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Arkadiusz J. Derkacza, Santos Necas Bilab and Sodiq Arogundadec

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Autonomous Expenditure Multipliers and Gross Value Added in South Africa

ARKADIUSZ J. DERKACZ[A], SANTOS NECAS BILA[B] AND SODIQ AROGUNDADE[C1]

[a] Institute of Economics, University of Social Sciences, Warsaw, Poland
[b-c]School of Economics and Econometrics, University of Johannesburg, South Africa.

Abstract

This study answers two main questions. What are the South African fiscal, export, and investment multipliers? Is obtaining the impact of autonomous expenditure on gross value-added growth rate possible? In answering these questions, we use the principle of aggregate demand and data spanning 1992 to 2019. The results suggest that autonomous expenditure multipliers exert a positive effect on the change in gross value added. These multipliers are however driven by several factors. First, the import intensity level - the import intensities of each autonomous expenditure reduce their significance. This means that the leakage of aggregate demand in the form of expenditure on the purchase of imported goods increases. Secondly, the value of the fiscal, investment and export multipliers is determined by the propensity for total private consumption. The value of the propensity for total private consumption depends on the household income taxes and the propensity to save. An increase in these two ratios decreases the value of the propensity to private consumption. This indicates that the leakage of aggregate demand is driven by a decline in total private consumption in the economy, and this may be caused by an increase in savings and/or an increase in the average household income tax.

JEL Classification: E0; E12; E20; E63

Keywords: Fiscal multiplier, export multiplier, investment multiplier, GVA, South Africa

*Corresponding author:
1. Sodiq Arogundade *E-mail address*: arogundadesodiq9@gmail.com

1. Introduction

South Africa's democratic transition was followed by a recovery in its growth performance, a growth acceleration that lasted until the 2000s, ending with different shocks that hit the economy, such as the financial crisis and recently the Covid-19 pandemic. Since the advent of the crisis, South African growth has reverted to much lower levels, and in trend terms shows little signs of improvement (Fedderke and Mengisteab, 2017). This has prompted the government to adopt series of policies to stimulate aggregate demand. This and subsequent attempts to reverse budget deficits, increase investment and export have been accompanied by a resurgence of economic research on the effectiveness of aggregate demand policies in the economy. It has also been understood within theories of economic growth and development that changes to autonomous expenditure affect the economy (Barro 1990). Within the context of economic crises, studies such as Naimzada and Pecora (2017) and Pusch (2012) have estimated autonomous expenditure multiplier. Derkacz (2020) also examines autonomous expenditure multiplier for selected European Union countries. However, this study is not aware of any empirical literature on autonomous expenditure multipliers within the context of South Africa. The closest attempt is that (Burrows and Botha, 2013; Magubu et al. 2013; Fedderke and Mengisteadb, 2017; Makrelov, et al, 2018; Kavese and Erero, 2018; Girardi et al, 2018; Kavese and Phiri, 2020), and these studies only estimated fiscal multipliers for South Africa, ignoring in this context other multipliers such as investment and export multiplier.

The novelty of this study is that we estimate the autonomous expenditure using the theory of aggregate demand, which has been employed in other autonomous expenditure multiplier calculations (Łaski et al. 2010c; Palley, 2009). The theory reveals how GDP responds to fiscal, investment and export policies in a capitalist economy. However, there are some concerns on the methodology in estimating the multipliers, particularly import-intensity coefficient. Furthermore, modern economics advocates for the predominance of the gross value-added ratio over gross domestic product. Gross value added (GVA) determines the value of all the socio-economic benefits that are generated in the process of producing goods and services in the economy (Derkacz, 2020).

Within this context, this study attempts to answer two crucial questions: (1) How is the import capacity of autonomous expenditure calculated? Is calculating the import-intensive ratios i.e., autonomous expenditure multiplier possible in the short term. While there are variety of methodology used in the calculation of autonomous expenditure multiplier, majority of these studies uses the input-output methodology (Burrows and Botha, 2013). Since this publication

is done every five years, a different approach to calculating import-intensity indicator is ideal. (2) is it possible to quantify how change in autonomous expenditure respond to change in change in gross value added?

In answering these two questions, this study rearranged the approach for estimating the import-absorbency ratios of autonomous expenditure. Specifically, total import is broken down into consumer, capital and supply goods. In addition to this, the second question which is to determine the dynamics of GVA with respect to the GDP is verified using the theoretical mechanism of autonomous expenditure multipliers. The study uses the aggregate demand approach. In adopting the most important theoretical assumptions, the study transforms a key formula that classically determines the level of GDP response to changes in autonomous expenditure (Blanchard and Perotti, 2002). This has allowed the dynamics of changes in gross value added to be defined using fiscal, investment and export multiplier mechanisms.

This study uses the principle of effective demand to answer two main question; (1) what is the South African fiscal, export and investment multipliers? (2) is obtaining the impact of autonomous expenditure on gross value-added growth rate possible? The results suggest that autonomous expenditure multipliers have a positive effect on the change in gross value added. However, this impact is conditional import intensity level propensity for total private consumption.

The remaining section of this paper is structured as follows. Section two describes the theoretical framework and data, while section three presents the empirical findings. The last section offers some concluding remarks.

2. Theoretical framework and methods

When calculating and analyzing the values of the autonomous expenditure multipliers, the authors use the theory of effective demand. Several fundamental assumptions are made, these include; (i) it is necessary to reject the assumptions of mainstream economics, which points out to the automatic striving of a free market economy to a state of equilibrium with full use of production capacity (Akerlof 2007; Dequech 2007). According to the theory of effective demand, it is assumed that in a capitalist economy we are dealing with a 'natural' state of instability (Łaski, 2019). It depends on the investment decisions of entrepreneurs; ii) There is under-utilization of production capacity; (iii) It is also assumed that foreign trade balances without major restrictions and there are slight changes in the distribution of national income between wages and gross profit margin. In this context, changes in gross domestic product are

mainly determined by the size of autonomous expenditure. These include private investment by the enterprise sector, public expenditure and the rest of the world spending on exports. The ratio of change in the size of GDP to changes in individual autonomous expenditure is defined as the multipliers of these expenditures. Therefore, the multipliers of public, investment and export expenditure are revealed. On the one hand, we are dealing with factors driving total demand in a capitalist economy – autonomous expenditure. On the other hand, there are aggregate demand leakages that show up in the multiplier mechanism (Blanchard and Perotti, 2002).

According to the theory of effective demand, the value of GDP (Y) from the expenditure approach is given by the equation:

$$Y = CP + IP + G + X - M \tag{1}$$

where CP is private consumption, IP – private investment, G – government expenditure, X – export and M – import. In turn, GDP from the income approach is written with the equation:

$$Y = W + R + TN \tag{2}$$

where W is total household income, R – corporate profits and TN – total taxes less subsidies. On this basis, the value of disposable income in the economy is calculated. This can be written as $YD = W + R$. From this we get the relationship $YD = Y - TN$. It is assumed that disposable expenses may be allocated to private consumption (CP) and private savings (SP). This can be formally expressed as follows, $CP + SP = Y - TN$. From this we get the relationship $Y = CP + SP + TN$.

