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## **The Government Expenditure Multiplier and its Estimates for Poland in 2006-2009**



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## **Abstract**

*The paper starts with examining the standard concept of government expenditure multiplier and finds that in a model of open economy with government revenues and expenditures the multiplier definition is incorrect in so far as the import intensity component relates total imports to GDP, whereas part of imports serves as inputs in exported output. Therefore the value of imports should be related to the value of final output, which is the sum of domestic absorption and exports. Since for most countries final output is significantly larger than GDP, the value of the multiplier is correspondingly larger.*

*Moreover, the paper argues that, the import intensity of exports being as a rule larger than that of domestic absorption, the import intensity of the latter – which is the import intensity relevant for the government expenditure multiplier – is lower than that of final output, which again raises the value of the multiplier.*

*Next the value of the government expenditure multiplier in Poland in 2006-2008 is estimated on the basis of statistics of non-financial quarterly accounts by institutional sectors. The variations in the value of multiplier are found to depend heavily on changes in import intensity of domestic absorption. The value of the multiplier ranges between 1.59 and 1.70 if, in order to reduce the impact of seasonal fluctuations, it is calculated on a quarterly basis, for four consecutive quarters, and between 1.62 and 1.86 if, in order to make the calculations more suitable for economic forecasting, the quarterly coefficients year on year are used. Both sets of multiplier values are slightly higher than those assumed in other countries (1.5-1.6) which may be explained by the rather high import intensity of Polish exports.*

**Keywords:** *macroeconomics, principle of effective demand, fiscal multiplier, stabilization policy*

**JEL classification:** *E0, E12, E20, E63*



## **The government expenditure multiplier and its estimates for Poland in 2006-2009**

### **1 Traditional concept of government expenditure multiplier concept**

This paper rejects the economic paradigm of neoclassic economics of the 1930s, as well as of the present-day mainstream economics, and their central idea that a market economy automatically tends towards a stable (static or dynamic) equilibrium at full employment of factors of production, and that if such equilibrium is not reached, the causes are market imperfections, mainly downward rigid wages, as well as government intervention, which by nature cannot bring the economy any closer to full employment equilibrium.<sup>1</sup> We believe that neither the causes of the present economic crisis, nor policies that could effectively counter its effects, can be successfully examined within that theoretical framework. Instead, in line with the tradition of Keynesian Economics, it is assumed that market economy is inherently unstable, the main cause of this instability being volatile private investment decisions, and therefore also instability of total effective demand which tends to remain below the volume necessary for full employment of factors of production. Hence stable equilibrium at capacity employment (or close to it) requires government intervention towards balancing insufficiency of effective demand of the private sector.

In line with a standard model of Keynesian economics, it is assumed that in a capitalist economy, as a rule, and especially in periods of business downswing and crisis, production capacity and labour are underutilized. We also assume that national income distribution between wages and gross profit margins is roughly stable,<sup>2</sup> and that within the range of considered output changes no difficulties appear in balancing current account. Finally, it is assumed that the central bank follows policy of flexible supply of money. Under those assumption expansion of global effective demand does not need to generate price rises, and at any rate it leaves enough room for expansion of output and employment. There is also no much room then for rising interest rates, nor for rate of exchange appreciation, and therefore for significant changes in expectations. Moreover, since it is assumed that factors of production are underutilized also in the periods of business upswing, as long as our other assumptions hold, our conclusions hold also in the long period, because accommodative monetary policy ensures relative stability of rates of interest and therefore does not restrict private investments.

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<sup>1</sup> In rejection this paradigm and its core idea the authors follow, among others: Akerlof (2007), Akerlof and Shiller (2009), Krugman (2009) and (2009a), Leijonhufvud (2009), Laski (2009).

<sup>2</sup> This is tantamount here to assuming stability of the ration of prime costs to gross profit margins.

In such environment an autonomous rise in government spending generates a rise of aggregate demand and Gross Domestic Product (GDP). The ratio between the thus generated increment of GDP to the initial autonomous rise in government spending is the government expenditure multiplier. Its volume is traditionally defined as the reciprocal of the sum of 'leakage' coefficients of domestic demand, i.e. the reciprocal of the sum of the rate of net taxation, of private savings and of import intensity, all expressed as respective fractions of GDP. The concept is usually derived as follows. The national income equation is:

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

where  $Y$  stands for GDP,  $CP$  is private consumption,  $IP$  is private investments,  $G$  is government expenditures on goods and services,  $X$  is export, and  $M$  is import (and where net factor income from abroad is neglected). Let  $TN$  represent the difference between the sum of all domestic public revenues from taxes, levies, social and healthcare contributions, etc., paid by households, private business and other non-public entities on the one hand, and the sum of all money transfers from government to households and to the enterprise sector on the other hand. Then the difference,  $Y - TN = YD$  represents disposable income of the private sector. Moreover, let us denote by  $SP$  the difference between disposable income of the private sector on the one hand, and its private consumption on the other,  $SP$  representing gross private savings of both, households and the enterprise sector. Then private consumption is:

$$CP = Y - TN - SP.$$

Denoting by  $tn$  and  $sp$  the average (equal to marginal) rate of net taxation and of private savings respectively, we get:

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

and

$$CP = cpY \quad (2)$$

where  $cp = 1 - tn - sp$  represents the average (equal to marginal) rate of private consumption (i.e. private propensity to consume).

