the economic reform. When they re-estimated the causes leading to the decrease in production, they found measurement difficulties in inventory investment and private consumption. The drop in real GDP was actually smaller than the announced 12 %. Berg and Sachs based their calculations on consumer surveys and employment as a measure of value added in the private sector. They argued that the weighed average decrease in real consumption was 4.8 % in 1990. These estimates do not include improvements in quality and variety of goods or time savings (Berg et al. 1992, 141–144).

Berg and Sachs continue to estimate the decrease in production by including also changes in real exports (29.4 %) and imports (3.3 %). In addition, real public consumption was estimated to have grown by 1 % from 1989 and real investment and inventory investment were assessed to have declined by 9 % and 6.2 %. As a result, Berg and Sachs conclude that the decrease in GDP was only 4.9 %, a much lower estimate than earlier results. However, these calculations are not completely correct due to shortcomings in consumer surveys and estimates of inventory investment (Berg et al. 1992, 144–149).

Berg and Sachs argue that the cause for the significant decrease in output was a simple macroeconomic reaction. The effects of stabilisation: cutting of subsidies and tight monetary and fiscal policies combined with the price liberalisation and devaluation to cause a steep decrease in output. All of the above mentioned factors led to a very tight liquidity situation and resulted in a drop in aggregate demand. They also see that monetary and fiscal policies had to be tight to eliminate hyperinflation. Berg and Sachs further argue that only 20 % of growth in the Polish export could have been obtained by simply decreasing the inventory level and with no demand contraction (Berg et al. 149–150).

Calvo and Coricelli claim that the fall in inventories after December 1989 diminishes the credibility of demand factors in explaining output contraction. When demand is falling, firms should adjust their production level or increase inventories. In 1990, the increase in output inventories and the decrease in input inventories has generally been interpreted as demand-led recession. However, in January, when the output contraction was strongest,

the output inventories decreased, too. According to Calvo and Coricelli, Berg and Sachs are mistaken in omitting the trade sector from finished goods inventory estimates. In the trade sector, inventories decreased more than in the industrialised sector in January 1990 and they dropped the whole year through. Calvo and Coricelli emphasise that an increase in output inventories can not be interpreted as a Keynesian recession when transition from shortage to market economy occurs (Calvo et al. 1992, 198).

Calvo and Coricelli agree with Berg and Sachs on the factors behind the 1991 recession. The output contraction was due to the collapse of Comecon (Berg et al. 1992, 152–153) (Calvo et al. 1992, 183). However, Calvo and Coricelli consider demand factors incomplete in explaining the Polish output contraction. The causes of the resulting persistent and steep fall in output and the high inflation rate shall now be discussed (Calvo et al. 1992, 198–199).

4.2.2   Supply and Credit Rationing

The effects of Polish economic reform have been compared to stagflation effects of the oil crises in the 1970s. In Poland, the increase in input prices was a domestic phenomenon and not imported. If enterprises were capable of adjusting and minimising expenditures quickly, a new equilibrium would be achieved by changing factor intensities without contraction in production or employment. When real wages decrease, cost minimisation implies the substitution of labour for other inputs and there is a fall in the unemployment rate. In this case, output collapse would be only a temporary phenomenon in the transformation process and thus would not explain the decrease in output and persistence of high inflation (Calvo et al. 1992, 193).

Negative interest rates were typical for Poland before the economic reform in 1990. In the centrally planned system, bank deposits and inventories for intermediate and final goods are the only form of storing wealth. Enterprises had an incentive to have large inventories because of the low interest rates. A decrease in inventory level could also partly explain permanent output contraction because of the new lower inventory equilibrium. According to Calvo and Coricelli, the fall in inventory level

would explain 5 % of the fall in output in 1990 (Calvo et al. 1992, 193 & 183).

Arguments based on above supply shocks cannot explain all of the features in the Polish - economy in 1990. Estimations did not show that inventories had been excessive in the end of 1989. Depending on how inventories are measured, turnover varied between 1.4 and 2 months in Poland, compared to 1.5 months in the USA and Canada. Moreover, supply shocks do not shed light on the persistence of high inflation. The used wage indexation system with supply shocks does not explain the constant increases in prices (Calvo et al. 1992, 194).

