Capital Intensity of Investments and GDP Dynamics

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Abstract

The aim of this publication is an attempt to prove the impact of the level of capital intensity in economy on the rate of economic growth. The author has mostly based his reflections on the major issues of M. Kalecki's economics. These are economic growth rate, production accumulation, and production effect. The analyses were made based on statistical data for two European economies: the British economy and the German economy.

The proof of the thesis about the impact of capital intensity on economic growth rate has been based on statistical data concerning the two countries provided by Eurostat. The analyses used major values shaping GDP in relation to the definition and dependencies described by M. Kalecki.

The conducted research and analysis allowed for drawing some interesting conclusions. It turned out that what is vital for the GDP dynamics are not only consumption and economic investments. Another value is capital intensity of investments in relation to total capital. Additionally, the conclusions led to an attempt to make a general recommendation for the economic policy in the scope of encouraging and boosting economic growth. The author also specified a new field for future research which ought to aim at discovering the mechanism of capital intensity optimization in relation to production and organizational improvements.

Key words: economic growth, capital intensity, economic investments, Kalecki
JEL Codes: A220, B520, E110

1. Introduction

In this article the author attempts to analyse the impact of capital intensity level on the economic growth rate in the British and German economies. The issue of economic growth remains an important area of economic research, also in the context of economic policy, which is implemented in the social and economic space. Constant attempts made by countries to boost their economies add value to analyses that aim at showing relevant relationships and factors that make it possible to achieve the goals of the economic policy.

The primary aim of this article is to present and prove the impact of the level of capital intensity of investments in economy on the gross domestic product growth rate. Based on statistical data from the British and German economies the author conducted detailed analysis of major components of GDP, which made it possible

to prove the original thesis. It turns out that the GDP dynamics are heavily dependent on the capital intensity level in relation to investments in the economy.

The conducted analyses of the economic data are based on two economic trends. The first of them is M. Kalecki's economics, more and more often perceived as the one that optimally describes present-day economic mechanisms. (Toporowski 2018) It is based mostly on the definition of economic growth rate, production accumulation, and production effect. The second theoretical basis is formed by new institutional economics. Use of the economics in this discussion makes it possible to present the institutional determinism as having an impact on social and economic phenomena. A form of representation of such determinism is the capital intensity level of investments in economy.

There are many publications in the source literature concerning the economic growth itself. Numerous attempts have been made to explain various dependencies and correlations that affect the GDP dynamics. The author decided to join the group of economists, yet he does so base on Kaleckian economics. It has been additionally set within the trend of new institutional economics. This led to interesting conclusions, drawn based on the analysis of empirical data. It turned out that it is not only the consumption itself (which has been omitted in these reflections) and investments that have profound impact on economic growth. A new factor appeared, equally or maybe even more important for the GDP dynamics. The fact that the thesis is supported by data from the British and German economies, as well as from economies of the whole European Union, seems to be of additional merit.

The conclusions from the analysis can prove valuable for further theoretical economic research and for the economic policy itself, understood as practice. It is also worth mentioning that the following reflections formed an interesting area for future scientific research aiming at analysing the institutional determinism having an impact on capital intensity of institutions in economy. Also studies of the relationship between the capital intensity level and organisational and production improvement factor, present in Kaleckian economics, are worth consideration. The conclusions the author draws may also form the basis for developing detailed recommendations for economic policy in the scope of future GDP growth unit's production optimisation in the British and German, and other, economies.

2. Theoretical Bases of Empirical Research

The analyses of the economic growth rates are based on the most important relations in M. Kalecki's economics. This chapter is not devoted to presenting a complex economic growth theory, but rather to presenting the relations that will enable introducing the discussed issues in a consistent way. Therefore, the author focuses on the economic growth rate, production accumulation, and production effect. All the contents of the article related to M. Kalecki's economics have been presented after a comprehensive analysis of his works. The author mostly based on such publications as: "Introduction To The Theory Of Growth In A Socialist Economy" (Kalecki 1984), "Theory Of Economic Dynamics" (Kalecki 1980a), "Teoria zysków" (Kalecki 1980b) or "Uwagi o teorii wzrostu" (Kalecki 1962).

2.1 Economic Growth Rate from M. Kalecki's Perspective

We can begin the presentation of the most important relations for the further discussion of Kaleckian economics from production accumulation. The value, together with general consumption and the balance of trade, is one of the principal elements of national income, nowadays called the gross domestic product. (Woźniak 2006, 148) ($D = I + O + S + Export - Import$) Production accumulation is a sum of production investments (I) and the increase in current assets (O), understood as the value of income from work-in-progress inventory as well as work materials and finished goods inventory. Relating the amount of the production accumulation to gross domestic product, we get production accumulation rate expressed in the following formula:

(1)

$$i = \frac{I + O}{D}$$

Another value which will be used in further analysis is the so-called production effect for investments I, expressed in the following formula:

(2)

$$\Delta D = \left(\frac{1}{m}\right) xI$$

It shows the relations between gross domestic product growth (ΔD) and the investments level as well as capital intensity level (m). The coefficient specifies the final amount of capital expenditures needed to produce the next GDP growth value. Thus, in M' Kalecki's reflections the capital intensity ratio appears, in relation to investments made in the economy. It can be expressed in the following formula:

(3)

$$m = \frac{I}{\Delta D}$$

The contribution of production accumulation to GDP is not related to the value of capital expenditures alone. In this context Kaleckian economics employs the amount of current assets increase, which is also influenced by the capital intensity ratio. The relationship has been described as the relation of the current asset's status to GDP growth. It is presented below:

(4)

$$\mu = \frac{O}{\Delta D}$$

The interpretation of this relation is like one for the m-factor. M. Kalecki describes it as the average inventory turnover time, affected to a large extent by commodity pattern of current assets growth. It needs to be emphasised, however, that the μ-factor also affects the final capital intensity level in the economy. This has been expressed in the formula:

(5)

$$k = m + \mu$$

Thus M. Kalecki introduces the capital intensity ratio in relation to total capital (k). The ratio reveals demand for fixed capital and current assets necessary to produce a GDP growth unit.

The last equation which will be used in further reflections presents the rate of gross domestic product growth. It has been expressed in the following way:

(6)

$$r = \frac{1}{k} i - \frac{m}{k}(a - u)$$

Additional values appear here. These are the depreciation factor (a) and organisational and technological improvement factor (u). From the above formula it follows that the depreciation parameter slows the growth rate down, which is the effect of using up the fixed assets. He values of u-factor has an inverse effect on the growth rate. Improved organisational and technological quality will positively affect the GDP growth rate. Here, however, of greater importance are the production accumulation rate (i) and the level of capital intensity (k). These values are key to the economic growth dynamics, which has been shown in empirical research.

2.2 The Key Data Describing Economic Growth in Great Britain and Germany

The analysis of economic growth rate in certain countries is based on statistical data taken from Eurostat databases. The period of analysed economic phenomena are years 2000 to 2018. For the analysis purposes, values have been adopted in current prices expressed in millions of euros. The author focused on the values that can be assigned to the values present in M. Kalecki's economics (see Table 1). Therefore, the source for further analysis are:

- Gross domestic product (GDP),
- Gross fixed capital formation (I),
- Changes in inventories and acquisitions less disposals of valuables (O),
- Final consumption expenditure (S), and
- External balance of goods and services.

According to the assumptions of Kaleckian economics, also the gross capital formation (I+O) value has been calculated. According to Formula 1, it constitutes the sum of gross fixed capital formation and growth of tangible current assets.

Year	Gross fixed capital formation (I)	Changes in inventories and acquisitions less disposals of valuables (O)	Final consumption expenditure (S)	External balance of goods and services	GDP	Gross capital formation (I+O)
2000	320 327.20	11 378.60	1 497 150.00	-31 174.10	**1 797 681.60**	331 705.80
2001	327 930.30	8 718.90	1 536 020.40	-40 328.40	**1 832 342.80**	336 649.20
2002	338 891.30	9 228.20	1 594 007.90	-48 768.30	**1 893 359.10**	348 119.50
2003	317 296.50	7 361.40	1 532 551.00	-40 022.30	**1 817 185.20**	324 657.90
2004	336 373.10	6 705.90	1 651 693.00	-49 574.20	**1 945 197.90**	343 079.00
2005	355 196.00	8 969.00	1 726 826.60	-49 058.20	**2 041 933.30**	364 165.00
2006	383 593.20	10 074.40	1 814 266.60	-44 434.00	**2 163 500.20**	393 667.60
2007	408 681.40	11 343.80	1 889 497.90	-44 830.10	**2 264 694.50**	420 025.20
2008	348 229.30	587.70	1 690 836.10	-42 954.70	**1 996 698.40**	348 817.00
2009	276 349.70	-16 730.60	1 505 270.80	-27 890.80	**1 737 000.20**	259 619.10
2010	295 144.80	5 291.20	1 604 238.60	-37 279.70	**1 867 396.00**	300 436.00
2011	294 766.60	4 651.60	1 630 344.10	-17 304.20	**1 912 457.90**	299 418.20
2012	327 345.90	7 128.10	1 801 986.80	-24 753.70	**2 111 708.40**	334 474.00
2013	329 185.40	12 870.00	1 783 159.50	-26 789.20	**2 098 425.70**	342 055.40
2014	377 992.10	17 215.80	1 946 782.10	-32 204.90	**2 309 785.10**	395 207.90
2015	447 237.70	12 637.80	2 217 510.70	-36 451.60	**2 640 934.60**	459 875.50
2016	419 405.00	4 312.50	2 050 779.80	-39 443.30	**2 435 055.20**	423 717.50
2017	407 314.00	6 812.10	1 977 405.40	-28 661.90	**2 363 109.30**	414 126.10
2018	409 895.90	6 910.70	2 034 828.40	-33 668.70	**2 423 736.60**	416 806.60