Finally, denoting by  $m$  the average (equal to marginal) propensity to import, we get:

$$M = mY. \quad (3)$$

Using 2 and 3 in 1 we get:

$$Y = cpY + IP + G + X - mY$$

$$Y = (IP + G + X)/(1 - cp + m) \quad (4)$$

Assuming that the parameters  $sp$ ,  $tn$  (and therefore also  $cp$ ) as well as  $m$  are all constant, and that government spending on goods and services is increased by  $\Delta G$ , while private investments  $IP$  and export  $X$  remain unchanged, we get:

$$\Delta Y = \Delta G / (1 - cp + m). \quad (5)$$

The expression  $1/(1 - cp + m)$  represents the traditional concept of government expenditure multiplier. However, when used for economic forecasting equation (5) gives rise to some difficulties. They appear, for instance, in debates on potential consequences of overcoming the present economic crisis through strategies of fiscal expansion that would aim at stimulating business upswing and accelerating economic recovery through increased government spending financed from public debt. And they appear as well when examining consequences of fiscal contraction strategies, which recommend reduction in government spending in order not to let budget deficit increase in the face of falling government revenues due to economic recession. In both cases the question arises: what would be the multiplier results of any such rises (reductions) of government spending. Can we estimate them on the basis of equation (5)? The answer is negative since any such estimate would be grossly inaccurate.

## 2 Import intensity of final production, domestic absorption and exports

How import intensities to be considered in estimating the volume of government expenditure multipliers (and also of private investment multipliers which, however, are not discussed in the present paper) should be defined? Import intensities expressed as ratios of value of imports to that of GDP as a rule are rather high. This is seen immediately in the case of small countries for which import intensity of GDP is 0.7-0.8 or more. Given fairly realistic values of  $cp$ , of more or less 0.6, the difference  $(1 - cp)$  would be of the order of 0.4, and the sum  $(1 - cp) + m$  would easily be greater than 1, thus in an open economy rendering the value of multiplier determined by equation (5) is smaller than one.

The problem consists in the fact that the concept of import intensity used traditionally in equations (3), (4) and (5) relates the value of imports to GDP ( $m = M/Y$ ). However, calculation of government expenditure multiplier requires a different concept of import intensity, i.e. one that would define it as a ratio  $m_{FG} = M/FG$ , where  $FG$  represents output of final goods, i.e.  $CP + IP + G + X$ .<sup>3</sup> Considering that  $FG$  is greater than  $Y = FG - M$  (for  $M > 0$ ), the coefficient  $m$  is significantly greater than  $m_{FG}$ . In fact, when estimating the multiplier it is commendable to divide output of final goods  $FG$  between those goods that serve domestic absorption  $A = (CP + IP + G)$ , and those that serve exports  $X$ , where  $FG = A + X$ .<sup>4</sup>

<sup>3</sup> This was earlier noted by Laski (2009a); see also Podkaminer (2009), pp. 18-19.

<sup>4</sup> Import intensity of domestic absorption could and should be farther disaggregated by separating import intensities of private investments, private consumption, but especially of public expenditures on goods and services. However, any such disaggregation, rather straightforward in theoretical analysis (cf., e.g., Gandolfo, 2002, pp. 4560-452, and Palley,

Consequently, we shall distinguish between that part of imports,  $M_A$ , which directly and indirectly serves domestic absorption, and that part,  $M_X$ , which directly and indirectly serves exports. Moreover, we shall denote import intensity of domestic absorption by  $m_A$ , where  $m_A = M_A/A$ , and import intensity of exports by  $m_X$ , where  $m_X = M_X/X$ . Then, instead of 3, we get:

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

and considering 2

$$M = m_A cpY + m_A (IP + G) + m_X X \quad (3')$$

Next, considering 2 and 3', from 1 we get:

$$\begin{aligned} Y &= cpY + (IP + G) + X - m_A cpY - m_A (IP + G) - m_X X \\ Y[1 - cp(1 - m_A)] &= (1 - m_A)(IP + G) + (1 - m_X)X \\ Y &= [(1 - m_A)(IP + G) + (1 - m_X)X] / [(1 - cp(1 - m_A))] \end{aligned} \quad (4')$$

