

Autonomous expenditure multipliers as safety buffers during the COVID-19 pandemic – a comparison between Poland and Germany

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Abstract

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In recent months, many economic studies have emerged in the economic slowdown during the COVID-19 pandemic. Economists have analysed a great many socio-economic phenomena, from the slowdown in GDP dynamics to changes in consumer behaviour. There is a research gap that the research presented here aims to fill. It focuses on the issue of changes in fiscal, investment and export multipliers during the COVID-19 pandemic, attempting to show how the autonomous spending multipliers have changed because of the ongoing COVID-19 pandemic. The research results can provide insight into how GDP and Gross Value Added have changed because of changes in government, private investment and export expenditure. The research reveals that the values of the multipliers of autonomous expenditure have increased during the pandemic. On this basis, it can be concluded the multipliers became safety buffers during the COVID-19 pandemic. The increase in their value meant that the economic slowdown came about due to the decline in autonomous spending.

Key words

autonomous expenditure multipliers, effective demand, macroeconomic stabilisation, COVID-19.

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Introduction

2020 saw an economic downturn caused by the COVID-19 pandemic. Today it is widely acknowledged that we are dealing with a crisis largely unprecedented in history, which has touched every socio-economic space in almost all countries of the world. In recent

months there have also been many studies on the economic and social effects of the COVID-19 pandemic, analysing various phenomena ranging from declines in GDP value to changes in consumer behaviour. In this context, however, there is a research gap

that seems to be unfilled. It is difficult to find studies that answer the question of how the value of GDP has changed because of changes in individual autonomous expenditure. This paper aims to provide an answer by means of research on the fiscal, investment and export multipliers.

During the COVID-19 pandemic, the major cause of the economic slowdown that is the subject of this analysis is administrative decisions by national governments. These have led to a downturn in some areas of the economy, and even to the closure of the activities of enterprises and organisations in the socio-economic space. Although it is not the role of the author to assess such activities, these were actions that resulted from medical and sanitary-epidemiological logic. The facts are, however, that the effects of the COVID-19 pandemic are affecting the way countries, businesses and households function. In this context, it should be assumed that the aforementioned sanitary and epidemiological restrictions influenced human activity in these three areas. It can therefore be said that the economic slowdown has manifested in the first place in government spending, private investment, export activity and private consumption. This includes these activities that affect the size of the national GDP. However, their impact on the main economic indicators also depends on the mechanism of multipliers of autonomous expenditure; that is, what they say about how much GDP will change because of changes in autonomous spending. It is in this context that the primary research question arises: did the autonomous spending multipliers during the pandemic act as safety buffers and weaken the decline in domestic GDP? If, during economic development, these multipliers reveal the extent to which GDP will change because of an increase in autonomous spending, then perhaps the same happened during the crisis. Attempts to answer the research question can be found in research on economic phenomena in the Polish economy.

The German economy was chosen for the purpose of comparison. The rationale for this choice is as follows. The multiplier mechanism was based on import-intensity issues. The German economy is one of the most important in the context of Polish trade. It is the volume of trade that is the main determinant of the choice of this economy. Without going into the details of the development of the COVID-19 pandemic, it can be said that it developed very similarly in virtually all European countries. Sanitary and epidemiological restrictions were introduced at a similar time on a similar scale. However, this aspect is not the main criterion for selecting the German economy for the comparison that was carried out in this article – which was rather the context in which the Polish and German economies, European economies and almost all economies in the world find themselves. Due to these facts, changes in the multipliers of the autonomous expenditure of the Polish economy were analysed against the background of the same changes in Germany.

The research leads to an analysis of changes in the value of the fiscal, investment and export multipliers in Poland during the COVID-19 pandemic in 2020. However, to get to this stage, several elements had been researched earlier. First, based on the proposed additional indicators, imports were analysed having been broken down into capital, intermediate and consumer goods. As a result, imports were decomposed and assigned to individual autonomous expenditure and consumption expenditure. The structure of the absorption of imports in Poland and Germany was examined. These results made it possible to calculate the import intensity of government expenditure, private investment, export and private consumption. Using the concept of effective demand, the values of each of the multipliers for the analysed economies in the period of 2010-2020 were calculated. Their relative changes concerning the previous year are also presented. These

results made it possible to analyse the dependence and correlation of the multiplier values with their key determinants.

The paper consists of four main parts. The first part is a general literature review. Selected aspects of the socio-economic consequences of the COVID-19 pandemic that appear in contemporary research are presented here. This subject is highly topical, which means that in recent months there have been many different studies on this subject. It is impossible to present most of them here. This section is only intended to outline the general context of the research that underpins this article. The second part presents the most important issues of the methodology used for research. It is the method of autonomous expenditure multipliers in the context of the effective demand theory. This part also presents the original concept of import decomposition, which enables the analysis of changes in the value of multipliers in short periods as well. The most important research results are presented in the third part of the paper. Based on Eurostat statistical data, appropriate indices were calculated, imports were decomposed and appropriate import intensity indices were presented. Finally, the charts show the values of the fiscal, investment and export multipliers for Poland and Germany. This section also presents the impact of the relevant determinants on each of the three autonomous expenditure multipliers. The fourth part of the paper presents answers to key research questions. It presents a comparison of the dynamics of changes in the value of multipliers, correlation coefficients and the main variables determining the value of the multipliers. The most important conclusions resulting from the research are also described. The discussion presented in this part finally led to the most important conclusion, which was that the fiscal, investment and export multipliers became safety buffers that reduced the impact of the recession during the COVID-19 pandemic in Poland and Germany.

1. Literature review

It is worth presenting the most important results of research conducted on the economic effects of the COVID-19 pandemic. We may risk a statement that today we know a great deal about it. Certain studies show that “the different economic impact of COVID-19 across regions cannot be explained solely by the spread of infections, while both a region’s sectoral structure and its trade linkages are relevant determinants” (Meinen and Serafini, 2021). Even in this context, we can conclude that the research presented in this article fills the existing research gap. However, most studies analyse the direct impact of the COVID-19 pandemic on the most important economic indicators, such as public debt and household spending (Pinkus and Ramaswamy, 2020). The direct impact of the pandemic on changes in GDP was studied (Maliszewska et al., 2020). The issues of job losses and the decline in livelihood were analysed (Bottan et al., 2020). Research into the financial instability of households emerges in this context (Mogaji, 2020). The shocks that arose in global supply chains, which caused a slowdown and decline in production capacity in the enterprise sector, were also examined (McKibbin and Fernando, 2020, p. 45). Some studies show that “the major impact of the epidemic, or alleged pandemic, is on the supply side of the global economy – while remedies now considered and applied are on the demand side. The global armoury of tools against supply-side disruptions and shocks is very limited” (Maital and Barzani, 2020, p. 2). The first attempts to estimate the economic costs of fighting the COVID-19 pandemic are also being made. Most often, however, they are referred to as a real slowdown in GDP dynamics (Makridis and Hartley, 2020).