4.2.2.1 Credit market

The focus of this chapter is on credit in transmitting the effects of monetary policy. In a transition - economy, the credit market can be considered the only source of liquidity, and its importance is therefore stressed.

In Calvo and Coricelli's model, which emphasises the importance of working capital in normal enterprises, working capital is an important factor of production. A lack of it leads to difficulties in production or bankruptcy. High real interest rates and credit rationing create constraints on accumulation of working capital. If an enterprise has too little working capital, it has difficulties in purchasing inputs or paying wages. Consequently, some capacity is left unused and production decreases. The level of production reacts both directly and indirectly to a fall in working capital. The indirect influence refers to the incentive to decrease inventories also because of high interest rates (Calvo et al. 1992, 200).

The model by Calvo and Coricelli would explain the steep fall in production and the high inflation rate encountered in the Polish economic reform. In their view, the output collapse and high inflation were due to the low amount of working capital of firms. Thus, output contracts initially, but starts to increase later on as the situation is corrected. Simultaneously, there is an increase in real wages, particularly in the nontradable sector. This spurs aggregate demand. This drives up domestic prices. A strong increase in domestic prices appreciates the real exchange rate while the nominal exchange rate is fixed. This makes export more difficult and leads into a current account deficit. These conclusions remain valid when interest rate and credit ceilings are introduced into the model. Basically, the model succeeds in describing the - economic state of Poland in 1990. (For more, please see Appendix 1.)

Basic assumptions in the model are flexible prices and wages. Moreover, there are no inventories. Let us first consider the case where the Worker Council tries to maximise the utility of workers in tight liquidity conditions.

In the Calvo and Coricelli model, there is an economy which produces two goods: tradable a and nontradable b. The price of good a is determined in the international market and it is set at unity. The stabilisation program does not influence the production of good a. Production of the nontradable good b also requires good a as an input. Firms in the nontradables sector are always subject to a liquidity-in-advance constraint. In other words, inputs have to be paid for before any revenues are received from selling the final products. Purchased inputs are put immediately into production and no inventories exist. Assessable liquidity is cash at first. Production of good b asks also for labour input. Every firm is led by a Workers' Council that tries to maximise utility of every identical worker. If the marginal productivity of labour is positive and there is no unemployment compensation available, nobody will be fired from the firm. In other words, labour is a constant factor of production. When the exchange rate is fixed and price of the good b is given exogenously, the firm's production is determined at one moment in time by the change in liquidity. Change in liquidity is equal to the value of production from which the amount of money spent on inputs and wages are subtracted.

There are different optimal paths in the model and the Workers' Council can choose between them. In other words, they can choose between a higher output level and lower wages or lower output and higher wages. If they choose to allow higher wage increases, tight credit decreases the output level.

After the initial shock, the liquidity starts to move to the steady state and output starts to grow again in the model. The output increase is accompanied by real wage and relative price growth in the model. Higher real wages raise the disposable income of households, which in turn increases domestic aggregate demand. The recovery in aggregate de-

mand is likely to be followed by increases in domestic prices, especially in nontradable sector, in services. This could be explanation for the persistent inflation in 1990. Berg and Sachs also agree that service prices rose faster than prices in other sectors, except agriculture and energy (Berg et al. 1992, 133).

Again, the model describes the Polish - economy in 1990 well. The wage tax, or *popiwek*, was notably quite ineffective in restraining wage increases at the end of 1990. Moreover, inflation was very persistent in 1990. The model also indicates that the domestic inflation exceeded the international level, and thus, the real exchange rate appreciated.

Calvo and Coricelli expand their model to include the bank lending rate. This modification is needed to capture the effects of monetary policy in Poland. The above results are again valid. At first, interest rates are high and they are expected to decrease in time. Firms were not willing to take loans but let the output to decrease at the beginning of 1990. Interest rates remained positive from February to June and turned then to be negative. Production, real wages and relative prices all increase later in the model.