Since we assumed that the coefficients  $sp$  and  $tn$  (hence also  $cp$ ), as well as  $m$  are all constant, and that only government expenditure is increased by  $\Delta G$  while private investments  $IP$ , and exports  $X$ , remain unchanged, we get:

$$\Delta Y = \frac{1 - m_A}{1 - cp(1 - m_A)} \Delta G, \quad (5')$$

Thus, in a model of an open economy with government sector, government expenditure multiplier is  $(1 - m_A)/[1 - cp(1 - m_A)]$ , where  $m_A$  stands for import intensity of domestic absorption that attributes to domestic absorption only that part of imports,  $M_A$ , which serves it, and it is not – as commonly used in economics textbooks –  $1/(sp + tn + m)$ .

Considering that in the equation (5') its nominator,  $(1 - m_A)$ , and its denominator,  $[1 - cp(1 - m_A)]$ , are both smaller than 1, the multiplier may be greater or smaller than 1. Let us separate (5') into two components:

$$\Delta Y = \frac{\Delta G}{1 - cp(1 - m_A)} - \frac{m_A \Delta G}{1 - cp(1 - m_A)}, \quad (5'')$$

where component  $\Delta G/[1 - cp(1 - m_A)]$  represents the rise of domestic absorption,  $\Delta A$ , whereas component  $m_A \Delta G/[1 - cp(1 - m_A)]$  represents the rise of imports  $\Delta M_A = m_A \Delta A$  generated by this rise of domestic absorption. Indeed, since  $A = CP + IP + G$ , and as long as  $\Delta IP = 0$ , we get  $\Delta A = \Delta CP + \Delta G$ . Hence, considering (5''), we get:

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2010), is difficult in any empirical investigation (for instance, Polish Central Statistical Office information on the 'distribution of imports by direction of use' in 2008 does not distinguish the structure of import intensity if indirect use, see GUS, 2009, Table 15). For Poland, relatively reliable information was available only regarding import intensity of exports, thanks to which import intensity of domestic absorption could be estimated. For this reason our theoretical enquiry stops at the level of domestic absorption as a whole.

$$\Delta A = \frac{cp(1-m_A)\Delta G}{1-cp(1-m_A)} + \Delta G$$

$$\Delta A = \frac{\Delta G}{1-cp(1-m_A)}. \quad (6)$$

Therefore component  $1/[(1 - cp (1 - m_A))]$  in equation (5'') represents the multiplier of government expenditure related to domestic absorption only. Its value is greater than one because for  $0 < cp < 1$  and  $0 < m_A < 1$  we have  $cp (1 - m_A) < 1$ , and  $1 - cp (1 - m_A) < 1$ . Hence the reciprocal of the left hand side of this inequality is:  $1/[(1 - cp (1 - m_A))] > 1$ .

On the other hand, the multiplier related to both parts of government expenditure,  $\Delta Y$ , i.e. that part which is directed to domestic market and that which increases import, will be greater than the increase in government spending  $\Delta G$ , i.e. the multiplier will be greater than one, if, and only if, respective propensities to consume and to import will be in the right proportion to each other. This condition will be met if  $cp > [m_A/(1 - m_A)]$ , or else if  $m_A < [cp/(1 + cp)]$ .

Thus the magnitude of multiplier depends on empirical values of its determining coefficients. It must be noted, however, that for Poland, for instance, considering the past values of those coefficients and assuming their relative stability, the multiplier is significantly greater than one. Given that  $cp$  is of the order of 60 per cent, as long as  $m_A$  is less than about 37 per cent, the multiplier determined by equation (5'') will be greater than one (it is worth noting that when import intensity of domestic absorption is the same as that of exports, at  $m$  equal in Poland to some 40 per cent the coefficient  $m_{FG}$  equals only about 30 per cent<sup>5</sup>. Since import intensity of exports  $m_X$  is greater in Poland (and probably also in most of industrial economies) than import intensity of output of final goods  $m_{FG}$ , import intensity of domestic absorption must be smaller than  $m_{FG}$ . Therefore  $m_A$  is considerably less than 30 per cent and the condition for the multiplier to be greater than one (i.e. that  $m_A$  is less than 37 per cent) is certainly met. This conclusion most likely holds also for other countries where domestic market is not smaller than in Poland. In 2008, in UE15 and UE27 the average import intensity of GDP, i.e.  $m$ , was 39.8 per cent and 41.3 per cent respectively, which is more or less of the same magnitude as in Poland.<sup>6</sup>

<sup>5</sup> We have  $m_{FG} = M/FG = M/(Y + M) = m/(1 + m)$  where  $m_{FG} < m$  because  $1 + m > 1$ .