The concept of the propensity to save (sp) should be introduced here. It is defined as the ratio of private savings to the value of GDP. We write this as $sp = SP / Y$. We also deal with the average net tax rate in the economy, which is written as $tn = TN / Y$. These two quantities are necessary for determining the propensity to consume in the context of the effective demand theory. The last equation for GDP can be converted into the form $CP = Y - SP - TN$. If we divide this equation both sides by Y, we get $cp = 1 - tn - sp$. This dependence shows that $CP = cpY$. This relationship will be used in the further part of our analysis.

At this point, the issue of decomposition of imports should be introduced. It is necessary to assign imported goods to individual expenses in the economy. Or, in other words, how much of the individual expenditure in the economy is allocated to imports. The division of imports

by their final destination (end-use). According to the methodology adopted by the OECD, imported goods are divided into intermediate goods, consumption goods and capital goods. Some of the imported goods are also assigned to the categories 'Mixed end-use' and 'Miscellaneous'. In our calculations, we include these imported goods in the category of intermediate goods (De March 2008; Rueda-Cantuche et al. 2017; United Nations 2002; Derkacz, 2020). This is due to the fact that a significant part of them goes to the South African economy through commercial companies. We make this assumption based on the types of goods that have been assigned to these groups. Under 'Mixed end-use' you will find packed medicines, personal computers, passenger cars, personal phones and precious goods. The group 'Miscellaneous' includes import commodities not elsewhere specified and light petroleum oils & oils from bituminous minerals other than crude. (Bilateral Trade Database (BTD), 2017)) In this context, the total import of goods is written according to the equation:

$$M = M_{IG} + M_{CG} + M_{HC} \tag{3}$$

where M_{IG} it is the import of intermediate goods, M_{CG} – import of capital goods and M_{HC} – import of consumption goods absorbed by households.

Individual groups of imported goods should now be assigned to the expenditure that determines the change in GDP from the expenditure approach. Private consumption is entirely absorbed by the import of consumer goods. All imported capital goods are absorbed by private investment. Moreover, private investment, apart from capital goods, also absorbs some of the imported intermediate goods. In turn, imported intermediate goods are absorbed in the economy through private investment, government spending and exports. To assign individual parts of import to four groups of expenses certain factors are introduced. They will be determined based on the share of individual expenses in gross value added. (GVA). They will be determined based on the share of individual expenses in gross value added (GVA).

The first two factors separate imported intermediate goods between the government sector and the corporate sector. The g-factor will mean the share of government expenditure in gross value added. Thus, state activity, expressed in terms of government expenditure, absorbs a part of the import of intermediate goods worth gM_{IG}. The other part of the import of intermediate goods with a value of $(1-g)M_{IG}$ is absorbed by the enterprise sector. This part of the import of intermediates is defined as pM_{IG}, where $p = 1-g$. From this it follows that $M_{IG} = gM_{IG} + pM_{IG}$. In the next stage, the import of intermediate goods absorbed by enterprises pM_{IG} should be divided into domestic accumulation and export. The coefficient e is introduced, which

denotes the share of exports in gross value added. On this basis, you can calculate that part of the import of intermediate goods that is used to produce export goods epM_{IG}. The remaining part of imported intermediate goods is absorbed by private enterprises for domestic absorption apM_{IG}. Also in this case we are dealing with the relation $a = 1 - e$. We therefore, write the total value of the import as follows:

$$M = M_{HC} + (M_{CG} + apM_{IG}) + gM_{IG} + epM_{IG} \tag{4}$$

It is now possible to determine the level of import intensity for individual expenses. This can be written as:

$$m_{CP} = \frac{M_{HC}}{CP};\ m_G = \frac{gM_{IG}}{G};\ m_{IP} = \frac{M_{CG} + apM_{IG}}{IP};\ m_X = \frac{epM_{IG}}{X} \tag{5}$$

At this point, an attempt can be made to derive the formulas for the fiscal, investment and export multipliers. For this purpose, formula (1) is transformed. Using formulas (2) and (5) we get:

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

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

Starting from one of the most important dependencies of the theory of effective demand, which shows that YD + TN = CP + IP + G + M-X = GVA + TN, we get:

$$Y = GVA + TN \tag{6}$$

By making further transformations, we obtain the following dependencies.

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

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

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

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

Finally, we get the following equation:

$$GVA = \frac{IP(1 - m_{IP}) + G(1 - m_G) + X(1 - m_X)}{1 - cp(1 - m_{CP})} - TN \tag{7}$$

This equation reveals the expected multipliers of autonomous expenditure. We write them in the following form:

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

Equation (7) can therefore be rewritten as:

$$GVA = k_1 G + k_2 IP + k_3 X - TN \tag{9}$$

We want to analyze the impact of autonomous expenditure on GVA changes, taking into account the multiplier mechanism, we divide equation (9) by Y and write it in the following form:

$$\frac{\Delta GVA}{Y} = \frac{1}{Y}\frac{\Delta IP(1-m_{IP})+\Delta G(1-m_G)+\Delta X(1-m_X)}{1-cp(1-m_{CP})} - \frac{\Delta TN}{Y} \tag{10}$$

We write the expression on the left side of the equation as $r_{GVA} = \Delta GVA \,/\, Y$. It means the ratio of changes in gross value added to GDP. Thus, the value of r_{GVA} determines the rate of growth of the gross value added in relation to the gross domestic product. The final form of the main equation is written as:

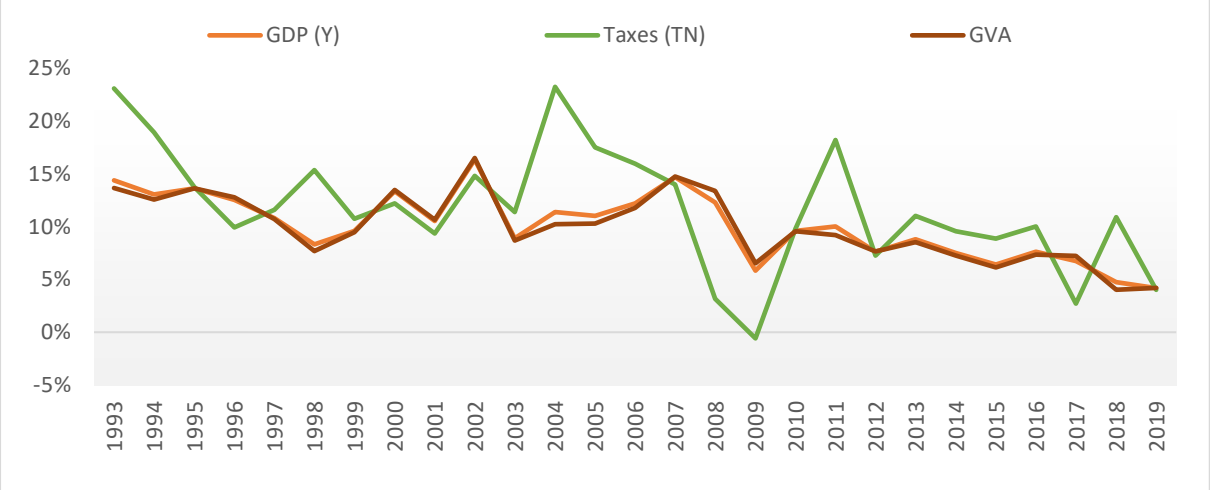
$$r_{GVA} = k_1 \frac{\Delta G}{Y} + k_2 \frac{\Delta IP}{Y} + k_3 \frac{\Delta X}{Y} - \Delta tn \tag{11}$$

The above equations and relationships, especially the designated fiscal, investment and export multipliers and the growth dynamics of GVA in relation to GDP constitute the theoretical basis for the empirical research. The approach was also used by several scholars in this field (see for example, (Palley, 2009; Łaski et al. 2010c and Derkacz, 2020).

