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Economic Outlook of Polish Economy for 1998

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Opinions in this paper express personal view of authors and should not be regarded as an official paper of the Ministry of Finance.

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1. Introduction

1.1 Historical background
The main aim of this paper is to present a general outlook of Polish economy for 1998. Historical background of economic situation in Poland is included in our paper to illustrate how far Polish economy is advanced with structural reforms. This paper will be presented during our stay at Economic Research Institute, Economic Planning Agency, Government of Japan.

In 1990 the Polish government launched a stabilization program aimed at macroeconomic stabilization and structural reform. A new government inherited economy which could be characterized by the following structural distortion:

- over industrialized, taking into account its level of economic development,
- huge agriculture sector with low productivity,
- almost all companies were state owned, private ownership operate only on the very small scale in services sector,
- Poland traded with other centrally planed economies through the now defunct Council for Mutual Economies Assistance. Much of this trade was conducted along bilateral or multinational agreement and was settled up in special currency or in the form of barter,
- There was no labour market, the majority of workers could not be fired and salary levels did not diverge widely. Its level was set up on government level,
- prices for almost all goods and services were given by government,
- huge external debt,
- hyperinflation.

The solidarity-rooted government that took power in the fall of 1989 had as its principal economic goal a rapid move to a market economy. The government’s strategy called “shock therapy” involved:

- macroeconomic stabilization,
- liberalization of prices,
- liberalization of economic activity.

All mentioned above steps were intended to reduce inflation expectations and to introduce widespread competition from abroad.

1.2 Legal regulation
According to Polish Budget Law the Ministry of Finance on behalf of the government is responsible for preparing and submitting the draft of Budget Act for given fiscal year to the cabinet. The draft of Budget Act must cover forecast of following macroeconomic aggregates:

- prices (consumer price index, producer price index),
- GDP and its components,
- interest rate and exchange rate,
- balance of payment,
- labour market,
and forecast of revenues, the size of deficit and expenditures of the state budget.

During the process mentioned above Department of Financial Policy and Analysis on behalf of the Ministry of Finance collaborates with different central institutions and agencies (e.g., Ministry of Economy, National Bank of Poland (the central bank), Ministry for Social Affairs, Ministry of the Treasury).
2. Economic performance of Polish Economy in years 1992—96

2.1 Inflation
Huge increase in prices at the end of 1989 was caused by two main factors: the adoption of a formal wage-indexing mechanism which led to a sharp increase in real wages in the industrial sector and the cut in food subsidies.

Almost seven years into transition, Poland has been able to bring down annual inflation (measured by the consumer price index) to around 15 percent. At the same time Poland experienced the best rate of growth of all former planned economies.

At the beginning of structure reform when the initial inflationary impact of price liberalization and devaluation was considerably high, subsequently inflation came down rapidly under the influence of the fixed exchange rate, the strong fiscal adjustment and a high real interest rate.

Inflation resumed its moderate decline in late 1992, and kept falling until the third quarter of 1993 and than it remained in the 30 percent range until early 1995. Since mid-1995 renewed progress has been made with disinflation. Inflation declined dramatically during the second half of 1995, from over 30 percent in the first half to 21.5 percent in December, followed by a more moderate decline in 1996 (to slightly below 20 percent by mid-year).

2.2 Output
All the previously centrally planed economies of Central and Eastern Europe have experienced a fall in the industrial output. The fall in case of Poland in the industrial output was among the smallest. After declining in years 1990—91 industrial output accelerated firstly at the low rate (in 1992 2.8%) and peaked at 8.7% in 1996.

The structure of Polish production has changed drastically with transition. The share of services has increased from little over one-third in 1989, to more than one half in 1996. Though the share of industry in GDP has declined, much of this reflect sharp adjustment in the early stage of transition.

2.3 GDP
After falling almost 18% in 1990—91, gross domestic product (GDP) in Poland has recovered significantly, (in 1994: 5.2%, in 1995: 7.0%, in 1996: 6.1%). The structure of GDP over that period of time was different. Recent economic developments can be divided into two phases:
• a period of accelerating, export-led growth (1994–95),
• a period (since mid-1995) when increase of real income was observed and domestic demand (consumption and investment) started to play the main role.

2.4 Balance of payments
Polish experiences with balance of payments during the transition process can be divided into three phases:
• Poland built up foreign reserves by generating a current account surplus,
• Devaluation in late 1993 and rapid growth in productivity had provided a
substantial boost to competitiveness, which led to a current account surplus in 1994—95 (in 1994: 2,267 mln USD and 5,455 mln USD in 1995).

- 1996 was a beginning of the third phase, instead of current account surplus, capital inflows explained the increase of international reserves.

In years 1993—1996, mainly export and import of goods and services and unclassified transactions (cross border trade) explained the state of the current account balance.

Devaluation in late 1995 and rapid increase of productivity led export to increase by 25% in 1994 and by 35% in 1995. In volume terms export grow steadier. In 1996, slower growth of foreign demand and the real appreciation of 1995 combined to dampen export performance. Detailed analysis of aggregated figure indicates that a slight increase of export was accompanied by the fall of sectors with lower value-added and the increase more than average of more sophisticated products.

One of the results of domestic recovery was accelerated growth of import (from 12% in 1994 to almost 40% in 1995). However intermediates input still predominates, this share declined slightly in the first half of 1996.

After the large current account surplus associated with higher surplus from unclassified transaction than a trade deficit, Poland coped with huge current account deficit. The recent emergence of a current account deficit is no cause for concern: Poland needs additional resources to finance the increasing investment, which are necessary to sustain rapid growth. The real danger is a speed with which the current account balance turnaround has taken place.

2.5 Labour and unemployment

One consequence of the reforms was an initial rise in unemployment. The unemployment rate rose from very low level in 1990 to 13 percent at the end of 1991. As output stabilized in 1992, firms continued to shed labour a trend that continued into 1993 when output growth accelerated. After peaking at almost 17 percent in mid 1994, the unemployment rate has fallen to a little over 13 percent at the end of 1996. Additional progress was made in 1997, at the end of September that rate was 10.6%.

Analyzing data concerning unemployment one should be careful: a significant number of those counted as unemployment were or are working in the “second” economy or in agriculture sector (farms) while collecting unemployment compensation.

Regional disparities in Polish unemployment are immense, and reflect deep-rooted structure of the Polish economy. The disappearance of certain sections of heavy industry and liquidation of state farms has created regional pockets of high unemployment.

2.6 Interest rates

The NBP (National Bank of Poland) sets its official interest rates—rediscount and lombard rate—with a view to signalling its interest rate intentions. The influence of these rates on the banks’ credit policy has been declining due to high liquidity of the banking sector in recent years.

In 1991 domestic financial policy weakened and real interest rate became negative. In 1993 interest rates, were barely positive in real terms. In fact, a large reduction of interest rate in early 1993 (in response to declining inflation) contributed to the loss of
reserves. In early 1995, headline rates were raised by 2–3 points following a relatively high inflation in January. Later in the year in connection with step appreciation and with inflation starting to decline, these rates were cut by 4 and 2 points, respectively. In January 1996, headline rates were cut by 2–3 points due to the same reasons as it was in 1995. With inflation slowing down, headline rates have since reduced only once, by 1 point in mid-1996. To reduce accelerating domestic demand NBP has been keeping headline rate at the level 25 percent, 23 percent, respectively. Due to declining inflation the real interest rates are growing up.

2.7 Exchange rates

When the structural reform was initiated high devaluation of polish zloty took place and fixed rate regime was applied. During 1991 when competitiveness was eroding the exchange rate policy came under increasing pressure leading first to a devaluation and then to a switch to a crawling peg. From October 1991 to August 1993, the rate of crawl was 1.8 percent per month. This mechanism with a pre-announced and relatively steady rate of crawl served as the nominal anchor.

To correct for under-valuation of zloty and to stem speculative capital inflow the monetary authorities modified the exchange rate policy by implementing pre-announced crawling peg, with the fixing rate fluctuation within +/- 7% (rate of crawl 1.2 per month percent and initial appreciation of fixing rate to 5% below central parity took place) in May, 1995

Appreciation was brought to a halt in 1996. After the rate of crawl was reduced to 1 percent in January. There were no changes to exchange rate policy.

From Polish experiences with exchange rate policy we can withdraw conclusions, that an exchange rate peg can provide a considerable instruments of disinflation (the timing of leaving that regime is important in preventing the speculative attacks) and a rate of crawl lower than the inflation differential can help reduce inflation without loosing competitiveness.

2.8 Revenues of state budget

Between 1992 and 1996 the ratio of budget revenues to GDP has changed considerably. In 1992 ratio of revenues to GDP was 27.2% it was the lowest level during that period of time. In the next year a huge jump of 2.3 percentage points to the level of 29.5% was observed. In 1994 relatively slight increase took place (an increase of 0.5 percentage point) but in the next year revenues fell to the level of 29.0%. In 1996 ratio of revenues of state budget to GDP was almost at the same level as in 1992 (27.3%).

