Recent Assessment of Disinflation Policy Scenarios for Slovenia

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Abstract

Sustainable reduction of inflation remains, even after more than a decade of economic transition, one of the key tasks for the majority of central and east European countries. In the present paper we employ an iterative multisectoral model underpinned by estimates of sectoral price functions to simulate six disinflation scenarios for the case of Slovenia. The model simulations show that substantial progress in disinflation can be made already in 2004. However, instead of relying on a single anti-inflationary tool, stabilization of the inflation rate at around 3 – 4 % per annum demands highly harmonized implementation of at least three instruments: moderate de-indexation of wages, rigorous price policy in those segments of the Slovenian economy where lack of competition does not assure price stability, and a prudent monetary policy.

Keywords: *disinflation, disinflation factors, economic policy*

JEL Classification: E31, E37, E64

Introduction

Since the early 1990s the transition economies have introduced a series of fundamental economic reforms. One of the key issues of economic stabilization and reform programs was whether the persistence of inflation results from the traditional causes of insufficiently tight financial policies and non-market based wage formation. Money growth fuelled by fiscal obligations (Begg, 1996), wage increases out of line with productivity gains, strong growth of administered

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prices (for Slovenia see the evidence in Table 1) and stubbornness of inflation expectations played a dominant part in explaining inflation in central and east European countries. Progressive inclusion of these countries into European integration process urged price stabilization, predominantly through elimination of tariff barriers and through selective liberalization of prices of goods and production factors. Among crucial tasks for countries that are further ahead in their structural adjustment to economic rules of developed market economies remains the sustainable lowering of their inflation rates to European Union (EU) average. Despite of the recent success in reducing inflation, reported by individual „new" EU countries (e. g. Janíček and Zamrazilová, 2003), further (and not just temporary) disinflation is frequently hampered by inflation inertia reflecting explicit or implicit wage indexation and by distortions in the mechanism of relative prices (Koen and De Masi, 1997). In addition, relative price variability in these countries has appeared to be associated with downward price rigidity at the moderate levels of inflation. In such circumstances more close cooperation is needed between different branches of economic policy to accomplish successful disinflation intervention.

Table 1

Selected Statistics of the Slovenian Economy (growth rates in %)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004[6]
Inflation, annual average[1]	19.8	12.6	9.7	9.1	7.9	6.1	8.9	8.4	7.5	5.6	4.9
Administered prices (total)	13.5	12.8	16.1	12.5	12.5	8.6	14.1	15.0	10.5	3.7	n.a.
Average nominal exchange rate[2]	13.8	–8.0	14.3	17.9	16.7	3.9	5.9	6.0	4.1	3.3	2.2
Nominal base money	66.7	17.4	16.9	18.4	22.9	16.4	4.8	21.4	8.6	5.1[5]	n.a.
Nominal money M3	50.8	32.3	19.4	23.8	20.9	15.3	17.0	27.3	22.6	15.9[5]	n.a.
Gross average real wages[3]	3.6	4.4	4.9	3.2	1.6	3.3	1.6	3.3	2.1	1.9	n.a.
Labour productivity[4]	5.0	3.3	4.5	5.2	3.6	3.3	4.0	2.8	3.8	2.5	3.6

[1] Until 1998 inflation rate was measured by retail price index, after 1998 by consumer price index. [2] Until 1997 average nominal exchange rate SIT/US$, after 1997 average nominal exchange rate SIT/EURO. Tolar (SIT) = Slovenia*s national currency. [3] Deflated by consumer price index. [4] Value added per employee. [5] May 2003. [6] Forecast by IMAD (2004).

Source: IMAD (2004) and Bank of Slovenia (2004), Monthly Bulletin, No. 4; own calculations.

The effects of macroeconomic policies on price formation are elaborated in numerous studies, but only few of them consider these effects at sectoral levels (e. g. Mundlak et al., 1990; Feltenstein and Ha, 1993; Estrada and Hernando, 1999). Degree of tradability of goods, intensity of competition on domestic market, relative factor endowment of individual sectors and nominal rigidities of sectoral prices are just few of the significant factors that influence the effectiveness of monetary, exchange rate and income policy in disinflation. The aim of the present paper is to explore various disinflation scenarios for 2004 in the case of Slovenian economy taking into account the sector-specific pressures on the development of inflation. For this purpose an iterative multisectoral model has been utilized underpinned by detailed estimates of sectoral price functions. The rest of the paper is organized into four sections. Section 1 is devoted to the estimation of sectoral price functions. Following these estimates section 2 contains the specification of economic policy variables, focusing on the channels for inflation control, and the presentation of the model. Description of model simulations accompanied by discussion of results is given in section 3. The main findings and possible policy implications are stated in the final section.