There is now a great deal of valuable research and scientific studies that describe specific economic areas and the changes that have occurred during the COVID-19 pandemic. It is worth mentioning several of them

in this context. Although the effects of the pandemic are slowing down the economy, some industries have found an opportunity to develop in the new reality. One of these is trading on the Internet. The new situation accelerated the implementation processes of IT solutions, which resulted in the exponential development of various internet platforms. In addition, sanitary restrictions, which on the one hand limited “commercial traffic”, on the other hand contributed to the development of e-commerce (Kitukutha et al., 2021; Sharfuddin, 2020). Improvement in the overall economic situation was also recorded in the medical services sector, which is evident from the medical nature of the economic slowdown caused by the pandemic. For the health security of citizens, many countries have introduced various mechanisms of “new” medical services, which has increased the portfolio of medical services as well as medical and medical-related technologies (Sarkodie and Owusu, 2021; Ye, 2020). The time of the pandemic, however, was a difficult period for many economies across the globe. In this context, national governments faced a new challenge (Erikson, 2020). There were new forms of various anti-crisis measures that were dedicated to society as well as to enterprises. From the economic perspective, the main goal of these activities was to counteract emerging demand and supply shocks (Bojarowicz, 2020; Bolesta and Sobik, 2020; Płóciennik, 2020). These activities led, on the one hand, to the improvement of the sanitary and economic situation of societies and enterprises; but on the other hand, there were also negative effects, i.e. a reduction in the activity of some enterprises (Ashraf, 2020). This shows that anti-crisis measures have to deal with a very complex situation that goes beyond economic aspects. The economic slowdown caused by the COVID-19 pandemic affects a very wide range of socio-economic aspects, not just economic (Bagchi et al., 2020; Bashir et al., 2020; Buheji et al., 2020; Martin et al., 2020).

The experience of the COVID-19 pandemic also contributed to research on monetary policy. In this context, the effectiveness of forwarding guidance at the effective lower bound was examined (Levin and Sinha, 2020). Production shocks were also compared with financial indicators and with monetary shocks that may increase the level of uncertainty (Caggiano et al., 2020). Studies that analyse changes in interest rates are also important. Interesting conclusions emerge in this context. “High-income countries entered the crisis with historically low-interest rates and as a result, were more likely to use nonconventional monetary policy tools. These findings raise the concern that countries with poor credit histories – those with lower credit ratings and, in particular, lower-income countries – will not be able to deploy fiscal policy tools effectively during economic crises” (Benmelech and Tzur-Ilan, 2020, p. 1). The interest rate issue was also explored in the context of the demand-side shock following changes in consumer behaviour (Cochrane, 2020). This, in turn – largely simplified of course – contributed to the increase in household savings (Dossche and Zlatanov, 2020).

Earlier studies on fiscal policy in the COVID-19 pandemic are also important for this article. The effects of inequality, fiscal policies and restrictions resulting from the COVID-19 pandemic against the backdrop of rigid capital costs were examined. They claim that “inequality has large negative effects on output, while also diminishing the effects of demand-side fiscal stimulus. COVID-19 restrictions can reduce current-period GDP by more than is directly associated with the restrictions themselves when rigid capital costs induce firm exit” (Auerbach et al., 2021). The response of fiscal policy to the economic slowdown caused by the COVID-19 pandemic was also analysed. It turns out that this reaction was quick and decisive. Of course, a fiscal policy with an appropriate monetary policy was implemented. It turned out that

developed economies reacted more to the change of fiscal policy than developing economies (Alberola-Ila et al., 2020). At the same time, it should be emphasised that the adopted fiscal policy strategy was also determined by other factors, such as the level of disposable income, the level of social security, or automatic stabilisers.

In this context, the research presented below complements the broad spectrum of economic research. The key research question posed earlier does not refer to the main economic indicators. The primary goal of this research is to show how autonomous spending multipliers have changed because of the ongoing COVID-19 pandemic. Only these multipliers allow for a complete analysis of the response of the GDP value to changes in government spending, private investment and exports during the economic slowdown. Therefore, these studies emphasise the multiplier mechanism as the final determinant of changes in the value of GDP. In this light, one can risk a certain thesis that the mechanism of multipliers of autonomous expenditure during the COVID-19 pandemic acted as a safety buffer, causing the pace of economic slowdown, from the perspective of GDP or Gross Value Added, to be reduced. We can assume that this is due to the socio-economic phenomena which increased the value of the fiscal, investment and export multipliers.

2. Methodology

When presenting the method of autonomous expenditure multipliers below, in light of the effective demand theory (Cesaratto et al., 2003), some theoretical assumptions should be made beforehand. In this context, it is assumed that the autonomous expenditure multipliers determine how GDP responds to changes in government spending, private investment, and exports (as spending on domestic exports by the rest of the world) (Ramey, 2019; Łaski, 2019, pp. 99–103). It is also assumed that the economy is under-util-

ising the factors of production, that foreign trade is balanced without any major restrictions, there are some differences in the distribution of national income between wages and gross profit margin, and the money supply policy is accommodating (Akerlof and Yellen, 1987). On this basis, it can be concluded that the Gross Domestic Product (Y) from the perspective of expenditure will be the sum of private consumption (CP), private investment (IP), government expenditure (G) and the balance of trade ($E = X - M$) where X is the export expenses from the rest of the world and M is the import value (Łaski, 2019, 1–5). This can be written as follows:

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

The value of GDP from an income perspective should also be entered here. It is the sum of Disposable Income (YD) plus all taxes minus subsidies. This is expressed as $Y = YD + TN$. Value (YD) is understood here as total income in the economy, both of households and enterprises. Thus, disposable income is broken down into private consumption (CP) and gross private sector savings (SP). These relationships can be written as follows: $YD = CD + SP$ and $Y = CP + SP + TN$. By making a simple transformation, we obtain the formula for private consumption in the economy, which can be written as $CP = Y - SP - TN$. Dividing this equation into both sides by the value of Y , we get $cp = 1 - sp - tn$. At this point, they revealed three average values. The first is the average private consumption $cp = CP/Y$, which is defined as the propensity for private consumption. This relationship in the form of $CP = cpY$ will be used in further considerations. The second value is the propensity for private savings $sp = SP/Y$. It should also be remembered that the relationship between them is such that $cp = 1 - sp$. The third value is the average tax rate $tn = TN/Y$.