3. Empirical results and Discussion

To investigate and compare the effectiveness of the fiscal, investment and export multipliers, the analysis employs OECD dataset. The study covers the period from 1992 to 2019. The most important values that will be used in research, calculations and analyzes are presented here. First, they are the main components of GDP (Y) according to the production approach. They are Gross Value Added (GVA) and Taxes less subsidies on products (TN). The relative changes YoY of these values are shown in Figure 1. The research also used the main expenditure in the

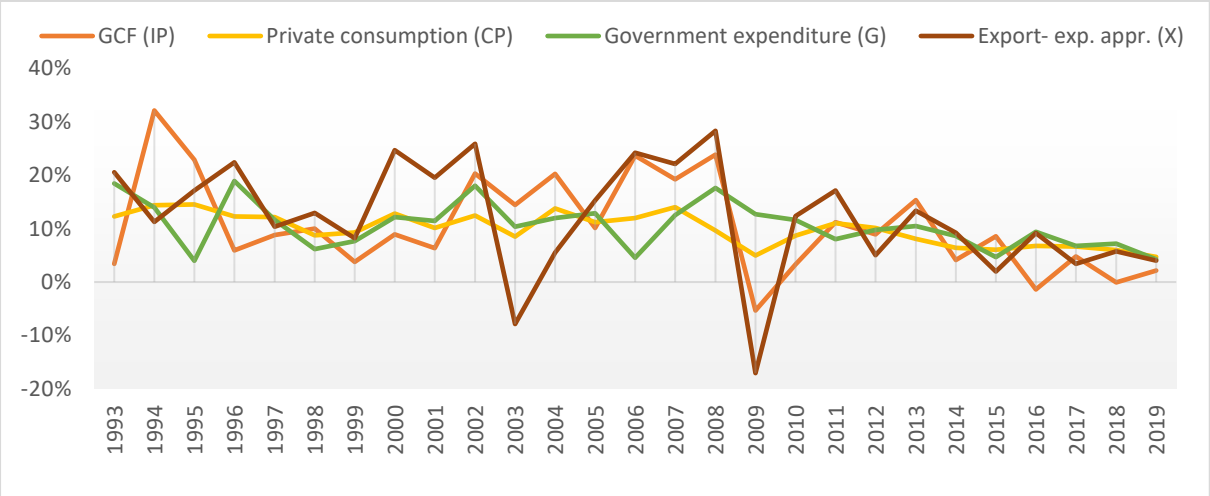
FIGURE 1: MAIN COMPONENTS OF GDP – PRODUCTION APPROACH, RELATIVE CHANGES YOY, SOURCE: OECD STAT.



economy. They are Gross Capital Formation (IP), Private Consumption (CP) Government Expenditure (G) and Export (X). Figure 2 shows the relative changes YoY of these values over the analyzed period.

Source: Authors' own plot

Figure 2: Main expenditures in economy, relative changes YoY, source: OECD Stat.



Source: Authors' own plot

3.1 Autonomous Expenditure Multipliers in South Africa

Solving the main research problem requires appropriate calculations based on the source data. All calculations were made on the basis of the theory that was described in the previous section. First, an attempt was made to decompose imports and assign them into individual expenses in the economy. For this purpose, indices of import decomposition were calculated. These include: g, p, e, and a. We remember the described dependencies that $p = 1 - g$ and $a = 1 - e$. Therefore, we present the results of the calculations in Table 1 below.

Table 1. *Import decomposition coefficients, own work, source: OECD Stat*

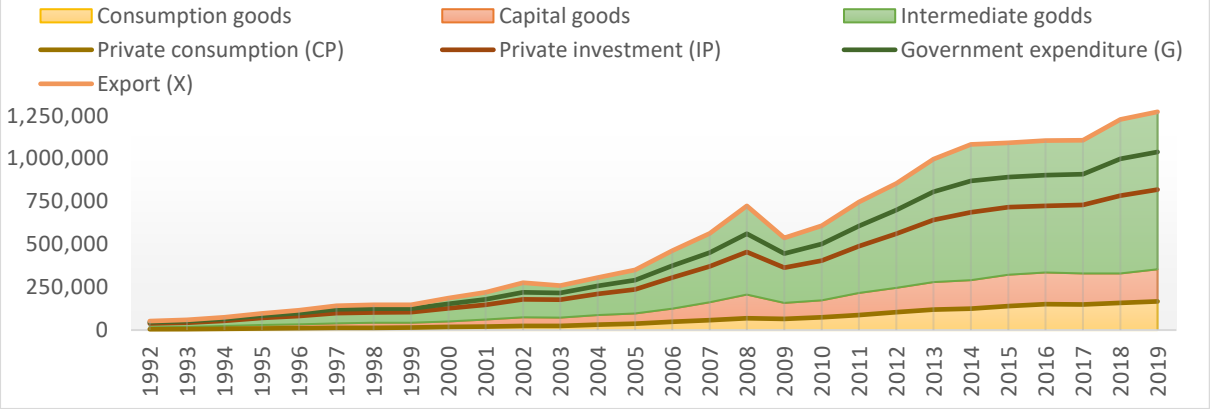
Variable	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Coefficient p	0.80	0.79	0.78	0.80	0.79	0.79	0.79	0.80	0.80	0.80	0.79	0.79	0.79	0.78
Coefficient a	0.78	0.76	0.77	0.76	0.74	0.74	0.73	0.73	0.70	0.68	0.65	0.71	0.72	0.70
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Coefficient p	0.80	0.80	0.79	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.76	0.76
Coefficient a	0.67	0.65	0.61	0.69	0.68	0.66	0.67	0.66	0.65	0.66	0.66	0.67	0.66	0.66

It can be seen that these indicators remain relatively stable in the analysed period. The coefficient of variation is below 10%. Only the coefficient of variation for the e index in this period amounted to 13.73%.

Using the import decomposition coefficients, it was possible to estimate the absorption of individual components of imports by expenditure in the economy. The results are shown in Figure 3. Area charts show the values of the three groups of imports. The lines in the chart show the four types of expenditures in the economy. Such an assignment is presented in formula (4). In the entire analyzed period, a very clear increase in each value can be seen. However, 2009 in South Africa was a period of strong economic shocks as a result of the global financial crisis. This has also left a strong mark on the indicators presented here. The following years, however, show a return to the dynamics of development. Relative changes for the base year 2010=100 absorption of imports by individual expenses in the economy amounted to

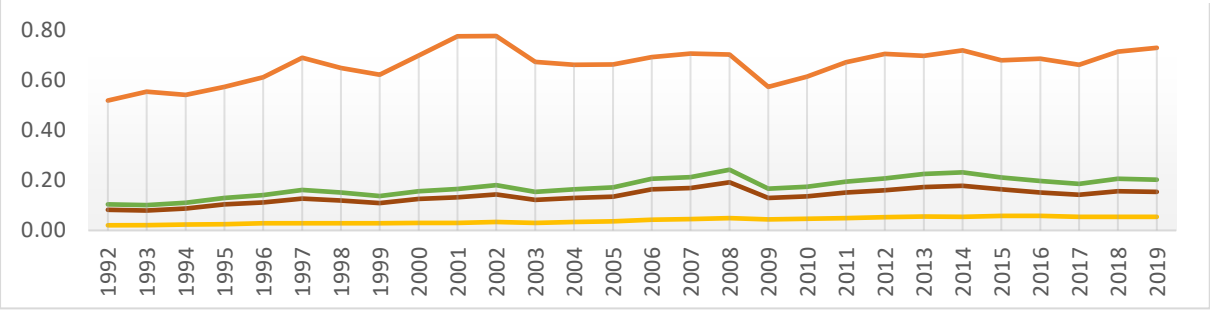
97.8% for private investment, 121.8% for private consumption, 126.3% for government expenditure and 119.6% for exports, respectively.