Table 1 GDP and main components (United Kingdom), source: Eurostat

Year	Gross fixed capital formation (I)	Changes in inventories and acquisitions less disposals of valuables (O)	Final consumption expenditure (S)	External balance of goods and services	GDP	Gross capital formation (I+O)
2000	487 502.00	28 948.00	1 589 068.00	3 572.00	**2 109 090.00**	516 450.00
2001	473 140.00	25 685.00	1 638 377.00	35 338.00	**2 172 540.00**	498 825.00
2002	442 301.00	14 389.00	1 648 004.00	93 426.00	**2 198 120.00**	456 690.00
2003	431 772.00	20 202.00	1 676 129.00	83 467.00	**2 211 570.00**	451 974.00
2004	431 938.00	16 925.00	1 695 994.00	117 663.00	**2 262 520.00**	448 863.00
2005	436 534.00	9 346.00	1 723 428.00	119 002.00	**2 288 310.00**	445 880.00
2006	472 315.00	18 313.00	1 765 274.00	129 178.00	**2 385 080.00**	490 628.00
2007	501 323.00	33 079.00	1 795 901.00	169 247.00	**2 499 550.00**	534 402.00
2008	517 013.00	29 112.00	1 845 702.00	154 663.00	**2 546 490.00**	546 125.00
2009	471 232.00	-17 391.00	1 869 331.00	122 558.00	**2 445 730.00**	453 841.00
2010	501 148.00	13 419.00	1 914 886.00	134 947.00	**2 564 400.00**	514 567.00
2011	548 701.00	34 057.00	1 978 598.00	132 204.00	**2 693 560.00**	582 758.00
2012	557 877.00	-16 612.00	2 036 576.00	167 469.00	**2 745 310.00**	541 265.00
2013	559 500.00	4 281.00	2 085 678.00	161 891.00	**2 811 350.00**	563 781.00
2014	586 665.00	9 661.00	2 137 354.00	193 750.00	**2 927 430.00**	596 326.00
2015	605 941.00	56.00	2 194 938.00	229 135.00	**3 030 070.00**	605 997.00
2016	636 421.00	-2 903.00	2 269 811.00	230 771.00	**3 134 100.00**	633 518.00
2017	665 889.00	7 353.00	2 341 306.00	230 442.00	**3 244 990.00**	673 242.00
2018	707 719.00	21 310.00	2 409 282.00	206 059.00	**3 344 370.00**	729 029.00

Table 2 GDP and main components (Germany), source: Eurostat

Based on the data collected from the British and German economies, calculations have been made according to the rules describing the concept of M. Kalecki concerning economic growth rate (see Table 3 and 4). Thus, the following factors have been specified:

- Production accumulation rate (i),
- Capital intensity ratio in relation to investments (m),

- Relation between current assets status and GDP growth (μ),
- Capital intensity ratio in relation to total capital (k),
- Production effect (ΔD),
- GDP growth rate (r),
- Index $\frac{1}{k}$, and
- Index $\frac{m}{k}$.

Year	Rate of gross capital formation (i)	Factor (m)	Factor (μ)	Capital intensity (k)	Production effect (ΔD)	GDP growth rate (r)	Index 1/k	Index m/k
2000	***0.18***	*1.46*	*0.05*	*1.51*	*219 075.50*	***12.19%***	*0.66*	*0.97*
2001	***0.18***	*9.46*	*0.25*	*9.71*	*34 661*	***1.89%***	*0.10*	*0.97*
2002	***0.18***	*5.55*	*0.15*	*5.71*	*61 016*	***3.22%***	*0.18*	*0.97*
2003	***0.18***	*-4.17*	*-0.10*	*-4.26*	*-76 174*	***-4.19%***	*-0.23*	*0.98*
2004	***0.18***	*2.63*	*0.05*	*2.68*	*128 013*	***6.58%***	*0.37*	*0.98*
2005	***0.18***	*3.67*	*0.09*	*3.76*	*96 735*	***4.74%***	*0.27*	*0.98*
2006	***0.18***	*3.16*	*0.08*	*3.24*	*121 567*	***5.62%***	*0.31*	*0.97*
2007	***0.19***	*4.04*	*0.11*	*4.15*	*101 194*	***4.47%***	*0.24*	*0.97*
2008	***0.17***	*-1.30*	*0.00*	*-1.30*	*-267 996*	***-13.42%***	*-0.77*	*1.00*
2009	***0.15***	*-1.06*	*0.06*	*-1.00*	*-259 698*	***-14.95%***	*-1.00*	*1.06*
2010	***0.16***	*2.26*	*0.04*	*2.30*	*130 396*	***6.98%***	*0.43*	*0.98*
2011	***0.16***	*6.54*	*0.10*	*6.64*	*45 062*	***2.36%***	*0.15*	*0.98*
2012	***0.16***	*1.64*	*0.04*	*1.68*	*199 251*	***9.44%***	*0.60*	*0.98*
2013	***0.16***	*-24.78*	*-0.97*	*-25.75*	*-13 283*	***-0.63%***	*-0.04*	*0.96*
2014	***0.17***	*1.79*	*0.08*	*1.87*	*211 359*	***9.15%***	*0.53*	*0.96*
2015	***0.17***	*1.35*	*0.04*	*1.39*	*331 150*	***12.54%***	*0.72*	*0.97*
2016	***0.17***	*-2.04*	*-0.02*	*-2.06*	*-205 879*	***-8.45%***	*-0.49*	*0.99*
2017	***0.18***	*-5.66*	*-0.09*	*-5.76*	*-71 946*	***-3.04%***	*-0.17*	*0.98*
2018	***0.17***	*6.76*	*0.11*	*6.87*	*60 627*	***2.50%***	*0.15*	*0.98*