Another element of the method that will be used to calculate the value of the multi-

pliers of autonomous expenses is the issue of import intensity. This is understood as the absorption of imported goods through individual expenditures generating domestic demand ($A = CP + IP + G$) and exports. As a basis for the decomposition of imports, its division into basic categories of goods was proposed, which was adopted in the System of National Accounts. In this way, the total import of goods is divided into imports of capital goods M_{DP} , intermediate goods M_{DZ} and consumer goods M_{DK} . It is written as:

$$M = M_{DZ} + M_{DI} + M_{DK} \quad (2)$$

We now need to allocate the values of the individual imported goods to the consumption, investment, government and export spending of the rest of the world. There is no major issue with importing consumer and investment goods. However, supply goods are absorbed by businesses and by the government. Therefore, coefficients are introduced that will make it possible to decompose this part of the import (Derkacz, 2020a). Because imported intermediate goods supply final production, the proposed coefficients will be based on Gross Value Added (GVA). The purpose of the first factor is to distribute the imported intermediate goods between the government and enterprises. For this purpose, government spending is divided by Gross Value Added, which we can write

$$m_{CP} = \frac{M_{DK}}{CP}; m_G = \frac{gM_{DZ}}{G}; m_{IP} = \frac{M_{DI} + apM_{DZ}}{IP}; m_X = \frac{epM_{DZ}}{X} \quad (4)$$

At this point, we return to the main equation for GDP (1). Using the above dependencies, through appropriate transformations, the formulas for the multipliers of autono-

as $g = G/GVA$. This coefficient ranges from 0 to 1. This gives us an estimate of the value of imported intermediate goods absorbed by public expenditure. This is written as gM_{DZ} . In turn, the value of import of intermediate goods absorbed by the enterprise sector can be written in the form pM_{DZ} , where $p = 1 - g$.

Subsequently, imports of intermediate goods from the corporate sector should be distinguished. On the one hand, this is absorbed by domestic accumulation as private investment, and on the other hand by export activity. In this context, the coefficient was introduced, which defines the share of exports in Gross Value Added $e = X/GVA$. Thanks to this solution, it is possible to estimate the value of imports, which is absorbed by the economic activity of enterprises in the field of export production. This value is written as epM_{DZ} . The value of the coefficient will range from 0 to 1. The other part of the import of intermediate goods absorbed by enterprises will be defined as apM_{DZ} , where $a = 1 - e$. In this way, the import divided by BEC (Broad Economic Categories) can be assigned to individual expenses included in formula (1). Thus, equation (2) can be written as:

$$M = M_{DK} + gM_{DZ} + (M_{DI} + apM_{DZ}) + epM_{DZ} \quad (3)$$

Based on the estimated import decomposition, individual import intensity factors can be derived. They are written as follows:

omous expenses are derived. Thus, equation (1), using equation (4) and the relationship $CP = cpY$, can be written in the following form:

$$Y = cpY + IP + G + X - m_{CP}cpY - m_{IP}IP - m_GG - m_XX$$

$$Y = cpY(1 - m_{CP}) + IP(1 - m_{IP}) + G(1 - m_G) + X(1 - m_X)$$

In this study, autonomous expenditure multipliers should be analysed in terms of Gross Value Added rather than Gross Domestic Production. Therefore, at this

point, the value of is replaced by the value of GDP from a production perspective ($Y = GVA + TN$). In this context, further transformations can be made.

$$\begin{aligned} GVA + TN &= cp(GVA + TN)(1 - m_{CP}) + IP(1 - m_{IP}) + G(1 - m_G) + X(1 - m_X) \\ (GVA + TN) - cp(GVA + TN)(1 - m_{CP}) &= IP(1 - m_{IP}) + G(1 - m_G) + X(1 - m_X) \\ (GVA + TN)(1 - cp(1 - m_{CP})) &= IP(1 - m_{IP}) + G(1 - m_G) + X(1 - m_X) \end{aligned}$$

Finally, this equation can be written as:

$$GVA = \frac{IP(1 - m_{IP}) + G(1 - m_G) + X(1 - m_X)}{1 - cp(1 - m_{CP})} - TN \quad (5)$$

The main essence of the multiplier mechanism is to reveal changes in the value of GDP (according to this approach – GVA) to changes in individual autonomous expen-

diture. In this context, equation (5) can be transformed once more. Both sides of this equation are divided by Y . Thus, we get:

$$\frac{\Delta GVA}{Y} = \frac{\Delta IP(1 - m_{IP}) + \Delta G(1 - m_G) + \Delta X(1 - m_X)}{1 - cp(1 - m_{CP})} - \frac{\Delta TN}{Y} \quad (6)$$

The left side of this equation is defined as the ratio of changes in Gross Value Added to GDP. It can be said that this is the dynamics of changes in the GVA value to GDP. On the one hand, it reveals the relative changes in Gross Value Added. On the other hand, it

shows the ratio of these changes to the value of Gross Domestic Production. Thus, this value was defined as the dynamics of GVA to GDP r_{GVA} . In this context, equation (6) can be simplified to the form:

$$r_{GVA} = k_1 \frac{\Delta G}{Y} + k_2 \frac{\Delta IP}{Y} + k_3 \frac{\Delta X}{Y} - \Delta tn \quad (7)$$

where

$$k_1 = \frac{(1 - m_G)}{1 - cp(1 - m_{CP})}; k_2 = \frac{(1 - m_{IP})}{1 - cp(1 - m_{CP})}; k_3 = \frac{(1 - m_X)}{1 - cp(1 - m_{CP})} \quad (8)$$

Thus, the formulas for the fiscal (k_1), investment (k_2) and export (k_3) multipliers were derived. They reveal the response of the GVA dynamics to GDP as a result of changes in individual autonomous expenditure to GDP. In this context, equation (7) should be interpreted as follows. The growth rate of Gross Value Added in an open economy is determined by:

- changes in the share of individual autonomous expenditure in GDP,
- changes in the average tax rate, and
- the value of the fiscal, investment and export multipliers.

