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Fiscal multipliers and factors of growth
in Poland and the Czech Republic in 2009

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Summary

First, the concept of public expenditure multiplier is redefined to allow for import intensity of exports, and its value is estimated for Poland and the Czech Republic in 2008–2009. Next, on the basis of effective demand model of economic dynamics, there follows a comparative analysis of GDP dynamics in the two countries in 2008-09 and of the factors that in 2009 made the rate of GDP growth positive in Poland and negative in Czech Republic. In 2009 both countries experienced the rate of exchange depreciation which, however, was significantly greater in Poland, as was the rise of rate of private savings, which negatively affects the GDP growth rate. On the other hand, fiscal expansion was slightly greater in Czech Republic than in Poland. What factors then helped to avoid the GDP growth to decline in 2009 in Poland but not in the Czech Republic? The key difference in the GDP generation was that in the latter country net exports were too small to offset the rate of growth of private savings, while in Poland improvement in the trade balance, heavily negative in earlier years, together with strong fiscal expansion outbalanced the effect of much greater than in the Czech Republic rise in the rate of private savings. The derived results are strongly sensitive to variations in such parameters of our model as sectoral import intensities and private propensity to save, which may well change with changes in growth of GDP and its components. This does not undermine theoretical foundations of our analysis, yet it limits validity of any conclusions with respect to hypothetical future impact of fiscal expansion or fiscal contraction. Nevertheless, it appears that maintaining a positive rate of GDP growth may require that the rate of private savings no longer continues to rise (i.e. that the average private propensity to consume no longer falls) at least until the dynamics of private investment and/or exports do not recover.

Key words: macroeconomics, effective demand principle, multiplier, stabilization policy

Kody JEL: E0, E12, E20, E63

1. Introduction

What were the main determinants of GDP changes in Poland and the Czech Republic in 2009 that made the GDP rise in the former and fall in the latter country? They both saw their respective rates of exchange depreciating, much more, however, in Poland where the zloty/euro rate declined by 23.2 per cent while the krona/euro rate declined by 6 per cent only. At the same time fiscal stimulation was stronger in the Czech Republic where public spending increased by 1.7 per cent of GDP and net taxation fell by 2.3 per cent of GDP, which added to GDP 4 per cent of fiscal stimulation. In Poland it was 3.5 per cent of GDP only, of which GDP 0.6 per cent represented increased public spending and GDP 2.9 per cent a fall in net taxation (see Statistical Annex, Table A2). How these and other differences affected the respective rates of growth in both countries?

The analytical framework of our study is the demand driven economy model that we have already used for refining the concept of fiscal multiplier and estimating its value in Poland in 2006-2009.¹ This refinement, important also for the present examination of growth factors in Poland and the Czech Republic in 2009, accounts for the fact that the 'import leak' that reduces the value of Keynesian multipliers is not the ratio of total imports to GDP, as it is usually represented, since part of imports serves export production (or represents re-export). Therefore, in calculating the GDP fiscal multipliers, from total imports their part servicing export production plus re-exports must be deducted and only the difference must be related to the volume of domestic absorption. Considering that in an open economy final output which includes exports is significantly greater than its GDP, the GDP fiscal multipliers are correspondingly greater. Moreover, since import intensity of exports is as a rule greater than that of domestic absorption, this also increases fiscal multipliers. Thus import intensities of domestic absorption and of its component parts affect strongly the impact of changes in individual components of effective demand on the GDP dynamics.

In estimating fiscal multipliers in Poland and the Czech Republic not only import intensity of exports and that of domestic absorption as a whole are distinguished but, moreover, the latter is subdivided into import intensities of: (i) private consumption, (ii) public spending, and (iii) gross capital formation, since those intensities being different from each other affect in turn the volume of fiscal multipliers. Moreover, disaggregating sector multipliers helps to explain relative differences in the impact of changes of individual components of global effective demand on the GDP dynamics. This, as it will be shown in the concluding part of our paper, may be meaningful for policy recommendations.

¹ See Łaski, Osiatyński, Zięba, 2010, 2010a; see also Łaski 2009a and 2010.

2. Analytical model

It is assumed that within capacity volume of factors of production, changes in output and employment are determined on the one hand, by changes in the sum of demand injections, i.e. in private investments, exports and government spending and, on the other hand, by leakages in global demand, i.e. in net taxation, imports and private savings. Given the coefficients of net taxation, propensity to save of the private sector, and the respective import intensities, autonomous demand injections determine the GDP changes. Furthermore, in accordance with the standard Keynes/Kalecki model, it is assumed that: (i) in the economy under examination factors of production are not fully used, (ii) changes in national income distribution between gross profit margins and wages are insignificant, (iii) within the considered changes in output no difficulties in balancing current account of balance of payments appear, (iv) the supply of money is demand elastic. Under these assumption a rise in global effective demand need not generate price rises, and at any rate it leaves room for accommodative changes in the volume of output and employment.

Let us denote GDP by Y and represent it as the sum:

$$Y = CP + IP + G + X - M, \quad (1)$$

where CP stands for private consumption, IP for private investments, G for government expenditures on goods and services, X for exports, and M for imports (net factor incomes from abroad are ignored here).² Moreover, let TN stand for net taxation, i.e. the difference between total revenues from taxes and other contributions imposed on the private sector, and total current money transfers from the public sector to households and firms. Hence the difference, $Y - TN$, is YD , i.e. disposable income of the private sector, TN is the disposable income of the public sector, and $Y = YD + TN$. Moreover, let us denote the difference between disposable income of the private sector and private consumption by SP_k , where SP_k represents gross savings of the private sector (i.e. of households and firms from their respective disposable incomes). Then:

$$CP = Y - TN - SP_k \quad (2)$$

or

$$Y = CP + TN + SP_k \quad (2.1)$$

² Because of lack of sufficiently disaggregated data on current account of balance of payments, changes in GDP dynamics, and not in gross national income, GNP, are considered here. Therefore, in our calculations only balance of foreign trade of goods and non-factor services will be accounted for.

Denoting by tn and sp_k respectively the average (and marginal) rate of net taxation, $tn = TN/Y$, and the rate of private savings, $sp_k = SP_k/Y$, we get:

$$CP = (1 - tn - sp_k)Y$$

and
$$CP = cpY \quad (3)$$

where $cp = 1 - tn - sp_k$ stands for average and marginal rate of consumption (i.e., private propensity to consume).