***Figure 3**. Absorption of import by autonomous expenditure (mln Rand), own work, source: OECD Stat.*



Source: Authors' own plot

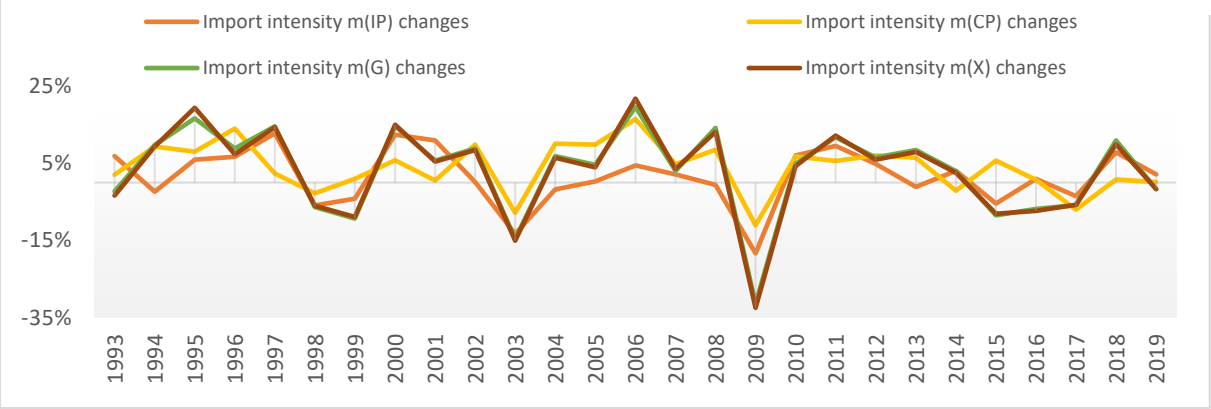
***Figure 4**. Import intensity factor, own work, source: OECD Stats.*



Source: Authors' own plot

Subsequently, it was possible to calculate import intensity factors for private investment, private consumption, government expenditure and exports. For this purpose, formulas (5) were used. The results are shown in Figure 5. By analyzing these results, a conclusion can be drawn. The highest import intensity in South Africa was recorded for private investment expenditure. In 2019, this factor was as high as 0.73. Additionally, the relative change for the base year 2010=100 in the import intensity of private investments amounted to 18.8%. The result of the private consumption import intensity is quite surprising.

***Figure 5**. Import intensity factor - relative changes YoY.*



Source: Authors' own plot

In 2019, it was only 0.05 and the relative change to the base year 2010=100 was 17.6%. This means that private consumption in South Africa is not very dependent on imports. This situation will be quite important in further analyzes of the autonomous expenditure multipliers. The other two import intensity factors did not reach 0.20 for government spending and 0.15 for exports in 2019. In addition, their relative change to the base year 2020=100 was respectively 16.4% for government expenditure and 13.9% for exports. It follows that the factors of import intensity of private investment and private consumption increased the fastest in 2019. Detailed relative changes YoY for import intensity factors are presented in Figure 5. This observation is also quite important for further analyzes.

The value of propensity to private consumption and the average tax rate in South Africa was calculated. For this purpose, conclusions from the analysis of formula (2) were used. The calculations were made using the value of GDP (expenditure approach), Households and Non-profit institutions serving households and Taxes less subsidies on products.

The results of the calculations are presented in Table 2. Also in this case we observe a rather interesting situation. On the one hand, the propensity to private consumption, in the period 1992-2019, is characterized by a coefficient of variation at the level of 2.32%. On the other hand, for average taxation, the coefficient of variation reached the level of 10.23%. This means that in South Africa private consumption is growing not much faster than the value of GDP. In turn, average taxes are growing much faster. This fact is also confirmed by the changes relative to the base year 2010 = 100. It reached the level of 2.1% for the cp index and 18.5% for the tn index.

***Table 2**. Coefficients cp and tn, own work.*

Variable	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Coefficient cp	0.63	0.61	0.62	0.63	0.63	0.63	0.64	0.63	0.63	0.63	0.61	0.61	0.62	0.62
Coefficient tn	0.07	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Coefficient cp	0.62	0.61	0.60	0.60	0.59	0.60	0.61	0.61	0.60	0.60	0.59	0.59	0.60	0.60
Coefficient tn	0.11	0.11	0.10	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.11	0.11

Source: Authors' own calculations

At this point, it was possible to calculate the fiscal, investment and export multipliers. For this purpose, the formula (8) was used. The results of the calculations are presented in Table 3. The general observation of the results suggests that the value of the investment multiplier is much lower than the other two multipliers. Moreover, the value of the investment multiplier has consistently been below 1.00 since 1996.

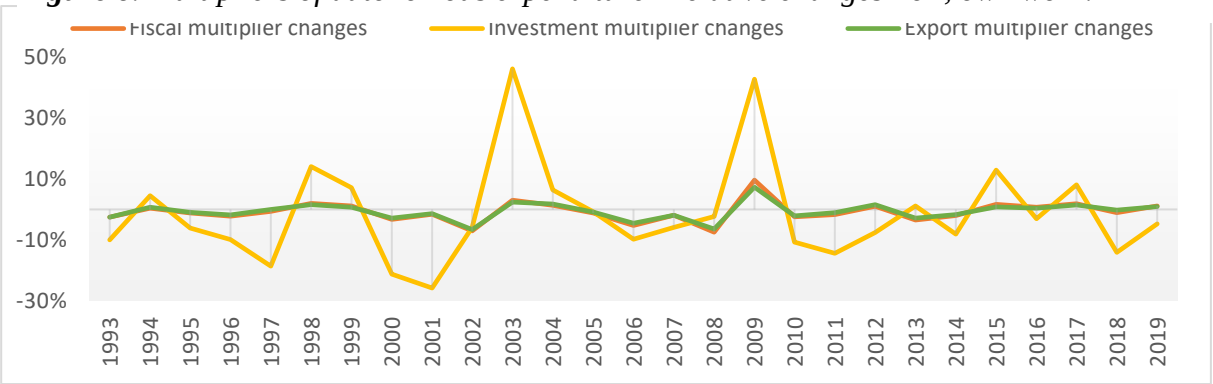
***Table 3**. Multipliers of autonomous expenditure, own work.*

Multipliers	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Fiscal	2.32	2.26	2.27	2.24	2.19	2.18	2.22	2.25	2.17	2.14	1.99	2.05	2.08	2.05
Investment	1.24	1.12	1.17	1.10	0.99	0.80	0.92	0.98	0.77	0.57	0.54	0.79	0.84	0.83
Export	2.37	2.31	2.33	2.31	2.27	2.27	2.30	2.32	2.25	2.22	2.08	2.13	2.16	2.15
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Fiscal	1.95	1.91	1.76	1.94	1.89	1.86	1.88	1.81	1.77	1.80	1.82	1.85	1.83	1.85
Investment	0.75	0.71	0.69	0.99	0.88	0.75	0.70	0.71	0.65	0.73	0.71	0.77	0.66	0.63
Export	2.05	2.01	1.88	2.02	1.98	1.96	1.99	1.93	1.90	1.91	1.92	1.95	1.94	1.96

Source: Authors' own calculations

Interesting conclusions can also be drawn on the basis of the analysis of the variability of these values. While the coefficient of variation in the period 1992-2019 for the fiscal multiplier will reach the level of 8.84% and for the export multiplier 7.64%. The coefficient of variation for the value of the investment multiplier is more than twice as high and reached the level of 21.66%. It is also worth noting that the values of each multiplier are characterized by a downward trend in the analysed period.