<sup>6</sup> It must be noted that with respect to imports from outside EU, import intensity of GDP in 2008 in EU-15 and EU-27 was only 12 per cent, and import intensity of  $FG$  and of  $A$  was even less. That means that for EU as a whole the government expenditure multiplier is much greater than one. However, because of absence of any unified fiscal expansion policy inside EU this conclusion does not enjoy the attention it deserves.

### 3 Increase in government expenditure and the structure of GDP increment

Government expenditure multiplier is determined by rising private consumption accompanied by rising net tax revenues and private savings. Rising tax revenues reduces budget deficit generated by increased government spending. At the same time private savings increase less than budget deficit due to deteriorating balance of trade. We shall now discuss these interrelations in some detail.

The rises in private consumption, private savings and net tax revenues are all directly determined by equation (5'):

$$\Delta CP = cp\Delta Y = \frac{cp(1-m_A)\Delta G}{1-cp(1-m_A)} = \frac{cp\Delta G}{1-cp(1-m_A)} - \frac{cpm_A\Delta G}{1-cp(1-m_A)} \quad (7)$$

$$\Delta SP = sp\Delta Y = \frac{sp(1-m_A)\Delta G}{1-cp(1-m_A)} \quad (8)$$

$$\Delta TN = tn\Delta Y = \frac{tn(1-m_A)\Delta G}{1-cp(1-m_A)} \quad (9)$$

As in equation (5'), the second component on the right hand side of equation (7) represents induced consumer demand being partly directed to imported goods and services needed to satisfy a rise in private domestic consumption.

The rise of budget deficit is  $\Delta D = \Delta G - \Delta TN$ , and since  $\Delta TN > 0$  we have  $\Delta D < \Delta G$ , i.e., the rise of budget deficit is less than in government spending. This means that increased budget deficit in part finances itself through rising GDP and the consequent increase of budget revenues. From equation (9) we get:

$$\Delta D = \Delta G - \Delta TN = \Delta G - \frac{tn(1-m_A)}{1-cp(1-m_A)} \Delta G,$$

$$\Delta D = [1 - cp(1-m_A) - tn(1-m_A) + m_A - m_A]\Delta G/[1 - cp(1-m_A)],$$

which after rearrangements gives:

$$\Delta D = \frac{(1-m_A)sp + m_A}{1-cp(1-m_A)} \Delta G, \quad (10)$$

which in turn can be written as:

$$\frac{(1-m_A)sp\Delta G}{1-cp(1-m_A)} = \Delta D - \frac{m_A\Delta G}{1-cp(1-m_A)} \quad (10')$$

Considering 8 and 6, we can write 10' as:

$$\Delta SP = \Delta D - m_A\Delta A, \quad (10'')$$

where  $m_A \Delta A = \Delta M$  represents deterioration in the balance of trade since export is assumed not to change.

Equation (10") is interpreted here – in accordance with the theory of effective demand – to mean that increased budget deficit together with deterioration in the balance of payments taken together determine the increase in private saving. This is different to common interpretation of this equation in the sense that a rise in private savings  $\Delta SP$  is inadequate to balance the rise of budget deficit by  $\Delta D$ , and therefore 'foreign savings' must be imported, equal to the value of import surplus  $\Delta M$ . Therefore, it is claimed, the rate of domestic savings  $sp$  must be raised to substitute domestic savings for foreign ones. The question arises, however, what would be the sense of rising the rate of private savings  $sp$  when public expenditure is increased in order to improve employment of production capacities and labour, whereas increased  $sp$  would reduce the impact of fiscal stimulation of the economy? Concurrent rising of  $G$  together with  $sp$  is like when starting the car or attempting to accelerate its unsatisfactory speed to press the accelerator and the brakes pedals at the same time. Moreover, 'foreign savings' cannot be imported. The so-called foreign savings of any given country appear only as import surplus which at the same time is export surplus of abroad. Considering that abroad neither productive capacities nor labour are fully employed too, especially in the phase of business crisis, fiscal expansion policies should be applied in international scale, first of all in the UE area. This would prevent deterioration in balance of payments which otherwise must accompany fiscal expansion policy applied in any single country, as increased induced imports would then go in step with increased exports.

#### **4 Mechanism of government expenditure multiplier**

The multiplier mechanism will now be illustrated with the help of a simple numerical example. Let the fiscal impulse be  $\Delta G = 100$  Euros and assume the following values of multiplier's coefficients:  $cp = 0.6$ ;  $tn = 0.2$ ;  $sp = 0.2$ ;  $m_A = 0.25$ . Assume also that increased public spending of the value of 100 Euros finances infrastructural investments. They generate additional employment in the investment goods sector. However, since import input in those additional investments is 25 Euros, final output rises only by 75 Euros. It represents the rise of incomes of domestic factors of production, i.e., of capital and labour, engaged in production of investment goods. In line with our assumptions, of those incomes 15 Euros go to budget as additional net tax revenue, and 15 Euros is saved. This leaves 45 Euros spent on consumer goods.