Let us now denote by A domestic absorption, i.e. the sum of investments (private and public), and consumption (private and public), where $A = CP + G + IP$, and divide total import M between its part M_A that serves (directly and indirectly) domestic absorption, and its part M_X that serves (directly and indirectly) exports,³ where $M = M_A + M_X$. Moreover, let us denote by m_A import intensity of domestic absorption, i.e. the ratio M_A/A , and by m_X import intensity of exports, i.e. the ratio M_X/X . Then we get:

$$M = M_A + M_X = m_A A + m_X X = m_A CP + m_A (IP + G) + m_X X,$$

and substituting cpY for CP we get:

$$M = m_A cpY + m_A (IP + G) + m_X X \quad (4)$$

Now, substituting (3) and (4) into (1) we get:

$$\begin{aligned} Y &= (1 - m_A)CP + (1 - m_A)G + (1 - m_A)IP + (1 - m_X)X \\ Y[1 - cp(1 - m_A)] &= (1 - m_A)(IP + G) + (1 - m_X)X \\ Y &= \frac{(1 - m_A)G + (1 - m_A)IP + (1 - m_X)X}{1 - cp(1 - m_A)} \end{aligned} \quad (5)$$

Once total imports are disaggregated into categories that serve each component of global demand, i.e. imports for (i) private consumption, (ii) private investments, (iii) public spending and (iv) exports, $M = M_{CP} + M_G + M_{IP} + M_X$, we can express import intensities of each component part of global demand as:

$$m_{CP} = \frac{M_{CP}}{CP}, \quad m_G = \frac{M_G}{G}, \quad m_{IP} = \frac{M_{IP}}{IP}, \quad m_X = \frac{M_X}{X}.$$

Substituting these definitions and equation (3) into (4) we get:

$$M = m_{CP} cp Y + m_G G + m_{IP} IP + m_X X \quad (4.1)$$

³ Re-exports are ignored here.

Then, from (1), (3) and (4.1) instead of formula (5) we get:

$$Y = \frac{(1-m_G)G + (1-m_{IP})IP + (1-m_X)X}{1-cp(1-m_{CP})} \quad (5.1)$$

Once individual components of global demand as well as their respective import intensities are estimated, equation (5.1) will provide foundations for our examination of GDP dynamics in both countries in 2009.

Equation (5.1) represents GDP as a function of government spending, G , private investment, IP , and exports, X , and of parameters that represent private propensity to consume, cp , and import intensities of the respective component parts of domestic absorption. In accordance with (5.1), given the leakage parameters, the respective volumes of exogenous demand injections, IP , G , and X , and their changes determine private consumption and thereby GDP.

If in equation (5.1) we denote:

$$\frac{(1-m_G)}{1-cp(1-m_{CP})} = k1, \quad \frac{(1-m_{IP})}{1-cp(1-m_{CP})} = k2, \quad \frac{(1-m_X)}{1-cp(1-m_{CP})} = k3,$$

then it can be put as:

$$Y = k1G + k2IP + k3X \quad (6)$$

where each k represents the respective multiplier: $k1$ – fiscal, $k2$ – investment, and $k3$ – export. Thus, on the strengths of (6), Y is fully determined by autonomous injections of each component part of global demand and its respective multiplier k .⁴

Denoting an absolute change in GDP between period t and $t+1$ by ΔY , $\Delta Y = GDP(t+1) - GDP(t)$, and differentiating the right part of equation (6), we get:

$$\Delta Y = \Delta(k1G + k2IP + k3X) = \Delta(k1G) + \Delta(k2IP) + \Delta(k3X)$$

Now, taking into account changes in multipliers k over time, GDP changes may be represented as:

$$\begin{aligned} \Delta Y = & (k1\Delta G + G\Delta k1 + \Delta G\Delta k1) + \\ & (k2\Delta IP + IP\Delta k2 + \Delta IP\Delta k2) + \\ & (k3\Delta X + X\Delta k3 + \Delta X\Delta k3) \end{aligned} \quad (7)$$

⁴ Individual multipliers, k , are subject to variations from one period to another as the coefficients that determine them change depending on subjective factors (such as, e.g., propensity to save), as well as the objective ones (such as rates of interest and rates of exchange). Considering, however, that the subject-matter of our study is an *ex post* examination of factors that determined economic dynamics in Poland and the Czech Republic in 2008 and 2009, causes for changes of those coefficients are not examined here, their empirical values being taken from statistical series.

Grouping together changes in demand injections (i.e. in G , IP and X), in multipliers (k) and those representing mixed effects of the former and the latter, equation (7) may be written as:

$$\begin{aligned} \Delta Y &= (k_1 \Delta G + k_2 \Delta IP + k_3 \Delta X) + \\ &(G \Delta k_1 + IP \Delta k_2 + X \Delta k_3) + \\ &(\Delta k_1 \Delta G + \Delta k_2 \Delta IP + \Delta k_3 \Delta X) \end{aligned} \quad (7.1)$$

In periods when parameters determining equations (7) and (7.1), i. e. propensity to consume, the rate of net taxation and the respective import intensities, do not change, and therefore neither change the respective multipliers, k , equation (7.1) is simplified to the form:

$$\Delta Y = k_1 \Delta G + k_2 \Delta IP + k_3 \Delta X \quad (7.2)$$

Now, changes in GDP are a sum of changes in the disposable income of the private and the public sectors, and may be written as:

$$\Delta Y = \Delta YD + \Delta TN = \Delta CP + \Delta SP_k + \Delta TN \quad (8)$$

where increments ΔCP , ΔSP_k i ΔTN represent the combined results of changes in the values of the respective multipliers and in the volumes of G , IP and X .

Since in our study the respective volumes of Y , G , IP , X , CP , SP , TN and YD in 2008 and 2009 are known, as are the parameters cp , sp , tn , and the import intensities of private consumption, private investments, public expenditures and exports, the respective multipliers k_1 , k_2 and k_3 can be estimated. Therefore changes in private consumption, private savings and net taxation may be represented as the following system of equations⁵:

$$\begin{aligned} d(GDP) &= d(k_1 G) + d(k_2 IP) + d(k_3 X) , \\ d(CP) &= d(cp k_1 G) + d(cp k_2 IP) + d(cp k_3 X) , \\ d(SP) &= d(sp k_1 G) + d(sp k_2 IP) + d(sp k_3 X) , \\ d(TN) &= d(tn k_1 G) + d(tn k_2 IP) + d(tn k_3 X) \\ d(D) &= d(G - TN) \end{aligned} \quad (9)$$

where the last equation represents change in the deficit of the public sector.