***Figure 6**. Multipliers of autonomous expenditure - relative changes YoY, own work.*

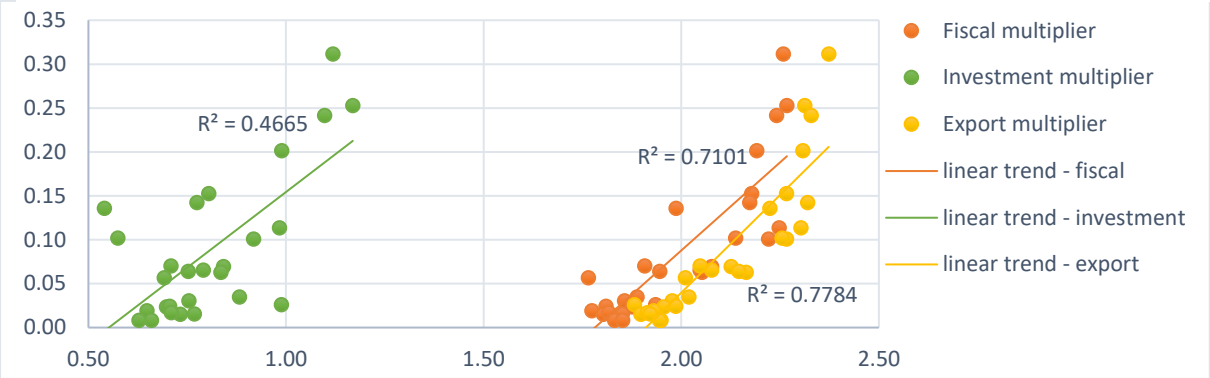


Source: Authors' own plot

Relative changes to the base year were, for the fiscal multiplier -20.1% (1992=100) and -2.0% (2020=100), the investment multiplier -49.5% (1992=100) and -28.8% (2020=100) and. -17.2% (1992=100) and -0.7% (2020=100). Assuming the base year 2015=100, the relative changes look slightly different. They reached the level of 2.7% for the fiscal multiplier, -14.3% for the investment multiplier and 2.6% for the export multiplier. It can be seen that in the last five years the values of the two multipliers start to increase slightly. However, the investment multiplier continues to decline, albeit at a much slower pace. Detailed changes in the value of the fiscal, investment and export multipliers are presented in Figure 6. It can be used to confirm the above calculations.

According to the theory of effective demand, the multipliers of autonomous expenditure show the ratio of the dynamics of changes in GVA and changes in individual autonomous expenditure in relation to GDP. In other words, the multipliers determine changes in the growth dynamics of GVA as a result of changes in autonomous expenditure in relation to GDP. These dependencies are presented in formula (11). In this context, the impact of the fiscal, investment and export multipliers on changes in the r_{GVA} should be analyzed. (see Chart 7) On the ordinate axis the values of GVA growth dynamics and on the abscissa axis the values of autonomous expenditure multipliers. A linear trendline is also shown with the calculated R-Square factor.

***Figure 7**. Impact of autonomous expenditure multipliers on r_{GVA} changes, own work.*

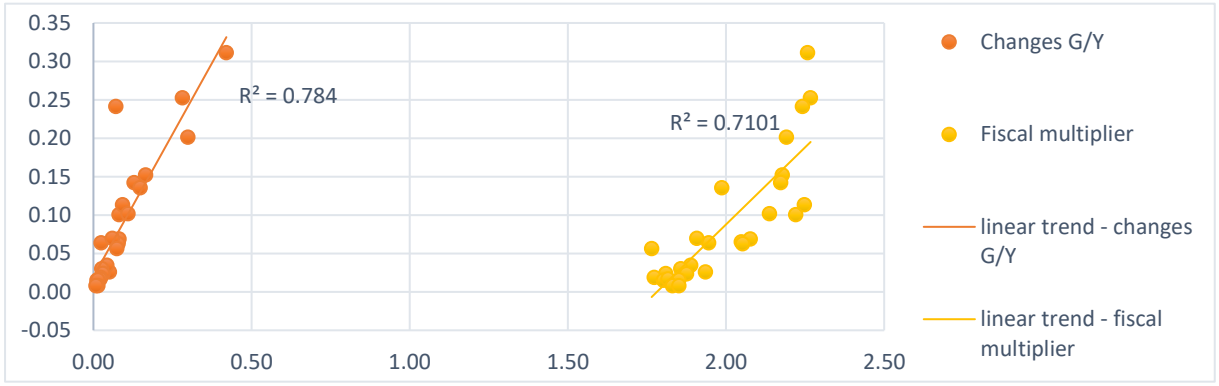


Source: Authors' own plot

These stalized facts exhibit that the fiscal and export multipliers strongly determine changes in the r_{GVA} value. On the other hand, the investment multiplier is poorly correlated with the growth dynamics of GVA. Nevertheless, and not without significance, each of the autonomous expenditure multipliers in the South African economy is positively correlated with the r_{GVA} value. This would mean that the increase in multipliers will accelerate the dynamics of GVA changes due to the increase in individual autonomous expenditure in relation to GDP in the economy. Thus, this dependence is consistent with the concept of the effective demand theory.

In this context, it is therefore worth analysing in detail the impact of individual determinants of changes in GVA dynamics. For this purpose, the changes in the GVA dynamics were again put on the ordinate axis on the correlation graphs. On the abscissa axis, the values of individual multipliers were put aside and the changes in the value of the respective autonomous expenditure in relation to the value of GDP were paired.

***Figure 8**. Impact of G/Y changes and fiscal multiplier on GVA/Y, own work.*



Source: Authors' own plot

First, the impact of changes in government spending and the fiscal multiplier on the r_{GVA} was analyzed. (see Figure 8 above) After calculating the R-Square ratio, it can be seen that both values have a strong influence on the changes in r_{GVA}. On this basis, it can be said that the increase in government expenditure significantly influences the changes in the r_{GVA} value. Additionally, the high value of the fiscal multiplier as well as its strong correlation significantly accelerates the dynamics of gross value-added growth in the South African economy. The first conclusion can be drawn from this observation that the South African economic policy may treat government expenditure as one of the most important factors of the country's economic growth. This issue will be discussed in the next part of the publication.