Thus the second round of multiplier process starts. The rise of output in the consumer goods sector by 45 Euros, equal to the rise of demand, leads to import leak of 11.25 Euros, and to a rise of final output and domestic incomes by 33,75 Euros only. Of those incomes

6.75 Euros go for increased net tax revenues, and the same for increased savings, leaving  $33.75 - 13.50 = 20.25$  Euros again spent on consumption.

Those consumption expenditures start the third round of the process. In its course the rise of consumer demand generates expansion of output in the consumer goods sector by 20.25 Euros, of which 5.0625 Euros represent import leak and the remaining 15.1875 Euros represent the increment in final output and in domestic factor incomes. Subtracting from them 3.0375 Euros for net tax revenues and the same amount for increased private savings, 6.075 Euros taken together, leaves  $15.1875 - 6.075 = 9.1125$  Euros of increased consumption spending which start the next round of the multiplier process.

Let us sum up the results of the above discussed rounds of the multiplier process. The rise in domestic absorption,  $\Delta A = \Delta G + \Delta CP$  in each successive round is: 100, 45, 22.50, 9.1125, ... . This is nothing else but a declining geometrical progression series, the quotient of which is 0.45. It should be noted that the value of this quotient is exactly the same as the value of component  $cp(1-m_A)$  in the multiplier equation (6). Indeed,  $0.6(1-0.25) = 0.45$ . Once the value of the quotient is given, successive elements of the geometrical progression series may be defined:

100, 45, 22.50, 9.1125, 4.10, 1.85, 0.83 and so on.

The sum of this series is  $\Delta G/[1 - cp(1 - m_A)] = 100/(1 - 0.45) = 181.81$  Euros. The multiplier equals 1.81, i.e.  $1/[1 - cp(1 - m_A)] = 1/(1 - 0.45)$  and it represents the value of increased domestic absorption  $\Delta A = \Delta G + \Delta CP$  per unit of increased government expenditures. At the same time the rise of consumption  $\Delta CP$  is 81.81 Euros.

However, the rise of domestic absorption by 181.81 Euros also requires expansion of imports by  $m_A\Delta A$ , i.e. by  $0.25(181.8) = 45.45$  Euros. Therefore final output and domestic incomes increase only by  $\Delta Y = \Delta A - m_A\Delta A = 181.81 - 45.45 = 136.36$  Euros. Thus in our example the multiplier is only  $1.36 = (1-m_A)/[1-cp(1-m_A)] = 0.75/0.55$ .

The rise in net tax revenues will be  $\Delta TN = tn\Delta Y = 0.2(136.36) = 27.27$  Euros, hence the rise in budget deficit will be  $\Delta D = \Delta G - \Delta TN = 100 - 27.27 = 72.72$  Euros.

Finally, the rise of private savings will be  $\Delta SP = sp\Delta Y = 0.2(136.36) = 27.27$  Euros. They are determined as the difference between the rise of budget deficit and the rise of imports  $\Delta SP = \Delta D - \Delta M = 72.72$  Euros minus 45.45 Euros.

## 5 Estimate of the multiplier in Poland in 2006-2009

We shall now turn to estimating the value of the multiplier in Poland. This requires estimating its three determinants:  $cp$ ,  $tn$  i  $m_A$ . Values of  $cp$  and  $tn$  may be calculated from the national accounts statistics of Poland's Central Statistical Office (GUS). However, estimating the value of  $m_A$ , encounters difficulties. As we have already seen, import intensity that must be taken into account here is that of domestic absorption, i.e. exclusive of import intensity of export,  $m_X$ .

When the latter is known, those imports that serve exports, i.e.  $M_X$ , are calculated from GUS statistics (GUS, 2009) and the remaining part of imports, i.e.  $M_A$ , is related to  $A$ , following which the value of  $m_A$  which enters our equations of multiplier is calculated. Yet, as a rule, import intensity of exports is not calculated on regular basis (as this would require input-output tables calculated annually) and its estimates are subject to many approximations and expert opinions. This is close to assuming some plausible but arbitrary value of import intensity of exports,  $m_X$ . Of course, in the absence of any 'hard' data on import intensity of exports, it may be assumed that  $m_A$  equals  $m_X$ . Then we find  $m_A$  as a ratio  $M/FG$ . However, the thus derived import intensity  $m_A$  is rather its upper limit (and the corresponding value of the multiplier is its lower limit) because – as it was already noted – as a rule import intensity of exports is higher than that of domestic absorption.

