THE IMPACT OF ECONOMIC FREEDOM ON BUSINESS CYCLE FLUCTUATIONS

Bartosz Pawęta

University of Łódź, Poland

This dissertation is submitted for the degree of Doctor of Philosophy

Dissertation supervision:

dr hab. Piotr Krajewski, prof. nadzw. UŁ

dr hab. Sylwia Roszkowska, prof. UŁ

May 2021

"When the profits of trade happen to be greater than ordinary,

overtrading becomes a general error

both among great and small dealers"

(A.Smith, 1776)

ACKNOWLEDGEMENTS

I want to thank my fantastic supervisors, Prof. Piotr Krajewski and Prof. Sylwia Roszkowska, for their supportive attitude, constructive feedback, and clear guidance on methodology. I extend my deepest gratitude to Prof. Ryszard Piasecki for his support in my early years at the university, as well as to those who helped me in time of need – Prof. Rafał Matera, Prof. Michał Mackiewicz, and the inestimable Ms. Aleksandra Sulwińska-Kuraś.

I wish to thank all my university professors for their valuable hints to my research, especially Prof. Michał Majsterek, Prof. Agnieszka Rossa, Prof. Janina Godłów-Legiędź, and Dr. Dorota Michalak.

This moment concludes an important chapter in my life. At times like this, I feel grateful to all my teachers, as well as those who inspired and coached me in various disciplines: Dr. Przemysław Pomykalski, sensei Tomasz Michałowski, sensei Andrzej Sysio, sensei Włodzimierz Kwieciński, and Maj. Arkadiusz Kups.

Nothing I could say would ever be enough to express my gratitude to my family. Let me just say that I love you.

I also know there are friends of mine, who kept their fingers crossed for me. To those who ever asked me, “Have you finally done it?” – Yes, I have, thanks!

Finally, I hope that the ‘economic freedom- business cycle’ problem will be picked up by other scholars, who will not only provide its in-depth understanding, but more importantly, its practical implications for the society.

ABSTRACT OF DOCTORAL THESIS

"The Impact of Economic Freedom on Business Cycle Fluctuations"

Author: Bartosz Pawęta.

Dissertation supervision: Dr. hab. Piotr Krajewski, Prof. nadzw. UŁ and Dr. hab. Sylwia Roszkowska, Prof. UŁ.

Economics as a science, has not adopted one comprehensive explanation of how economic freedom affects economic fluctuations. Views rooted in Keynesian paradigm opt for steering the economic growth to mitigate depressions. On the opposite side, liberal views drawn from classical theories, point out self-regulating mechanism of a free market. There is also scarcity of empirical research in this area, as researchers tend to focus on economic growth rather than on fluctuations, while economic freedom measures have been published only since mid-1990's.

The aim of this dissertation is to fill in that gap, by investigating the impact of economic freedom on business cycle fluctuations. Scope of the research includes 34 countries (mostly OECD) and 92 quarters (1996-Q1 – 2018-Q4). Fluctuations are measured by deviation cycles of real GDP per capita, decomposed with extraction filters: Hodrick-Prescott's filter with 3 different smothering parameters, Baxter & King's, and Christiano & Fitzgerald's. Because 'economic freedom' is a non-homogenous measure of the market economy, the study tests the relationship on its overall level and its components. In this study Index of Economic Freedom (IEF) is employed. In total, 20 econometric models are created. Fixed effects regression models with time dummies and control variables include structural factors to ensure robustness of the results.

The study indicates that, despite limitation for practical implication resulting from non-homogeneity of the IEF, there is a negative effect of economic freedom on business cycle volatility. Each point of IEF inversely stands for 6% of the business cycle deviation as compared to its trend line (non-linear effect was not investigated in this study). There is also a cumulative effect of IEF

components, – high scores in several categories result in total higher impact on economic stabilization.

Of all components, monetary freedom (stable inflation, government not intervening in price mechanism) has the highest stabilizing effect amounting to 4%. Business freedom (ease of doing business) as well as financial freedom (government not interfering in the financial/banking sector) also have stabilizing effect, which amounts to 1%. In terms of government size, tax policy was confirmed to act as an automatic stabilizer (amounting to 2%), but its effect is decreased by government spending, which in fact increases deviation cycle volatility by 1%. Legal system efficiency, market openness (ease of international trade), and investment freedom (constraints on capital investments) were found to have no statistically significant impact.

Research result found its theoretical confirmation mainly in liberal economic doctrines. This insight is important for academic discussion, policy makers and their economic advisors.