Tax reform introduced in Poland has followed the Western European revenue pattern. Personal income tax (PIT) was implemented to replace the previous range of taxes on personal income and value-added tax (VAT) and excise tax replaced the previous turnover tax. The main goal of implementing VAT was to extend the indirect tax base for services and enhance its neutrality by reducing the range of rates.

2.9 Budget deficit

It should be indicated that the state budget deficit in Poland, which is calculated, as a balance of revenues and expenditures is not synonymous with the government sector’s
deficit according to the methodology employed in the European Union.

In years 1992—96 deficit of state budget decreased by 3.5 percentage points. In 1992 ratio of deficit to GDP was 6.0% and in the next year dropped by 3.2 percentage points to the level of 2.8%. A relatively low deficit level has been observed over the most recent four years. Staring from 1994, state budget deficit was reduced by 0.1 percentage point each year and in 1996 ratio of state budget deficit to GDP was equal 2.5%.

It should be emphasized that the same deficit level may have had substantial different macroleconomics effects depending on the associated structure of taxation and expenditure and different ways of financing.

Looking at the structure of financing a fiscal deficit it is obvious that external borrowing did not play any substantial role: during 1992—1996 systematically increased share of non-bank borrowing as a source of financing state budget deficit. Borrowing form the central bank and from the rest of the banking system (which equivalent to the creation of high powered money) was replaced by non-bank borrowing—a non-monetary way of financing public debt. The share of banking financing decreased by 11.5 percentage points during 1992—96 and non-banking financing increase by 28.6 percentage points.

<table>
<thead>
<tr>
<th>Year</th>
<th>Banking</th>
<th>Non-banking</th>
<th>Foreign</th>
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<tr>
<td>1992</td>
<td>95.7</td>
<td>8.3</td>
<td>-4.0</td>
</tr>
<tr>
<td>1993</td>
<td>86.5</td>
<td>27.0</td>
<td>-13.5</td>
</tr>
<tr>
<td>1994</td>
<td>85.8</td>
<td>35.8</td>
<td>-21.6</td>
</tr>
<tr>
<td>1995</td>
<td>13.8</td>
<td>73.7</td>
<td>12.5</td>
</tr>
<tr>
<td>1996</td>
<td>84.2</td>
<td>36.9</td>
<td>-14.1</td>
</tr>
</tbody>
</table>

2.10 Spending of state budget
In years 1992—96 spending of state budget decreased by 3.4 percentage points. In 1992 ratio of spending to GDP was 33.2% and in the next year dropped by 1 percentage point to the level 32.3%. In 1994 slight increase was observed but in the next year expenditure dropped to the level 31.6%. In 1996 for the first time ratio of expenditure of state budget to GDP was lower than 30% (29.7%). It means systematic decrease in the scale of redistribution via the state budget.

Lower demand for treasury securities and disaster of flood forced the government to reshuffle and limit expenditures in this year. Those changes caused that expenditures will lower by 0.8 percentage points than it was prescribed by budget act for 1997 (as a ratio of GDP).

Level of state budget expenditures is determined by level of revenues and by a level of budget deficit. High level of expenditure in 1992 was determined by relatively high level of state budget deficit (6% of GDP). Decrease of expenditure in 1993 was influenced by huge fall of budget deficit and increased of revenues. After 1993 when budget deficit was decreased 0.1 percentage point each year, changes of revenues influenced expenditures deeper.

One of key item of state budget expenditure is burden of debt payments. During 1992—1996 the ratio of interest payments to GDP decreased from 9.5% to 8.8%.

Despite of change which took place in Polish economy current transfers are still
strongly dominated item of budget expenditure. During 1992–1995 the ratio of current transfers to GDP was above 17%.

2.11 Public debt
The State budget’s debt and the cost of servicing it exert a significant impact on many elements involved in the functioning of the nation’s economy, including the construction and the performance of the state budget, the level of interest rates and the level of credit for the national economy.

Issues pertaining to the state budget’s debt take on particular significance in light of the provisions set forth in the new Constitution and the requirements set forth in the Maastricht Treaty, concerning the criterion for the permissible level of government sector debt as a ratio of GDP at 60%.

Share of the state budget’s debt in GDP was reduced from 1993 to 1996 from 88.7% to 51.2%.


Strategic goal of Polish policy for coming years is a membership in the structure of the European Union. In that light 1998 is regarded as an early stage of that process. From a macroeconomic perspective, key issues in Poland are relatively low savings ratio and still high inflation rate. Both obstacles should center on further fiscal consolidation, tight monetary policy and structural measures to bolster private savings. Identifying problems which are described above, in 1998 the government will carry out an economic management policy to maintain conditions for economic growth.

In 1998 sound fundamentals for implementing structural reform of the pension system and health care system should be provide. At the same time structural reforms will be introduced in order to accelerate a privatization process. It will be a first year when a program aiming at reducing unemployment level will be in force.

More detailed approaches for economic management for 1998 are outlined below:

3.1 Maintaining conditions for economic growth
Increasing current account deficit and its rate (a rate of growth) should be treated as a main threat of sustaining foreign imbalance. An example of Czech’s crises (a first half of 1997) indicated that an increase of wages, which is not correlated with a increasing productivity, and fiscal imbalance can lead to a financial crises.

In order to keep an external balance of Polish economy and to provide appropriate conditions for lowering inflation rate the government will take up steps aiming at a reduction of domestic demand. To reach that target the state budget deficit will be reduced, structural reforms will be accelerated and nominal interest rate will be kept at constant level (it will cause that a real interest rate will increase).

National Bank of Poland will conduct the exchange rate policy to prevent unlimited inflow of the speculative capital. Changes in the exchange rate mechanism are not
prescribed but number of interventions of NBP on the exchange market will be limited and deviations of the market exchange rate from its parity is prescribed to be deeper than in 1997.

3.2 Structural reforms
The main elements of social protection system in Poland are unemployment benefits, pensions, family and housing allowances, sickness benefits, social assistance and health care. The need of reforming this system is one of the priority of the government. The creation of a largely self-financed and insurance-based social security system is one of the ways to improve an efficiency of that system.

Another key policy imperative arises from the still pervasive role of the state budget in the economy; rapid privatization of most of the remaining enterprises will be pivotal in raising efficiency and attracting private capital on the scale required to ensure continued rapid economic growth.

4. Economic Outlook for 1998


4.1 Inflation
Within nine first months of 1997 additional progress was made; at the end of 1997 inflation (December to December) will reach the level of 13 percent.

In 1998 inflation is expected to be declining and reaches the 9.5% in the end of the year. The average index of consumption prices will decline from about 15% in 1997 to 11% in 1998.

4.2 Output
From supply side of economy the impressive growth of GDP was obtained due to increase of production in main sectors of economy in previous years. It is expected that in 1998 this trend will continue and real industry production will increase by 8.8%, the real production of construction by 9.2%, and the real agriculture production by 1.5%.

4.3 GDP
One of the main targets of Polish economy is to maintain the high growth of GDP, what is necessary condition in case of applying for access in the European Union. It is forecasted that in 1998 GDP growth will be 5.6%. It will be obtained by smaller share of domestic demand in GDP, specially declining growth of consumption and accumulation. In 1998 real growth of private consumption will be lower by 1.5—percentage point than in the previous year, and collective consumption by 1.7—percentage point. Also growth of gross capital formation will be lower than in 1997 by 2—percentage points.
4.4 Balance of payments
A speed with which the current account balance turnaround has taken place is a real
danger for Polish economy. To prevent additional deterioration the government and the
central bank will take up needed steps.

Deepening current account deficit in balance of payments is caused by a huge real
import growth, which in 1996 was about 32%, for 1997 is forecasted on 20% and for 1998
about 18% and moderate increase of export. In nominal terms import is forecasted on
the level of 39,100 mln USD in 1997 and 46,100 mln USD in 1998, export 27,100 and
30,900 respectively. The unclassified transaction on current account after falling down
in 1997 to the level 5,700 USD will be stable during forecasting period.

The current account deficit as a ratio of GDP will increase from 1% in 1996, to 4.1% in
1997 and it will be over 6% in 1998.

4.5 Labour and unemployment
In 1998 the unemployment rate will decrease by 0.6—percentage point comparing to
1997 to the level 10.1% mainly as a result of the high production growth and
government investment. Change in average number of employees in 1998 will be 1.2%
and it will be less than in 1997 by 0.4—percentage point.

Observed in the previous years increase of private consumption was mainly a result of
the big real increase of salaries and social benefits. In order to decrease a little domestic
demand it is necessary to decrease disposable incomes of households. According to
forecasts of Ministry of Finance the real average wage in economy will growth to 2.7%,
and will be smaller than in 1997 by nearly 2 percentage points.

4.6 Interest rates
To reduce accelerating domestic demand NBP in years 1997—98 will be kept headline
rate at the level 25, 23, respectively. It is assumed that in 1998 due to decreasing
inflation the real average lombard interest rate increase by 3—percentage points and
reaches 12.6%.