Now we can turn to examining interdependencies represented by the system of equations (9) in Poland and the Czech Republic in 2009.

⁵ In order to distinguish between differences expressed by symbol „ Δ ” symbol ‘ d ’ is used to denote the operator of differentiation backward in time, $d(GDP) = GDP(t) - GDP(t-1)$.

3. Keynesian multipliers in Poland and the Czech Republic in 2008 and 2009

Let us start with estimating the respective coefficients that determine fiscal multipliers, k_1 , investment multipliers, k_2 , and export multipliers, k_3 , in Poland and the Czech Republic in 2008 and 2009. Empirical values of cp and sp_k (as defined above) are calculated from official statistics, as are the average rates of net taxation, tn (see Table 1). However, although accurate estimating of import intensities, and especially that of exports, m_X , is of great importance since they strongly affect import intensity of domestic absorption as a whole, m_A , it encounters difficulties. Moreover, in contrast to sub-dividing respective categories of imported final goods, import data in the published input-output tables does not allocate imported intermediate goods and services between separate categories of final demand. Our estimates of the respective import intensities, m_X , m_G , m_{IP} and m_{CP} , in 2008 and 2009 in Poland and the Czech Republic are shown in Table 1. It must be noted, however, that these estimates are based on some simplifying assumptions (explained in Statistical Annex below) which make them open to reservations and of only approximate nature.

Table 1. Multipliers and their underlying coefficients in Poland and the Czech Republic in 2008 and 2009

	Czech Republic			Poland.		
	2008	2009	Change in 2009	2008	2009	Change in 2009
$cp=CP/GDP$	0,497	0,506	0,009	0,617	0,614	-0,003
$sp_k=SP_k/PKB$	0,268	0,281	0,013	0,184	0,216	0,032
$tn=TN/PKB$	0,235	0,212	-0,023	0,199	0,170	-0,029
$m_{FG}=M/(C+I+X)$	0,420	0,389	-0,031	0,305	0,280	-0,025
$m_A=M_A/(C+I)$	0,318	0,283	-0,035	0,243	0,224	-0,019
$m_{CP}=M_{CP}/CP$	0,296	0,256	-0,040	0,227	0,202	-0,025
$m_G=M_G/G$	0,259	0,223	-0,036	0,183	0,183	0,000
$m_{IP}=M_{IP}/IP$	0,437	0,452	0,015	0,366	0,382	0,017
$m_X=M_X/X$	0,547	0,534	-0,014	0,467	0,424	-0,043

Source: Own calculation on the basis of nominal data of Polish Central Statistical Office and the Czech Statistical Office (all data in this and the following tables as available in April 2010); see also Table A1.

Our estimates show that in 2009 import intensities of exports and of public spending fell in both countries. Especially large was the reduction of import intensity of public spending in the

Czech Republic, while in Poland that of exports. In 2009, the latter was nonetheless higher in the Czech Republic (0.534) than in Poland (0.424) which is no surprise considering that import intensity of final output (defined as the ratio $M/(C + I + X)$) was significantly greater in the first country (where it was 0.420 and 0.389 in 2008 and 2009 respectively) than in the second (0.305 and 0.280).

Between 2008 and 2009 import intensity of private investment in both countries increased at a similar rate, since in both of them investments fell at a greater rate than imports. Import intensity of investment was smaller in Poland than in the Czech Republic, as were import intensities of public spending and of private consumption (see Table 1).

Coefficients shown in Table 1, i.e. private propensities to consume and to save, the rates of net taxation, and import intensities of component parts of final output, enable the calculation of the respective fiscal, investment and exports multipliers in both countries in 2008 and 2009 (see Table 2). A significantly greater fiscal multiplier in Poland (about 1.6) than in the Czech Republic (less than 1.25) is striking. Also investment multiplier was greater in Poland than in the Czech Republic (where it slightly increased between 2008 and 2009 while in Poland it hardly changed). Export multiplier was greater in Poland than in the Czech Republic as well (both, investment and export multipliers were greater than 1 in Poland and less than 1 in the Czech Republic). In 2009 export multipliers increased in both countries, more in Poland, however. As we shall see, their rise had a crucial impact on the rate of GDP growth in both countries in 2009 (see Table 4, row $\Delta k3X$).

Table 2. Multipliers: fiscal (k1), investment (k2) and export (k3) in Poland and the Czech Republic in 2008 and 2009 (current prices)

	Czech Republic.			Poland.		
	2008	2009	Change in 2009	2008	2009	Change in 2009
Fiscal multiplier, k1, $k1 = \Delta Y / \Delta G, \Delta G = 1$ $k1 = (1 - m_G) / [1 - cp(1 - m_{CP})]$	1,140	1,247	0,106	1,560	1,602	0,042
Investment multiplier, k2, $k2 = \Delta Y / \Delta IP, \Delta IP = 1$ $k2 = (1 - m_{IP}) / [1 - cp(1 - m_{CP})]$	0,866	0,880	0,014	1,211	1,210	-0,002
Export multiplier, k3, $k3 = \Delta Y / \Delta X, \Delta X = 1$ $k3 = (1 - m_X) / [1 - cp(1 - m_{CP})]$	0,697	0,748	0,052	1,019	1,129	0,110

Source: As in Table 1.

4. Demand injections, multipliers and GDP growth in Poland and the Czech Republic in 2009

If the multipliers are given and assumed not to change, decomposition of nominal GDP in accordance with changes in exogenous components of effective demand alone shows (see equation 7.2 and Table 3) that in the years 2008-09 the Czech economy was basically driven by exports which in 2009 generated 52 per cent of its GDP growth rate, 33 per cent being generated by public spending, and the remaining 15 per cent by private investment. A similar structure of growth factors is seen also in Poland, where the single most important GDP growth factor was also export, which contributed 44 per cent, next was public spending which contributed 38 per cent, and then private investment which generated 18 per cent. The share of public spending and private investment in GDP growth generating was significantly greater in Poland (56 per cent) than in the Czech Republic (38 per cent).