Table 3 Main indicators according to Kaleckian economics (United Kingdom)

Year	Rate of gross capital formation (i)	Factor (m)	Factor (μ)	Capital intensity (k)	Production effect (ΔD)	GDP growth rate (r)	Index 1/k	Index m/k
2000	***0.24***	*9.83*	*0.58*	*10.41*	*49 610.00*	***2.35%***	*0.10*	*0.94*
2001	***0.23***	*7.46*	*0.40*	*7.86*	*63 450*	***2.92%***	*0.13*	*0.95*
2002	***0.21***	*17.29*	*0.56*	*17.85*	*25 580*	***1.16%***	*0.06*	*0.97*
2003	***0.20***	*32.10*	*1.50*	*33.60*	*13 450*	***0.61%***	*0.03*	*0.96*
2004	***0.20***	*8.48*	*0.33*	*8.81*	*50 950*	***2.25%***	*0.11*	*0.96*
2005	***0.19***	*16.93*	*0.36*	*17.29*	*25 790*	***1.13%***	*0.06*	*0.98*
2006	***0.21***	*4.88*	*0.19*	*5.07*	*96 770*	***4.06%***	*0.20*	*0.96*
2007	***0.21***	*4.38*	*0.29*	*4.67*	*114 470*	***4.58%***	*0.21*	*0.94*
2008	***0.21***	*11.01*	*0.62*	*11.63*	*46 940*	***1.84%***	*0.09*	*0.95*
2009	***0.19***	*-4.68*	*0.17*	*-4.50*	*-100 760*	***-4.12%***	*-0.22*	*1.04*
2010	***0.20***	*4.22*	*0.11*	*4.34*	*118 670*	***4.63%***	*0.23*	*0.97*
2011	***0.22***	*4.25*	*0.26*	*4.51*	*129 160*	***4.80%***	*0.22*	*0.94*
2012	***0.20***	*10.78*	*-0.32*	*10.46*	*51 750*	***1.89%***	*0.10*	*1.03*
2013	***0.20***	*8.47*	*0.06*	*8.54*	*66 040*	***2.35%***	*0.12*	*0.99*
2014	***0.20***	*5.05*	*0.08*	*5.14*	*116 080*	***3.97%***	*0.19*	*0.98*
2015	***0.20***	*5.90*	*0.00*	*5.90*	*102 640*	***3.39%***	*0.17*	*1.00*
2016	***0.20***	*6.12*	*-0.03*	*6.09*	*104 030*	***3.32%***	*0.16*	*1.00*
2017	***0.21***	*6.00*	*0.07*	*6.07*	*110 890*	***3.42%***	*0.16*	*0.99*
2018	***0.22***	*7.12*	*0.21*	*7.34*	*99 380*	***2.97%***	*0.14*	*0.97*

Table 4 Main indicators according to Kaleckian economics (Germany)

3. Analysis of Economic Growth Rate in Great Britain and Germany

The main purpose of these reflections is to present and prove the impact of capital intensity level on economic growth rate in Great Britain and Germany. In this chapter an attempt will be made to prove the claim that GDP growth rate depends not only on the value of capital expenditures or the level of consumption – an equally important determinant is the level of capital intensity. The presented analysis is based on Kaleckian economics, which means that it is to a large extent determined by the relation presented in Formula 6.