4.7 Exchange rates
In 1998 year announced annual devaluation of polish currency will be slower than in
1997 nearly by 2.7—percentage points. Real change of average exchange rate is assumed
to evaluate between 12.4—15.6% and real change of exchange rate at the end of the year
between 7.9—11.1%.

4.8 Revenues of state budget
According to forecast prepared by the Ministry of Finance state budget revenues in 1998
will decrease as a ratio of GDP by 0.7 percentage point (to the level of 26.1%). That fall
will be caused mainly by a sharp decease of non-tax revenues (revenues from that
source will drop by 0.6 percentage point) and relatively a small fall of revenues from
privatization (0.1 percentage point; in 1997 1.4% and 1.3% in 1998)\(^1\).

Besides of reduction of a nominal personal income tax rate and a corporate income tax

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\(^1\) Income from privatization in Poland has been treated as revenues of the state budget not as a source of
financing the state budget deficit. That situation will be changed in 1998; in this paper state budget
revenues are comparable, it means that income from privatization is treated as revenues.
rate state budget revenues from taxes in years 1997–1998 will be at the same level (tax revenues as a ratio of GDP in years 1997–98 will be 22.2%).

4.9 Budget deficit
As was mentioned early, to keep an external stability, in 1998 the government will take up steps to improve a fiscal consolidation. The state budget deficit as a ratio of GDP in 1998 will be lower than in 1997 by 0.6 percentage point (from 2.2% in 1997 to 1.6 in 1998).

4.10 Expenditures of state budget
The decreasing level of state budget revenues and the state budget deficit will influence the size of state budget expenditures. The state budget expenditures as a ratio of GDP in 1998 will be lower by 1.4 percentage points (from 29.1% in 1997 to 27.7 in 1998).

4.11 Public debt
Due to the reduction of the state budget deficit and the growth of GDP, the share of state budget debt in GDP will be reduced by 1.3 percentage points (from 51.3% in 1997 to 50.0% in 1998).

5. Conclusions

In the light of recent history, the Polish structural reforms were basically successful but there are many challenges which should be resolved on the path to a market economy. This concern: privatization, institutional reforms (health care system), and macroeconomic policy. In this last issue declining inflation and lowering of state budget deficit are of key importance for the prospects of stable economic growth and accession to the European Union.
### Appendix 1

#### Table 1. Gross Domestic Product

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<td></td>
<td></td>
<td></td>
<td>1997</td>
</tr>
<tr>
<td>GDP at current prices</td>
<td>mld zl</td>
<td>155.8</td>
<td>210.4</td>
<td>288.7</td>
<td>362.6</td>
<td>437.3</td>
</tr>
<tr>
<td>GDP (at constant prices; 1996 year = 100)</td>
<td>mld zl</td>
<td>303.6</td>
<td>319.4</td>
<td>341.8</td>
<td>362.6</td>
<td>383.2</td>
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<td>GDP deflator</td>
<td>%</td>
<td>130.6</td>
<td>128.4</td>
<td>128.2</td>
<td>118.4</td>
<td>114.1</td>
</tr>
<tr>
<td>Real changes</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>− GDP</td>
<td>%</td>
<td>103.8</td>
<td>105.2</td>
<td>107.0</td>
<td>106.1</td>
<td>105.7</td>
</tr>
<tr>
<td>− export</td>
<td>%</td>
<td>103.2</td>
<td>113.1</td>
<td>123.6</td>
<td>112.0</td>
<td>111.2</td>
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<tr>
<td>− import</td>
<td>%</td>
<td>113.2</td>
<td>111.3</td>
<td>124.3</td>
<td>129.9</td>
<td>119.9</td>
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<tr>
<td>− domestic expenditure</td>
<td>%</td>
<td>106.1</td>
<td>104.7</td>
<td>107.1</td>
<td>110.5</td>
<td>108.2</td>
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<td>− consumption expenditure</td>
<td>%</td>
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<td>103.9</td>
<td>103.4</td>
<td>107.4</td>
<td>105.7</td>
</tr>
<tr>
<td>− individual</td>
<td>%</td>
<td>105.2</td>
<td>104.3</td>
<td>103.6</td>
<td>108.6</td>
<td>106.5</td>
</tr>
<tr>
<td>− collective</td>
<td>%</td>
<td>103.8</td>
<td>102.8</td>
<td>102.9</td>
<td>103.3</td>
<td>103.0</td>
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<tr>
<td>− gross capital formation</td>
<td>%</td>
<td>112.8</td>
<td>109.0</td>
<td>126.0</td>
<td>124.0</td>
<td>118.3</td>
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<td>− investment</td>
<td>%</td>
<td>102.9</td>
<td>109.2</td>
<td>116.9</td>
<td>122.7</td>
<td>119.0</td>
</tr>
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<td>− changes in inventories</td>
<td>%</td>
<td>10.0</td>
<td>119.2</td>
<td>−307.7</td>
<td>144.0</td>
<td>110.0</td>
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#### Table 2. Real production

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<td></td>
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<td>1997</td>
</tr>
<tr>
<td>Real change:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>− sold production of industry</td>
<td>%</td>
<td>106.4</td>
<td>112.1</td>
<td>109.7</td>
<td>108.7</td>
<td>109.6</td>
</tr>
<tr>
<td>− construction and assembly production</td>
<td>%</td>
<td>108.0</td>
<td>100.5</td>
<td>108.1</td>
<td>104.6</td>
<td>112.6</td>
</tr>
<tr>
<td>− agriculture production</td>
<td>%</td>
<td>—</td>
<td>90.7</td>
<td>110.7</td>
<td>100.3</td>
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### Table 3. Prices

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<tr>
<td>Consumer Price Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>— average</td>
<td>%</td>
<td>35.3</td>
<td>32.2</td>
<td>27.8</td>
</tr>
<tr>
<td>— December / December</td>
<td>%</td>
<td>37.6</td>
<td>29.5</td>
<td>21.6</td>
</tr>
<tr>
<td>Producer Price Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>— average</td>
<td>%</td>
<td>31.9</td>
<td>25.3</td>
<td>25.4</td>
</tr>
<tr>
<td>— December / December</td>
<td>%</td>
<td>37.0</td>
<td>27.9</td>
<td>18.9</td>
</tr>
</tbody>
</table>

### Table 4. Exchange rate and interest rate

|-------|------|------|------|------| | 1997 Forecast | 1998 Forecast |
| Exchange rate | | | | | | | |
| — PLN/USD | | | | | | | |
| — average | Zl | 1.8145 | 2.2727 | 2.4244 | 2.6965 | 3.3069 | 3.7153—3.8232 |
| — end of year | Zl | 2.1344 | 2.4372 | 2.4680 | 2.8755 | 3.6083 | 3.8917—4.0097 |
| Polish zloty against US dollar rate of change | | | | | | | |
| — average | % | 133.1 | 125.3 | 106.7 | 111.2 | 122.6 | 112.4—115.6 |
| — XII/XII | % | 135.4 | 114.2 | 101.3 | 116.5 | 125.5 | 107.9—111.1 |
| NBP interest rates | | | | | | | |
| — lombard rate | | | | | | | |
| — average | % | 33.6 | 31.7 | 30.6 | 25.6 | 25.8 | 25.0 |
| — end of year | % | 33.0 | 31.0 | 28.0 | 25.0 | 27.0 | 23.0 |
| — rediscount rate | | | | | | | |
| — average | % | 32.0 | 28.4 | 27.6 | 22.6 | — | — |
| — end of year | % | 29.0 | 28.0 | 25.0 | 22.0 | — | — |
### Table 5. Balance of Payments

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1997 Forecast</td>
</tr>
<tr>
<td>Current account</td>
<td>mln USD</td>
<td>-579.0</td>
<td>2,267.0</td>
<td>5,455.0</td>
<td>-1,352.0</td>
<td>-5,378.0</td>
</tr>
<tr>
<td>– trade balance</td>
<td>mln USD</td>
<td>-2,993.0</td>
<td>-836.0</td>
<td>-1,827.0</td>
<td>-8,154.0</td>
<td>-12,000.0</td>
</tr>
<tr>
<td>– merchandise exports</td>
<td>mln USD</td>
<td>13,385.0</td>
<td>16,990.0</td>
<td>22,878.0</td>
<td>24,420.0</td>
<td>27,100.0</td>
</tr>
<tr>
<td>– merchandise imports</td>
<td>mln USD</td>
<td>15,878.0</td>
<td>17,786.0</td>
<td>24,705.0</td>
<td>32,374.0</td>
<td>39,100.0</td>
</tr>
<tr>
<td>– unclassified transactions on current account: net</td>
<td>mln USD</td>
<td>1,791.0</td>
<td>3,211.0</td>
<td>7,754.0</td>
<td>7,153.0</td>
<td>5,700.0</td>
</tr>
</tbody>
</table>