Table 3. Nominal shares in GDP of demand injections in the Czech Republic and Poland in 2008 and 2009 (current prices, PLN and KCs billion respectively)

	Czech Republic			Poland		
	2008	2009	Change in 2009	2008	2009	Change in 2009
(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP (bln KCs, PLN)	3689,0	3627,2	-61,8	1272,8	1342,6	69,8
k1G	1027,6	1181,0	153,4	459,3	511,5	52,2
k2IP	680,4	558,8	-121,6	295,4	240,4	-55,1
k3X.	1981,1	1887,3	-93,8	518,3	590,9	72,6
GDP =100 %	100,0%	100,0%		100,0%	100,0%	
k1G	27,8%	32,6%		36,1%	38,1%	
k2IP	18,4%	15,4%		23,2%	17,9%	
k3X	53,7%	52,0%		40,7%	44,0%	

Source: Own calculations on the basis of Polish and Czech Statistical Office data respectively.

Whereas Table 3 shows composition of nominal GDP as generated by demand injections assuming that their respective multipliers of 2008 have not changed, Table 4 represents decomposition of nominal variations in GDP in accordance with equation 7 (or 7.1), which bring together GDP adjustments not only due to changes in individual demand injections but also due to changes of their multipliers. First, following equation 7, Table 4 shows

contributions to GDP changes of the government sector, private investment, and export – in each case separating effects due to changes in the respective demand injections, and those due to changes in the respective multipliers. Next, decomposition according to equation 7.1 shows the impact on the GDP growth rates of changes: (i) in the demand injections by sectors, given the values of their respective multipliers, (ii) in respective multipliers, given the values of demand injections, and (iii) due to combined effects of incremental changes of both, the injections and the multipliers.

Decomposition of GDP growth by sectors helps to explain the difference between the Czech Republic, where in 2009 the nominal GDP fell by 1.7 per cent, and Poland where it increased by 5.5 per cent. Contribution of public sector's demand to the GDP growth rate was about the same, 4.16 p.p. in the former country and 4.1 p.p. in the latter. Responsibility for the difference in the GDP dynamics rests with negative contributions, in the Czech Republic, of private investment demand (by 3.3 p.p.) and of external demand (by 2.5 p.p.), whereas in Poland reduction in the contribution of private investments by 4.3 p.p. was outbalanced by external demand which contributed 5.7 p.p. to the GDP nominal growth rate.⁶ Most striking was the difference in external demand, the contribution of which was -2.5 p.p. in the Czech Republic and +5.7 p.p. in Poland. Together with a smaller by over 1 p.p. in the Czech Republic contribution of private investments, those sectoral contributions taken together produced 7.2 points difference in absolute terms between the GDP nominal growth rates in the two countries.

Table 4. Decomposition of nominal GDP growth rate in the Czech Republic and Poland in 2008 and 2009 (current prices, KCs and PLN billion respectively, and in per cent)

	Czech Republic				Poland			
	2008	2009	Change in 2009		2008	2009	Change in 2009	
			bln Kcs	%			bln PLN	%
GDP	3689,0	3627,2	-61,8	-1,7	1272,8	1342,6	69,8	5,5
G	901,1	947,4	46,3		294,3	319,1	24,8	
IP	785,9	635,3	-150,6		243,9	198,5	-45,4	
X.	2844,0	2521,6	-322,4		508,9	523,4	14,5	
Contribution to GDP growth due to changes in:								
1. government sector's demand, d(k1G)			153,4	4,16			52,2	4,10
2. private investment's demand, d(k2IP)			-121,6	-3,30			-55,1	-4,33
3. external demand d(k3X)			-93,8	-2,54			72,6	5,70

⁶ The rise in government spending in Poland was caused by greater than in the Czech Republic pre-financing by central and local governments of projects co-financed by the European Union, as well as by public spending on infrastructural projects linked with organization in Poland of the Football European Cup 2012.

Total $\Delta(\text{GDP})$, i.e., the sum of 1+2+3,								69,8	5,48
Contribution to GDP growth according to equation (7)									
1.1 general government sector, $k1*\Delta G+G*\Delta k1+\Delta k1*\Delta G$, of which:								52,2	4,10
$k1*\Delta G$			52,8	1,43				38,7	3,04
$G*\Delta k1$			95,7	2,59				12,5	0,98
$\Delta k1*\Delta G$			4,9	0,13				1,1	0,09
2.1 private investment, $k2*\Delta IP+IP*\Delta k2+\Delta k2*\Delta IP$, of which:								-55,1	-4,33
$k2*\Delta IP$			-130,4	-3,53				-55,0	-4,32
$IP*\Delta k2$			10,8	0,29				-0,1	-0,01
$\Delta k2*\Delta IP$			-2,1	-0,06				0,0	0,00
3.1 export, $k3*\Delta X+X*\Delta k3+\Delta k3*\Delta X$, of which:								72,6	5,70
$k3*\Delta X$			-224,6	-6,09				14,8	1,16
$X*\Delta k3$			147,5	4,00				56,2	4,42
$\Delta k3*\Delta X$			-16,7	-0,45				1,6	0,13
Total ΔGDP (the sum of 1.1+2.1+3.1):			-61,8	1,68				69,8	5,48
Contribution to GDP growth according to equation (7.1)									
4. Total contribution of demand changes, $k1*\Delta G+k2*\Delta IP+k3*\Delta X$, of which:								8,5	0,67
Change in demand of the government sector, $k1*\Delta G$			52,8	1,43				38,7	3,04
Change in demand of private investment and export sectors taken together, $k2*\Delta IP+k3*\Delta X$			-355,0	-9,62				-30,2	-3,16
of which private investment sector, $k2*\Delta IP$			-130,4	-3,53				-55,0	-4,32
external demand, $k3*\Delta X$			-224,6	-6,09				14,8	1,16
5. Total impact of changes in multipliers, $G*\Delta k1+IP*\Delta k2+X*\Delta k3$, of which of::								68,5	5,38
fiscal multiplier, $G*\Delta k1$			95,7	2,59				12,5	0,98
Investment multiplier, $IP*\Delta k2$			10,8	0,29				-0,1	-0,01
Export multiplier, $X*\Delta k3$			147,5	4,00				56,2	4,42
6. Total contribution of changes in demand injections and multipliers, $\Delta k1*\Delta G+\Delta k2*\Delta IP+\Delta k3*\Delta X$, of which:								2,7	0,21
$\Delta k1*\Delta G$			4,9	0,13				1,1	0,09
$\Delta k2*\Delta IP$			-2,1	-0,06				0,0	0,00
$\Delta k3*\Delta X$			-16,7	-0,45				1,6	0,13
Total: ΔGDP (the sum of 4+5+6)			-61,8	-1,68				69,8	5,48

Source: As in Table 3.