1. Estimation of Sectoral Price Functions

The literature on estimation of price functions using disaggregated, industry data (Melliss, 1996; Bekő, 1998; Bils and Chang, 2000; Bekő and Boršič, 2001; Ashworth and Byrne, 2003) suggests that the determinants of price movements in Slovenian economy can be specified in the following form:

$$\begin{aligned}\frac{CNp_{j,k}}{CNp_{j,k-1}} &= A_{1j}\cdot\left(1+P_{k-1}\right)^{1/n} + A_{2j}\cdot\frac{Fp_{j,k}}{Fp_{j,k-1}} + A_{3j}\cdot\frac{BM_k}{BM_{k-1}} + \\ &+ A_{4j}\cdot\frac{PC_{j,k}}{PC_{j,k-1}}\cdot\frac{Vq_{j,k-1}}{Vq_{j,k}} + A_{5j}\cdot\frac{\sum_{j=A}^{m} W_{j,k}}{\sum_{j=A}^{m} W_{j,k-1}}\cdot\frac{Cq_{j,k-1}}{Cq_{j,k}} + \\ &+ A_{6j}\cdot\frac{\sum_{j=A}^{m} S_{j,k-1}}{\sum_{j=A}^{m} S_{j,k-2}}\cdot\frac{Cq_{j,k-2}}{Cq_{j,k-1}} + A_{0j}\end{aligned} \tag{1}$$

where

- CNp_j – net sectoral prices (in SIT) (data source: Institute of Macroeconomic Analysis and Development of the Republic of Slovenia),
- P – consumer price index (data source: Bank of Slovenia),
- Fp_j – gross sectoral prices of final imports (in SIT) (gross sectoral prices of final imports consist of gross sectoral import prices of capital goods plus gross sectoral import prices of consumption goods; data source: Statistical Office of the Republic of Slovenia),
- BM – nominal base money (in SIT) (data source: Bank of Slovenia),
- PC_j – sectoral production costs (in SIT) (data source: Institute of Macroeconomic Analysis and Development of the Republic of Slovenia),

Vq_j – quantity of sectoral production (data source: Bank of Slovenia and Statistical Office of the Republic of Slovenia),

$\sum_{j=A}^{m} W_j$ – total gross nominal wages (in SIT) (data source: Bank of Slovenia),

Cq_j – quantity of sectoral sales (data source: Bank of Slovenia and Statistical Office of the Republic of Slovenia),

$\sum_{j=A}^{m} S_j$ – total nominal investment and non-production demand (in SIT) (data source: Economic Institute of the School of Law in Ljubljana),

j – observed sector = $A, B, \ldots m$,

k – individual month = $1, 2, \ldots n$.

Coefficient A_{1j} reflects connection of net sectoral prices with past inflation, coefficient A_{2j} with changes in gross sectoral prices of final imports, coefficient A_{3j} with variation of nominal base money, coefficient A_{4j} with fluctuations in average production costs, coefficient A_{5j} with surplus of total gross nominal wages over quantity of sectoral sales, coefficient A_{6j} with changes in total nominal investment and non-production demand over quantity of sectoral sales.

The determinants of price changes were estimated according to sectors of NACE classification Rev. 1 (*Nomenclature statistique des activités économiques dans la Communauté européenne*). Due to a change in the methodology of sectoral costs and price calculations the sample was limited to the period of January 1996 to December 2002. The definition of relevant explanatory variables demanded overcoming some mostly technical problems, such as separated calculations of specified variables, classification of the most appropriate series for individual sectors, adjustment of cyclical movements in statistically available series according to model specifications, etc.

Following the specification of equation 1, the data series analysed consist of coefficients (based on month-on-month changes), only stationary series were used. Stationarity was tested by ADF tests and the detected non-stationarity was eliminated by differentiation. When testing the basic data for the presence of a unit root the constant and the trend were included, while trend component was excluded in test of differences.

The sectoral functions are specified in a double linear form and estimated using ordinary least squares or generalized least squares method. In order to determine the time lag the Akaike information criterion was utilized. Taking into account the sample length and the length of model calculations, the time lag never exceeded the period of five months. For additional checking the Breusch-Godfrey LM test for first-, second- to twelfth-order autocorrelation was performed. The results of price function estimation, based on equation 1, are presented in Table 2.