### Table 6. Labour market

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1997 Forecast</td>
</tr>
<tr>
<td>Employees (annual average) in national economy</td>
<td>tys. os</td>
<td>9,163.4</td>
<td>9,105.7</td>
<td>9,360.0</td>
<td>9,470.4</td>
<td>9,620.0</td>
</tr>
<tr>
<td>Change of employees in economy</td>
<td>%/</td>
<td>95.7</td>
<td>99.4</td>
<td>102.8</td>
<td>101.2</td>
<td>101.6</td>
</tr>
<tr>
<td>Unemployed persons (end of period)</td>
<td>tys. os</td>
<td>2,889.6</td>
<td>2,838.0</td>
<td>2,628.8</td>
<td>2,359.5</td>
<td>1,900.0</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>%/</td>
<td>16.4</td>
<td>16.0</td>
<td>14.9</td>
<td>13.2</td>
<td>10.7</td>
</tr>
<tr>
<td>Real change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– average monthly wage and salary in national economy</td>
<td>%/</td>
<td>90.6</td>
<td>101.7</td>
<td>103.0</td>
<td>105.4</td>
<td>104.6</td>
</tr>
</tbody>
</table>

### Table 7. State budget and public debt

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1997 Forecast</td>
</tr>
<tr>
<td>Revenue as a percentage of GDP</td>
<td>%/</td>
<td>29.5</td>
<td>30.0</td>
<td>29.0</td>
<td>27.3</td>
<td>26.9</td>
</tr>
<tr>
<td>– Total Revenue</td>
<td>%/</td>
<td>23.7</td>
<td>24.5</td>
<td>23.9</td>
<td>23.0</td>
<td>22.2</td>
</tr>
<tr>
<td>– Nontax Revenue</td>
<td>%/</td>
<td>5.2</td>
<td>4.7</td>
<td>4.2</td>
<td>3.3</td>
<td>3.1</td>
</tr>
<tr>
<td>– Revenue from Privatization</td>
<td>%/</td>
<td>0.5</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Expenditure as a percentage of GDP</td>
<td>%/</td>
<td>32.3</td>
<td>32.7</td>
<td>31.6</td>
<td>29.8</td>
<td>28.1</td>
</tr>
<tr>
<td>– Total Expenditure</td>
<td>%/</td>
<td>2.8</td>
<td>2.7</td>
<td>2.6</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>State Budget Balance as a percentage of GDP</td>
<td>%/</td>
<td>86.0</td>
<td>69.5</td>
<td>56.2</td>
<td>49.5</td>
<td>49.4</td>
</tr>
<tr>
<td>Public debt as a percentage GDP</td>
<td>%/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Privatization

A2.1 Privatization concepts and legal framework

A first general debate on the privatization concept took place in late 1989 and in 1990. Three main concepts of privatization came up against each other:

- a commercial concept of the sale of state-owned assets with classical means, first of all through public offers, based on the British experience;
- non-equivalent privatization, based on employee ownership and on American ESOP concepts;
- non-equivalent privatization through free distribution of assets among all citizens, based on new drafted mass privatization concepts (called “citizens' privatization”).

The privatization law, passed 13 July, 1990 tried to find a compromise between the three concepts. First six large enterprises was privatized by the end of 1990 through initial public offerings.

The so called capital privatization (through public offer and trade sale) got under way on a much larger scale in 1991 but continued to be carried out on a case-by-case method, which resulted in slow progress. The direct privatization of smaller enterprises through employee-management leasing, proved to be faster and more efficient.

The mass privatization program (called National Investment funds Program or the NIF Program), couldn't be launched until the end of 1995, although its first version was prepared in the half of 1991 year and the relevant legislation was passed in April 1993. In the first half of 1997, the NIF program entered more advanced stage, on the Warsaw Stock Exchange the fund’s shares stared be traded.

In 1993, two other laws important for privatization were passed:

- the law on the restructuring of enterprises and banks, which allowed banks to start composition agreement procedures for indebted enterprises and change their debts into equity;
- the law on enterprises of special importance to the state.

In the half of 1996, after long-lasting controversies, the new privatization law was passed, which gave more power for employees in acquiring free shares in privatized enterprises\(^2\). It also narrowed the group of enterprises available for direct privatization, including employees and management buy-out.

The responsibility for privatization had Ministry of Privatization, which after implementation of the reform of the central government administration (1 October 1996) was replaced by new established Ministry of the Treasury, which is responsible for the supervision of all state-owned assets and for some privatization procedures. The

\(^2\) Up to 15% of enterprise’ shares can be acquired free by the employees. Another 15% can be acquired by farmers and fisherman being stable suppliers of the company. These shares are not tradable during two years after their purchase and those acquired by the management are blocked even for three years.
privatization of large enterprises will be carried out by the Agency for Privatization, a state corporation subordinated to the Treasury Ministry. Smaller enterprises will be privatized by the local governments by direct privatization.

A2.2 Privatization tracks and their results

The privatization of the state sector has been conducted on three main tracks:

- the indirect (capital) privatization,
- the mass privatization program (NIF program),
- the direct privatization (through liquidation under the privatization law).

Table 1 illustrates the number of enterprises that entered the transformation process from 1990 until to the half of 1996. Only 168 capital privatization have been completed from the 1188 enterprises transformed into commercial companies of the state treasury. A further 512 companies have been transferred to the NIF program, but their privatization will take some years. Of the remaining 508 commercial companies 353 were prepared for individual capital privatization and the rest 155 belong to a group for which special procedure of privatization is foreseen. In the direct privatization almost all the projects started have been completed (1114 out of 1167), but in liquidation less than 1/3 of transformations begun, could have been completed. Altogether, the ownership transformation process for 6015 state enterprises out of the 8441 in this group had been started in December 1990 (71.2%), only 1719 enterprises were completed, that is 20.4% of the total.

A2.2.1 Capital privatization

Within indirect privatization only 168 cases out of the 1188 enterprises transformed into joint stock companies had been completed (14.1%).

The main tracks of the indirect privatization:

- direct sale of shares of privatized companies to individual investors (domestic and foreign),
- privatization through initial public offering,
- mixed privatization scheme combined private sale and public offering.

The vast majority of companies privatized in this way were located in the manufacturing (food and beverage production, tobacco industry, the chemical industry, the electrical and general machinery industry) and construction sector.

Trying to assess the effects of the capital privatization track, one has to admit that from quantity point of view, it applied only to a small number of enterprises, but these enterprises are much bigger than others, employ more people and represent an important part of the former state-owned sector. The sale of shares of these enterprises also facilitated the establishment and development of the capital market in Poland and was the main source of income from privatization for the state budget. From the quality point of view, most of the enterprises show very good economic results and in many of them, an in-depth restructuring process has been launched.
A2.2.2 National Investment Funds program

The legal framework of this program was completed in December 1994 after almost 3 years delay under strong pressure from domestic and international public opinion. Firstly, the potential members of the supervisory and management board of the funds and the management groups for the funds were selected by special governmental commission and afterwards were appointed by the government. Foreign and domestic firms organized in consortia, in order to take part in the bid. The operational part of the program began in June 1995, with distribution of shares of 413 enterprises among the funds. Finally (together with two additional tranches of enterprises) a group of 512 state treasury companies were handed over to the 15 National Investment Funds for their restructuring and privatization. The distribution scheme was as follows:

- 60% of shares of each enterprises were placed in NIFs,
- 15% were given free to the employees of the relevant company,
- 25% have been temporarily withheld by the state treasury for later placement in pension funds and compensation programs.

These 60% of shares of each enterprises were divided in majority and minority stocks, in order to avoid too large a dispersion of the shares. As result:

- 33% of the shares of each company have been located in one fund,
- 27% were dispersed through all remaining funds (1.93% for each fund).

The minority shares are freely tradable and the majority only as a whole.

Next part of the NIF program started in November 1995 (finished November 1996) as a distribution of share certificates among the Polish population in which 27.8 millions people took part in. The certificates are freely tradable on the private secondary market and on the stock exchange. During the first half of 1997 each certificate is exchangeable into package of one share in each fund (in total 15 shares).

Results of NIF program:
- plans of the selling 76 of the 512 enterprises were presented (August 1996),
- in 9 cases the process was begun,
- the entrance to the stock market of 64 NIF companies is planned.