It follows that the value of r_{GVA} depends on two phenomena. The first is the so-called injection of private investment, government expenditure and exports (Łaski and Walther, 2015). Their growth accelerates the growth of

Gross Value Added in the economy. The second phenomenon is leaks from the economic system. They are: (a) the import intensity of individual autonomous expenses and (b) private consumption, (c) gross saving propensity (as defined by $sp = 1 - cp$), and (d) average tax rate, which remains one of the instruments of fiscal policy (Derkacz, 2020b).

3. Research results

This chapter presents the most important results of the calculations that were performed based on the described method. All calculations are based on statistical data obtained from Eurostat. Data sets of the main components of GDP and foreign trade of the European Union countries according to BEC were used. On this basis, the g , p , e and a co-

efficients were first calculated for Poland and Germany. Remembering that $p = 1 - g$ and $p = 1 - e$, Table 1 shows the values of the in-

dependent coefficients (g, e) for Poland and Germany in the period of 2010-2020.

Table 1. Coefficients g and e in Poland and Germany

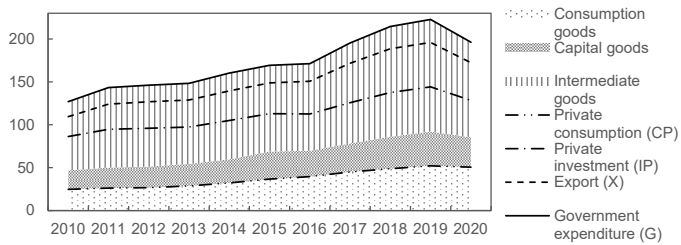
Coefficients		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
g	Poland	0.22	0.21	0.20	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.22
	Germany	0.22	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.25
e	Poland	0.37	0.40	0.41	0.42	0.43	0.45	0.47	0.49	0.50	0.50	0.51
	Germany	0.40	0.43	0.43	0.42	0.42	0.43	0.42	0.43	0.43	0.42	0.40

Source: Eurostat

The coefficients and calculations presented here made it possible to decompose imports and assign them to individual expenditures generating national GDP. Figure 1 shows the results of these calculations for the Polish economy, and Figure 2 the German

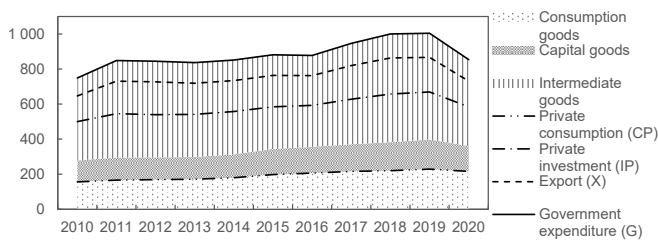
economy, in 2010-2020. The dashed lines reveal the values of imported goods that are absorbed by private consumption, private investment, government spending, and exports. The shaded areas show a breakdown of total imports by Broad Economic Category.

Figure 1. Import decomposition – Poland (in bln EUR)



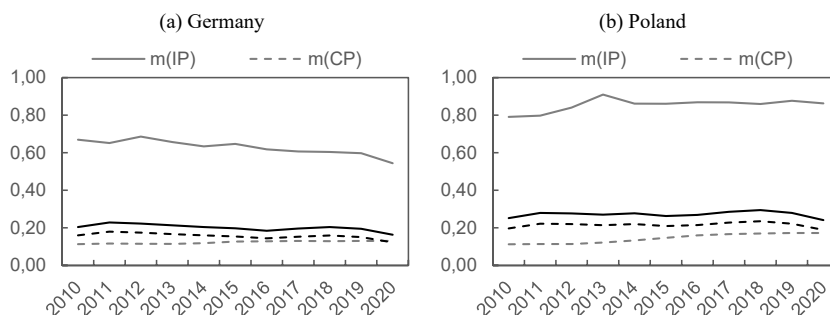
Source: Eurostat

Figure 2. Import decomposition -Germany (in bln EUR)



Source: Eurostat

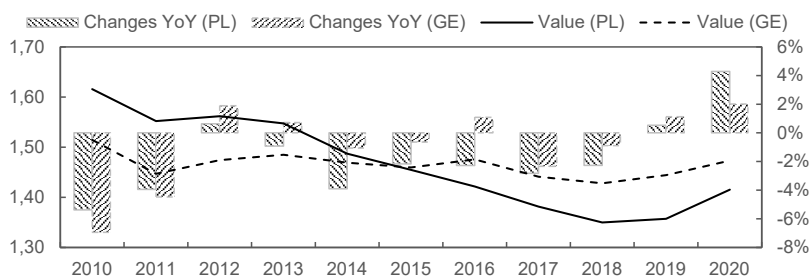
Based on the decomposition of imports, it is possible to calculate import intensity indicators. The rates of import intensity of private investment (m_{IP}), private consumption (m_{CP}), government expenditure (m_G) and exports (m_X) are calculated. The results for the Polish and German economies are presented in Figure 3.

Figure 3. Import intensity factors (in %)

Source: Eurostat

It is already possible to present the results of calculations of the individual multipliers of autonomous expenditure. For this purpose, the graphical images were reused, displaying the values of individual multipliers on the left ordinate axis. On the right axis of ordinates, the relative changes to the previous year as percentages are presented. This is how Figure 4 shows the calculations for the fiscal multiplier in Poland and Germany. First, one may compare the values of this multiplier. We may observe that they differ significantly in terms of their volatility. The coefficient of variation in the period 2010-2020 in Poland will reach the level of 5.93% and in Germany only 1.58%. Relative changes in 2020 concerning the base year 2010 = 100 turned out to be negative in both economies. However,

in Poland, it reached the level of -12.41% and in Germany -2.73%. The opposite situation took place in 2020 when compared to 2019. It can be observed here that the relative change in the value of the fiscal multiplier in Poland increased by 4.29% and in Germany by 2.01%. This characteristic is also visible in the chart of relative changes year-on-year. Here we may observe a clear increase in the dynamics of changes in the value of the fiscal multiplier during the COVID-19 pandemic. Such an observation applies to the present considerations. One should remember here the dependence and importance of the multiplier mechanism for changes in the GVA value because of changes in government expenditure.