Table 2: **Results of Price Function Estimation**[1]

	A_{0j}	A_{1j}	A_{2j}	A_{3j}	A_{4j}	A_{5j}	A_{6j}	*F–test*	*AVDV*	*AVSDV*
A	0.195 (0.416)	0.772_1^{*} (1.653)	–	–	–	–	0.026_4^{**} (2.360)	4.630 (0.005)	0.997	0.999
B	0.644 (0.598)	0.285 (0.266)	–	–	0.067^{***} (5.511)	–	–	11.650 (0.000)	1.005	1.003
CA	1.395^{***} (5.681)	-0.397_1^{*} (–1.625)	–	–	0.006_1 (1.454)	–	-0.0001^{**} (–2.337)	5.053 (0.003)	1.002	1.002
CB	0.310 (1.737)	0.694_2^{***} (3.914)	–	–	-0.004^{**} (–2.136)	–	–	27.560 (0.000)	1.006	1.004
DA	0.450^{***} (2.802)	0.479_5^{***} (3.122)	–	0.068^{*} (1.678)	0.021_4^{***} (3.025)	-0.015_2^{***} (–3.639)	–	6.788 (0.000)	1.007	1.006
DB	0.538^{*} (1.971)	0.664_2^{**} (2.589)	0.032^{**} (2.210)	-0.205_4^{***} (–3.180)	–	-0.026^{**} (–2.203)	–	4.830 (0.001)	1.004	1.004
DC	0.020 (0.024)	1.013_2 (1.207)	-0.032^{**} (–2.043)	–	–	–	–	5.478 (0.002)	1.006	1.006
DD	1.207^{***} (10.048)	-0.217_4^{**} (–1.816)	0.003_5^{*} (1.957)	–	0.009_3^{*} (1.913)	–	–	4.030 (0.010)	1.002	1.002
DE	0.828^{***} (3.721)	0.282_5 (1.379)	–	-0.107_5^{*} (–1.995)	–	–	–	4.491 (0.006)	1.003	1.004
DF	0.155 (0.089)	0.765_3 (0.442)	–0.005 (–1.656)	–	0.041_1^{**} (2.319)	0.181_4^{***} (2.935)	-0.135_4^{**} (–2.295)	3.648 (0.009)	1.008	1.013
DG	0.324 (0.625)	0.606_5 (1.192)	0.017^{**} (2.159)	–	0.062^{**} (2.312)	-0.053_1^{*} (–1.964)	0.044^{**} (2.569)	7.029 (0.000)	1.006	1.006
DH	0.489 (1.275)	0.541_1 (1.413)	0.015_3^{**} (2.043)	–	-0.046_3^{***} (–2.984)	–	–	5.049 (0.003)	1.003	1.003
DI	0.741^{**} (2.483)	0.414_4 (1.440)	–	-0.151^{**} (–2.147)	–	–	–	2.532 (0.065)	1.005	1.005
DJ	0.042 (0.139)	0.951_4^{***} (3.120)	0.004_3^{*} (1.589)	–	–	–	–	4.931 (0.004)	1.004	1.004
DK	0.684^{**} (3.140)	0.421_4^{*} (1.980)	–	-0.104_2^{*} (–1.931)	–	–	–	4.036 (0.011)	1.003	1.003
DL	1.592^{***} (9.828)	-0.564_3^{***} (–3.512)	–	–	–	–	-0.023^{***} (–3.879)	12.194 (0.000)	1.001	1.001
DM	1.312^{***} (5.403)	-0.484_4^{**} (–2.110)	–	0.178_3^{***} (2.858)	–	–	–	5.197 (0.003)	1.005	1.004
DN	0.396 (1.418)	0.462_5^{*} (1.755)	0.014_2^{***} (2.871)	0.156_2^{**} (2.323)	-0.030_2^{**} (–2.422)	–	–	3.865 (0.004)	1.005	1.004
F	0.653^{***} (6.532)	0.351_1^{***} (3.530)	–	–	–	–	–	16.403 (0.000)	1.006	1.006
G	0.724^{***} (7.688)	0.281_1^{**} (3.006)	–	–	–	-0.001_4^{**} (–2.176)	–	29.408 (0.000)	1.002	1.004
H	0.520^{**} (2.029)	0.653_4^{**} (2.632)	–	-0.169^{***} (–2.652)	–	–	–	6.804 (0.002)	1.006	1.006
I	–0.152 (–0.404)	1.098_4^{***} (2.950)	–	–	0.056^{***} (3.296)	–	–	9.321 (0.000)	1.009	1.009