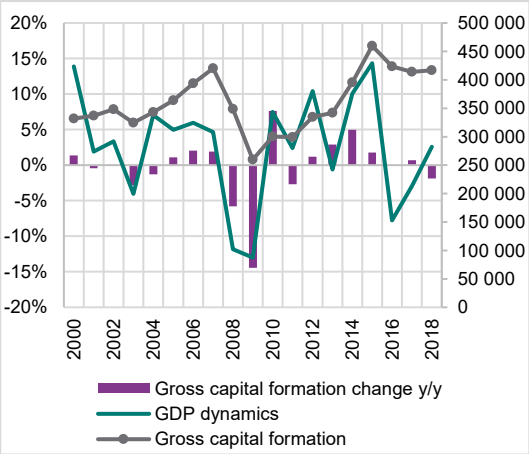

Figure 1 Analysis of GCF (United Kingdom), sources: Eurostat

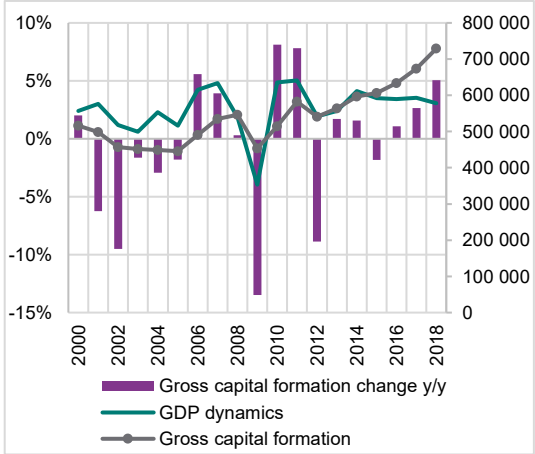

Figure 2 Analysis of GCF (Germany), sources: Eurostat

First, the production accumulation values have been analysed. (see Figures 1 and 2) For the analysed time series the values have been placed on the right-hand axis of ordinates. The left-hand axis of ordinates, in turn, presents percentages of the production accumulation dynamics as well as gross domestic product dynamics. Here, it is worth looking at the relation between the two presented dynamics. It is evident that GDP dynamics strongly correlates with the production accumulation dynamics. In the analysed time series, the Pearson's correlation coefficient for the British economy is 0.70, and for the German economy – 0.80. Such Pearson's level indicates that there is a rather strong positive relation between the two values. This, however, does not change the fact that gross domestic product dynamics remains under the influence of factors other than the values shaping the production accumulation. This is indicated by the difference between the correlation indicators, which do not reach the values typical for very strong relations.

Another set of data will be used for an analysis of the value of production effect in certain national economies (see Figures 3 and 4). The value has been calculated

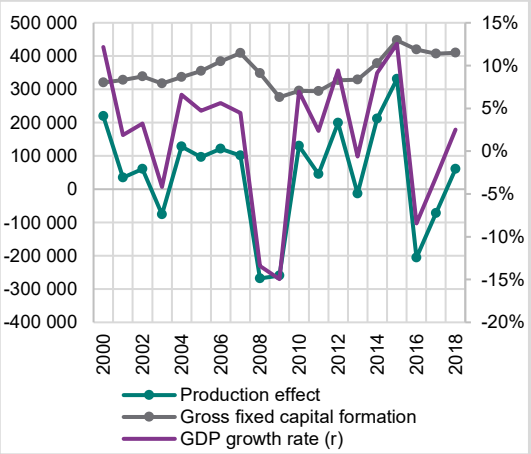

Figure 3 Analysis of Production effect (United Kingdom), sources: Eurostat

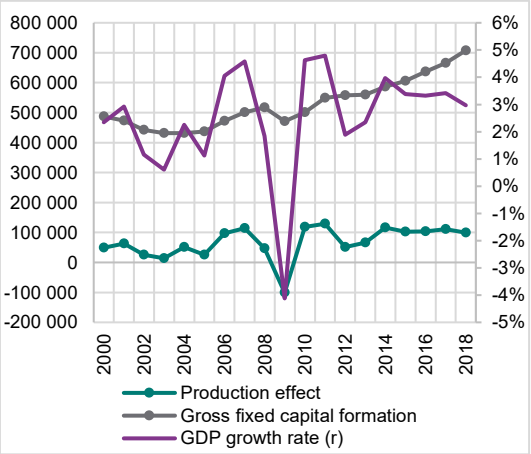

Figure 4 Analysis of Production effect (Germany), sources: Eurostat

according to Formula 2. The formula shows that the change in GDP value does not solely depend on the level of investments. An important component also affecting the final value of the production effect is the capital intensity ratio in relation to investments (m). The increase of the value of the ratio will strongly slow down the GDP growth. This can be observed in the presented figures for the British and German economies. The values of the production effect in the analysed time series correlate weakly with gross fixed capital formation. The Pearson's coefficient for the two values is 0.21 for the British economy, and 0.53 for the German one. This means that in the former economy we have weak positive correlation, while in the latter one the correlation is moderate. The situation changes completely when we compare the production effect and the GDP growth rate. It needs to be emphasised that the value has been calculated according to the guidelines of Kaleckian economics. (see Formula 6) The relation is much stronger. It turns out that in the analysed period the relations between the GDP growth rate and the production effect reaches the Pearson's correlation coefficient for the British economy of 0.99, while for the German economy it is 0.98. It is also worth mentioning that the relationships in the economy of the whole European Union have the Pearson's correlation coefficient of 0.98. This means that the relation between the two values is very strong. Thus, the conclusion can be drawn that the economic growth rate depends strongly on the level of investments adjusted by the capital intensity level.

Now we will compare the values of the production effects demonstrated by the British and German economies in the context of capital intensity levels in relation to total capital (see Figure 5). On the figure below the value of capital intensity has been presented according to Formulas 2 and 6. This means that the values are in the denominator ($\frac{1}{k}$). When we put the data together in such a way, a very strong

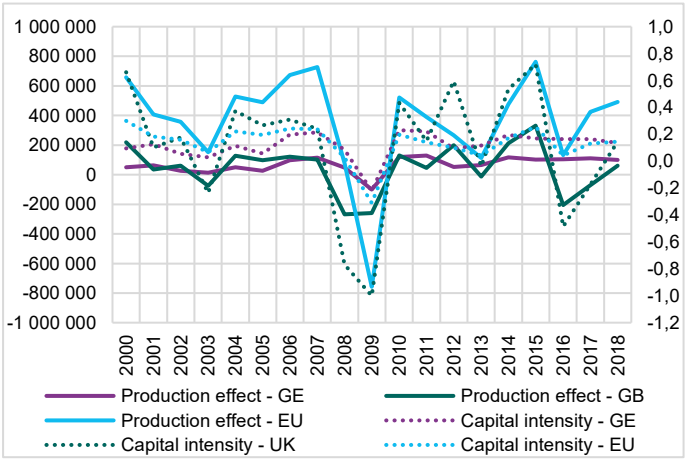

Figure 5 Production effect and capital intensity - comparison, source: Eurostat

correlation between them for each of the analysed economies is shown. It is clearly visible that an increase in capital intensity has a negative impact on the level of production effect in economy. The Pearson's correlation coefficient for the values reaches the level of 0.98 for each economy that has been analysed here. The impact of capital intensity level on the production effect in the whole European Union economy is the same. This analysis alone allows us to reach the conclusion that would prove the original thesis.