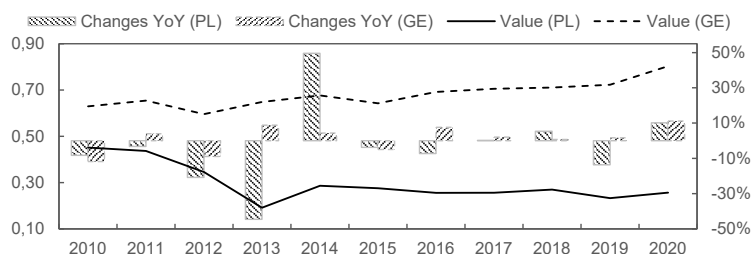
Figure 4. Fiscal multiplier – Poland & Germany

Source: own elaboration

Second, Figure 5 presents the calculation results for the investment multiplier. A different situation can be observed here. The coefficient of variation in the value of the investment multiplier in Germany amounted to 7.87% and in Poland as much as 26.40%. It is worth noting, however, that the highest dynamics of changes took place in 2010-2013. It was calculated that the coefficient of variation for the Polish investment multiplier in the period of 2014-2020 would reach the level of 6.10%. Somewhat interesting obser-

vations result from the calculations of the dynamics of relative changes of this multiplier to the base year 2010 = 100. It turned out that in Poland the value of the investment multiplier dropped by as much as -43.12%, while in Germany it increased by 27.69%. However, this situation changed in 2020. The relative change in the value of this multiplier compared to the previous year amounted to 10.17% in Poland and 11.18% in Germany. This is quite an important observation in the context of this research (Charles et al., 2018).

Figure 5. Investment multiplier – Poland & Germany

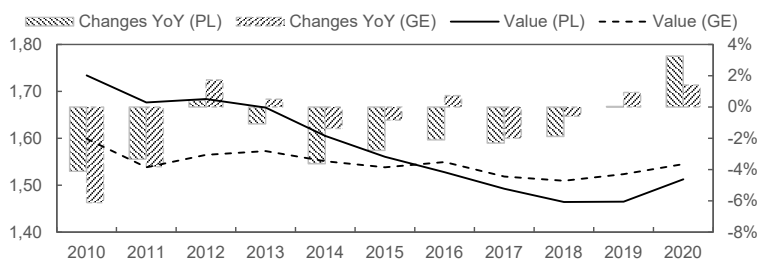


Source: Own elaboration

Yet another situation can be observed when analysing changes in the value of the export multiplier in Poland and Germany. The results of these calculations are shown in Figure 6. Based on the results of the relevant calculations, we can observe that the coefficient of variation of the value of the export multiplier in Germany was 1.59% and in Poland 5.84%. This suggests that the value of this multiplier in Poland is stable.

Analysing the value of this multiplier over the period of 2010-2020, a decline is visible. The dynamics of changes in the relative export multiplier to the base year 2010 = 100 reached values below zero. In Poland, it was 12.77% and in Germany 3.39%. This situation changed in 2020. The relative change in the value of the export multiplier when compared to 2019 amounted to 3.26% in Poland and 1.41% in Germany.

Figure 6. Export multiplier – Poland & Germany

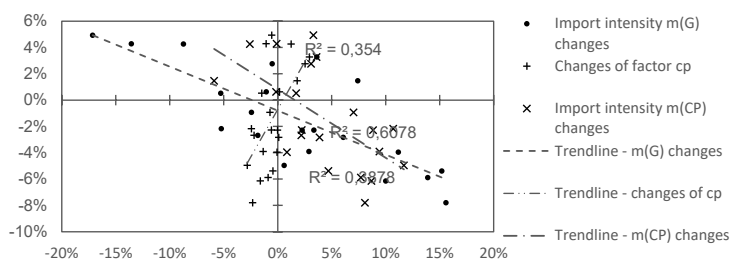


Source: Own elaboration

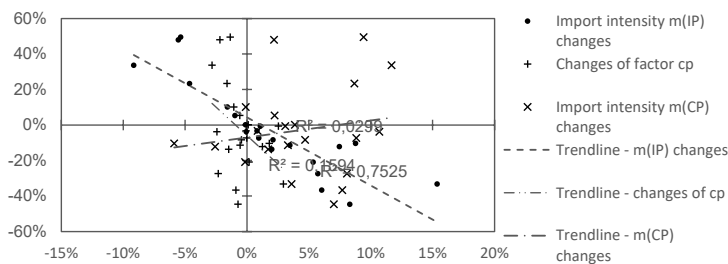
The results of correlation analyses between the values of individual multipliers and their determinants are presented. These calculations were made based on formula (8) for each multiplier in Poland and Germany. Point numbers were used to present the results. Each time the relative changes in value concerning the previous year were entered on the ordinates for the individual multipliers. Their determinants were put on the abscissa. These are the import intensity of individual autonomous expenses, the propensity for private consumption and its import intensity. Of course, these variables are also presented as relative changes in their values compared to the previous year. Hence, the percentages appear on the ordinates and abscissa. In addition, each of the charts has a linear trend line and an R-Squared coefficient for each of the analysed pairs. It is also worth mentioning that the changes in individual multipliers depend on variables, while the other three variables are explanatory.

The next three figures show the results of the calculations for the fiscal (see Figure 7), investment (see Figure 8) and export (see Figure 9) multipliers for the Polish economy in 2000-2020. A longer time perspective was used in these calculations so as to obtain more accurate correlation results. This analysis allows the researchers to determine the strength, intensity and direction of the correlation between the analysed pairs of variables. It may seem that changes in the YoY value of the fiscal multiplier are correlated with changes in the propensity to consume and correlated with the other two determinants. An analy-

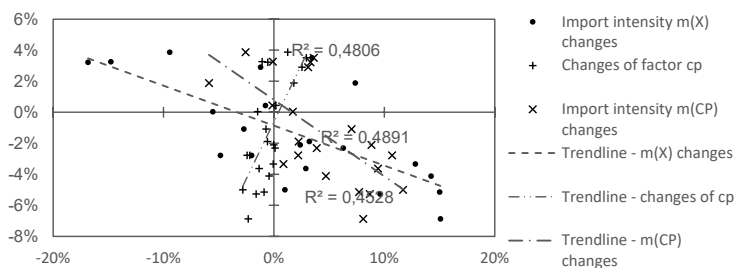
sis of the significance and strength of these relationships is important here. The most important explanatory variable is the import intensity of government expenditure. The Pearson coefficient was -0.78 and the R-Squared was 0.61. This shows significant dependence and high correlation. The investment multiplier remains correlated only with changes in the import intensity of private consumption. This is quite surprising, if only because changes in the propensity to consume have an opposite effect on changes in the value of this multiplier. Although the strength and significance are quite weak here (Pearson's index -0.40, R-Square 0.16), the very fact of the negative correlation should be a signal for further and detailed analyses. This situation may result from, for example, a decrease in the propensity to consume or an increase in its import intensity. The results of the calculations confirm this assumption. The relative change in the value of the coefficient in 2020 when compared to the base year 2000 = 100 was 28.64%. The private consumption import intensity ratio changed by 149.04% in the same period. Relative changes in the export multiplier respond to the key determinants more predictably. Here, the correlation to changes in the propensity for private consumption is positive again. The Pearson coefficient was 0.69 and the R-Squared was 0.48. This shows a high correlation and a significant dependence. The other explanatory variables are correlated, as expected. A higher correlation and a more significant dependence are visible here to changes in the level of export-import intensity.