[1] Numbers in parentheses are values of t–statistics; numbers beside the regression coefficients denote the length of the time lag; a (*), (**) or (***) indicate significance at the 10 %, 5 % or 1 % level, respectively; *p* values for the F – test are in parentheses. AVDV – Average value of the dependent variable. AVSDV – Average value of the simulated dependent variable. A – Agriculture, forestry, hunting. B – Fishing. CA – Mining and quarrying of energy materials. CB – Mining and quarrying, not energy materials. DA – Manufacture of food products, beverages and tobacco. DB – Manufacture of textiles and textile products. DC – Manufacture of leather and leather products. DD – Manufacture of wood and wood products, except furniture. DE – Manufacture of pulp, paper and paper products; publishing and printing. DF – Manufacture of coke, refined petroleum products and nuclear fuel. DG – Manufacture of chemicals, chemicals products and man-made fibres. DH – Manufacture of rubber and plastic products. DI – Manufacture of other non-metallic mineral products. DJ – Manufacture of basic metals and fabricated metal products. DK – Machinery and equipment n.e.c. DL – Manufacture of electrical and optical equipment. DM – Manufacture of transport equipment. DN – Manufacture of furniture n.e.c. F – Construction. G – Wholesale and retail trade, repair of motor vehicles. H – Hotels and restaurants. I – Transport, storage and communication.

Sectoral analysis of price function can be summarised as follows:

- In the specified price functions of individual sectors demand-pull and cost-push factors were included. Among the latter the most important according to statistical significance are fluctuations of the consumer price index, changes in gross prices of final imports and dynamics of average production costs. In addition, in all functions the average value of dependent variable corresponds with the simulated value of sectoral prices.
- In fifteen sectors out of twenty-two estimated the sectoral price formation is significantly dependent on past inflation rate. In the remaining seven sectors the import prices and production costs outweigh the role of inflation expectations by the formation of individual sectoral prices. Higher inflation rate clearly leads to price increases in the following sectors: agriculture, forestry and hunting (A), mining and quarrying (CB), manufacture of food products, beverages and tobacco (DA), manufacture of textiles and textile products (DB), manufacture of basic metals and fabricated metal products (DJ), machinery and equipment (DK), manufacture of furniture (DN), construction (F), wholesale and retail trade (G), hotels and restaurants (H), transport, storage and communication (I).
- Taking into account the foreign conditions of economic activity a positive impact of gross prices of final imports on domestic net sectoral prices was confirmed in the case of manufacture of textiles and textile products (DB), manufacture of wood and wood products (DD), manufacture of chemicals, chemicals products and man-made fibres (DG), manufacture of rubber and plastic products (DH), manufacture of basic metals and fabricated metal products (DJ), and manufacture of furniture (DN).
- The rise of average production costs generates additional price increases in six sectors: fishing (B), manufacture of food products, beverages and tobacco (DA), manufacture of wood and wood products (DD), manufacture of coke, refined petroleum products and nuclear fuel (DF), manufacture of chemicals, chemicals products and man-made fibres (DG), and transport, storage and communication (I).
- The explanatory power of the monetary variable is modest. The direct impact of an increase in nominal base money on sectoral price formation appears to be positive in manufacture of food products, beverages and tobacco (DA), in manufacture of transport equipment (DM) and in manufacture of furniture (DN). As it has been already pointed out by, inter alia, Bekő (1998) and Coricelli et al. (2003), the impact of base money on prices of goods and services is in Slovenia also indirect; it runs through exchange rate movements (import prices), these influence the level of production cost and the latter shapes the dynamics of sectoral prices.

• The demand-pull factors of domestic net sectoral prices are covered by changes in surplus of total gross nominal wages over quantity of sectoral sales and by changes in total nominal investment and non-production demand over quantity of sectoral sales. Both variables are able to explain individually the development of prices in five sectors.

2. Specification of Economic Policy Variables and Description of the Model

The price function (equation 1) enables the inclusion of three sets of exogenous variables that represent particular measures of economic policy. In the first set of exogenous variables, the gross sectoral prices of final imports (Fp_j) are affected through SIT/EURO exchange rate (EX) and through variation of import tariff rates (ΔFTr_j). Formation of exchange rate changes is a function of two indexation schemes (coefficient FEX and coefficient GEX) with respect to the last calculated consumer price index (P) and a function of exogenous shocks in exchange rate (ΔEXr):

$$\frac{EX_k}{EX_{k-1}} = \left(1 + P_{k-1} \cdot FEX + GEX\right)^{1/n} \cdot \left(1 + \Delta EXr_k\right) \tag{2}$$

where

ΔEXr – exogenous changes of SIT/EURO exchange rate,

k – individual month = $1, 2, \ldots n$.