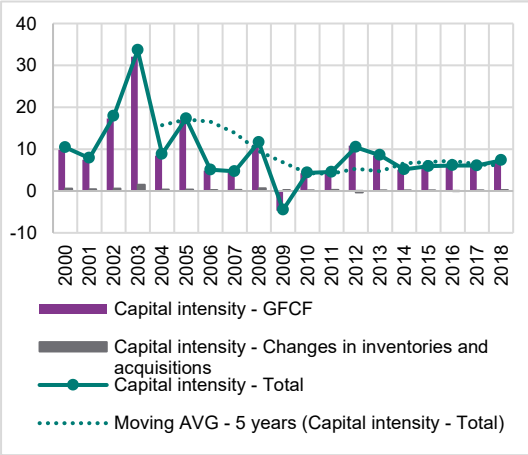

Figure 6 Capital intensity (United Kingdom), sources: Eurostat

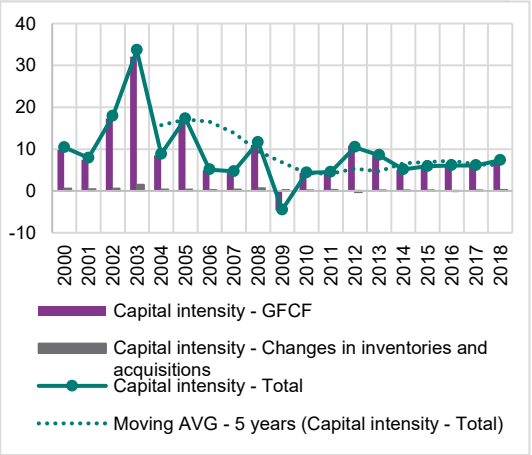

Figure 7 Capital intensity (Germany), sources: Eurostat

When analysing the production effect for the British and German economies, it turned out that the capital intensity level is a very important value in economy. Here it is worthwhile making a detailed analysis of the coefficient based on M. Kalecki's economics claims. The relationships between capital intensity factors have been discussed in Formulas 3, 4, and 5. Let us have a look at these factors, as calculated for the British and German economies. (see Figures 6 and 7) In the analysed time series the structure of capital intensity indicators economies is clearly visible. The share of the μ-factor value in the level of capital intensity in relation to total capital is small. In the British and German economies an average share in the analysed period is only 2%. This means that the key element for the level of total capital intensity is the capital intensity ratio in relation to investments made in economy (m). Let us also compare the value of capital intensity in relation to total capital in the analysed economies (see Figure 8). It is quite clear that the indicators differ considerably between economies. Neither is there any noticeable dependency

between capital intensity indicators in the British and German economies and the economy of the whole European Union. Based on this, one can draw a conclusion that the capital intensity levels national economies are to a large extent determined by internal factors. This, however, does not change the fact that the capital intensity level plays an important role in economy.

Another comparison of data that has been analysed is directly related to the capital intensity ratio as compared to total capital. Figures 9 and 10 present capital intensity level as $(\frac{1}{k})$, in line with Formula 6. They also present the relation between capital intensity of investments and capital intensity of total capital $(\frac{m}{k})$. A graphic analysis of such a data comparison shows that the latter factor is almost a neutral value for the GDP dynamics. In the presented time series, for the British and German economies as well as the economy of the whole European Union, the average value of $\frac{m}{k} = 0.98$. Totally different is the relation between capital intensity ratio $\frac{1}{k}$ and the gross national product growth rate (r). The Figure below clearly shows that the relation between the two values is very strong for each of the analysed economies. The Person's correlation coefficient for the analysed period is exactly 1.00 for both the British and the German economy. It is also worth noticing that the relationship between GDP growth and the production accumulation rate was for the British economy only 0.26, and for the German economy – 0.37. (see Table 5) On this basis we can conclude that in economies of these countries the GDP growth dynamics is determined to a much greater extent by the level of capital