Figure 7. Fiscal multiplier and its determinants – Poland

Source: Own elaboration

Figure 8. Investment multiplier and its determinants – Poland

Source: Own elaboration

Figure 9. Export multiplier and its determinants – Poland

Source: Own elaboration

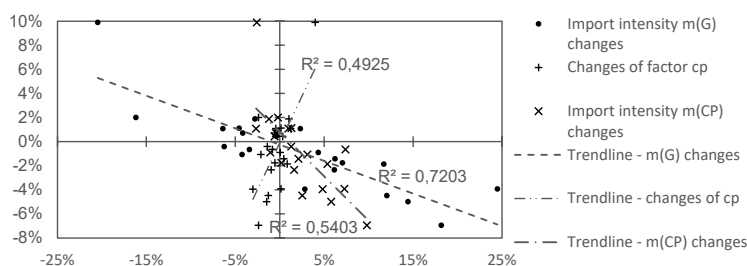
The results of the research on the dependence and correlation of changes in the value of individual multipliers to their determinants in the German economy are similar to the results collected in the Polish context. The next three figures show the results of the calculations for the fiscal (see Figure 10), investment (see Figure 11) and export (see Figure 12) multipliers. The time perspective 2000-2020 was re-adopted. The fiscal multiplier is correlated with changes in the import intensity of government expenditure and the

import intensity of private consumption in Germany as well. Here, we are dealing with a very high correlation and a very large and significant relationship. This multiplier is correlated with changes in the propensity for private consumption. Here, the Pearson coefficient is 0.70 and the R-Squared is 0.49. This means that we are dealing with a high positive correlation and a significant dependence. Different results from the calculations of the correlation of the investment multiplier in Germany to individual determinants

have been obtained. Here, we are dealing with three negative dependencies. Not only changes in private consumption, but also its import intensity with changes in the investment multiplier, are negatively correlated. However, the strongest correlation which may be noticed here pertains to the import intensity of private investments. The Pearson coefficient is 0.91 and the R-Squared is 0.83. This means that we are dealing with an almost complete dependency here. The export

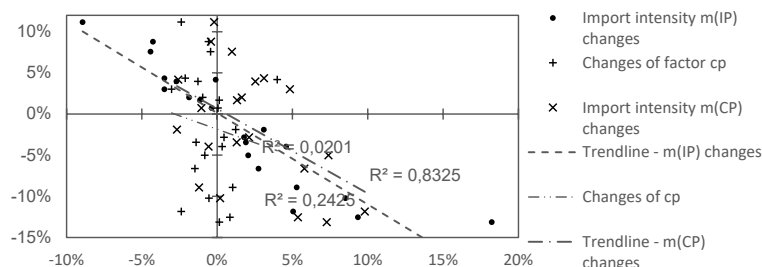
multiplier in Germany correlates even more strongly with its determinants than in Poland. The directions of these dependencies remain the same. The correlation between changes in this multiplier and changes in the import intensity of exports is very large, and the correlation is very high. The Pearson correlation is -0.82 and the R-Squared is 0.67. The other two explanatory variables affect the changes in the export multiplier with a high correlation and significant dependence.

Figure 10. Fiscal multiplier and its determinants – Germany



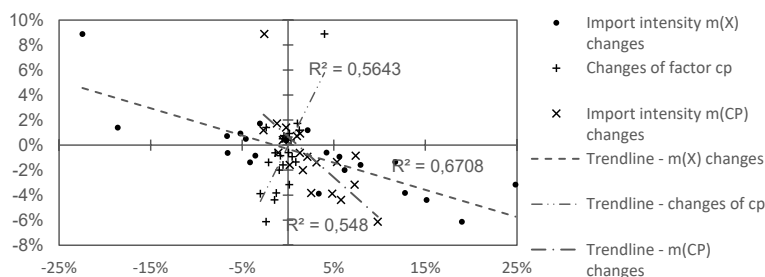
Source: Own elaboration

Figure 11. Investment multiplier and its determinants – Germany



Source: Own elaboration

Figure 12. Export multiplier and its determinants – Germany



Source: Own elaboration

Due to the relatively high correlation indices described above, detailed data are presented in Table 2. These are all the variables that were used in the calculations, the results of which are shown in Figures 7-12. These very general descriptive statistics in tabular form should allow for the verification of the calculations performed. Additionally, it should be mentioned that there should be no

apparent correlation error. Although the calculations were made with the use of empirical data, they are nevertheless entered into appropriate formulas (mainly 7 and 8). This makes it impossible to talk about the risk of an apparent correlation. The individual relationships result directly from the adopted methodology based on the theory of effective demand.