The dynamics of exchange rate affects, in combination with possible shocks in net sectoral import prices ($\Delta FNpr_j$), the net prices of final imports (FNp_j), (equation 3). Afterward, these form a new level of gross sectoral prices of final imports (Fp_j), (equation 4). Through simulation obtained values of gross sectoral prices of final imports enter the price equation delineated in section 1 and contribute to changes in domestic prices in accordance with the estimated impact coefficients. In addition, equation 4 assumes that changes in gross prices of final imports can also be provoked by the alteration of import tariff rates (ΔFTr_j), (equation 5).

$$\frac{FNp_{j,k}}{FNp_{j,k-1}} = \frac{EX_k}{EX_{k-1}} \cdot (1 + \Delta FNpr_{j,k}) \tag{3}$$

$$Fp_{j,k} = FNp_{j,k} \cdot (1 + FTr_{j,k}) \tag{4}$$

$$FTr_{j,k} = FTr_{j,k-1} + \Delta FTr_{j,k} \tag{5}$$

where

$\Delta FNpr_j$ – exogenous changes of net sectoral import prices,

ΔFTr_j – exogenous changes of import tariff rates,

j – observed sector = *A, B,…m,*

k – individual month = *1, 2,…n.*

The second set of exogenous variables covers the modelling of nominal base money (*BM*). Equation 6 presupposes growth of nominal base money that is linked to the targeting of the recorded consumer price index through two indexation coefficients (*FBM* and *GBM*) and growth of nominal base money that is independent on current inflation trends (ΔBMr):

$$\frac{BM_k}{BM_{k-1}} = \left(1 + P_{k-1} \cdot FBM + GBM\right)^{1/n} \cdot \left(1 + \Delta BMr_k\right) \tag{6}$$

where

ΔBMr – exogenous changes of nominal base money,

k – individual month = *1, 2,…n.*

The average net nominal sectoral wages (WNp_j) are the third set of exogenous channels affecting sectoral price formation. Their dynamics is based on the adjustment to the last recorded consumer price index through two indexation coefficients (*FW* and *GW*), or is subject of direct wage control in individual sectors ($\Delta WNpr_j$):

$$\frac{WNp_{j,k}}{WNp_{j,k-1}} = \left(1 + P_{k-1} \cdot FW + GW\right)^{1/n} \cdot \left(1 + \Delta WNpr_{j,k}\right) \tag{7}$$

where

$\Delta WNpr_j$ – exogenous changes of average net nominal sectoral wages,

j – observed sector = *A, B,…m,*

k – individual month = *1, 2,…n.*

The changes in average net nominal sectoral wages are transmitted, with or without exogenous changes in the taxation rate of net wages (ΔWTr_j), to the new level of average gross nominal sectoral wages (Wp_j):

$$Wp_{j,k} = WNp_{j,k} \cdot (1 + WTr_{j,k}) \tag{8}$$

$$WTr_{j,k} = WTr_{j,k-1} + \Delta WTr_{j,k} \tag{9}$$

where

ΔWTr_j – exogenous changes in the taxation rate of net nominal sectoral wages,

j – observed sector = *A, B,…m,*

k – individual month = *1, 2,…n.*

With the help of the level of sectoral employment (Wq_j) and the level of average gross nominal sectoral wages (Wp_j) the sectoral gross nominal wages (W_j), that enter equation 1, can be expressed as:

$$W_{j,k} = Wq_{j,k} \cdot Wp_{j,k} \tag{10}$$

The remaining components of equation 1 are, together with changes of net sectoral prices, derived from dynamic interdependence model of the Slovenian economy (Kračun, 1996; Kračun and Bekő, 1999). The model base is calculated out of the Slovenian input-output table and taking account of results of causality tests between exports and domestic production (Bekő 2003) the dynamics of sectoral production is in price equation dependent on foreign demand, represented by growth of real gross domestic product in OECD countries. Sectoral quantity adjustments are in the interdependence model function of changes in relative net sectoral prices and are defined so that they consider corresponding succession of quantity and price computations at the sectoral level. Since the model is iterative, all quantity and price changes are constructed according to time lag structure established by the coefficients of sectoral price functions (Table 2). The model allows twelve consecutive iterations which matches with the frequency of time series used by the estimation of price functions. The dynamics of sectoral production costs is in every iteration separately determined by corresponding matrix multiplier, while the calculation of matrix elements of domestic intermediary consumption is performed with the modified biproportional method (Kračun, 1990).

The structure of the model presented above enables a spontaneous formation of sectoral prices in accordance with the magnitude of estimated parameters of price functions, with the values set for the specified economic policy measures and with endogenously calculated variables of the model. Through such procedure all sectoral peculiarities in price formation are maintained and, in combination with possible economic policy actions and exogenous chocks, reasonably considered by assessment of aggregate inflation rate.

Prices in any of the sectors are under direct control of economic policy, then price changes can be set exogenously ($\Delta CNpr_j$) or adjusted to the last registered inflation rate (FCN_j and GCN_j) as it is defined in equation 11:

$$\frac{CNp_{j,k}}{CNp_{j,k-1}} = \left(1 + P_{k-1} \cdot FCN_j + GCN_j\right)^{1/n} \cdot \left(1 + \Delta CNpr_{j,k}\right) \tag{11}$$

where

FCN_j and GCN_j – indexation coefficients for individual sector,
$\Delta CNpr_j$ – exogenous changes of net prices for individual sector,
j – observed sector = $A, B, \dots m$,
k – individual month = $1, 2, \dots n$.