In any case, the credit ceiling was not binding in Poland in 1990. Again, Calvo and Coricelli add nonbinding credit rationing in the model. With the help of subjective time preference, the above-mentioned results are again attained. In the first period, interest rate is higher than the time preference, consumption of inputs is delayed and output decreases. Later on, interest rate and time preference are equal and relative prices, real wages and output start to increase. Over time increases in production stem from lower interest rates that make firms more willing to take bank loans and therefore attain more working capital. Real wage increases, in turn, stimulate aggregate demand and accelerate inflation.

According to Calvo and Coricelli, the loosening of monetary and rapid growth in bank credit caused the wage increases in late 1990, and thereby led to increased demand for services. Increased credit did not have an effect on production, rather it was spent on wages. Thus, wage increases can be regarded as an opportunity cost of slow output recovery (Coricelli et al. 1992, 26). As a result, - economic growth took place in the private sector where there were no Workers' Councils. Workers Councils, long powerful in the state sector, had guaranteed better wages than in the private sector. In essence, the Councils clearly succeeded in postponing privatisation and firm restructuring (Coricelli 1995, 83).

4.2.2.2   Empirical estimation

Calvo and Coricelli (1993) estimate the influence of tight credit on production empirically. Here, let us first consider the changes in the amount of real credit (see Table 3). The fall in Poland, 49 %, exceeded expectations. The expectation errors are mainly due to high inflation. The credit ceilings were not binding, although real value of credits decreased. This was a result of excessively high interest rates (Calvo et al. 1993, 38).

In the following, different methods are used to estimate liquidity of firms. Let us start with changes in wealth. When the prices were liberalised the net worth of a firm could increase but the amount of liquidity could decrease. Let us consider the following situation, where a firm produced Q units using its full capacity and inputs from the former period. B indicates credit to the firm to purchase inputs and this is the only way to buy them. Before economic reform, the prices of input and output equalled unity and the interest rate was zero. Profits could be defined: = Q – B. Before the implementation of the economic reform, firms are completely dependent on credit, profits are assumed to be zero and thus Q = B. Prices for output and inputs are respectively $P > 1$ and $P_i > 1$ after the economic reform.

After reform, firms can still attain credit with zero interest rate. In this case, post-reform profits are defined as PQ –B > 0. Net worth has risen. The firm's post-reform capability to buy new inputs is now analysed when nominal lending credit is constant B. The firm's liquidity satisfies:

(4.1)   (B + after-tax profits)/ P_i =

$$\left[B + (PQ - B)(1 - \tau) \right] / P_i ,$$

where τ is the profit tax, $0 \le \tau \le 1$. The firm's capability of purchase inputs ceases when profit tax $\tau > 0$ or $P < P_i$

Table 3   **Real Credit and Money in the Enterprise Sector After Reform (%)**

	Credit to Enterprises		Inflation	
Poland	Actual	Target	Actual	Target
(1990:1/1989:4)	−49.0	−10.0	129.4	45.0
(1990:4/1989:4)	13.0	25.0	193.0	94.0

Source: Calvo & Coricelli, Output Collapse in Eastern Europe, IMF 1993

Table 4   **Credit and Liquidity Requirements with Full-Capacity Utilisation (Percentage of sales)**

Credit or liquidity measure	Poland		
	1989	1990:1	Percent change
Bank Credit	41.5	21.3	−48.6
Liquidity 1	63.5	26.3	−53.8
Liquidity 2	69.7	38.7	−44.4

Bank Credit = Credit Ceilings
Liquidity 1 = Bank Credit and Full-Capacity Profits
Liquidity 2 = Liquidity and M2 at the beginning of the period

Source: Calvo & Coricelli, Output Collapse in Eastern Europe, IMF 1993

In other words, the price of output falls relative to the price of inputs. This is a realistic assumption for most non-energy producing sectors. If the level of profit taxes is large, real liquidity can be estimated by B/ P_i (see Table 4). Bank credit seems to have fallen by about 50 %. In Table 4, credit requirements of firms are estimated for the second quarter of 1990. Liquidity requirements are estimated by assuming full capacity (at actual prices) and taking into account new interest rates and profit taxes. This definition is less vulnerable to the criticism that output collapse is the result of decreased demand for liquidity. The assumption of full capacity ensures that the tightening of credit is measured before the fall in production. Table 4 confirms the results attained by different liquidity definitions in Table 3. The size of the estimates is the same, approximately 40 %. Moreover, the negative correlation between output and tight credit was largest for those firms that were most dependent on bank credit at the end of 1989. According to these estimates, economic reform decreased the liquidity of firms and the fall in production was negatively correlated with credit dependence.