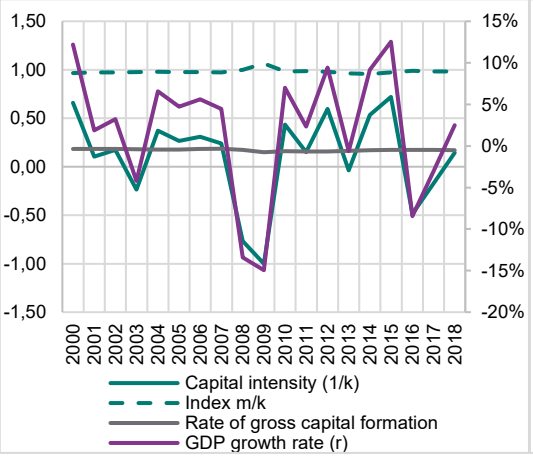

Figure 9 Capital rate and GDP growth rate (United Kingdom), source: Eurostat

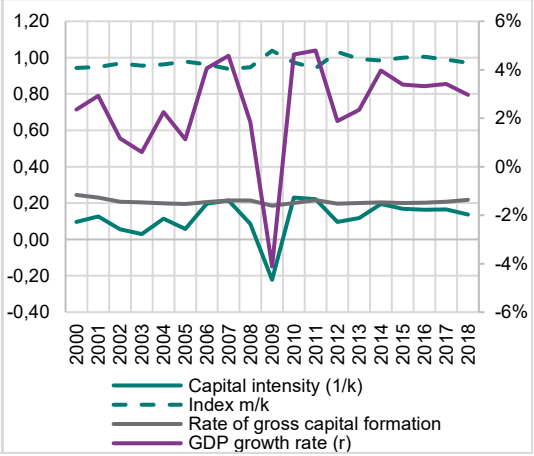

Figure 10 Capital rate and GDP growth rate (Germany), source: Eurostat

intensity than by the level of capital expenditures alone. In the table below there are other Pearson's correlation coefficients shown in relation to the GDP growth rate.

Pearson's correlation coefficients: x to the GDP growth rate (r)	United Kingdom	Germany
Gross fixed capital formation (I)	-0,13	0,40
Changes in inventories and acquisitions less disposals of valuables (O)	0,71	0,46
Production effect	0,98	0,98
Change of GDP y/y	0,98	0,98
Rate of gross capital formation change y/y	0,53	0,72
Rate of gross capital formation	0,31	0,17
Capital intensity (1/k)	1,00	1,00
GDP dynamics	0,99	1,00

Table 5 Pearson's correlation coefficient, own work

Based on this, one can conclude that the influence of the capital intensity level on the economic growth rate can be proven – which was the aim of this article. In order to verify the strength of the dependency, the coefficient of determination r-squared has been calculated. The following results were obtained. The results for the growth rate depended, respectively, on:

- Production accumulation rate for Great Britain (7%) and Germany (14%)
- Capital intensity level ($\frac{1}{k}$) for Great Britain and Germany - 99%.

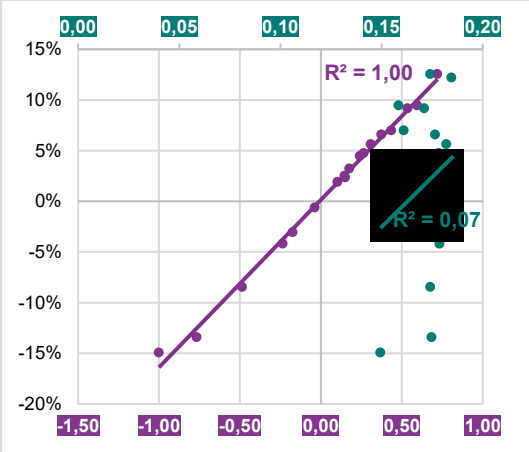

Figure 11 Coefficient of determination R-squared (United Kingdom), own work

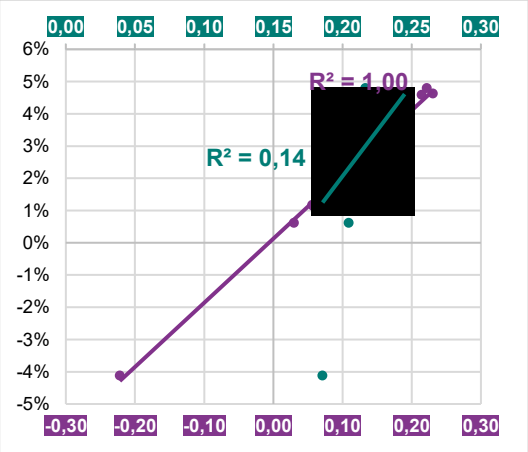

Figure 12 Coefficient of determination R-squared (Germany), own work

Such results suggest that the gross domestic product growth rate is well adjusted to the levels of capital intensity in the analysed time series for the British and German economies. This has been presented in Figures 11 and 12. It is clear that the R^2 straight line specifying the influence of capital intensity of particular economies on GDP growth rate (purple line, lower axis of abscissae) is better adjusted than the other straight line, presenting the other relationship. Based on the above analysis, made using the real data from the British and German economies, we can conclude that the purpose of this article has been fulfilled. Thus, the thesis of the author has been proven.