3. Model Simulations and Results

After defining all the channels through which the formation of sectoral prices can be influenced, either within the model or via shocks coming from economic environment, in this section we construct a mix of aggregate (sectoral) shocks and analyse their end-effects. The estimation of inflation rates for 2004 under various economic policy scenarios was made under the following general assumptions: the growth of real gross domestic product in OECD will reach 3.0 % (source: OECD, 2003) in 2004, the average SIT/EURO exchange rate will rise by 2.2 % this year, the initial increase in consumer price index amounts to 5.6 % (data from 2003) (source: IMAD, 2004) and the tariffs for final imports will fall by 5 percentage points in fifth iteration. The assumption about lowering of tariff rates on final imports takes into account Slovenia's full membership in EU and with it associated additional liberalization of foreign trade regime with EU countries in May 2004.

In order to evaluate possible disinflation options six alternative economic policy scenarios were specified. The transformation of scenarios into exogenous variables of the model is shown in Table 3.

Scenario 1 is based on the assumption that all in section 3 defined economic policy measures are neutral and there are not nominal rigidities in the sectors observed. The movements in SIT/EURO exchange rate, nominal base money and average net nominal wages therefore follow fully the projected inflation rate from 2003. In addition, the energy prices in sector electricity, gas and water supply (E), which are under government control,[1] are also adjusted to the targeted monthly dynamics of consumer price index.

In scenario 2 prices in sector electricity, gas and water supply remain unchanged, but all other elements of the scenario 2 are equal to the scenario 1.

Scenario 3 is based on the strict control of prices in sector electricity, gas and water supply in combination with growth of average net nominal wages so that it is 3 percentage points below the annual inflation rate.

Scenario 4 and 5 are modifications of scenario 3. The former assumes stronger de-indexation of average net nominal wages and a simultaneous rise of controlled prices that does not exceed the cumulative increase of consumer prices recorded in 2004 ($FCN_j = 0.94$), while the latter by limiting the growth of controlled prices to the dynamics of year-end inflation allows complete indexation of average net nominal wages under condition that the SIT/EURO exchange rate rises so that it is 3.9 percentage points below the annual inflation rate.

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[1] Since the prices in sector electricity, gas and water supply (E) are under government control in all six scenarios, the price function for this sector was not estimated by equation 1.

Table 3

Values of Exogenous Variables

Simulation variable	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
FEX	1.0	1.0	1.0	1.0	1.0	1.0
GEX	0.0	0.0	0.0	0.0	–0.039	–0.039
ΔEXr_k	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12
$\Delta FNpr_{j,k}$	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12
$\Delta FTr_{j,k}$	–0.05; j = A, B, …NMS; k = 5, 0.0; j = A, B,…NMS; 1 < k < 4, 4 < k < 12	–0.05; j = A, B,…NMS; k=5, 0.0; j = A, B,…NMS; 1 < k < 4, 4 < k < 12	–0.05; j = A, B,…NMS; k = 5, 0.0; j = A, B,…NMS; 1 < k < 4, 4 < k < 12	–0.05; j = A, B,…NMS; k = 5, 0.0; j = A, B,…NMS; 1 < k < 4, 4 < k <12	–0.05; j = A, B,…NMS; k = 5, 0.0; j = A, B,…NMS; 1 < k < 4, 4 < k < 12	–0.05; j = A,B,..NMS; k = 5, 0.0; j = A, B,…NMS; 1 < k < 4, 4 < k < 12
FBM	1.0	1.0	1.0	1.0	1.0	1.0
GBM	0.0	0.0	0.0	0.0	0.0	–0.03
ΔBMr_k	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12	0.0; k = 1, 2,…12
FW	1.0	1.0	1.0	1.0	1.0	1.0
GW	0.0	0.0	–0.03	–0.045	0.0	–0.025
$\Delta WNpr_{j,k}$	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12
$\Delta WTr_{j,k}$	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12
FCN_j	1.0; j = E	0.0; j = E	0.0; j = E	0.94; j = E	0.94; j = E	0.94; j = E
GCN_j	0.0; j = E	0.0; j = E	0.0; j = E	0.0; j = E;	0.0; j = E	0.0; j = E
$\Delta CNpr_{j,k}$	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12	0.0; j = A, B,…NMS; k = 1, 2,…12

The most restrictive mix of economic policy measures, scenario 6, is grounded on three preconditions. First, the dynamics of prices under government control and the movements in SIT/EURO exchange rate remain equal to that in scenario 5. Second, average net nominal wages increase so that they are 2.5 percentage points below the recorded year-end inflation rate. And third, the growth of nominal base money lags behind the annual inflation rate by 3 percentage points.