STRESZCZENIE ROZPRAWY DOKTORSKIEJ

„Wpływ stopnia wolności gospodarczej na przebieg cyklu koniunkturalnego”

Autor: Bartosz Pawęta

Promotorzy: dr hab. Piotr Krajewski, prof. nadzw. UŁ oraz dr hab. Sylwia Roszkowska, prof. UŁ

Ekonomia, jako dyscyplina naukowa, nie była w stanie wypracować jednej wspólnej odpowiedzi na pytanie: jak wolność gospodarcza wpływa na wahania koniunktury. Poglądy oparte na doktrynie keynesowskiej skłaniają się do interwencjonizmu państwowego na rzecz pobudzania wzrostu gospodarczego i ograniczania negatywnych skutków recesji. Z drugiej strony poglądy liberalne, zakorzenione w ekonomii klasycznej, wskazują na samostabilizujące właściwości wolnego rynku. Brak również dogłębnych badań empirycznych w tym zakresie, jako że większość badań skupia swą uwagę na problemie wzrostu gospodarczego niż na samych fluktuacjach. Z kolei dane statystyczne dotyczące wolności gospodarczej zaczęły być publikowane dopiero w latach dziewięćdziesiątych XX wieku.

Celem niniejszej pracy jest więc zbadanie, jaki jest wpływ stopnia wolności gospodarczej na przebieg cyklu koniunkturalnego. Zakres badania obejmuje 34 kraje (głównie OECD) w okresie 92 kwartałów (1996-Q1 – 2018-Q4). Fluktuacje gospodarcze wyrażone są jako cykl odchyleń realnego PKB per capita, uzyskanego przy pomocy filtrów: Hodrick-Prescott z 3 różnymi parametrami wygładzającymi, Baxter-King, oraz Christiano-Fitzgerald. ‘Wolność gospodarcza’, rozumiana jako miara wolnego rynku, nie jest pojęciem homogenicznym. Niniejsze badanie bada więc jej wpływ na poziomie ogólnym, jak i poszczególnych jej komponentów. Wykorzystany jest tu Indeks Wolności Gospodaczej (Index of Economic Freedom – IEF). Badanie opiera się na 20 modelach efektów stałych wraz ze zmiennymi zero-jedynkowymi czasu i, dla zapewnienia odporności statystycznej wyników, zmiennymi kontrolnymi biorącymi pod uwagę także czynniki strukturalne.

Otrzymane wyniki, choć należy pamiętać o heterogeniczności IEF, wskazują na odwrotną zależność pomiędzy stopniem wolności gospodarczej a

intensywnością cyklu koniunkturalnego – zwiększenie indeksu IEF o 1 punkt zmniejsza cykl odchyleń o 6% (efekty nieliniowe nie są przedmiotem niniejszego badania). Występuje również kumulacja wpływu poszczególnych jego komponentów – zwiększenie wolności gospodarczej w kilku obszarach skutkuje większym stabilizowaniem koniunktury.

Wśród poszczególnych obszarów, wolność w zakresie polityki monetarnej (monetary freedom – stabilna inflacja i ograniczona rola państwa w kształtowaniu cen) ma największy stabilizujący efekt wynoszący 4%. Wolność w zakresie prowadzenia działalności gospodarczej (business freedom) oraz liberalizacja rynku finansowego (financial freedom) charakteryzują się także stabilizującym efektem wynoszącym 1%. W obszarze rozmiaru sektora rządowego obserwuje się dwojaki efekt: im większe obciążenia podatkowe, tym stabilniejsza koniunktura (wpływ 2%); jednakże wpływ ten jest zmniejszany poprzez wpływ wydatków rządowych – im większe, tym większe wahania koniunktury (wpływ 1%). Efektywność funkcjonowania wymiaru sprawiedliwości, otwartość rynkowa na handel międzynarodowy oraz wolność w obszarze inwestycji kapitałowych, okazują się nie mieć wpływu istotnego statystycznie.

Otrzymane wyniki znajdują potwierdzenie teoretyczne głównie wśród liberalnych doktryn. Niniejsza praca może nie tylko wzbogacić dyskurs akademicki, lecz stanowić także praktyczną wartość dla decydentów politycznych i ich doradców ekonomicznych.

CONTENTS

1 INTRODUCTION

Perhaps, one of the first notice of cyclical economic activity comes from the Bible, when Joseph interpreted Pharaoh's dream: "Seven years of great abundance are now coming throughout the land of Egypt; but seven years of famine will rise up after them, when all the abundance will be forgotten in the land of Egypt." (New American Bible Revised Edition, Genesis 41: 29-30). The prophesy was followed by, what it may be called today, one of the first state intervention to smoothen the amplitude of economic fluctuations. To avoid supply shock, Pharaoh designated Joseph to collect all the food in the prosperous years to keep it as a reserve for the country against the seven years of famine.