Table 2. Variables adopted for the calculation of the correlation coefficients of multipliers and their determinants (in %)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Poland																					
k_1	1.5	4.3	3.3	-7.8	-5.9	-2.7	-6.1	-5.0	2.8	4.9	-5.4	-4.0	0.6	-0.9	-3.9	-2.2	-2.3	-2.8	-2.3	0.5	4.3
m_6	7.4	-8.7	3.6	15.6	13.9	-1.8	10.0	0.6	-0.5	-17.1	15.2	11.2	-1.1	-2.4	2.9	-5.2	2.3	6.1	3.3	-5.3	-13.6
k_2	-10.3	-12.1	-33.2	-27.4	-36.6	48.0	23.4	33.7	-0.6	-11.3	-8.3	-3.3	-20.8	-44.6	49.6	-3.8	-7.3	0.2	5.4	-13.6	10.2
m_{ip}	8.8	7.5	15.4	5.7	6.0	-5.5	-4.6	-9.2	1.1	3.5	2.1	0.8	5.3	8.3	-5.4	-0.1	1.0	-0.1	-1.0	2.0	-1.6
k_3	1.9	3.9	3.5	-6.9	-5.1	-2.8	-5.3	-5.0	2.9	3.2	-4.1	-3.3	0.4	-1.1	-3.6	-2.8	-2.1	-2.3	-1.9	0.0	3.3
m_x	7.4	-9.5	3.4	15.1	15.0	-2.0	9.6	1.0	-1.2	-16.8	14.2	12.8	-0.8	-2.7	2.9	-4.9	2.4	6.3	3.2	-5.5	-14.8
cp	1.8	1.2	2.9	-2.3	-0.9	-2.2	-1.6	-2.8	2.5	-0.6	-0.5	-0.1	0.2	-0.7	-1.4	-2.4	0.0	0.1	-0.6	-1.5	-1.1
m_{cp}	-5.9	-2.6	3.6	8.1	7.7	2.2	8.7	11.7	3.1	3.3	4.7	0.9	-0.2	7.0	9.4	10.7	8.8	3.9	2.2	1.7	-0.1
Germany																					
k_1	-3.9	0.4	-0.4	1.1	-1.8	-1.9	-5.0	-3.9	-1.4	9.9	-6.9	-4.5	1.9	0.7	-1.1	-0.6	1.1	-2.3	-0.9	1.1	2.0
m_6	24.5	-0.4	-6.2	2.3	7.1	11.7	14.4	2.8	6.2	-20.5	18.2	12.0	-2.8	-4.2	-4.2	-3.4	-6.4	6.1	4.3	-4.6	-16.2
k_2	-13.1	-3.9	-3.4	-1.9	-10.2	-12.5	-6.6	3.0	-2.8	4.2	-11.8	4.0	-8.9	8.8	4.4	-5.0	7.6	2.0	0.7	1.7	11.2
m_{ip}	18.2	4.6	1.9	3.1	8.5	9.3	2.7	-3.5	1.8	-0.1	5.0	-2.7	5.3	-4.3	-3.5	2.1	-4.4	-1.9	-0.4	-1.1	-8.9
k_3	-3.2	0.4	-0.6	1.2	-1.6	-1.3	-4.4	-3.9	-0.9	8.9	-6.1	-3.8	1.7	0.5	-1.4	-0.8	0.7	-2.0	-0.6	0.9	1.4
m_x	24.8	-0.2	-6.6	2.1	7.9	11.7	15.1	3.4	5.6	-22.5	19.0	12.8	-3.1	-4.6	-4.1	-3.6	-6.7	6.2	4.2	-5.2	-18.6
cp	0.1	0.3	-1.4	1.2	-0.5	0.8	-1.5	-3.0	0.5	4.0	-2.4	-1.3	1.0	-0.6	-2.1	-0.8	-0.4	-1.0	0.0	0.1	-2.4
m_{cp}	7.3	-0.6	1.3	-2.7	0.2	5.4	5.8	4.8	2.1	-2.6	9.8	2.5	-1.2	-0.4	3.1	7.4	1.0	1.6	-1.1	1.3	-0.2

Source: own elaboration

4. Have the multipliers become safety buffers against the recession?

The results of the research and relevant calculations presented above may be the basis for discussion. At the beginning of the research, the following key question was asked: did the multipliers of autonomous spending become some kind of safety buffers that weakened the negative impact of the pandemic on changes in the dynamics of Gross Value Added? According to the adopted method, the growth

rate of Gross Value Added to GDP in an open economy is determined by: (a) an increase in the share of individual expenditures in autonomous GDP, (b) changes in the average tax rate, and (c) the value of the fiscal, investment and export multipliers. In this context, it was found that the r_{GVA} value depends, on the one hand, on private, government and export investment expenditure. Their growth is positive for the dynamics of changes in Gross Value Added in the economy. The value of r_{GVA} depends on the so-called total demand

leakages, which are: (a) the import intensity of individual autonomous expenses, (b) import intensity of private consumption, (c) gross saving propensity, and (d) average tax rate.

When discussing this issue, it is worth considering how the multipliers of auton-

omous expenditure changed in 2020 compared to changes in previous periods. For this purpose, the relative changes in 2020 were compared to the base year 2010 = 100 and 2019 (see Table 3).

Table 3. Comparison of the dynamics of changes in the value of multipliers (in %)

Multipliers	2020/2010=100	2020/2019	2020/2010=100	2020/2019
	Poland		Germany	
fiscal	-12.41	4.29	-2.73	2.01
investment	-43.12	10.17	27.69	11.18
export	-12.77	3.26	-3.39	1.41

Source: Own elaboration

We may observe that in 2020 the values of individual multipliers in Poland decreased compared to 2010. In the German economy, the fiscal and export multipliers slightly decreased. The investment multiplier strengthened significantly. A surprising picture, however, emerges from the observation of the dynamics of changes compared to 2019. It is clear that the downward trend in Poland has been corrected. In Germany, a similar correction occurred, albeit not as strongly. It turned out that during the COVID-19 pandemic, the autonomous spending multipliers increased in value. In Poland, the fiscal multiplier reached the level of 1.42 (1.36 in 2019), the investment multiplier 0.26 (0.23 in 2019) and the export multiplier 1.51 (1.46 in 2019), respectively. In the German economy, the fiscal multipliers reached a value of 1.47 (1.44 in 2019), investment 0.80 (0.72 in 2019) and the export multiplier 1.55 (1.52 in 2019), respectively.

Such a comparison may be the basis from which to draw certain inferences. Since in 2020 there was an increase in the value of the fiscal, investment and export multipliers, with a simultaneous slowdown in the growth rate of autonomous expenditure, the slowdown in the dynamics of changes in the GVA value to GDP

was blocked. In this context, another question can be asked: what made the autonomous spending multipliers behave this way?

In response to this question, the analyses of dependencies and correlation, which were presented in the research results, will be helpful. Here, the Pearson and R-Squared indices for individual multipliers and their determinants were compared, according to formula (8) (see Table 4). The values of the correlation coefficients in the table below that show at least a significant relationship are written in bold digits (Pearson's coefficient > 0.7, R-Squared coefficient > 0.4). Such a comparison gives rise to some conclusions. The most important dependence and the strongest correlation occur between all multipliers and import intensity coefficients of adequate autonomous expenditure. The following factors have a relatively significant impact on the value of the fiscal and export multiplier: (a) import intensity of private consumption and (b) propensity for private consumption. Since such conclusions have been drawn, another question arises, namely: how have the import intensity indicators and the propensity for private consumption changed during the COVID-19 pandemic in Poland and Germany?