Decomposition of GDP growth by changes in demand injections and in multipliers shows in turn that multipliers' changes by themselves played also an important role in differentiating the GDP dynamics in both countries. These changes were heavily influenced by changes of export multipliers, much stronger than of other multipliers and only slightly greater in Poland (4.4 p.p.) than in Czechia (4.0 p.p.). Considering that the impact on GDP growth of demand injections alone was -8.2 p.p. in the Czech Republic, and merely 0.7 p.p. in Poland, in the

Czech Republic the multipliers' changes (where they totaled 6.9 p.p.) could only mitigate the effects of reduced demand, while in Poland (where they totaled 5.4 p.p.) they added to the GDP growth rate.⁷

Regarding fiscal stimulation effects in both countries, changes in fiscal multiplier in the Czech Republic played far greater role, contributing nearly 2.6 p.p. (against 1.4 p.p. by the change in public spending), whereas in Poland increased public spending contributed 3.0 p.p. and increased fiscal multiplier less than 1p.p.

Considering that import intensity declined in 2009 in both countries at a similar rate (the greatest fall was recorded in import intensity of private consumption – by 11 per cent in Poland and 13.6 per cent in the Czech Republic), the Keynesian multipliers increased significantly that year. In Poland, the strongest rise was experienced by export multiplier, by nearly 11 per cent. In the Czech Republic it increased by 7 per cent only (see Table 2), but the strongest riser there was recorded by fiscal multiplier (9 per cent, and only 2.5 per cent in Poland). Investment multipliers were rather stable in both countries. Since growth in the Czech Republic is far more export driven than in Poland, a fall in foreign demand had to affect the former country much stronger than the latter (in both countries foreign demand reductions were partly compensated by changes in export multipliers).

In conclusion – given a similar impact on the GDP growth rates of changes in demand of the public sector (4.16 p.p. in the Czech Republic and 4.10 p.p. in Poland), and of reductions in private investments (-3.3 p.p. in the first country and -4.3 p.p. in the second), the difference in impact of reduced foreign demand was of primary importance for explaining different GDP growth performance between the two countries.

⁷ Noteworthy are also differences in demand injections. In the Czech Republic, the strong negative impulse of the private sector (-9.6 p.p.) was due to a fall in private investments (-3.5 p.p.), but first and foremost in foreign demand (-6.1 p.p.). Those negative effects were compensated by a positive impact of rising spending of the public sector by only 1.4 p.p. In Poland, although the impact of reduced private investment was as much as -4.3 p.p., contribution of the export sector was positive (1.2 p.p., the difference in its impact between the two countries being 7.3 p.p. in absolute terms). The other difference was the impact of fiscal stimulation which was 3.0 p.p. in Poland, i.e. the difference between the two countries was 1.6 p.p. in absolute terms.

5. GDP distribution in Poland and the Czech Republic in 2008 and 2009

Nominal GDP is the sum of disposable income of the private sector (which splits between private consumption and private savings) and of the public sector (which splits between public consumption and public savings). On the basis of our system of equations (9) we shall now turn to examining the impact of (i) demand injections, (ii) sectoral multipliers, and (iii) the combined changes in (i) and (ii) on private consumption, private savings, and disposable income of the public sector in the Czech Republic and Poland in 2008 and 2009.

The data shown in Table 5 point out that stagnation of nominal private consumption in the Czech Republic in 2009 (it increased by a mere Kcs 2.9 mln) was caused by reduced private investments and exports. A rise in public spending was too small to stimulate private consumption, although it fully compensated the results of a fall of domestic and foreign private demand, thus preventing a decline in private consumption in 2009. Due to a relatively high rate of private savings in the Czech Republic, a rise in public spending was fully responsible for the increment in private savings in 2009, which amounted to Kcs 30.5 bn. A fall of exports and investments also caused a reduction of tax revenues and the resulting decline of government's disposable income by Kcs 95.4 bn.

Table 5. Private consumption, private savings and disposable income of the public sector in Poland and the Czech Republic in 2008 and 2009 (current prices, KCS and PLN billion)

	Czech Republic			Poland		
	2008	2009	Increment in 2009.	2008	2009	Increment in 2009
Private consumption, CP	1834,1	1836,9	2,8	785,3	824,5	39,2
cp(k1G)	510,9	598,1	87,2	283,3	314,1	30,8
cp(k2IP)	338,3	283,0	-55,3	182,3	147,6	-34,7
cp(k3X)	984,9	955,8	-29,1	319,7	362,9	43,1
Private savings, SP	990,0	1020,5	30,5	234,3	290,4	56,1
sp(k1G)	275,7	332,3	56,5	84,5	110,6	26,1
sp(k2IP)	182,6	157,2	-25,4	54,4	52,0	-2,4
sp(k3X)	531,6	531,0	-0,6	95,4	127,8	32,4
Disposable income of the public sector, TN	865,1	769,7	-95,4	253,4	227,9	-25,5
tn(k1G)	241,0	250,6	9,7	91,4	86,8	-4,6

tn(k2IP)	159,6	118,6	-41,0	58,8	40,8	-18,0
tn(k3X)	464,6	400,5	-61,1	103,2	100,3	-2,9
PKB=CP+SP+TN	3689,0	3627,2	-61,8	1272,8	1342,6	69,8

Source: Own calculations based on data of Table 3.

In Poland, in turn, notwithstanding a sharp decline in private investments, private consumption increased because a rise in public spending fully offset the effects of reduced private investments and increased exports generated increased private consumption. True, the latter's nominal growth was due to sharp price rise, but since prices of imports increased more, this stimulated consumption of domestic goods. Import of consumer goods fell stronger than total output and the gap could be filled in by increased domestic production. In difference to the Czech Republic, where the nominal rise of savings by Kcs 30.5 bn was generated in the public sector alone (by Kcs 56.5 bn), outbalancing reduced savings in the private investment sector (by Kcs -25.4 bn), in Poland private savings increased both, due to expansion of the public sector (by PLN 26.1 bn), and the export sector (by PLN 32.4 bn). Finally, in difference to the Czech Republic, where a sharp fall in disposable income of the public sector was generated by a reduction of private demand, in Poland reduction of disposable income of the public sector was produced also by reduced rates of personal income tax.