In Poland in 2008 the ratio of total imports to GDP was 43.5 per cent, the ratio of total exports to GDP was 39.8 per cent, hence import surplus was 3.7 per cent of GDP. It follows that import intensity of final output  $m_{FG}$ , equal to the ratio of total imports  $M$  to final output  $FG$  in 2008 was  $0.435/1.435 = 0.303$ . Estimating the value of multiplier requires, however, calculation of import intensity of domestic absorption rather than that of final output. According to an expert assessment of Foreign Trade Research Institute, in 2008 the import intake of exports, i.e.,  $m_X$ , was about 60 per cent of total exports.<sup>7</sup> Thus, given the ratio of total exports to GDP, import linked to exports was 23.9 per cent of GDP ( $0.6 \times 0.398$ ). It follows that in 2008 the ratio of imported inputs serving domestic absorption to the volume of this absorption, i.e.  $m_A$ , was  $(0.435 - 0.239)/1.037 = 0.189$  (where the denominator of this fraction, equal 1.037, represents domestic absorption expressed in terms of GDP, since  $Y = A + X - M$ , and hence  $A = Y + M - X$ ).

---

<sup>7</sup> For Commodity Group VII (which includes machinery and transport equipment) of the Standard International Trade Classification Jan Przystupa estimates import intensity of exports in 2008 at 0.7 (see Przystupa, 2009). Equally high is import intensity of Polish manufactured goods (SITC Group 6). According to other experts of the Institute, import intensity of aggregated exports in 2008 was above 0.6, and taking into account GUS foreign trade statistics (see GUS, 2009, Table 26: Indices of Distribution of Import by Broad Economic Categories) some external experts consider it even higher. In what follows Przystupa's estimate will be used and, moreover, because of lack of information  $m_X$  will be assumed constant throughout the period under examination.

Between Q I, 2006 and Q II 2009 the average annual value of the multiplier related to domestic absorption was estimated at 2.03,<sup>8</sup> while the average coefficients of import leak in domestic effective demand – determined by the second component of equation (5'') – was in that year 0.36. It follows that the multiplier related to GDP ( $\Delta Y/\Delta G$ ) was on average 1.67. Its variability coefficient (expressed as standard deviation in per cent of the mean value of the multiplier) is 4.1 per cent which is  $\pm 0.07$  of its mean value.

The average annual values of parameters of the multiplier in the examined period were as follows:  $m_X = 0.6$ ,<sup>9</sup> import intensity of final output,  $m_{FG} = 0.298$  (var. 2.8 per cent),  $m_A = 0.180$  (var. 5.5 per cent),  $sp = 0.187$  (var. 1.7 per cent),  $tn = 0.195$  (var. 4.2 per cent), and  $cp = 0.618$  (var. 1.7 per cent).

Table 1

**Government expenditure multiplier in Poland, 2006-2009 (annual estimates on the basis of quarterly data summed for four successive quarters)**

	QI 2006 – QIV 2006	QI 2007 – IV 2007	QI 2008 – QIV 2008	QI 2007 – QI 2008	QII 2007 – QI 2008	QI 2008 – QI 2009	QII 2008 – QI 2009
cp	0.625	0.605	0.613	0.606	0.607	0.614	0.613
sp	0.186	0.190	0.188	0.190	0.192	0.190	
tn	0.189	0.205	0.199	0.204	0.201	0.196	0.387
cp+sp+tn	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$m_{FG}$	0.297	0.304	0.303	0.305	0.306	0.296	0.287
$m_A$	0.176	0.186	0.189	0.188	0.190	0.180	0.168
$m_X$	0.600	0.600	0.600	0.600	0.600	0.600	0.600
<b>GDP multiplier</b>							
<b><math>\Delta Y/\Delta G</math></b>	<b>1.697</b>	<b>1.603</b>	<b>1.612</b>	<b>1.598</b>	<b>1.594</b>	<b>1.653</b>	<b>1.699</b>
$\Delta G / \Delta G$	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$\Delta CP / \Delta G$	1.060	0.970	0.988	0.969	0.968	1.016	1.041
$\Delta A / \Delta G$							
$\Delta A = \Delta G + \Delta CP$	2.060	1.970	1.988	1.969	1.968	2.016	2.041
Leak of effective demand through import per unit of							
$\Delta G, \Delta M_A / \Delta G$	0.363	0.367	0.376	0.371	0.373	0.363	0.342

Source: Own calculations on the basis of GUS data (Non-financial quarterly accounts by institutional sectors, [http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL\\_rn\\_niefin\\_rach\\_kwart\\_wg\\_sekt\\_instytuc\\_8-10-2009.xls](http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_rn_niefin_rach_kwart_wg_sekt_instytuc_8-10-2009.xls)) and Eurostat (Database Eurostat, Quarterly non-financial accounts for general government, [http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=gov\\_q\\_ggnfa&lang=en](http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=gov_q_ggnfa&lang=en))

<sup>8</sup> In order to reduce the impact of seasonal fluctuations the value of multiplier was calculated here on the basis of successive sums of quarterly data for four consecutive quarters. The volume of the multiplier determines the volume of domestic absorption in accordance with the first component of equation (5'').