The simulations of all six economic policy scenarios, summarized in Table 3, were computed using the latest version of software application KIMSLO 3.3.4. Coefficients by individual sectors show the cumulative (from January to December 2004) increase in net sectoral prices, whereas figures in the last row of Table 4 depict the cumulative increase in the weighted average of gross sectoral prices, i.e. the year-end inflation rate.[2] Due to poor data availability price functions for financial intermediation (J), real estate, renting and business services (K+MS) and non-market services (NMS) could not be satisfactorily estimated. The price formation in these sectors is therefore approximated to the dynamics of sectoral costs following the procedure delineated in previous section.

The results of the simulation exercises enable a number of conclusions. First, all disinflation scenarios point to the weakening of the inflationary impact coming from agricultural prices which is in accordance with the past decrease of prices in sector agriculture, forestry and hunting, documented in Table 4.

Second, the strict control of energy prices of public utilities during the whole year contributes to the lowering of inflation by 0.38 percentage points with respect to the inflation record under scenario 1. However, it has to be emphasized that such price fixation inherently feeds inflationary expectations which in the course of time may create new distortions in relative sectoral prices.

Third, additional lowering of inflation rate by 0.65 percentage points, compared with the scenario of strict regulation of energy prices (scenario 2), is gained by a 3 % de-indexation of average net nominal wages according to recorded consumer price index.

Fourth, the same inflation outcome (approximately 3.6 % inflation rate) can also be achieved in 2004 when the formation of prices in sector electricity, gas and water supply is tied down by forecasted inflation and combined with a cut of real wages by additional 1.5 percentage points, but also when full indexation of average net nominal wages is supplemented with more restrictive exchange rate policy (scenario 5).

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[2] Weights are initially based on input-output table for Slovenia and subsequently computed for every iteration (month) using the KIMSLO 3.3.4 without any changes in the taxation rate of domestic sectoral sales.

Results of simulations of all scenarios in Table 3 for individual months are available from Jani Bekő upon request.

The disinflation effect from appreciation of exchange rate appears to be more evenly distributed among prices in manufacturing sectors than in the case of substantial de-indexation of average net nominal wages (scenario 4), where the smaller increase of prices is concentrated mainly in labour-intensive sectors.

Table 4

Results of Model Simulations

Sector[1]	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
A	0.953631	0.951077	0.948141	0.948595	0.947217	0.944384
B	1.021747	1.018930	0.997087	0.988262	1.008992	0.990751
CA	1.037961	1.034557	1.005520	0.993551	1.025032	1.000342
CB	1.037519	1.035150	1.031331	1.031230	1.031021	1.027493
DA	1.059928	1.057999	1.054673	1.054484	1.054530	1.049540
DB	1.056007	1.054380	1.052166	1.052304	1.050138	1.053847
DC	1.052141	1.048734	1.043001	1.042731	1.043917	1.038651
DD	1.032130	1.032832	1.033859	1.033835	1.033903	1.034871
DE	1.050870	1.050260	1.049230	1.049181	1.049183	1.051257
DF	1.050203	1.047446	1.031327	1.025536	1.037928	1.024214
DG	1.043659	1.041308	1.040344	1.041616	1.037572	1.036391
DH	1.014960	1.013257	1.010897	1.011020	1.010793	1.008588
DI	1.061643	1.060720	1.059164	1.059090	1.059093	1.061980
DJ	1.015877	1.012665	1.007258	1.007003	1.006885	1.001918
DK	1.026460	1.025382	1.023562	1.023476	1.023480	1.024681
DL	1.035669	1.037956	1.040373	1.039857	1.042705	1.045041
DM	1.053690	1.054757	1.056561	1.056647	1.056642	1.053227
DN	1.078912	1.075488	1.056529	1.049668	1.059633	1.043388
E	1.047203	1.000000	1.000000	1.035392	1.035404	1.030380
F	1.061299	1.060070	1.057997	1.057899	1.057903	1.055993
G	1.052720	1.051748	1.050155	1.050101	1.050033	1.048560
H	1.069252	1.065651	1.037152	1.025609	1.055101	1.030791
I	1.070012	1.065943	1.057358	1.056156	1.058154	1.050416
J	1.053290	1.049873	1.025635	1.016114	1.033921	1.013252
K + MS	1.053055	1.049614	1.040988	1.039311	1.032769	1.025070
NMS	1.051182	1.047771	1.038578	1.036605	1.032155	1.024016
WAGSP	1.046331	1.042517	1.036045	1.035681	1.035634	1.029671