The main difference between NIF program and indirect privatization is a size of enterprises. NIF enterprises employ between 200 to 1000 people, had worsen the financial standing, so they needed the strategic investors and serious restructuring process.
Table 1. Number of state enterprises subjected to ownership transformation by legal path, June 1996

<table>
<thead>
<tr>
<th>Number of state enterprises</th>
<th>As % of enterprises</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>existing on 31.06.1990</td>
<td>8441 100.0</td>
<td></td>
</tr>
<tr>
<td>transformed into companies of the State Treasury, of which:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1188 14.1</td>
<td>168 of them has been privatized and 512 transferred to the NIF program</td>
</tr>
<tr>
<td>− transformed into companies under Law on Ownership</td>
<td>155 1.8</td>
<td>temporary not subject to privatization</td>
</tr>
<tr>
<td>Transformations of Enterprises of Special Importance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>− liquidated under Law on Privatization of State Enterprises</td>
<td>1167 13.8</td>
<td>1,114 completed</td>
</tr>
<tr>
<td>(direct privatization)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>− liquidated under Law on the State Enterprises (liquidation)</td>
<td>1427 16.9</td>
<td>437 completed, 441 went into bankruptcy procedure</td>
</tr>
<tr>
<td>− taken over by the Agriculture Property of the State Treasury</td>
<td>1654 19.5</td>
<td></td>
</tr>
<tr>
<td>− being in liquidation under the Bankruptcy Law</td>
<td>316 3.7</td>
<td></td>
</tr>
<tr>
<td>− handed over to local governments under the law on communalization</td>
<td>263 3.1</td>
<td>may undergo further transformation</td>
</tr>
<tr>
<td>Total number of enterprises being subject of ownership transformation</td>
<td>6015 71.2</td>
<td></td>
</tr>
<tr>
<td><strong>Completed privatization</strong></td>
<td><strong>1719 20.4</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: B.Blaszczyk *Privatization in Poland*
The indirect privatization

State enterprises

Commercialization

Commercial law company
State Treasury-100%

Sale of shares

Max 75%

With payment

Negotiations

Public offers

Competitive tender

Min 10%

For Social Security Program

Max 15%

Without payment
A2.2.3 The direct privatization through liquidation method

Direct privatization through liquidation, designed for small and medium size enterprises was undertaken up to 30 June 1996 for 1167 SOE’s and was completed in 1114 cases. The direct privatization method may be classified as a quasi-sale method because of the delay in payments and various legislative measure which ease conditions of purchase.

Three basic procedures are possible in liquidation under the privatization law:
• the sale of an enterprise’s assets,
• leasing,
• entering them as a contribution in kind, into new companies.

In majority of completed cases liquidated enterprises were leased to companies formed by the employees of the former enterprises. The price of such a lease is a result of negotiations without public bid and the payments are made by instalments. As of June 1996, leasing has been used in 52% cases of direct privatization, sale in 38.7% and contribution in kind in only 8% cases.
Direct privatization as a sale of enterprise

State enterprise

Feasibility study of enterprise

Decision about direct privatization as a sale of enterprise

Negotiations

Competitive tender

Chosen investors

Sale of enterprise
The direct privatization in general (in detail entering enterprise as a contribution in kind)
A3.1. General overview of the model

M98 model is a model of the Polish economy designed for macroeconomic projections and simulation analysis. The M98 model integrates a macroeconomic AD-AS model with a data model. The AD-AS model is the dynamic model, which consist with behavioral and institutional macro-economic relationships describing behavior of the Polish economy. Using endogenous variables calculated from the AD-AS model all the output variables can be calculated. Parameters of the model are calibrated. Parameters in the behavioral relationships are set on a base of values used in different published macro-economic models. Parameters in the institutional equations are set mostly based on historical data. The parameters of the model are subject to alternations because the essence of the transition process of each economy is the change in behavioral and institutional relationships. The theoretical framework of the AD-AS model is described in the Section 2.

The data part of the model consists of input data and definitional relationships. The input data include:

- historical, statistical data describing the performance of the economy in the past;
- assumed, future values of exogenous variables of the model.

The historical data are used to calibrate a model and give base-year values for all model variables. The exogenous variables, which future values have to be assumed, concern mostly external factors (e.g. import prices) and policy measures.

The definitional relationships are used to calculate the output data of the model. The bases for these calculations are values of endogenous variables of the model. The output from the model provides a full description of the economy. The following accounts are present:

- Integrated Economic Accounts which distinguishes the following institutional sectors:
  - Households;
  - General Government;
  - Corporations;
  - And Non-profit Institutions;
  - Rest of the World;
- GDP resources and expenditures in current and constant prices;
- Balance of payments;
- Monetary survey and consolidated balance of the banking system;
- Labour market survey;
- Pension and social funds accounts;
- State budget;
- Public debt;
— Price indices, wages, social benefits.
Therefore, the M98 gives a comprehensive and consistent survey of the Polish economy.

The M98 model is running and solving in a spreadsheet (EXCEL) which enables to integrate all parts of the model, i.e., input data, the main economic model and output date, and makes very easy a presentation of output results (tables, and pictures).

A3.2. The theoretical framework of the AD-AS model

A3.2.1. The AD-AS model

The model is built mostly along the traditional lines of the aggregate demand-aggregate supply (AD-AS) framework. The model is demand driven in the short run, and we assume that any demand is actually met, that is, we assume that there always is some excess capacity in the economy. High demand leads to high capacity utilization rates and low unemployment rates, however, which lead to wage and price increases. Because of the policy of maintaining a crawling peg for the exchange rate, these price increases lead to a real appreciation and a reduction in export demand. In this way the model has a tendency to return to equilibrium capacity utilization and unemployment rates in the medium and long run.

Demand in the model consists of consumption, exports, investment and government spending. Consumption depends on income and the real interest rate. Exports depend on world trade, the real exchange rate and the investment/GDP ratio. This ratio often appears significant in export equations, and may signify a supply effect, such as foreign direct investment producing for the European market, or a quality effect, which is not correctly measured by prices (for instance, investment in equipment that contains modern western technology).

Investment in fixed assets is related to output through an accelerator term, the relative price of capital, profitability and the capacity utilization rate. Since we do not have reliable data on the capital stock, we approximate capacity output by trend output. Inventory investment is related to sales through an assumed constant sales-inventory ratio.

Government spending is either exogenous or the remainder term in the government budget constraint, depending on the implemented policy stand.

Imports is related to total output, reweighted by import share intensities, the real exchange rate and import duties. Total demand minus imports equals GDP, which is produced with capital and labour. Assuming a CES production function, we derive demand for capital and labour. The demand for capital leads to investment as mentioned above.

For the demand for labour we distinguish between the agricultural sector, treated autonomously, and the rest of the economy. The demand for labour in the rest of the economy depends on GDP, productivity and unit labour costs. It is assumed that employment always equals labour demand.

Labour supply is mostly determined exogenously. In addition there is a positive income
effect and a negative discouraged worker effect, proxied by the unemployment rate. Unemployment equals labour supply minus employment.

Costs, the capacity utilization rate, taxes and subsidies, and competitor prices determine prices in the model. Wages are modelled according to a bargaining framework, in which employers and workers bargain over wages while employment is set unilaterally by the firm. Wages depend on productivity, value added prices, the unemployment rate and the wedge (consisting of taxes and social security contributions, indirect taxes and the ratio of import prices to value added prices). Both the level and the change in the unemployment rate are included in the wage equation, allowing for a flexible short run equilibrium unemployment rate and a fixed long run one. Money demand is related to output and the nominal interest rate. The exchange rate is set according to a predetermined crawling peg, with the possibility of an extra depreciation if the ratios of foreign reserves to imports, domestic credit creation to GDP or the current account deficit to GDP exceed some critical values. Given this policy for the exchange rate, the domestic nominal interest rate is determined by the foreign interest rate and the pre-announced rate of depreciation. The money supply is then endogenous as well and equals to money demand at this interest rate.

A3.2.2. The theory behind the behavioral equations

A3.2.2.1. Price determination

We assume that firms who operate in a market structure of monopolistic competition set output prices. That is, we assume that, for each good, there exits an inverse demand curve $p^f = p^f(z)$, with $p^f$ denoting the price at factor cost and $z$ gross output. The price at factor cost is exclusive of indirect taxes and subsidies, and thus equals the price the firm actually receives for its product. We also assume that there exists a well behaved cost function $c = c(z)$. Profit maximization then leads to:

$$\begin{align*}
\text{argmax}(z): \quad & (1 - t_p) \left[ p^f(z) z - c(z) \right] \\
\end{align*}$$

where $t_p$ is the profit tax. Profits are maximized by setting the price $p^f$ equal to:

$$p^f = \left( \frac{1}{1 - e} \right)^e mc$$

where $e$ is the price elasticity of demand and $mc$ denotes marginal cost: $mc = dc/dz$. Note that the profit tax has no influence on the price, since both marginal revenue and marginal cost are reduced by the same amount. The market price, denoted $p$, is related to the factor cost price $p^f$ by:

$$p = p^f \left( 1 + t_z - s_z \right)$$

where $t_z$ and $s_z$ are the indirect tax and subsidy rates. The relation for the market price is therefore:
We do not observe marginal cost, however, so the above equation is not operational. Therefore we first define capacity as the level of production with minimum average long run cost. Note that marginal cost at capacity equals this average long run cost. Using duality theory, we make a Taylor expansion of marginal cost around capacity output. We get:

\[ mc = ac + \alpha \frac{z-z^*}{z^*} \]

where \( z^* \) equals capacity level of output and \( \alpha \) involves derivatives of the cost function. The term \( z/z^* \) is the capacity utilization rate, denoted \( q \).