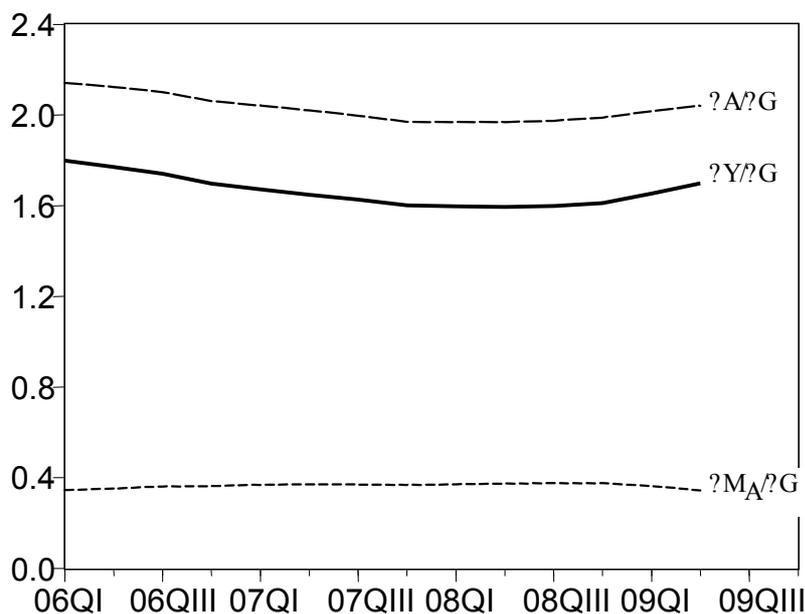
<sup>9</sup> See footnote 6.

Table 1 shows the estimated values of coefficients determining the multiplier as well as estimates of its value in Poland between Q I 2006 and Q II 2009.

Figure 1 represents the values of multiplier between Q I 2006 and Q II 2009 calculated from equation (5"). The solid line in the figure represents the value of multiplier in relation to GDP, the dashed line above it the rise in domestic absorption and the dashed line below the results of part of induced demand being directed to imports.

Figure 1

**Increment of GDP,  $\Delta Y$ , domestic absorption,  $\Delta A$  and imports,  $\Delta M_A$ , per unit of government expenditure,  $\Delta G$ , in four consecutive quarters, between Q I 2006 r. and Q II 2009**



Source: Own calculations.

Equation (9) allows us to calculate the expected rise of net tax revenues following a rise of government expenditure by  $\Delta G = 1$ . In 2006-08, it would generate on average an increase in net tax revenues by 0.32. Thus, at  $\Delta G = 1$ , budget deficit would rise only by 0.68.

The method of calculating the annual values of multiplier and its determining coefficients in four successive quarters, which was followed in our calculations shown in Table 1 and Figure 1, to some extent helps to eliminate seasonal fluctuations. This explains why variability of the multiplier (where the used measure of variability is standard deviation as a percentage of the mean) and of its determinants is rather small, in no case exceeding 5 per cent. However, in forecasting the value of multiplier for the whole of 2009 the reference point should be quarterly coefficients year on year which are more informative for assessment of current developments. Therefore our forecast is based on multiplier

coefficients in the first two quarters of 2009 which are compared with similarly calculated respective coefficients in the first two quarters of 2008 (see Table 2).