In 2009 private consumption in the Czech Republic represented 50.6 per cent, and in Poland 61.4 per cent of their respective GDPs. Of these, in the Czech Republic 16.5 p.p., and in Poland 23.4 p.p. depended on the demand of the public sector, 7.8 p.p. in Czechia and 11.0 p.p. in Poland depended on private investments, and 26.4 p.p. in Czechia, and 27.0 p.p. in Poland on exports. Thus, a higher share of private consumption in GDP in Poland was due to public spending and private investments, as well as higher propensity to consume there. The role of exports in determining the share of private consumption in GDP was similar in both countries.

6. Public sector deficit

By definition, deficit of the public sector is the difference between public expenditures on consumer and investment goods and services, G , and the disposable public income, TN , $D = G - TN$. Those deficits in Poland and the Czech Republic are shown in Table 6.

Table 6. Deficits of the public sector in the Czech Republic and Poland in 2008 and 2009 (current prices)

	Czech Republic (Kcs bn)			Poland (PLN bn)		
	2008	2009	Change in 2009	2008	2009	Change in 2009
G	901,1	947,4	46,3	294,3	319,1	24,8
TN	865,1	769,7	-95,3	253,4	227,9	-25,5
Deficit of the public sector	36,0	177,7	141,6	41,0	91,3	50,3

Source: Own calculation on the basis of GUS, CSO and Eurostat data.

Since tn is the average rate of net taxation, net tax revenue may be expressed as the sum: $TN = tn(k1G) + tn(k2IP) + tn(k3X)$. Its first component, which represents the contribution to net tax revenues of public spending, G , is most important from the viewpoint of our study. Its second component represents the contribution of private investments, IP , and the third – the contribution of the export sector.⁸ Table 7 shows how each of those components contributed to the rise of public sector deficit in the Czech Republic and Poland in 2009.

Table 7. Contributions of demand injections to public sector deficits in the Czech Republic and Poland in 2008 i 2009 (current prices)

e	Czech Republic (Kcs bn)			Poland (PLN bn)		
	2008	2009	Change in 2009	2008	2009	Change in 2009
Deficit of the public sector, bn	36,0	177,7	141,7	41,0	91,3	50,3
G - $tn(k1G)$	660,2	696,8	36,6	202,9	232,3	29,4
- $tn(k2IP)$	-159,6	-118,6	41,0	-58,8	-40,8	18,0
- $tn(k3X)$	-464,6	-400,5	64,1	-103,2	-100,3	2,9
Increment in the public sector deficit = 100%			100,0%			100,0%

⁸ Therefore the deficit of the public sector may be written as: $D = G - tn(k1G) - tn(k2IP) - k3(X)$ which enables examination of the question how the separate components of TN contribute to deficit generation.

G - tn(k1G)			25,8%			58,5%
- tn(k2IP)			28,9%			35,8%
- tn(k3X)			45,2%			5,7%

Source: Own calculations on the basis of GUS, CSO and Eurostat data and Table 6.

Table 7 reveals significant differences in the structure of changes in public sector deficits in the two countries. In Poland the deficit increased mainly because of a rise in G , and in the Czech Republic because of a fall in TN generated in the private investment and export sectors. The rise in the public sector's deficit in Czechia in 2009 was due to a loss of tax revenues in those two sectors by about GDP 2.6 per cent. On top of this, increased public spending generated additional deficit, to the tune of GDP 1.3 per cent, which made the deficit total about 3.9 per cent of GDP. In Poland, public sector deficit increased from 3.2 per cent of GDP in 2008 to 6.8 per cent in 2009, i.e. by 3.6 p.p.⁹ In difference to the Czech Republic, in Poland the main cause of deficit rise was additional public spending (net of additional taxes it generated), equal to GDP 2.4 per cent. Reduction of disposable income of the public sector due to a fall in private investments was about 1.2 per cent of GDP. As it was already noted, reduction of exports played no significant role in rising public sector's deficit in Poland in 2009.

⁹ According to the official statistics, in 2009 the deficit of the public sector was 7.2 per cent of GDP. This number includes, however, also the deficit on the balance of payments income transfers account which is ignored in our study.

7. Conclusions: GDP structure and its changes in the Czech Republic and Poland

Let us start with recalling the definitional relationship between private savings from domestic incomes, private investments, export surplus, and budget deficit. From equations (1) and (2.1) it follows that

$$SP_k = IP + (X - M) + (G - TN).$$

Denoting the difference between exports and imports of goods and services, i.e. net exports ($X-M$), by E , and the difference between government spending on goods and services, G , and net public revenues, TN , i.e. the public sector deficit, ($G - TN$), by D , we get:

$$SP_k = IP + E + D \quad (10)$$

Dividing both sides of (10) by Y , we get sp_k , which is the rate of private savings from domestic incomes (in *ex post* terms, i.e. after IP , E and D have already been made):

$$sp_k = (IP + E + D)/Y$$

and

$$Y = (IP + E + D) / sp_k \quad (11)$$

Thus, *ex post*, the autonomous components of total demand, IP , E and D , together with the rate sp_k , define the volume of GDP. Now, denoting the sum $IP + E + D$ by $IPED$ and taking logarithmic derivatives over time from (11) we get:

$$\Delta Y/Y = \Delta IPED/IPED - \Delta sp_k/sp_k \quad (12)$$

or

$$g(Y) = g(IPED) - g(sp_k) \quad (12.1)$$

where g is the rate of change of the variable under examination between year t and year $t-1$. According to (12.1), the rate of change of GDP is the difference between the rate of change of the sum of demand components, $IP + E + D$, on the one hand, and the rate of change of private propensity to save, sp_k , on the other hand. Since the rate of change of $IPED$ after some manipulations may be put as the sum of products of rates of change of its component parts and their relative shares in $IPED$, i.e.:

$$g(IPED) = g(IP)(IP/IPED) + g(E)(E/IPED) + g(D)(D/IPED),$$

equation (12.1) can be written in the form:

$$g(Y) = g(IP)(IP/IPED) + g(E)(E/IPED) + g(D)(D/IPED) - g(sp_k) \quad (12.2)$$

Equation (12.2) enables examination of the impact on $g(Y)$ of changes in individual components of *IPED*, which will be the subject matter of the final part of our study.