Average cost, denoted \( ac \), equals:

\[ ac = \frac{w(1+s_f)}{z} + \frac{p_k k + p_m m}{z} \]

where \( w \) denotes the gross wage level, \( s_f \) the social security contributions rate paid by the firm, \( k \) the capital stock, \( p_m \) the domestic currency price of imports and \( m \) imports. The user cost of capital \( p_k \) in turn equals:

\[ p_k = (i - \pi + \delta + r) \]

where \( i \) is the nominal interest rate, \( \pi \) the inflation rate, \( \delta \) the depreciation rate, \( r \) the real interest rate and \( \square \) the risk premium, \( p_i \) is the price of investment goods, that is the price of capital when bought.

The capacity utilization rate \( q \) should ideally be constructed using a proper explicit production or cost function. For the time being we simply assume that output fluctuates around capacity, so that we may approximate capacity by average output. This implies:

\[ \frac{z-z^*}{z^*} = q-1 = \frac{z}{z_{average}} - 1 \]

The basic equation for the percentage change in value added price is then:

\[ \hat{p} = \hat{ac} + \beta_1 \Delta (q-1) + \beta_2 (q-1) + \frac{\Delta t_z \Delta s_z}{l+t_z-s_z} + \text{constant} \]

The equation contains a constant. This is true for all behavioral equations, but for brevity’s sake we leave the constants out from now on. Assuming technological progress to be labour saving, and denoting labour productivity by \( h \), we get:

\[ \hat{ac} = \alpha_i \hat{w} + \alpha_h \hat{p}_k + \alpha_m \hat{p}_m \]
where $a_j$ is the share of factor $j$ in gross output.

So far we have abstracted from the influence of competitor prices. In the long run competitor prices should not matter much, because in equilibrium all firm will have a certain competitive rate of return on their investment. So if, say, exporting firms would continually meet foreign price reductions without accompanying reductions in their own costs, they would end up going bankrupt and disappear. In the short run, however, firms may well follow competitor prices in order to retain their market shares if foreign prices fall, or if foreign prices rise, to get a short run increase in profits when expansion of output is not possible in the short run. There is, indeed, strong evidence that especially export prices are sensitive to foreign competitor prices.

We may model this by writing:

\[
\tilde{p}^m_s = (1 - \gamma) \hat{p} + \gamma \hat{p}_{comp}
\]

\[
= \hat{p} + \gamma (\hat{p}_{comp} - \hat{p})
\]

where the superscript $m,s$ indicates short-run market prices and $g$ is the elasticity of final demand prices to competitor prices. Note that if $g > 0$, the value added price, $p_y$, also depends on competitor prices; a reduction in price in order to meet a reduction in competitor prices, leads to a reduction in value added and profits.

All together, we get for the final goods prices determined in the market sector:

\[
\tilde{p}^m_s = (1 - \gamma) \left( \alpha_w (\hat{w} - \hat{h}) + \alpha_k \hat{p}_k + \alpha_m \hat{p}_m + \beta_1 \Delta q + \beta_2 (q - 1) + \frac{\Delta t_z - \Delta s_z}{1 + t_z - s_z} \right) \]

\[
+ \gamma \hat{p}_{comp}
\]

Aggregate goods basically follow the same structure as given above for single goods. We only have to take into account that some goods are not set according to market conditions, but set directly by the government. Let the share of such goods be $\lambda$. The we get for the price equations of aggregate goods, $\tilde{p}^a$:

\[
\tilde{p}^a = (1 - \lambda) \hat{p}^m_s + \lambda \hat{p}^p
\]

where the superscript $p$ denotes policy-determined.
There are three aggregate goods prices in the model, one for consumer goods, one for investment goods, and one for export goods. The straightforward thing to do is to model all three according the to the above equations with coefficients that are appropriate for the separate aggregate goods. However, we do not know much about the user cost of capital $p_k$. Therefore, we decided to substitute it out of the price equations. To do this, we assume that the depreciation rate is constant, so that:

$$\hat{p}_k = \frac{d(r + \delta + r)}{r + \delta + r} + \hat{p}_i = \frac{dr}{r + \delta + r} + \hat{p}_i$$

On the further assumption that effective indirect taxes and subsidies are zero (for instance, because indirect taxes paid on investment goods may be taken as a credit by the investing firm) and also setting $g$ and $1$ equal to zero for investment goods, we get:

$$\hat{p}_i = \alpha_{w,i}(\hat{w} - \hat{h}) + \alpha_{h,i} \hat{p}_k + \alpha_{m,i} \hat{p}_m + \beta 1_i \Delta q + \beta 2_i (q - 1)$$

where the subscript $i$ stands for investment goods. This implies:

$$\hat{p}_k = \frac{dr}{r + \delta + r} + \alpha_{w,i}(\hat{w} - \hat{h}) + \alpha_{h,i} \hat{p}_k + \alpha_{m,i} \hat{p}_m + \beta 1_i \Delta q + \beta 2_i (q - 1)$$

$$= \frac{1}{1 - \alpha_{h,i}} \left[ \frac{dr}{r + \delta + r} + \alpha_{w,i}(\hat{w} - \hat{h}) + \alpha_{m,i} \hat{p}_m + \beta 1_i \Delta q + \beta 2_i (q - 1) \right]$$
We may use this equation to substitute out the user cost of capital in the price equations. Substituting this equation into the equation for the change in short run market prices of good \( j \), \( \hat{P}_{j}^{m,s} \), we get:

\[
\hat{P}_{j}^{m,s} = (1 - \gamma_j) \left[ \left( \alpha'_{r,j} \frac{dr}{r + \delta + \gamma} + \alpha'_{w,j} (\hat{\omega} - \hat{\beta}) + \alpha'_{m,j} \frac{\hat{\beta}}{\hat{\beta} + \beta 1'_{j}(q - l)} + \beta 2'_{j}(q - l) \right) \right] \\
+ \gamma_j \hat{p}_{comp}
\]

where:

\[
\alpha'_{r,j} = \frac{\alpha_{r,j}}{1 - \alpha_{r,j}} \\
\alpha'_{w,j} = \frac{\alpha_{w,j} + \alpha_{w,j} \frac{\alpha_{w,j}}{1 - \alpha_{w,j}}}{1 - \alpha_{w,j}} \\
\alpha'_{m,j} = \frac{\alpha_{m,j} + \alpha_{m,j} \frac{\alpha_{m,j}}{1 - \alpha_{m,j}}}{1 - \alpha_{m,j}} \\
\beta 1'_{j} = \frac{\beta 1_{j} + \alpha_{r,j} \frac{\beta 1_{j}}{1 - \alpha_{r,j}}}{1 - \alpha_{r,j}} \\
\beta 2'_{j} = \frac{\beta 2_{j} + \alpha_{r,j} \frac{\beta 2_{j}}{1 - \alpha_{r,j}}}{1 - \alpha_{r,j}}
\]

In the above equation we assumed that the capacity utilization rate \( q \) is modelled at the macro level. \( \alpha_{w,j} \) has the interpretation of the cumulated labour share in good \( j \), including the labour content of the capital stock. Similarly, \( \alpha_{m,j} \) has the interpretation of the cumulated share of imports in the production of good \( j \). The above equation thus model production as ultimately using only labour, imports and time (the effect of \( r \)).

**A3.2.2. Wage determination**

The most popular way to model wage determination is through a model of bargaining. The bargaining can take place at the level of centralized or decentralized unions or at the level of individual workers. The common idea is that workers and firms have a joint surplus and they have to come to some agreement as to how to divide this surplus. The
surplus is joint because both the firm and its workers have some market power over this surplus, as a result of their specific skills, the legal setup, or other reasons. The starting point of the bargaining model consists of defining what the different parties care about. The negotiations are generally about gross wages, but it is important to realize that neither the workers nor the firms care about gross wages directly. To illustrate this and to set up the bargaining model we assume a simple constant returns to scale production function with labour only: \( y = h_l \), where \( y \) equals production (value added), \( h \) productivity and \( l \) labour input. Profits are:

\[
\Pi = p_y y - w(l + s_f)l
\]

where \( P \) denotes profits, \( p_y \) the output (value added) price, \( w \) the wage rate and \( s_f \) the taxes, social security contributions, pension benefits, etc. paid by the firm that are associated with labour. Since the production function is constant returns to scale, we may divide by labour and the value added prices and thus calculate the real profit rate per worker. It is:

\[
\frac{\Pi}{p_y l} = \frac{y}{l} - \frac{w(l + s_f)}{p_y} = h - \frac{w(l + s_f)}{p_y}
\]

The last term in the above equation is called the real product wage, denoted \( w_y \):

\[
w_y = \frac{w(l + s_f)}{p_y}
\]

This is the wage concept the firm cares about. If it is above \( h \), the firm makes a profit, otherwise a loss.