Table 2

**Government expenditure multiplier in Poland, 2008-2009 (quarterly data)**

	2008 quarterly average	Q12008	QII2008	QIII2008 quarterly average	QI2009	QII2009	QIII2009 quarterly average	2009 quarterly average forecast
Cp	0.615	0.660	0.628	0.644	0.663	0.622	0.643	<b>0.615*</b>
Sp	0.186	0.159	0.176	0.167	0.169			
tn	0.199	0.181	0.196	0.189	0.167	0.378	0.357	0.385
cp+sp+tn	1.000	1.000	1.000	1.000	0.999	1.000	1.000	1.000
m <sub>FG</sub>	0.303	0.313	0.312	0.313	0.283	0.276	0.279	
m <sub>A</sub>	0.190	0.196	0.197	0.196	0.156	0.148	0.152	<b>0.147**</b>
m <sub>x</sub>	0.600	0.600	0.600	0.600	0.600	0.600	0.600	
<b>GDP multiplier</b>								
<b>ΔY/ΔG</b>	<b>1.619</b>	<b>1.715</b>	<b>1.620</b>	<b>1.667</b>	<b>1.920</b>	<b>1.811</b>	<b>1.865</b>	<b>1.796</b>
ΔG / ΔG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
ΔCP/ ΔG	0.999	1.132	1.017	1.075	1.273	1.126	1.200	1.105
ΔA / ΔG,								
ΔA =ΔG+ΔCP	1.999	2.132	2.017	2.075	2.273	2.126	2.200	2.105
Leak of effective demand through import per unit of ΔG, ΔM <sub>A</sub> / ΔG	0.380	0.417	0.398	0.407	0.354	0.315	0.334	0.309

\* Assumed unchanged 2008 propensity to consume.

\*\*Import intensity of domestic absorption is  $0.147 = 0.190 \cdot (0.152/0.196)$

Source: Own calculations on the basis of GUS data (Non-financial quarterly accounts by institutional sectors, [http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL\\_rm\\_niefin\\_rach\\_kwart\\_wg\\_sekt\\_instytuc\\_8-10-2009.xls](http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_rm_niefin_rach_kwart_wg_sekt_instytuc_8-10-2009.xls)) and Eurostat (Database Eurostat, Quarterly non-financial accounts for general government, [http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=gov\\_q\\_ggnfa&lang=en](http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=gov_q_ggnfa&lang=en))

The average value of multiplier in the first two quarters of 2009 was 1.865, while in the same period of 2008 it was 1.667 (a rise by 12 per cent). The average multiplier coefficients in the first half of 2009 were as follows:  $m_{FG} = 0.279$  (0.313 a year earlier),  $m_A = 0.152$  (0.196 a year earlier), and  $cp = 0.643$  (0.644 in the first half of 2008). Should, in the second half of 2009 compared to the second half of 2008, the average value of coefficient  $m_A$  decline at the same rate as it did in the first half of 2009, i.e. by 22.6 per cent, and should propensity to consume  $cp$  remain stable at its level of 2008 (as it did in the first half of 2009 compared to the first half of 2008), then in 2009 as a whole the average value of the multiplier would be 1.796 (compared to 1.619 on average in 2008).

Should actual changes of coefficients determining the multiplier differ insignificantly from our assumptions (including the assumption that import intensity of exports would continue

at 0.6)), in 2009 the multiplier would be 1.80. This means that every zloty spent from budget coffers would generate about 1.80 zlotys increment in gross national income followed by about 0.32 zlotys of additional public revenues, and that every reduction of public spending by one zloty would result in reduction of GDP by 1.80 zlotys followed by a reduction in public revenues by 0.32 zlotys, the net effect of any such savings being 0.68 zlotys. In other words, considering additional incomes generated in the multiplier process, under conditions of 2009 every billion zlotys of fiscal expansion financed from public debt in about a third finances itself and it increases net budget deficit by about 2/3 of the original additional public spending. And to the contrary, every cut in budget spending – through a similar multiplier process operating in the opposite direction – would result in reducing budget deficit only by 2/3 of the original fiscal contraction.

More importantly, fiscal expansion policy in the phase of business downswing, through the multiplier process, would assist business recovery and at least save jobs that otherwise would be lost because of economic depression; possibly it would also help to increase employment. Among countries that since the 2008 crisis follow policies of fiscal expansion (the United States, France, Germany) the volume of government expenditure multiplier is believed to range between 1.5 and 1.6, or more.<sup>10</sup> Our estimates of the multiplier value in Poland do not differ much from them.

Finally, it should be noted that in our analysis average coefficients of import intensity of domestic absorption are used. However, domestic absorption is far not a homogeneous category, and as a rule the nature of government expenditure is well defined. From this point of view, the less than average import intensity of domestic absorption as a whole is the marginal import intensity of additional government spending, the higher will be the value of the multiplier. Considering that government interventionist spending will most likely go to public infrastructure such as building or repairs of roads, bridges, public schools, medical centres, police stations, or for supporting social housing programmes, their import intensity will be lower than that of private investments, and therefore the higher will be the national income multiplier.

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<sup>10</sup> British Prime Minister Gordon Brown in the wake of the September 2009 summits in New York and Pittsburg, when discussing the results of the fiscal expansion policies pursued in the course of the 2008 world economic crisis, claimed: 'Evidence shows that for every dollar spent on fiscal expansion two dollars of growth has followed -- and estimates suggest that fiscal expansion will create or save seven million jobs this year alone' (Brown, 2009).

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