The causality of tight credit to production contraction should be established before using it to determine the influence of credit on production. We start by making cross-section regressions of 85 branches of Polish industry. First, we clear the proportional changes in production and real credit from the last quarter in 1989 to the first quarter in 1990. Because credit ceilings were not binding in the first quarter of 1990, the proportional change in real credit is an endogenous variable. Thus, the ratio of working capital credit to sales is chosen. In the regression analysis, the obtained point estimate is 0.2, which is also obtained when nominal credit is used to solve the model. When logarithm regressions are introduced, the obtained estimate is 0.6

for the first quarter of 1990. The ratio of working capital to sales and real sales is also employed in the last quarter of 1989.

According to the statistical analysis, credit and production are positively correlated. In addition, the causality runs from credit to production and not otherwise. The point estimates vary widely from 0.2 to 0.6. Thus, if real credit fell by 27 % on the average, the related decrease in production would be from 5.4 % to 15 %. Based on this analysis, credit is not the sole factor explaining the fall in production. In particular, when the point estimate is 0.2 the other factors have a stronger influence on the production level.

Let us now consider the changes in credit and production after the first quarter of 1990. We can see from Table 5 that real credit to state firms fell by 35 % in the first quarter, but increased by 70 % from March to December. During the same time, gross production grew only 9.6 %. Contrary to earlier results, it seems that the increased amount of credit had little influence on production. Point estimates varied from 0.2 to 0.6. If the elasticity is low, for instance 0.2, an increase in credit has only a minor effect on production. Still, the credit expansion should have resulted in production growth of 14 % during the three last quarters when calculated with the 0.2 estimate. Actual growth was slower. One explanation for the slow recovery in production is that input prices rose much more than output prices. An example of this is the cutting of subsidies from energy prices.

If CPI is used as the deflator, the amount of credit has grown only by 46 % from March to December. In the case low output-credit elasticity, the amount of credit should have risen by 50 % to provide a 10 % growth in production. If the output-credit elasticity ratio were higher, i.e. 0.6, economic growth would have still been substantially less than expected.

Give this statistical analysis, it seems that the negative influence of tight credit cannot be ignored. Moreover, the fall in production is clearly due to the low level of credit, not the reverse. The impact of these effects is still hard to ascertain. Through tight credit, supply shocks have hit the economy, in particular in the first quarter of 1990. The growth in credit later that year had little influence on the output. In other words, the high interest rates and credit ceilings prevented firms from taking credit from the markets that was badly needed because of

price liberalisation.

5   Conclusions

Monetarist theory was applied in Poland's - economic reform and thus strong focus was given to economic liberalisation and reducing the state's role in the economy. The success of price liberalisation was seen in the disappearance of queues and the black market, implying that monetary overhang had been eliminated. Initial speculation in agricultural products was also short-lived because the reasons to hope for higher prices were successfully eliminated. As Wijnbergen showed in his model, a strong initial increase in prices gives incentives to cease intertemporal speculation. According to Wijnbergen, it is optimal to implement an - economic reform using shock therapy because a gradualist approach always leads to intertemporal speculation and shortages in the market. In Poland, the market supply was only affected during the first two weeks of the reform, and intertemporal speculation never became a threat to economic reform. Supply reacted to price increases and no shortages emerged. On the other hand, the price liberalisation did cause persistent high inflation.

The opening up of foreign trade was the second challenge in liberalisation. According to empirical research, economic growth is faster in open economies. In addition, trade liberalisation tends to increase exports and diversify export structure. When there is monopoly power in the economy, the creation of international competition is necessary to prevent prices from rising excessively.