Cyclical nature can also be noticed in the Sun activity. The first notice of regular cycles was most likely made back in 1770s. However, Samuel Heinrich Schwabe's discovery in 1844 won international recognition. The 11-year long sunspots cycles have been named after him. Today, astronomers distinguish several types of cycles which vary in length and amplitude: 11-year Schwabe cycle, 22-year Hale magnetic polarity cycle, ~90-year Centennial Gleissberg cycle, 210-year Suess/de Vries cycle, etc. (Usoskin, 2017). Sunspot cycles have also left their imprint on economic fluctuations. In 1878, William Stanley Jevons in his "Commercial crises and sun-spots" compared economic fluctuations with sunspot cycles. According to him, an average economic cycle of his era lasted 10.8 years, while the sunspot cycle lasts 11 years. The explanation of this correlation is that higher magnetic activity of the Sun determines the amount and quality of crops, which influence the economy (Marczak & Piech, 2008). Nowadays, this explanation is no longer found to be useful in business cycle theory.

Throughout centuries, various discoveries emerging in this field aimed at structuring economic fluctuations, which seems to some point chaotic, even till now. Thisus popularity was gained by: Kitchin cycle (3-5 years, representing

time span needed to renew inventory), Juglar cycle (7-11 years, representing investment cycle, Kuznets swing (15-25 years, related to demographic processes, Kondratiev wave (50-60 years, driven by technology advancements). Today, however, the majority of influential economists deny any regularity in economic fluctuations (Korotayev & Tsirel, 2010).

There have also been numerous attempts aimed at explaining the reasons for economic fluctuations. Different views on this lead to one of the most significant disagreements in economics as a discipline. Some school of thought link economic fluctuations to random shocks (e.g. new discoveries), while some to monetary, institutional or other factors. In the public discussion, this often translates into debates between liberals and those, who opt for a state intervention in the economic system, somewhat limiting the degree of economic freedom.

The fact is that the impact of economic freedom itself on economic fluctuations has not been thoroughly investigated. Economic theories do not provide one comprehensive answer explaining the degree to which the liberalism of a given economy helps to stabilize the fluctuations or enhances their intensity. There is almost no empirical studies on how economic freedom affects cyclical fluctuations. Thus, the aim of this dissertation is to contribute to filling this knowledge gap.

1.1 Main Research Hypothesis

In theory, economic freedom can impact economic cycles in multiple ways. On one hand, liberal rules of purely free market might result in uncontrolled fluctuations, where rapid economic booms are followed by sever recessions. This might have negative implications for the society, for instance, increasing income inequality or wealth inequality. Economic fluctuations might also result in slowing down long-run growth. These diagnoses are characteristic for those schools of economics, which opt for state interventions aimed at steering the economic growth and mitigating depressions. On the opposite side, there are more liberal views, rooted in classical theory, which point out self-regulating mechanism of a free market. Details are presented in the Chapter 3.

Currently, thanks to already substantial statistical data gathered on the economic freedom parameters around the world, the problem can be addressed by an empirical research. Thus, the leading research hypothesis for this dissertation is:

Hypothesis A: There is a negative relationship between the degree of economic freedom and the volatility of the business cycle fluctuations.

1.2 Justification for choosing the topic

The topic of this dissertation is important at least from 3 perspectives:

Firstly, understanding how economic freedom affects fluctuations might indicate optimal economic policy for stabilizing the economy. This might help mitigate negative effects of economic slowdowns on the society.

For instance, on Sept 15th 2008, the covers of the leading American newspapers alarmed 'Crisis on Wall Street', 'The American financial system was shaken to its core'. This dramatic date of the 2007/2009 global financial crisis did not only hit large investment banks, but had a spillover effect on the entire economy. According to The National Bureau of Economic Research (NBER), almost 40% of the American households suffered from either unemployment, arrears on their mortgage payments, or even foreclosure. To make it worse, in a globalized world, there are so-called contagion effects (Rigobon, 2001), meaning that there are various channels through which shocks can spread across countries (e.g. the Debt crisis in 1982, the Mexican Tequila effect in 1994, the Asian Flu in 1997, the Russian Cold 1998, the Brazilian Sneeze in 1999, and the NASDAQ Rash in 2000). On Sept 22nd 2008, US edition of Forbes headline warned that "Financial Crisis Goes Global", indicating that the global financial crisis is taking its toll not only in the financial markets, but also in the entire world economy.

For this, it is crucial for policy makers (governments, central banks) to know which of their instruments are most/least useful in that respect.