The workers care about the purchasing power of the wage in terms of consumer goods. This consumption wage, denoted \( w_c \), is defined as:

\[
w_c = \frac{w(l + s_f)}{p_e}
\]

where \( s_f \) denotes the direct taxes and social security contributions paid by labour, and \( p_e \) the consumer price.

If we divide the wage costs to the firm by the wage benefit to the worker, we get the so-called wedge, denoted \( L \). The formula is:

\[
\Lambda = \frac{w_y}{w_c} = \frac{(l + s_f)}{(l - s_f)} \frac{p_e}{p_y}
\]

We can go a little further and note that \( p_e = p_d(1 + t_z) \), where \( t_z \) is the indirect sales tax (net of subsidies) and \( p_d \) is the domestic goods price to the firm. The latter is a weighted average of the value added price and the price of imports: \( p_d = p_i^{1-a} p_m^a \), with \( a \) the share of imports in output. This implies that:
This means that the wedge has four components to it: taxes and social security contributions paid by the worker, social security contributions paid by the firm, indirect taxes and the ratio of import prices to value added prices. From the points of view of workers and firms, they are all the same, namely a 'tax' on labour. It is, therefore, to be expected that, at least in the long run, they all have the same effect in the negotiations.

Considering the Nash bargaining solution to the wage negotiation process can show this formally. This is the solution to:

\[
\arg\max(w): \frac{P \cdot h - w(l + s_l) ^ h}{P \cdot c} ^ a \left( \frac{w(l - s_l) ^ h}{P \cdot c} - F \right) ^ a
\]

where \( F \) is the fallback position to the workers in the negotiations. The solution is:

\[
w = (1 - \alpha)h + \alpha F \Lambda
\]

So, the wage is determined by three elements: productivity, the fallback position of workers and the total wedge. Note in particular that the wedge enters as one single variable: all of its elements have the same coefficient.

The fallback position is generally considered proportionally to the average wage level and also influenced by the unemployment rate. This causes wages to be proportional to \( h \), and the log-linear first order condition then becomes:

\[
\log w(l + s_l) = \log p_y + \log h + \beta l \log \Lambda - \beta 2 \omega r
\]

In terms of gross wages \( w \) we get:

\[
\hat{w} = \beta l \hat{p}_e + (1 - \beta l) \hat{p}_y + \hat{h} + \beta l \frac{\Delta s_l}{1 - s_{l,0}} + (\beta l - 1) \frac{\Delta s_f}{1 + s_{l,0}} - \beta 2 \Delta \omega r - \beta 3 \omega r
\]

where the level of the unemployment is added partly because unemployment enters the theoretical equation in a highly non-linear way and in order to allow for a strong Phillips curve effect.

A3.2.2.3. Demand for factor inputs

We assume that production of value added takes place with a CES production function with capital and labour of the form:

\[
\frac{P \cdot c}{P \cdot y} = \left( \frac{P \cdot m}{P \cdot y} \right) ^ a (1 + t_c)
\]
Non-military employment, simply called employment, is divided up between employees and employers plus free lancers. The number of employers plus free lancers is exogenous in the model. The number of employees is derived from the CES production function above. The optimal labour input according to this CES production function is:

\[
y = \left( \alpha^{l/p} (l \bar{l})^{p} + (1 - \alpha)^{l/p} k^{\rho} \right)^{1/\rho}
\]

\[
\text{Employment}
\]

where \( y^e \) is the output produced with employees. Assuming \( y^e \) to be proportional to \( y \), we have in terms of percentage changes:

\[
\hat{i}^e = \hat{y} - \hat{h} - \sigma(\hat{w} - \hat{h} - \hat{p}_y)
\]

Total employment equals the sum of the number of employees and the number of employers plus free lancers \( \hat{l} \):

\[
l = \hat{i}^e + \hat{l}^\beta
\]

so:

\[
\hat{l} = \alpha_e \hat{i}^e + \alpha_f \hat{l}^\beta
\]

where \( \alpha_e \) and \( \alpha_f \) are the shares of employees and employers plus free lancers in total employment.

\[
\text{Investment}
\]

The other factor inputs are modelled at the macro level. The optimal macro capital stock is given by:

\[
k = (1 - \alpha) y \left( \frac{p_k}{p_y} \right)^{-\sigma}
\]

From this we get:

\[
\Delta k_{k,l} = \hat{y} - \sigma(\hat{p}_k - \hat{p}_y)
\]

or:

\[
\frac{i}{k_{k,l}} = \hat{y} - \sigma(\hat{p}_k - \hat{p}_y) + \delta
\]
Some authors suggest that the profit rate is also important. This may be justified by arguing that profits allow internal financing of investment, which is cheaper than external financing. In addition, the capacity utilization rate may play a role as a direct indicator of the difference between optimal and actual capacity. Adding these elements, we get:

$$\frac{i}{k^t} = \hat{y} - \sigma(\hat{p}_t - \hat{p}_{t-1}) + \delta + \lambda\left(\frac{\pi}{k}\right) + \mu(q-1) = \hat{y} - \sigma(\hat{p}_t - \hat{p}_{t-1}) - \sigma \frac{dr}{r + \delta + r} + \delta + \lambda\left(\frac{\pi}{k}\right) + \mu(q-1)$$

(36)

where we used the fact that \(p_k = (\sigma + \delta + \mu)p_1\). Capital is often considered a quasi fixed factor of production, because changing the capital stock takes a lot of time and involves important adjustment cost. Therefore, lags may be important in this equation. For the same reason, expectations matter as well, although they are difficult to model, and empirical models of investment with various expectation terms have not been very successful so far.

**Demand for imports**

Gross output is a CES function of value added and imports. So, we get a scale variable and a price elasticity. For our scale variable we use the growth of gross output weighted by importance to total imports. We derive this as follows:

$$\begin{align*}
    m &= m_c + m_i + m_g + m_x \\
    &= \frac{m_c}{c} + \frac{m_i}{i} + \frac{m_g}{g} + \frac{m_x}{x}
\end{align*}$$

(37)

where \(m_j\) denotes the cumulated imports content in final demand category \(j\). Assuming the shares \(m_j\) to be constant we get:

$$\Delta m = \left(\frac{m_c}{c}\right) \Delta c + \left(\frac{m_i}{i}\right) \Delta i + \left(\frac{m_g}{g}\right) \Delta g + \left(\frac{m_x}{x}\right) \Delta x$$

(38)

or:

$$\hat{m} = \hat{z}_m = \left(\frac{m_c}{m}\right) \hat{c} + \left(\frac{m_i}{m}\right) \hat{i} + \left(\frac{m_g}{m}\right) \hat{g} + \left(\frac{m_x}{m}\right) \hat{x}$$

(39)

This is the percentage change in imports due to output effects, assuming constant import shares, that is, constant relative prices. To add the effect of relative prices we write:
where \( p_v \) denotes the value added price.

Note that, by implication, \( z_m \) is proportional to a geometric average of the components of gross output \( z \):

\[
z_m \propto \frac{c_m}{i_m} \frac{m_m}{g_m} \frac{m_x}{x_m}
\]

In empirical studies, it is often found that the elasticity of imports with respect to the scale variable \( z_m \) is larger than 1. This may be explained by a trend towards internationalization. We capture this effect with an additional parameter \( a \geq 1 \):

\[
\hat{m} = a \hat{m}_v \cdot \sigma (\hat{p}_m - \hat{p}_v)
\]

The price of imports equals the (exogenous) price of imports in foreign currency, \( p_M(\$) \), times the exchange rate times 1 plus the import tariff rate:

\[
\hat{p}_m = \hat{p}_m(\$) + \hat{\epsilon} + \frac{\Delta t_m}{1 + t_m}
\]

**Investment in inventories**

For the investment in inventories we assume that firms want a constant inventory/sales ratio. This we model by:

\[
\hat{inv} = \hat{z}
\]

or:

\[
\Delta inv = \left( \frac{inv}{z} \right) \Delta z
\]

**A3.2.2.4. Labour supply and unemployment**

Labour supply is modelled exogenously as the product of the population within working age times the labour activity ratio plus employment in non-working age. The equation for labour supply is:

\[
l^* = \alpha \text{ population}_{working \, age} + \text{ employment}_{non \, working \, age}
\]

where \( \alpha \) is the exogenous labour activity ratio.