On the other hand, the opening up of foreign trade was aimed at providing equal trade opportunities for all. In practise, this meant implementing partial currency convertibility and a unification of exchange rates. The zloty was also devalued heavily to boost export growth. In accordance with Michaely et al., a fast opening up of foreign trade should have little influence on unemployment. In addition, a broad-based and rapid trade liberalisation was considered more lasting. Thus, the trade regime implemented in Poland was very liberal in comparison to what happened in other transition economies. Later, the Polish average tariff level was increased to protect domestic production and keep the current account deficit from widening.

Table 5   **Poland: Credit to Socialised Sectors (%)**

Credit or output measure	December 1989 – March 1990	March 1990 – December 1990
Change in real credit (deflated by PPI)	–34.3	71.6
Change in real credit (deflated by CPI)	–35.1	45.6
Change in production	–32.3	9.6

Source: Calvo & Coricelli, Output Collapse in Eastern Europe, IMF 1993

Trade liberalisation also resulted in a stronger emphasis on the exchange of goods with Western countries. In the coordination of liberalisation and stabilisation, the real exchange rate is a very important component. The excessive appreciation of the real exchange rate weakens international competitiveness and makes exporting more difficult. That causes problems in the current account. If the exchange rate is fixed, the result is a fall in international reserves of the central bank. The current account has been in deficit in Poland every year except 1990. Excessive real appreciation has been fought by devaluing the zloty in 1991 and by implementing a crawling peg system, a system of continuous small nominal devaluations. The crawling peg system put some inflationary pressure on the zloty.

The Polish stabilisation program consisted of balancing the budget, implementing monetary policy and establishing nominal anchors. The money supply growth was controlled by budget balancing policies. Fiscal policy was surprisingly successful in 1990 when the budget turned to a surplus as a consequence of a strong increase in tax revenues. Moreover, monetary policy was used for the first time in Poland. Tight monetary policy was implemented by raising the refinancing rate and setting credit ceilings. These regulating elements were considered to be so tight that they were called the third nominal anchor of the economic reform. The other two anchors were the fixed exchange rate and the wage tax, or *popiwek*. The fixed exchange rate and wage tax were designed to establish credibility to the economic reform. In addition, the popiwek was used to regulate aggregate demand.

Despite the stabilisation program, inflation proved hard to force down. Strong increases in consumer prices, particularly the initial shock, caused high inflation in 1990. Moreover, the nominal an-

chors of the stabilisation program were not binding. The only successful anchors were the fixed exchange rate and the balanced budget in 1990. In later years, the budget was subject to further pressures because of rising unemployment.

The Polish economy started to grow in 1992. Initially, the unemployment rate increased slower than output contraction would have indicated. Slow growth in the unemployment rate reflects the rigidness of the Polish labour market. Moreover, the collapse of Comecon explains part of the 1991 fall in output. Even though trade with Western countries grew quickly, adaptation costs could not be avoided. Strong economic growth did not have a positive influence on the unemployment rate in 1992–1994. This can be explained partly by continuous restructuring in the Polish economy.

There is no general agreement on the factors that led to output contraction in 1990. According to Berg and Sachs, the main reason was a macroeconomic recession caused by stabilisation, price liberalisation and devaluation. Tight monetary and fiscal policies and the cutting of subsidies to households and firms brought about a decrease in demand. Moreover, price liberalisation caused high increases in consumer prices. As a result, disposable income decreased while wages were regulated. Berg and Sachs base their argument on changes in inventories. The export growth to Western countries could not have been possible without a contraction in domestic demand. Berg and Sachs re-estimated output and consumption statistics and got lower results.

Calvo and Coricelli disagree with Berg and Sachs on what caused the fall in production. They model tight credit and analyse the influence of credit on output. After the implementation of the stabilisation program, the amount of real bank credit decreased and made operations more difficult for

firms. Calvo and Coricelli's model explains the effect of credit on a firm's working capital and thus why output contraction results. According to their model, production starts to increase after the initial output contraction, bringing about a rise in real wages that spurs domestic aggregate demand and accelerates inflation. As a result, when domestic inflation exceeds the international level, the real

exchange rate appreciates and makes export efforts more difficult. The above mentioned issues describe quite well the Polish economy in 1990. Moreover, Calvo and Coricelli try to show empirically that their arguments are valid. Their analysis shows that tight credit had some influence on output, although the actual level is hard to estimate.