Table A1 of the Statistical Annex shows the nominal rates of GDP growth in Poland and the Czech Republic in 2009 and the factors of those growth rates in terms of equation (12.2), and Table A2 shows the GDP structure and its changes in both countries in the same year. They both help to validate consistency of our analysis.

In 2009 in Poland the actual growth of nominal GDP, $g(Y)$, was 0.055, and the rate of growth of *IPED* was 0.239.¹⁰ In the Czech Republic, in turn, in 2009 $g(Y)$ was -0.017, and the rate of growth of *IPED* was 0.031, the difference between them being -0.048. From Table 1 it follows that the nominal rate of private savings, $g(sp_k)$ in 2009 in the Czech Republic was $(28,1/26,8) - 1 = -0.0485$ which is fully consistent with our calculations.

In 2009 private propensity to save increased more in Poland than in the Czech Republic, which additionally slowed down Poland's rate of growth. Nevertheless, Poland managed to avoid a fall in GDP and the Czech Republic did not. What factors were responsible for that outcome? Introducing to equation (12.2) the numerical values of its component parts and coefficients, we get:¹¹

for Poland (revised data): $5,5\% = -19,4\% + 21,8\% + 21,5\% - 18,4\%$,

for the Czech Republic: $-1,7\% = -15,2\% + 4,0\% + 14,3\% - 4,8\%$.

The difference in the respective GDP growth rates can be partly attributed to the combined effect of changes in investments and in public sector deficits in 2009 in both countries. In Poland they brought 2.1 p.p. of GDP growth, and in the Czech Republic 0.9 p.p. of GDP decline. However, the critical factor responsible for the difference was the performance of the export sector. In the Czech Republic, although export surplus increased by 23.5 per cent (at its 0.170 share in *IPED* in 2008), thereby contributing 4.0 p.p. to the GDP growth rate, this was insufficient to offset a rise in the rate of private savings by 4.8 p.p. In Poland, in turn, where for many years there was a large import surplus, in 2009 foreign trade balance was practically in equilibrium, the net balance of this sector increasing by -100.9 per cent. Given the share $E/IPED = 0.216$, this made export sector contribute to the GDP growth rate by as much as 21.8 p.p. Consequently, a much higher rise in the rate of private savings in Poland (by 18.4 per cent) than in the Czech Republic, was countered by the rise of export surplus (by 21.5 per

¹⁰ The difference between them, equal to -0.184, is somewhat higher than the empirical data on the rise in nominal rate of private savings, $g(sp_k)$, equal to 0.174 (calculated on the basis of Table 1 data: $0.174 = (21,6/18,4) - 1$), which may suggest some inconsistencies in the macroeconomic data available at the time of our investigation.

¹¹ See note 8, however.

cent). This added additional 3.4 p.p. to 2.1 p.p. GDP growth rate representing joint contribution of fiscal stimulation and private investments, thus producing 5.5 per cent of GDP growth. Noteworthy is a strong negative impact on the GDP growth rate of the rising rate of private savings: it would have resulted in a sharp reduction of Polish GDP in 2009 were it not for the operation of a radical change in the balance of trade and of fiscal stimulation.

In conclusion, in 2009 the sum of private investments, export surplus and general government deficit, i.e. *IPED*, increased in Poland by 23,8 per cent, and in the Czech Republic by 3,1 per cent only. At the same time private propensity to save, *spk*, increased by as much as 18,4 per cent in Poland, and only by 4,8 per cent in the Czech Republic. However, although both, *IPED* and *spk*; increased in Poland more than in the Czech Republic, nominal GDP increased in Poland by 5.5 and fell in the Czech Republic by 1,7 per cent, because in Poland *IPED* increased sufficiently to overcompensate the rise in private propensity to save.

Could any conclusions be drawn from our study regarding future economic policy making? Any answer to that question is subject to reservations since our analysis rests on the assumption that the coefficients of our equations remain roughly constant. However, import intensities of public spending, exports and investments in the period under examination were not stable, and at the same time those intensities largely affect our results. Moreover, propensity to consume, which also strongly affects the multipliers, may be subject to sharp changes, as experienced by the Czech Republic in 2009. Those limitations in no way undermine the theoretical foundations of our study. They merely point out to limitations of any conclusions regarding the future, hypothetical results of fiscal expansion or fiscal contraction. Nevertheless, within narrow boundaries some hypothesis may be put forward, provided our core assumptions hold. This will be seen in the example given below, which takes us somewhat beyond the strict analytical framework of our study.

It follows from our argument that maintaining a positive GDP growth rate requires that the rate of private savings must not increase (i.e. the average propensity to consume must not fall) until private investments and/or exports pick up. In Poland, for instance, where in 2009 of the PLN 39.2 bn rise of private consumption, PLN 30.8 bn was generated by government spending (see Table 5), and where in 2010 total investments continued to fall, instead of reducing private consumption the government should rather stimulate private propensity to invest.

With aforementioned reservations we may also attempt to answer the question by how much public spending would have to increase in the Czech Republic in order to balance the impact of actual reduction in private investments and exports in 2009, and thus prevent the reduction

of GDP. Assuming the same values of our equation parameters as they actually were in 2009, the same volumes of private investments and exports, and the same relative distribution of public spending, G , between consumption and investments (i.e. unchanged Cg/G and IG/G) compared to 2008, balancing nominal reduction of the sum of private investments and exports would require increasing the deficit of the public sector by Kcs 38 bn on top of its actual deficit of Kcs 142 bn. Then in 2009 it would be 0.9 p.p. greater than the actual deficit (5.8 per cent of GDP instead of 4.9 per cent). If, however, a fall of the real value of GDP were to be prevented, this would require a much greater increase in public sector deficit (to 7.2 per cent of GDP). Clearly, while rising budget deficit by less than GDP one percentage point need not undermine stability of parameters of our equations, its rise by over two points of GDP may well undermine it, thus invalidating our estimates of the potential results of any such operation. The greater the needed rise in budget deficit, the less certain is the assumption that it would not affect the coefficients of our equations.

8. Statistical Annex

Information on import elasticity of exports, investments and consumption is available only at five year intervals when input – output tables are calculated. The last such tables for Poland and the Czech Republic refer to 2000 and 2005 and, of course, they cannot fully account for a strong rise in import intensities in both countries after their accession to the European Union on April 1, 2004. Moreover, import data in the input-output tables does not allocate imported intermediate goods and services between separate categories of final demand (in contrast to sub-dividing respective categories of imported final goods). Our re-allocation of imported intermediate goods by categories of final demand in both countries in 2008 and 2009 is based on some simplifying assumptions as explained below

Our calculations of the respective multipliers are based on estimates of import intensities of exports for which the 2005 input – output tables for each country were used. Since 2005 import intensity increased in 2006-2008 and declined in 2009, in accounting for these changes the sectoral imports were weighted by the respective shares of each component sector of effective demand in total domestic absorption.