Table 4. Comparison of correlation indicators for multipliers

Multipliers		Import intensity of autonomous expenses		Import intensity of private consumption (m_{cp})		Propensity for private consumption (cp)	
		Pearson	R-Squared	Pearson	R-Squared	Pearson	R-Squared
fiscal	PL	-0.78	0.61	-0.62	0.39	0.59	0.35
	GE	-0.85	0.72	-0.74	0.54	0.70	0.49
investment	PL	-0.87	0.75	0.17	0.03	-0.40	0.16
	GE	-0.91	0.83	-0.49	0.24	-0.14	0.02
export	PL	-0.70	0.49	-0.67	0.45	0.69	0.48
	GE	-0.82	0.67	-0.74	0.55	0.75	0.56

Source: Own elaboration

For this purpose, Table 5 presents a comparison of the dynamics of changes in import intensity indicators and propensity for private consumption. The relative changes that took place in 2020 were compared to the base year 2010 = 100 and 2019. Again, quite obvious changes that occurred during the COVID-19 pandemic can be observed. In Poland, the coefficients of import intensity of private investment and private consumption increased significantly compared to the base year 2010 = 100. The latter increased by 53.29%. The import intensity of government expenditure and exports in the same period decreased by less than 4%. A significant change in trends took place in 2020. One may observe here a very clear decrease in

the levels of all four import intensity factors. The same phenomenon also occurred in the German economy. This can be interpreted to mean that the varying economic activity in these economies has reduced the absorption of imported goods. This is visible in the change in the dynamics of the import intensity of private consumption in Poland. It can be said that in 2020 the somewhat dynamic growth of the m_{cp} coefficient practically ceased. A similar phenomenon also took place in Germany. Thus, one can risk the statement that the decreases in the levels of import intensity in these economies during the COVID-19 pandemic positively influenced the increase in the value of the fiscal, investment and export multipliers.

Table 5. Comparison of the dynamics of changes in import intensity factors and propensity for private consumption (in %)

Import intensity factors	2020/2010=100	2020/2019	2020/2010=100	2020/2019
	Poland		Germany	
private investment	9.04	-1.58	-18.76	-8.94
private consumption	53.29	-0.10	14.69	-0.21
government spending	-3.94	-13.56	-19.94	-16.17
export	-3.71	-14.78	-23.16	-18.59
propensity for private consumption	-7.26	-1.07	-7.19	-2.39

Source: Own elaboration

The changes in the relative propensity for private consumption also deserve attention. They had a significant impact, first, on the value of the fiscal and export multipliers. Here, there was a slight correction of the trend in 2020. The value of the coefficient decreased in 2020 compared to the base year 2010 = 100 by over 7% in Poland and Germany. Compared to 2019, this decrease was at the level of -1.07% in Poland and -2.39% in Germany. Based on this, it is difficult to speak of any powerful shocks caused by the COVID-19 pandemic. Of course, if we consider the nominal value of private consumption, its decline in 2020 is visible. In Poland, this value decreased by 3.08% compared to 2019, and in Germany by 5.69%. However, it should be remembered that the propensity for private consumption was calculated as the ratio of private consumption to the value of GDP.

On this basis, one final question may be posed: what are the conclusions for economic policy presented here? The question posed in this way suggests the very broad context of the answer. No detailed answer will be given here. However, the purpose of the question posed in this way is to provoke a discussion of the above issues. Its ultimate effect could be recommendations for the government in taking actions pertaining to the so-called defrosting of the economy after the COVID-19 pandemic.

In this context, the role of autonomous expenditure injection should firstly be emphasised. These are, of course, government spending, private enterprise investment, and exports. The research has shown that the first and the last of these (because of the value of the multipliers) are the most important to changes in the dynamics of growth in Gross Value Added to GDP. At least in this context, it can be assumed that increasing government spending during the COVID-19 pandemic may be justified. Of course, these expenses should be targeted. Since the export expenditure of the rest of the world is an im-

portant determinant of the dynamics of r_{GVA} , aid activities should also be targeted at this area of economic activity. Export activities are carried out by enterprises. Therefore, it may be said that it is this area of the national economy that should be the beneficiary of aid instruments. It can be assumed that this type of support measure cannot only concern transfers or subsidies. Here, a wide range of actions is required, including fiscal and monetary policy. Such a statement is often confirmed by Polish economic policy.

When looking for the basis for creating recommendations for economic policy, one cannot forget about the so-called leakage of aggregate demand which appeared in the analysed fiscal, investment, and export multipliers. In this context, the multiplier mechanism should be emphasised. If decisions in economic policy lead to an increase in government expenditure (regardless of the defined group of beneficiaries of transfers or subsidies) and lead to a decrease in the value of the fiscal multiplier, these actions will prove completely ineffective. This results directly from the concept of effective demand presented here. Thus, it can be said that the government's actions, on the one hand, should be aimed at implementing budgetary policy, and they should focus on the optimisation – not to say minimisation – of the total demand for leakage. They are mainly revealed in the import intensity indicators. In this context, one may state that the period of the COVID-19 pandemic is a good time to intensify the promotion of generating domestic demand – of course, within the reasonable limits of the production system. This applies to the industrial service and agricultural sectors.

The proposed discussion must also include a propensity for private consumption. Although it mainly concerns households, it is inextricably linked with the situation of the enterprise sector. The classic statement is that entrepreneurs earn as much as they spend, and consumers spend as much as they earn.

Therefore, the level of private consumption of households will be largely determined by the situation of entrepreneurs. In this context, the conclusion from one of the previous paragraphs about the appropriate targeting of transfers or subsidies to the corporate sector is worth repeating. The government's actions, aimed at maintaining or blocking the decline in employment, also seem justified. Therefore, it can be said that the primary aim of economic policy will be to maintain an appropriate level of disposable income for households. This – to simplify matters – will stabilise the private consumption propensity ratio. The circle of the economic cycle of supply and demand closes, which does not require a detailed description here.

The key research questions posed at the beginning of this research paper suggested a certain thesis. Therefore, the mechanism of multipliers of autonomous expenditure during the COVID-19 pandemic acted as a buffer to economic slowdown expressed in the dynamics of changes in Gross Value Added to GDP. It turned out that in 2020, with a simultaneous decline in the growth rate of government spending, private investment and exports, the values of the multipliers increased in value. The research showed that the main reason for these changes was the corresponding changes in the value of import intensity of both individual autonomous expenditure and the import intensity of private consumption. Interestingly, the same dependencies existed in the Polish economy and the more developed German economy. In this context, it can be said that the fiscal, investment and export multipliers have become a kind of security buffer that have reduced the impact of the economic recession. This may be the basis for building recommendations for economic policy in creating plans for the Polish economy to recover from the slowdown caused by the COVID-19 pandemic in 2020.

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