Appendix

The Basic Model

Households and enterprises can consume either tradable good a and nontradable good b. The price of good a is determined in the international markets and is assumed to be unity in terms of the foreign currency. It is also assumed that the domestic output of tradables is exogenous[1] and thus the stabilisation program does not affect production. The production of the nontradable good b requires good a as an input. Credit or liquidity constrains the nontradable sector, where the production of identical enterprises is determined by the following equation:

(A1) $x_t \leq z_t$,

where x is amount of good a which is used as an input in nontradable sector. Inputs have to be paid in advance. z stands for the amount of liquidity needed to purchase commodity a. In addition, z refers to the liquidity stock available to firms. We make the simplifying assumption that firms hold no inventories. Thus, x_t refers to input and purchases of tradable good a at time t. Purchased inputs are transferred directly into production. Liquidity z is cash.

Besides good a, production requires labour input. The rigidity of the Polish labour market is captured by fixing the number of workers in a firm[2]. Every firm is managed by a Workers' Council whose objective is to maximise the welfare of every identical worker. There is no unemployment compensation available, and, if the marginal productivity of labour is always positive, so nobody can be fired from the firm. Consequently, labour is a fixed factor.

The production function of non-tradable b is f(x), where x is the amount of intermediate good a. The function strictly increases with $f'(x) > 0$. Moreover, the function is strictly concave, $f''(x) < 0$. Equation (A.1) is the firm's liquidity constraint, which is now binding, $x_t = z_t$. The output of good b can be described by f(z). Letter ω denotes total labour income at the firm. In addition, the exchange rate in the model is assumed to be fixed, as indeed the actual exchange rate system in Poland was in 1990. Now we get a dynamic liquidity equation

(A.2) $\dot{z}_t = p_t f(z_t) - z_t - \omega_t$

where p is the relative price of nontradable b in terms of tradables a. The equation describes the change in liquidity z over time t. This change is equal to the value of output when intermediate goods and labour costs are subtracted. Price (p) is determined exogenously because firms are assumed to be competitive.

Liquidity-constrained household

Let us now consider the liquidity constraints on households. In this case the household's expenditure is constrained by labour income:

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[1] Polish coal, for instance.

[2] Actual employment at a firm can vary and thus unemployment is possible.

(A.3) $\omega_t + y_t = p_t h_t + s_t$

where h and s stand for consumption of nontradable b and tradable a respectively and y is labour income from the tradable sector. Labour income , y, is assumed to be constant and the price of good a is unity. The (direct) utility function depends on h and s. Now, the indirect utility function is $u(\omega + y, p)$, in other words, the utility level is determined by labour income and its relative price. Let δ stand for household's subjective rate of time preference which measures the weight on consumption at different points of time. The workers' utility is described in the following equation:

(A.4) $\displaystyle\int_0^\infty u(\omega_t + y, p_t) e^{-\delta t} dt$.

Now, a Worker Council's objective is to maximise the above equation (A.4) subject to (A.2), the initial liquidity stock $z(t_0) = z_0$ and the expected path of relative prices (p). The expected path of relative prices refers to initial steep increase in prices and final equilibrium.

The (direct) utility function can be represented in Cobb-Douglas form as $h^\alpha s^{1-\alpha}$, $0 < \alpha < 1$. The households' demand function for nontradable good b is $h = \alpha(\omega + y)/p$. By resolving equation (A.3) with respect to s, the results can be substituted into the Cobb-Douglas utility function. Now the indirect utility function is

(A.5) $u(\omega, p) = A(1/p)^\alpha (\omega + y)$

where $A = \alpha^\alpha (1 - \alpha)^{1-\alpha}$. The indirect utility function is linear in labour income. Utility depends on the relative price of nontradable b with respect to the intermediate good a (p). The current value Hamiltonian (H) for the optimisation problem is the following:

(A.6) $\mathcal{H} \equiv H e^{\delta t} = A(1/p)^\alpha (\omega + y) + \hat{\lambda} [pf(z) - z - \omega]$

where $\hat{\lambda}$ is co-state variable of form $\hat{\lambda}(t) = \lambda(t) e^{\delta t}$. With the help of the control variable ω_t the optimal state variable z is found. Using the optimal control and state variables, the optimal path for objective function is found over time t. The Workers' Councils can affect the control variable ω_t, allowing them to choose between many optimal paths. This refers to circumstances where there is a trade-off between higher wages and lower production, and vice versa. Co-state variables stand for Lagrange variables in static optimisation. Co-state variables can also be interpreted as shadow prices of state variable z. According to Pontryagin maximum principle, the necessary conditions for the current value Hamiltonian are

$\underset{\omega}{\text{Max}} \ H(t, z, \omega, \hat{\lambda})$

(A.7) $\dfrac{\partial \mathcal{H}}{\partial \omega} = 0 = A(1/p)^\alpha - \hat{\lambda}$

(A.8) $\dot{z} = \dfrac{\partial H}{\partial \hat{\lambda}} = p_t f(z_t) - z_t - \omega_t$ (optimum trajectory)

(A.9) $\dot{\hat{\lambda}} = -\dfrac{\partial \mathcal{H}}{\partial z} + \delta\hat{\lambda} = -\hat{\lambda}[pf'(z) - 1 - \delta].$ (co-state trajectory)

Together, the optimum trajectory and co-state trajectory define the Hamiltonian system. Let us now add the equilibrium condition for the nontradable sector to close the model. By assuming that households are the only consumers of nontradable b, supply and demand are determined in equilibrium

(A.10) $f(z) = \alpha(\omega + y)/p.$

By solving equation (A.7), we get the relative price

(A.11) $p = p(\hat{\lambda}) \equiv (A/\hat{\lambda})^{1/\alpha}.$

By substituting equations (A.10) and (A.11)into functions (A.2) and (A.9), we get

(A.12) $\dot{z} = p(\hat{\lambda})f(z)(1 - 1/\alpha) + y - z,$ when $\dot{z} = 0 \Rightarrow z = p(\hat{\lambda})f(z)(1 - 1/\alpha) + y$

(A.13) $\dot{\hat{\lambda}} = -\hat{\lambda}[p(\hat{\lambda})f'(z) - 1 - \delta],$ when $\dot{\hat{\lambda}} = 0 \Rightarrow \delta = p(\hat{\lambda})f'(z) - 1.$

The Hamiltonian system can be analysed in the phase diagram of Figure 1. The phase diagram consists of drawn phase lines, where $\dot{z} = \dot{\hat{\lambda}} = 0$. In plane $(z, \hat{\lambda})$, demarcation curve $\dot{z} = 0$ slopes upward. Above the line $\dot{z} > 0$ and below the line $\dot{z} < 0$ because $(1 - 1/\alpha)$ is negative on the open interval $]0,1[$. Correspondingly, the demarcation curve of co-state variable $\dot{\hat{\lambda}} = 0$ slopes downward. Below the line $\dot{\hat{\lambda}} < 0$ and above the curve it is positive. Simultaneously, we can examine the direction of movement of the point $(z_\infty, \hat{\lambda}_\infty)$ over time. The arcs in Figure 4 show directions of movement towards the steady state. The Hamiltonian system describes the saddle point equilibrium.

Figure 1. Determination of equilibrium

The point $\left(z_\infty, \hat{\lambda}_\infty\right)$ is the steady state in *Figure 1*. The saddle path passes through the steady state. It can be verified that, along the saddle path, firms and households maximise their utility. In addition, the market for nontradables is in equilibrium over time t. If there is a liquidity shortage, which refers to the points left of z_∞, the economy is initially at the point z_0. Thus, initial $\hat{\lambda}$, the point $\hat{\lambda}_0$ exceeds $\hat{\lambda}_\infty$ which is equilibrium. After the initial shock, both z and $\hat{\lambda}$ move monotonically towards their respective steady states. In other words, z increases and $\hat{\lambda}$ decreases over time which can be interpreted as diminishing marginal cost of credit. As a result, the initial liquidity shortage lowers output. Hence, output rises over time, and from equations A.10 and A.11 we can see that real wages increase in terms of nontradables and the relative price of nontradables with respect to tradables.

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