First import intensity of exports was estimated. This was done as follows. Since 2005 the dominating position in exports of both countries is taken by SITC Group 7, i.e., machinery and transport equipment, the share of which in total exports was over 40 per cent in Poland, and over 50 per cent in the Czech Republic. Merchandise goods that compose that group can be relatively easy separated in the classifications of goods and services on which input-output tables are calculated. Hence, for this homogeneous SITC Group 7, imports of intermediate products could be estimated for 2005. These estimates show that combined import intensity of production of machinery and equipment, transport vehicles, audio and tv sets, and IT and computer products, is significantly higher than the average import intensity of final goods. Assuming that in 2005 import intensity of exports of SITC Group 7 was in both countries 0.7, and that for all other exports it was equal to the average import intensity of final output, m_{FG} (see Table 1), we find that in 2005 import intensity of exports, m_X , was 0.44 for Poland and 0.56 for the Czech Republic.

Imports that serve exports represent mainly intermediate goods and services, the share of re-exported final goods being in both countries relatively negligible. Contrariwise, for other component categories of final output the dominant position in their respective imports is taken by final goods while imports of intermediate products and services play an insignificant role. Moreover, as it was already noted, the input-output tables do not allocate imports of intermediate products between individual categories of final demand. Our estimate of those

intermediate products between individual categories of final demand. Our estimate of those imports is based on the assumption that the shares of intermediate imports that serve private consumption, public consumption and investments in total imports of intermediate goods are the same as the shares of those respective categories of final demand in total domestic final demand. The thus estimated imports of intermediate goods were added to imports of final goods within each category of domestic absorption which allowed us to calculate the respective values of import intensities in 2005 of private consumption (0.18 in Poland and 0.28 in the Czech Republic), government consumption (0.12 in Poland and 0.2 in the Czech Republic), and private and public investments taken together (0.37 in Poland and 0.4 in the Czech Republic).

Given the distribution of public spending between consumption and investment, and the assumed the same import intensity of private and public investment, we estimated private and public investment demand. On this basis import intensity of the public sector spending in 2005 was found to have been 0.16 in Poland and 0.24 in the Czech Republic. Finally, assuming the same rate of growth of imports across all branches of industry in the years 2005-08 and 2005-09, the volumes of imports serving private consumption, private investments, public expenditure and exports were found, and thereby also the values of respective import intensities, m_X , m_G , m_{IP} and m_{CP} in 2008 and 2009 in Poland and the Czech Republic, as shown in Table 1.

Table A1 shows nominal GDP and its components in the Czech Republic and Poland in 2009 in terms of Kcs and PLN billions and their rates of change, and Table A2 shows the structure of nominal GDP in the Czech Republic and Poland and its changes.

Table A1. Nominal GDP and its components in the Czech Republic and Poland in 2009 (Kcs and PLN bn, changes in %)

	Czech Republic			Poland		
	2008 Kcs bn	2009 Kcsbn	2009/2008 %	2008 PLN bn	2009 PLN bn	2009/2008 %
GDP	3689,0	3627,2	-1,7%	1272,8	1342,6	5,5%
CP	1834,0	1836,9	0,2%	785,2	824,4	5,0%
SPk	989,9	1020,5	3,1%	234,3	290,4	23,9%
CG	753,2	801,7	6,4%	236,3	247,3	4,7%

SG	111,8	-32,0	-128,6%	17,1	-19,5	-214,0%
TN = CG+SG	865,1	769,7	-11,0%	253,3	227,8	-10,1%
YD=GDP-TN	2823,9	2857,4	1,2%	1019,5	1114,8	9,3%
G=CG+IG	901,1	947,4	5,1%	294,3	319,1	8,4%
IG	147,9	145,7	-1,5%	58,1	71,9	23,8%
IP	785,9	635,3	-19,2%	243,9	198,5	-18,6%
Export	2844,0	2521,6	-11,3%	508,9	523,4	2,9%
Import	2676,0	2314,1	-13,5%	559,5	523,0	-6,5%
(Exp—Imp.)	168,0	207,5	23,5%	-50,6	0,4	-100,9%
D=G-TN	36,1	177,7	392,8%	41,0	91,3	122,7%
(Ip+E+D)	989,9	1020,5	3,1%	234,3	290,3	23,9%

Source: Data of GUS and CZSO (as of April 2010) and own calculations.

Table A2. Nominal GDP and its structure in the Czech Republic and Poland in 2009.
(in terms of current price, %)

	Czech Republic			Poland		
	2008	2009	Change in shares (in p. p.)	2008	2009	Change in shares (in p.p.)
GDP	100,0%	100,0%		100,0%	100,0%	
CP/GDP	49,7%	50,6%	0,9	61,7%	61,4%	-0,3
SPk/GDP	26,8%	28,1%	1,3	18,4%	21,6%	3,1
CG/GDP	20,4%	22,1%	1,7	18,6%	18,4%	-0,2
SG/GDP	3,0%	-0,9%	-3,9	1,3%	-1,5%	-2,8
TN =CG+SG						
TN/GDP	23,5%	21,2%	-2,3	19,9%	17,0%	-2,9
YD=GDP-TN						
YD/GDP	76,5%	78,8%	2,3	80,1%	83,0%	2,9

G=CG+IG						
G/GDP	24,4%	26,1%	1,7	23,2%	23,8%	0,6
IG/GDP	4,0%	4,0%	0,0	4,6%	5,4%	0,8
IP/GDP	21,3%	17,5%	-3,8	19,2%	14,8%	-4,4
Export	77,1%	69,5%	-7,6	40,0%	39,0%	-1,0
Import	72,5%	63,8%	-8,7	44,0%	39,0%	-5,0
(Exp – Imp.)/GDP	4,6%	5,7%	1,2	-4,0%	0,0%	4,0
D=G-TN						
D/GDP	1,0%	4,9%	3,9	3,3%	6,8%	3,5
(IP+E+D)/GDP	26,8%	28,1%	1,3	18,5%	21,6%	3,1

Source: As in Table A1.

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