[1]A – Agriculture, forestry, hunting, B – Fishing, CA – Mining and quarrying of energy materials, CB – Mining and quarrying, not energy materials, DA – Manufacture of food products, beverages and tobacco, DB – Manufacture of textiles and textile products, DC – Manufacture of leather and leather products, DD – Manufacture of wood and wood products, except furniture, DE – Manufacture of pulp, paper and paper products; publishing and printing, DF – Manufacture of coke, refined petroleum products and nuclear fuel, DG – Manufacture of chemicals, chemicals products and man-made fibres, DH – Manufacture of rubber and plastic products, DI – Manufacture of other non-metallic mineral products, DJ – Manufacture of basic metals and fabricated metal products, DK – Machinery and equipment n.e.c., DL – Manufacture of electrical and optical equipment, DM – Manufacture of transport equipment, DN – Manufacture of furniture n.e.c., E – Electricity, gas and water supply, F – Construction, G – Wholesale and retail trade, repair of motor vehicles, H – Hotels and restaurants, I – Transport, storage and communication, J – Financial intermediation, K + MS – Real estate, renting and business services, NMS – Non-market services, WAGSP – weighted average of gross sectoral prices.

Fifth, the last set of results suggests that bringing down the rate of inflation in 2004 to 3 % is achievable only when the slower increase of exchange rate (under weak de-indexation of average net nominal wages) is accompanied by direct monetary squeezing.

Sixth, the more severe is the disinflation process the more narrow is the difference between the growth of prices in production sectors and prices in service sectors – in scenario 1, the difference in growth rate amounts to 1.78 percentage points in favour of growth of prices of service sectors, in scenario 2, this margin is reduced to 0.98 percentage points, in scenario 3, the margin drops off to 0.44 percentage points, whereas in scenario 6, the growth gap reaches 0.33 percentage points. Since the vigorous growth of prices of services in Slovenia is generated not only via real convergence and catching-up with EU countries (Čihák and Holub, 2001; Bole, 2003), the scope for eliminating with past inflation artificially established price disparities appears substantial. Despite virtually equal inflation outcome as under scenario 3, the difference in growth rate in favour of prices in service sectors is markedly bigger under scenario 4 (0.76 percentage points) and scenario 5 (0.93 percentage points). These results imply that more aggressive cut in real wages predominantly hurts the cost structure of labour-intensive manufacturing sectors (scenario 4), while appreciation of exchange rate hits mainly tradable (manufacturing) sectors leaving the growth of costs (prices) in services rather untouched (scenario 5).

Conclusion

Further lowering of inflation rate in Slovenia is an integral part of the process of sectoral restructuring and the abolishment of fundamental macroeconomic inequilibriums. Simulation of various economic policy actions performed in this article shows that substantial progress in disinflation can be gained already in 2004. However, instead of employing a single anti-inflationary tool, stabilization of the inflation rate at around 3 – 4 % per annum demands highly harmonized implementation of at least three instruments: moderate de-indexation of wages, rigorous price policy in those segments of the Slovenian economy where lack of competition does not assure price stability and a prudent monetary policy.

As it has been shown in six model simulations too aggressive use of just one of the macroeconomic policies increases unevenly the costs of disinflation. Massive de-indexation of nominal wages exacerbates the social position particularly of workers employed in labour-intensive industries and may loosen the budget discipline, pronounced appreciation of the SIT/EURO exchange rate on the other hand brings (in terms of weaker external competitiveness) an extra pressure on export-oriented sectors. Above all, disinflation grounded predominantly on exchange rate appreciation aggravates the growth disparity between prices in service sectors and prices in production sectors and therefore calls for additional government control of non-tradable (service) prices. As presented in scenario 6, in order to mitigate the problem of increasing gap between prices of goods and prices of services due to exchange rate appreciation the latter can be combined with a decrease of money supply. Such policy scenario has two limitations. First, excessive use of money supply control for inflation stabilization would drive up interest rate which could endanger domestic economic growth. And second, after entering of Slovenia (in June 2004) into the Exchange Rate Mechanism (ERM II) the domestic monetary policy is oriented towards lowering of interest rate and precluding exchange rate variability to achieve sufficient degree of nominal convergence with EU-economies. Thus, a potential distortion in relative prices together with the existing dynamics of inflation (at lower levels) has to be tackled by adequate mix of income, price and fiscal policy. Certain disinflation effect can also be expected from Slovenia's membership in the ERM II and with this associated more stable exchange rate regime. Under condition that a sustainable lowering of inflation in Slovenia (as well in other „new" EU countries) to comparable euroarea level is achieved, the ERM II can provide the necessary framework to manage under more rigid exchange rate mechanism a successful catching-up while maintaining a clear orientation towards nominal convergence and the ultimate adoption of euro.

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