The labour supply minus the military service equals the economically active population

---

\(^2\) Equations (44)—(45) are not introduced to the current version of the model.
where $\text{lecon}$ is the economically active population. The number of unemployed workers $u$ is given as the economically active population minus employment:

$$u = \text{lecon} - l$$

The unemployment rate $ur$ is given by the number of unemployed divided by the labour supply:

$$ur = \frac{u}{l}$$

### A3.2.2.5. Final demand for goods

**Consumption**

Consumption is determined by a model of intertemporal optimization. We present a simple version of this model. Suppose consumers maximize the following two period intertemporal problem:

$$\text{argmax}(c_1, c_2): \quad \log c_1 + \frac{1}{1 + \delta} \log c_2$$

subject to:

$$c_1 + \frac{1}{1 + r} c_2 = y^d_1 + \frac{1}{1 + r} y^d_2 + \text{wealth}_0$$

where $c_i$ and $y^d_i$ denote real consumption and real disposable income in period $i$, for $i = 1, 2$. The superscript $e$ denotes expected value; the value of $y_2$ is not known in the first period, so consumers have to form expectations about it. $r$ is the real interest rate and $d$ the personal discount rate. $\text{wealth}_0$ denotes wealth accumulated from the past. The maximand is the present discounted value of intertemporal utility. The appropriate discount rate is the personal discount rate $d$. The right hand side of the budget constraint equals the present discounted value of resources and the left hand side the present discounted value of consumption expenditure. The budget constraint says that consumers may save and borrow, but such that the present values of their incomes and expenditures remain equal to each other.

It is generally assumed that the personal discount rate $d$ is equal to the real interest rate $r$. Under this condition, the first order conditions for this problem imply:

$$c_1 = c_2$$

So the consumption levels in both periods are equal to each other. This is the basic idea of consumption smoothing over time: consumers save and borrow in order to keep their consumption levels relatively constant.
By assuming an explicit formula for expected real disposable income in period 2, we can solve for c explicitly. We assume:

\[ y_2^{de} = y_1^d (1 + g) \]

that is, income is assumed to grow at a rate g. Then the formula for consumption becomes:

\[ c_i = \left( 1 + \frac{g}{2 + r} \right) y_1^d + \left( \frac{1 + r}{2 + r} \right) wealth_0 \]

which indicates that the coefficient on current income is around 1 if g is around zero, that is, if the current level of income is at a normal level. The coefficient on wealth is around 1/2 in this model, but in a more general model with more periods, it is approximately equal to 1 divided by the number of periods. If the number of periods is very large, the coefficient equals \( r/(1+r) \approx r \). (r is the real interest rate).

Since reliable data on wealth was not available, we left that variable out of the equation. The equation in the model is:

\[ c = (\alpha_1 - \alpha_2 r) y^d \]

Exports

Exports are foreign demand for our products. We assume that the rest of the world has a CES utility function with our exports and their own tradeables as a subutility function. This leads to the following export demand function:

\[ x = wt^\sigma \left( \frac{p_x}{p_{wt}} \right)^{-\sigma} \]

where \( wt \) is the real quantity of world trade. Just as in the case of imports, we allow the elasticity with respect to the scale variable to exceed unity: \( a \geq 1 \). \( p_{wt} \) is the world trade price in domestic currency, or in foreign currency times the exchange rate.

The above equation abstracts form quality effects or supply side effects. The effects of the supply side could be modelled by adding the capital stock to the level equation, or the investment as a ratio of the capital stock or of value added to the percentage change equation. The last term has indeed been highly significant in several studies of exports. Adding this effect we get for the percentage change in exports:

\[ \hat{x} = \alpha \hat{w} t - \sigma (\hat{p}_x - \hat{p}_{wt} (S) - \hat{c}) + \phi \left( \frac{i}{y} \right) \]
The growth rate of world trade, \( w_t \), and the foreign currency price of world trade, \( \hat{p}_{\text{wt}}(\$) \), are exogenous.

### A3.2.2.6. Exchange Rate and Monetary block

#### Exchange rate

The exchange rate is assumed to devalue at a pre-announced rate, in accordance with current actual policy. We assume that three conditions may cause an additional devaluation: if the ratio of reserves to imports fall below a certain level, or if the ratio of domestic credit to GDP exceeds a certain level or if the deficit on the current account exceeds a certain level. The equation for the exchange rate is:

\[
\hat{e} = \hat{e}^a + \begin{cases} 
\frac{re}{m} < \alpha_1 & \text{then } \beta_1 \\
\frac{cr}{y} > \alpha_2 & \text{then } \beta_2 \\
\frac{x - m}{y} > \alpha_3 & \text{then } \beta_3
\end{cases}
\]

(57)

#### Money demand

The nominal demand for money, \( M^d \), is related to nominal GDP as a transaction motive. Further the nominal interest rate is included as its opportunity cost. We have:

\[
M^d = \alpha\hat{Y} - \beta\Delta(i_b - i_d)
\]

(58)

where \( M^d \) denotes nominal demand for money, \( Y \) nominal GDP, and \( i_b \) and \( i_d \) the nominal interest rates on bonds and deposits.

\( M^d \) consists of cash in circulation, foreign currency deposits and domestic currency deposits. We assume that cash has a stronger relation to consumption than \( M^d \) and that the ratio of cash to \( M^d \) also depends negatively on the nominal interest rate on deposits:

\[
\hat{\text{cash}^d} = M^d + \alpha(\hat{C} - \hat{Y}) - \delta\Delta i_d
\]

(59)

where \( C \) is nominal consumption expenditures. Foreign currency deposits are held by
households and by enterprises. We assume that households’ foreign currency deposits (depfc,h) are a fraction of total money demand where the fraction depends on the difference between the domestic nominal interest rate (i) and the foreign nominal interest rate (i*) plus the announced rate of depreciation of the domestic currency (êa):

$$\hat{d}e_{pfc,h} = M 2^d - \varepsilon h \Delta(i - i* - êa)$$

Foreign currency deposits (depfc,e) held by enterprises has the same form plus an additional transaction motive based on the share of imports (M) to GDP:

$$\hat{d}e_{pfc,e} = M 2^d - \varepsilon e \Delta(i - i* - êa) + \phi (M - \bar{Y})$$

Total deposits in foreign currency (depfc) is then given by:

$$depfc = depfc,h + depfc,e$$

and deposits in domestic currency (depdc) is calculated as the residual:

$$depdc = M 2^d - cash - depfc$$

### Money supply

Given the policy of pre-announcing the rate of depreciation of the exchange rate, monetary policy has to be accommodating. That is:

$$M 2^* = M 2^d$$

where $M 2^*$ denotes real money supply.

In the appendix “Modelling the asset side of the consolidated banking sector” we show that loans from the commercial banks (L) may be modelled by definition as:

$$L = \frac{mm - 1}{mm} M 2^* - V^{pb}$$

where mm is the money multiplier and $V^{pb}$ is net other assets of commercial banks. By letting mm be a parameter calibrated on the average value of mm over the past years, we have a behavioral equation for L. In modelling we may simply ignore $V^{pb}$, or assume that $V^{pb}$ is closely proportional to L so that we may ignore $V^{pb}$ in a percentage change equation. So in levels or in percentage change we have:

$$L = \alpha M 2^*$$

The parameter a rises if mm falls, thus if re or cu rises. So if the central bank raises required reserves, L falls as a fraction of $M 2^*$.

From the Balance of Payments we have an equation for net foreign assets (NFA). We

---

3 Equations (65) — (67) are not introduced to the current version of the model.
also have an equation for the net assets of the consolidated banking sector \((V^b)\). So we may let central bank domestic credit to the government \((DC)\) be the residual from:

\[
DC = M 2^t - NFA - L - V^b
\]

In the model \(L\) consist of credit to non-financial enterprises and long liabilities in the budget. We have an equation for the long liabilities in the budget and let credit to non-financial enterprises be the residual. \(DC\) consists of financing of state budget deficit and credit to rest of general government (outside of the state budget). We set the credit to rest of general government exogenously and let financing of the state budget deficit be the residual.

**A3.3. Schematic overview of the model**

A schematic overview of the model is given in figures 1 and 2. In figure 1 the real economy is depicted. The arrows indicate the flow of demand. Starting at the left top and following the arrows, we see that the production of value added results in demand for labour and capital input. Demand for labour input results in employment, and demand for capital results in investment. Employment and the use of capital also result in labour and capital income. Income leads to demand for consumption. The rest of the world has a demand for our exports through world trade. Investment, consumption, government spending and exports together make up total demand. Each of these components of aggregate demand is produced either with imports or with domestic value added, which closes the circle of demand.

In figure 2, we depict some of the major linkages of the nominal side of the economy. The center of it is the wage price spiral. The wage price spiral is embedded in a larger circle of employment and wages. Starting at the top left, employment and labour supply determine unemployment, which is a main determinant of wages. Wages determine prices and vice versa, through the wage price spiral. The other main determinant of prices is world prices. The price level determines nominal money demand and supply. Together with world prices, it also determine the real exchange rate. The real exchange rate influences exports, which is a component of aggregate demand. Aggregate demand is the main determinant of employment, which is where we started. World interest rates affect domestic interest rates one for one because of the crawling peg policy. Domestic interest rates influence domestic prices, money demand and the investment component of aggregate demand.
Figure 1. The real economy

Value added

Employment

Income

Capital

Investments

Consumption

Government consumption

Exports

Import

World trade
Figure 2. The nominal economy

labour supply

employment → unemployment → wage rate

aggregated demand
exports → real exchange rate

price level

money demand → money supply

domestic interest rate

world prices
world interest rate
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