Secondly, the impact of changes in private investment in relation to GDP and the investment multiplier on the change in the dynamics of GVA growth was analysed. The results are shown in Figure 9. Here the situation is slightly different. Based the R-Square coefficient, it can be concluded that each of these variables is significantly less correlated with changes in the r_{GVA} value. Nevertheless, this correlation remains positive. On this basis, it can be concluded that the increase in the value of private investment in the South African economy will positively affect the dynamics of the GVA value, although this impact is relatively weaker than that of other autonomous expenses. One more fact should be noted, over the analysed period, in most cases, the value of the investment multiplier is lower than 1. Based on the effective demand theory, the value of any multiplier $k_n = 1$ can be defined as the effectiveness border of autonomous expenditure. This means that the value of the multiplier lower than one will make dynamics of changes in the r_{GVA} value to be slower than the growth of autonomous expenditure in relation to GDP. In the context of the investment multiplier, it can be said that its value less than one reveals quite strong leaks of total demand from the South African economy. Based on previous observations, it can be assumed that one of the most serious leaks is the import

intensity of private investments. This issue will also be discussed in more detail later in the article.

Figure 10 shows the impact of changes in exports in relation to GDP and the export multiplier on the changes in the dynamics of the GVA value. We again observe a strong influence on the changes in the r_{GVA} value. It turns out that in the analyzed period, changes in the rest of the world expenditure on South African exports in relation to GDP is a very important factor in the dynamics of growth. The R-Square ratio is as high as 0.82. An equally strong correlation is also observed from the perspective of the export multiplier. Here, the R-Square ratio is 0.69. This suggests that the export activity of the South African economy is as important as

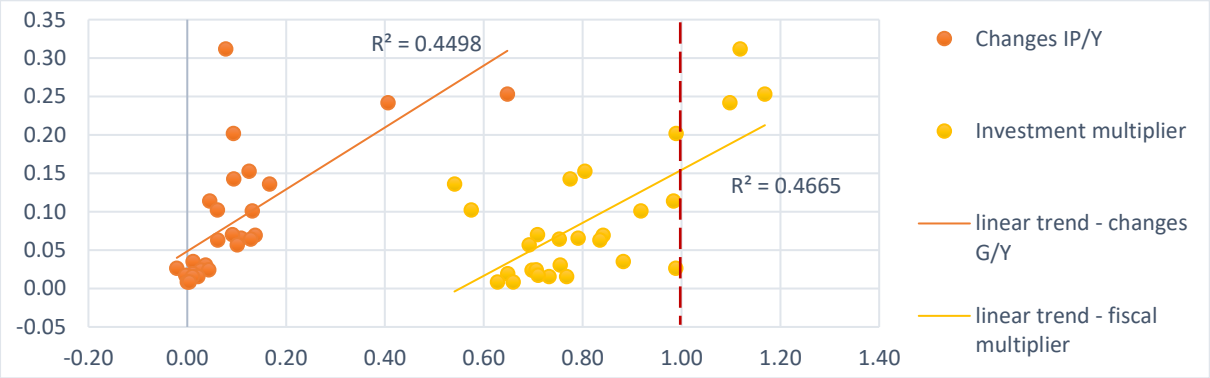


***Figure 9**. Impact of IP/Y and investment multiplier on GVA/Y, own work.*

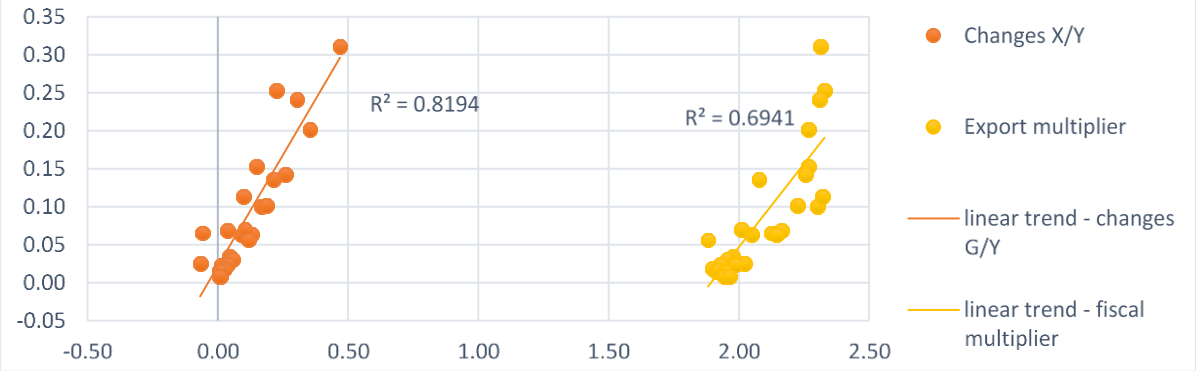


***Figure 10**. Impact of X/Y and investment multiplier on GVA/Y, own work.*

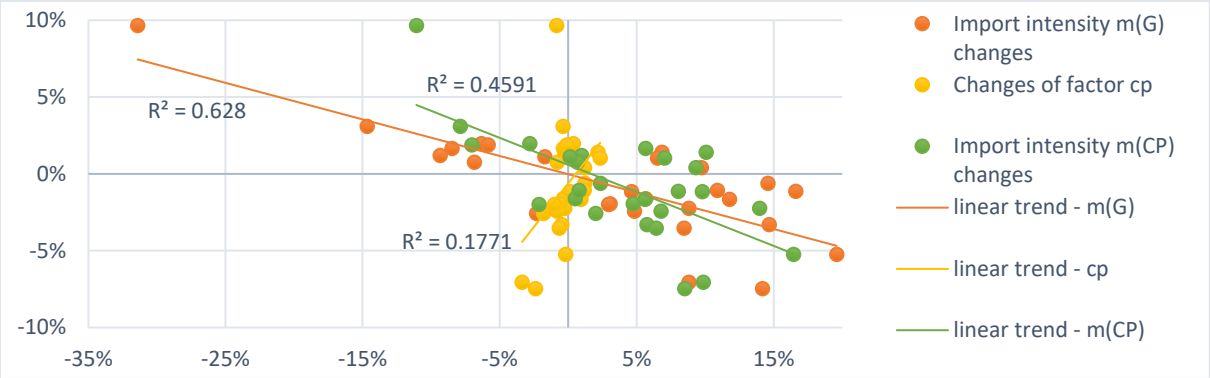
government spending. Therefore, it should also be noted that the export multiplier in the analysed period assumes relatively high values. In the vast majority of years, its value is greater than 2. This means that the dynamics of changes in the r_{GVA} value is more than twice as fast as the increase in the value of exports in relation to GDP. This observation will also be discussed in the next section of the article. It can be expected that the export activity of the South African

economy will be a key factor in economic growth. However, this conclusion should be analyzed in the context of the effectiveness of private investments.

In this part of the analysis, it is worth considering what values in the South African economy in determining the individual multipliers of autonomous expenditure. The correlation analysis was also used for this purpose. This analysis is also based on equation (8), which reveals all determinants of individual multipliers. Relative changes YoY in the values of individual multipliers were presented on the ordinate axis in the next three graphs. On the abscissa axis, we present the relative changes YoY of the three factors determining the values of the fiscal, investment and export multipliers. These are import intensity of private consumption and propensity to private consumption (applies to all three multipliers) as well import intensity of relevant autonomous expenses.