To conclude this chapter, we will briefly compare the results of key analyses for the economies of Great Britain and Germany to the situation of the whole European Union. The major GDP components have been calculated in line with the rules of M. Kalecki's economics. A detailed analysis of statistical data for the European Union consisting of 28 countries led to very similar conclusions. In a way analogous to presentation of data in Figures 11 and 12, also the key relationships for the whole European Union economy have

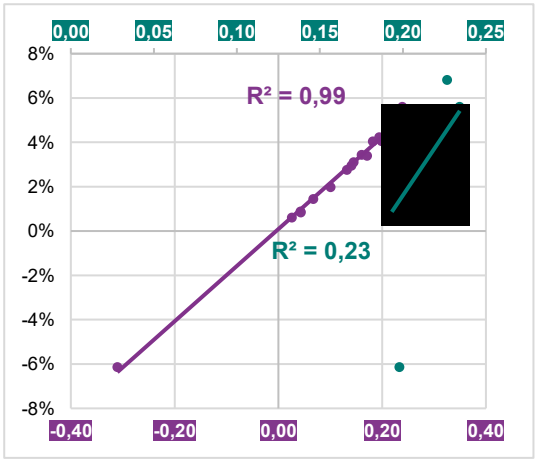

Figure 13 Coefficient of determination R-squared (European Union), own work

been presented (see Figure 13). Similarities with British and German economies are easy to spot. The R^2 straight line, which defines the influence of the capital intensity on the GDP growth rate in the whole European Union (the purple line, lower axis of abscissae) fits almost perfectly. The value of $R^2 = 0.99$, which means a very strong relation between the two variables. The other R^2 straight line, which refers to the relations between the GDP growth rate and the production accumulation rate, is also poorly matching. The coefficient of relations between the variables in the analysed period is only 0.23. This means that the relationship is moderate. Thus, the conclusions drawn earlier are confirmed by the economy of the whole European Union. We can therefore conclude that the capital intensity level is one of more important factors affecting the gross domestic product growth rate. Hence, we can say that M. Kalecki's economics can be used in modern-day economy, providing specific guidelines for the development of economic policy.

4. Conclusions for Economic Policy

The main aim of this article has been to prove the thesis about a considerable influence of capital intensity level on the economic growth rate as described in M. Kalecki's economics. By analysing the statistical data of the British and German economies, using the key relations of Kaleckian economics, the author proved the existence of a significant relation between the two values. As it turned out, the level of capital intensity in relation to total capital is a determinant that is equally strong, or stronger, in shaping the final level of GDP dynamics in the analysed economies, than such factors as for example gross accumulation level. The conclusion is also supported by the economy of the whole European Union, as well as that of EU countries (the author also conducts studies for the other EU economies). The conclusions obtained in that way may also serve as a kind of proof of the logics of Kalecki's economics, which forms theoretical basis for the author's economic research of capital intensity in investments into national economies.

The second theoretical pillar for the author has been the new institutional economics. Therefore, to sum up the above reflections, a research question may be posed and contribute to further research in this field. What is the reason for capital intensity level in an economy having a specific value? In this context one may arrive at an opinion, as justified by economists of the new institutional economy (Hodgson 2006; North 1995; Searl 2005), that capital intensity remains under the influence of certain institutional determinism. To provide some more details it can also be said that the coefficient reflects the socioeconomic phenomena related to investment processes in the economy. Thus, the conclusion can be deemed valid. On this basis a sort of verification can be suggested, as specified in Formula 5. Thus, we obtain a formula of capital intensity level in relation to total capital, considering the institutional factors.

(7)

$$k = \frac{I + O}{\Delta D} x \frac{restrictions}{facilitations}$$

According to it, the capital intensity level additionally depends on institutional determinism, which can have a double impact. The institutions that will be characterised by limitations to the investment process will cause an increase of the capital intensity level, while institutions facilitating investments will lower its value. By introducing the institutional determinism coefficient $\theta = \frac{restrictions}{facilitations}$ to the above formula, we obtain the following relationship. A higher number of restricting institutions than of those facilitating investment processes is responsible for a growing value of the institutional determinism coefficient. Its increase will, in turn, cause a higher capital intensity level. Institutional determinism, within this meaning, should now be related to the key conclusions of the above reflections.

There is no doubt as to the fact that an increase of the capital intensity level is a negative phenomenon, both for the economy and its growth. In Figures 9 and 10 a structure of this coefficient has been presented over the analysed time series for the British and German economies. It is evident there that the value changes constantly. This is a result of the institutional determinism and its influence. As has been proven earlier, the changes affect the economic growth dynamics in an important way. Based on this we can attempt to make a general recommendation for the economic policy. When planning the development of national economy for the coming years, based on growing capital expenditures, one ought to particularly focus on issues related to capital intensity, especially in relation to capital expenditures ($m = \frac{I}{\Delta D}$). In this context we can also conclude that the role of the state in this respect ought to be limited to creating an institutional environment in which the institutional determinism coefficient (θ) will have the optimum value.

The conclusions presented above may form the basis for further research on the problems of capital intensity of investments in economy. Two new areas of economic research appear, which should be well grounded in Kaleckian economics as well as in the new institutional economics. The first ought to be related to an analysis of the method and strength with which the level of investment capital intensity of institutional determinism affects the economy. This issue seems to fit into a broader context of sustainable development of national economies. The above analyses result in one more fact. Paradoxically, an increase in capital intensity level will affect the growth of investments, thus increasing the GDP. The issue of capital intensity refers, however, to relations between the value of investment and the growth rate itself. In this context the other area of economic research appears, which seems equally interesting. Its main aim ought to be to analyse the relations between the level of capital intensity and the level of organizational and production improvement, which is present in M. Kalecki's economics. Thus, there is potentially a possibility to find a complex explanation of the way GDP value in British and German economies, as well as in other European economies, is formed.

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