Before we go further with our analysis, we first look at the determinants of the fiscal multiplier. The results are presented in Figure 11. As can be observed, there are two negative and one positive relationships. for instance, this can be exhibited for the fact that an increase in the value of the fiscal multiplier is determined by the decrease in the import intensity of government expenditure and the decrease in the import intensity of private consumption. There is a positive relationship between changes in the value of the fiscal multiplier and changes in propensity to consume. Therefore, it can be said that the most significant leakage of aggregate demand in the context of government spending is the change in the m_G factor. A certain conclusion can be drawn against the background of the other correlations presented in this graph. South Africa's economic policy, which significantly drives the country's economic development through government spending, should pay particular attention to the import-intensity of these expenses. This issue will also be discussed briefly in the next part of the article.

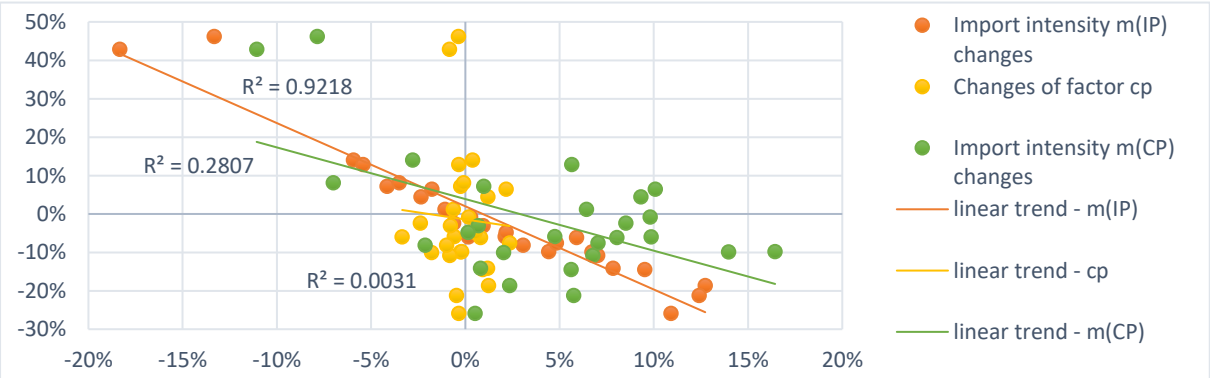
***Figure 11**. Determinants of fiscal multiplier changes, own work.*



Source: Authors' own plot

Going forward, we now analyse the determinants of the investment multiplier. The results are depicted in Figure 12 below. The results show that we are dealing with a rather interesting situation in the South African economy. It turned out that in the analyzed period all three determinants of the investment multiplier are negatively correlated with it. This means that an increase in each of them negatively affects the changes in this multiplier. The impact of the propensity to private consumption is surprising. Although the R-Kwadrat ratio is only 0.0031, such a correlation is still quite puzzling. On the other hand, one can see a very strong dependence of changes in the value of the investment multiplier on changes in the import intensity of private investments. Hence there is a very strong correlation between these values. Also this observation can - and even should - be the basis for creating appropriate recommendations for the economic policy of South Africa. As a rule, it is private investment in capitalist economies that is the main driving force behind the dynamics of development. Finally, the determinants of the export multiplier should also be analysed.

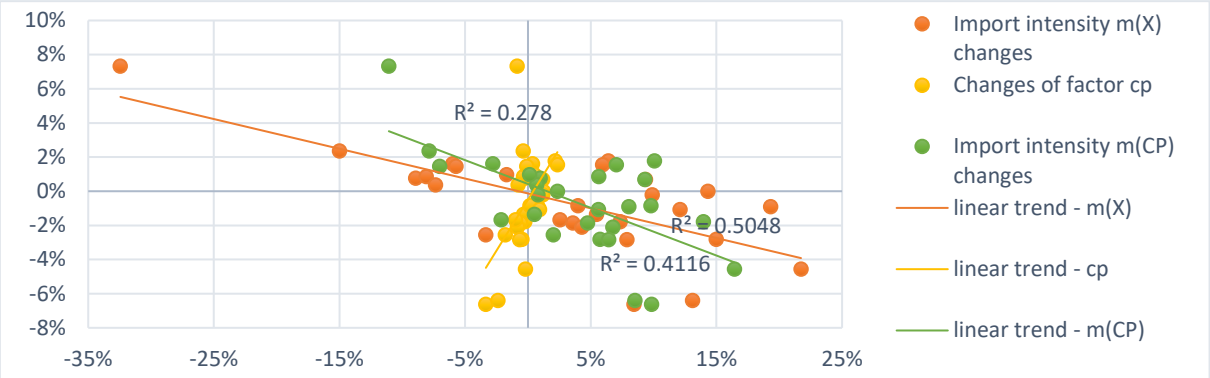
***Figure 12**. Determinants of investment multiplier, own work.*



Source: Authors' own plot

The results are shown in Figure 13. In this case, we are again dealing with two negative and one positive correlations. The increase in propensity to private consumption has a positive effect on changes in the value of this multiplier. At the same time, its increase is determined by the decrease in the value of import intensity of exports and import intensity of private consumption. In principle, also in this case, very similar conclusions can be drawn that appeared in the context of the fiscal multiplier.

***Figure 13**. Determinants of export multiplier, own work.*



At the end of the analytical part, one more question can be asked. Is the GVA growth dynamics model described in formula (11) confirmed in the realities of the South African economy in the analyzed period? For this purpose, all components of this equation were calculated. This is detailed in Table 4. It turns out that the Pearson correlation coefficient for the left and the entire right side of equation (11) is 0.93 and the R-Square ratio is 0.96. From that stylized fact, it can be concluded that the entire right side of the equation, which was calculated according to the principle of effective demand, almost perfectly reflects the real increase in GVA in relation to GDP.

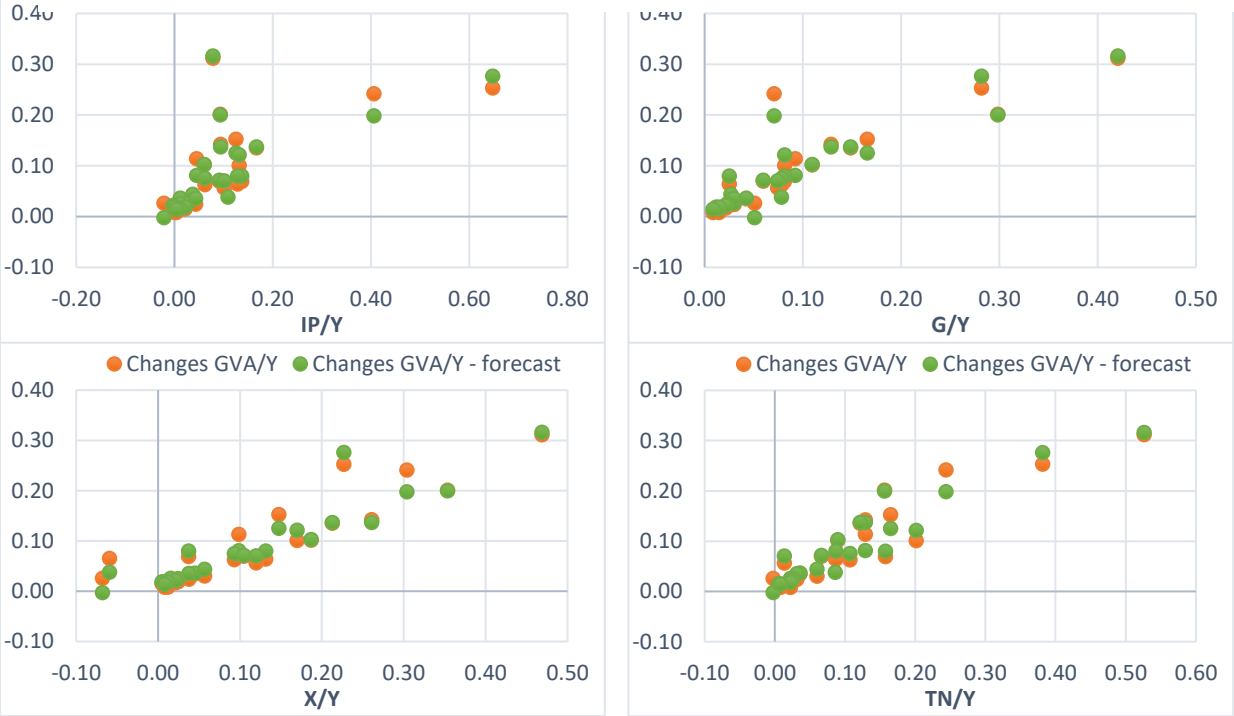
***Table 4**. The main elements of equation 11, own work.*

Multipliers	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
$\Delta GVA/Y$	0.31	0.25	0.24	0.20	0.15	0.10	0.11	0.14	0.10	0.14	0.07	0.07	0.06	0.31
$\Delta IP/Y$	0.08	0.65	0.41	0.09	0.13	0.13	0.05	0.09	0.06	0.17	0.11	0.14	0.06	0.08
$\Delta G/Y$	0.42	0.28	0.07	0.30	0.17	0.08	0.09	0.13	0.11	0.15	0.08	0.08	0.08	0.42
$\Delta X/Y$	0.47	0.23	0.30	0.35	0.15	0.17	0.10	0.26	0.19	0.21	-0.06	0.04	0.09	0.47
$\Delta TN/Y$	0.53	0.38	0.24	0.16	0.16	0.20	0.13	0.13	0.09	0.12	0.09	0.16	0.11	0.53
Right side of eq. 11	1.59	1.54	1.06	1.39	0.63	0.49	0.35	0.81	0.60	0.70	0.03	0.21	0.31	1.59
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
$\Delta GVA/Y$	0.06	0.07	0.06	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
$\Delta IP/Y$	0.13	0.09	0.10	-0.02	0.01	0.04	0.03	0.04	0.01	0.02	0.00	0.01	0.00	0.00
$\Delta G/Y$	0.02	0.06	0.07	0.05	0.04	0.03	0.03	0.03	0.02	0.01	0.02	0.01	0.01	0.01
$\Delta X/Y$	0.13	0.10	0.12	-0.07	0.04	0.06	0.02	0.04	0.02	0.00	0.02	0.01	0.01	0.01
$\Delta TN/Y$	0.09	0.07	0.01	0.00	0.04	0.06	0.02	0.03	0.03	0.02	0.02	0.01	0.02	0.01

Right side of eq. 11	0.33	0.32	0.41	-0.06	0.14	0.13	0.08	0.13	0.07	0.02	0.05	0.04	0.03	0.03

In order to check for the sensitivity of the results from equation (11), we employ a linear regression analysis. For this purpose, all the variables on the right side of the equation were used separately. (see table 4). Based on the regression statistics, we argue that this model is characterized by a very good fit of all variables. The R-multiple factor was 0.98 and the R-Square factor was 0.96. The p value, which denotes the significance of the variables, in each case reached a value significantly below 5%. The significance level was, respectively, for variables $x_1 = \Delta IP/Y = 0.09\%$, $x_2 = \Delta G/Y = 2.39\%$, $x_3 = \Delta X/Y = 0.01\%$ and $x_4 = \Delta TN/Y = 2.59\%$. Figure 15 shows the distribution of the fitted line for all four variables of equation (11).

Figure 15. *Fitted line distribution for individual variables, own work.*



Based on this linear regression analysis, the GVA dynamics model can be written as follows:

$$r_{GVA} = 0.199\frac{\Delta G}{Y} + 0.1329\frac{\Delta IP}{Y} + 0.2610\frac{\Delta X}{Y} + 0.1732\Delta tn + 0.0086 \qquad (12)$$

On the basis of the performed calculations and analyses, one basic conclusion can be drawn. The dynamics of GVA growth in South Africa is significantly determined by the increase in autonomous spending, in particular by government spending and export spending by the rest

of the world, and is additionally accelerated by a multiplier mechanism in line with the theory of effective demand. Thus, detailed analyses of autonomous expenditure multipliers may be used to develop recommendations for economic policy.

4. Conclusions

This study achieved two main objectives. The first objective is to rejigged the mechanism of calculating the fiscal, investment and export multipliers. We divided total import into intermediate, consumption and capital goods using the System of National Accounts. In addition to this, a new coefficient which enabled the division of imported goods into appropriate elements of final production is used. This allows us to estimate the short-term import intensity of all autonomous expenditure, it was also possible to estimate the fiscal, investment and export multipliers on an annual basis. The second objective tries to redefines the classical approach of the relationship between the response of GDP to change in autonomous expenditure. We changed the formula to answer the following questions: such a way as to get the answer to the following question: How much does gross value-added change in a capitalist economy as a result of changes in autonomous expenditure? It turned out that after appropriate algebraic transformations, it is possible to obtain an answer to this question. There is still an important mechanism of autonomous expenditure multipliers, which is used in the classical approach. However, there was an additional leakage of aggregate demand in the form of the average tax rate in the economy.

If the multipliers of autonomous expenditure have the form as in the Equation (8), the first inference that can be made from the dynamics of changes in GVA value relative to GDP can be interpreted as follows: The increase in the value of the autonomous expenditure multipliers exerts a positive effect on the change in gross value added. These multipliers are however driven by several factors. First, the import intensity level, the import intensities of each autonomous expenditure reduce their significance. This means that the leakage of aggregate demand in the form of expenditure on the purchase of imported goods increases. On the other hand, an increase in the value of the import intensity of private consumption negatively affects the change in GVA. This means that the leakage of aggregate demand, which consists in increasing consumer expenditure allocated to the purchase of imported goods, intensifies. Moreover, the value of the fiscal, investment and export multipliers is determined by the propensity for total private consumption. The value of the propensity for total private consumption in Equation (2) depends on the household income taxes and the propensity to save. An increase in these two ratios decreases the value of the propensity to private

consumption. This further decreases the impact of autonomous expenditure on gross value added. This suggests that the leakage of aggregate demand is driven by a decline in total private consumption in the economy, and this may be caused by an increase in savings and/or an increase in the average household income tax.

Equation (11) shows another aggregate demand leakage that determines the impact of autonomous expenditure on the response of GVA. This is the ratio of the average taxes in the economy. The growth of average taxes has negative impact on the relationship between autonomous expenditure and GVA. This means that the leakage of aggregate demand in the form of increased tax burdens in the entire economy intensifies.

Author Contributions: Santos Necas Bila conceptualized the major ideas of this research paper. He prepared the literature review, methodology and data collection section. Arkadiusz J. Derkacz prepared the analysis section, while Sodiq Arogundade did the introduction and concluding section of the paper. The three authors have read and approved the final version of this manuscript.

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