Secondly, the phenomenon lacks one comprehensive theoretical explanation, As indicated already, economics as a science does not provide one comprehensive explanation of the freedom-cycle relationship. Over the centuries, various theoretical concepts gained popularity, and many of them were actually applied in practice. Of the two extremes, from a centrally-planned economy to a free market, none seems to be regarded as an optimal, sufficient-enough solution to foster economic prosperity with mild economic slowdowns. In between, there are theories which focus on certain aspects of the economy—like monetary factors, financial markets and external shocks. It is worth to highlight their postulates on the economic freedom from the business cycle perspective.

Thirdly, there is insufficient empirical research aimed at verifying theoretical concepts. This is partly caused by the fact that economic growth tends to be treated separately from economic cycle. Furthermore, the statistical data measuring economic freedom started to be available only in mid-1990's, naturally limiting research possibilities. The problem of economic freedom is that business cycle has not been so widely discussed and empirically verified. Lack of sufficient empirical proof leaves economists debating, policy makers uncertain about their actions, and the general public unable to judge their decisions.

1.3 Plan of the dissertation

This dissertation tests the main research hypothesis stated in the Introduction. First, it provides foundations for the economic cycle concept, its characteristics and specific terminology – Chapter 2.

Chapter 3 presents a systematic literature review of major economic doctrines in the context of economic cycles and their relation to economic freedom. It provides a high-level view on how growth-cycle relation is perceived and how the approach towards freedom-fluctuations dependency evolved.

Chapter 4 looks closely at the concept of 'economic freedom'. It provides definitions and introduces its components. The importance of this chapter lies

in: (a) Directly linking economic freedom to the main economic dormitories, (b) Indicating knowledge gap existing in that area, and (c) Formulating supplementary hypotheses.

Chapter 5 outlines and justifies methodology design of the dissertation. It starts by explaining research strategy. Research variables are discussed and the tools for testing research hypotheses presented.

Chapter 6 presents research results. It presents the findings on the effect of economic freedom on economic cycles. This includes the overall economic freedom impact, as well as that of its components.

The thesis ends with Chapter 7—conclusion section. Concluding remarks, study's implications for theory and practice, as well as research limitations are presented.

Appendices include detailed output of econometric models.

2 FOUNDATIONS FOR UNDERSTANDING BUSINESS CYCLES TERMINOLOGY

2.1.1 What Economic Cycle Is

Economic (or business) cycle is a special type of fluctuations observed in economic activity. In fact, some scholars for many decades have claimed that the term 'cycle' is to some extent misleading as it suggests regularity and predictability. Even J.M. Keynes in his notes on the trade cycle claimed that its essential character should be "the regularity of time-sequence and of duration, which justifies us in calling it a cycle" (Keynes, 1936). In the real world, however, fluctuations are in fact hardly ever homogenous (Burns & Mitchel, 1946), (Lucas Jr, 1977), (Mankiw & Taylor, 2009). Still, fluctuations of economic activity are usually characterised based on their time span, which results in the following types of fluctuations (Rekowski, 1997):

- Development trend – direction of changes in the economy (its growth, or decline) in the long-run.
- Periodic fluctuations – short-term fluctuations in the economy caused by seasonal conditions, such as biologic rhythm of the society and its environment, climate changes, people habits, work hours, etc. They can occur in various lengths: Days, weeks, months, years.
- Random fluctuations – irregular in terms of their strength and direction, caused by unknown factors, but not related to the economy.
- Economic fluctuations – oscillation of the economic activity around its trend line. They are said to have short and medium duration, resulting

from the internal mechanics of the economy. They can be relatively regular. Economic cycles fall into this category.

There is no strict division between each type of fluctuations. It is also problematic to precisely define which of the economic fluctuations can be defined as cyclical. For instance, scholars argue about what should be the length of the cycle, its phases, and regularity.

Throughout history, there have been various approaches aimed at defining what an economic cycle is. At this point, it must be emphasized that there are significant differences between the so called classical cycles (which occurred before the World War II) and modern cycles (occurring after WW II). Differences between these two are presented in the Table 1. In short, modern cycles are shorter (3.5 to 5 years), with two phases (relatively high and relatively low economic activity) separated by smooth turning zones, rather than turning points. They also tend to have growing amplitude and much more complex structure, which depends on a large number of factors. For an exact explanation of the terminology, please see Chapter 2.1.2.

Morphology	Classic cycle	Modern Cycle
Number of phases defined	4 phases	2 phases
Turning points	Sharp points	Turning zones
Length: - growth phase - decline phase - cycle	 4-6 years 4-6 years 8-12 years	 2-3 years 1.5-2 years 3.5-5 years
Frequency	Low	High
Amplitude: - phases - cycle	 - similar amplitudes - amplitude close to zero	 - higher amplitude of growth phase than decline phase - positive, growing amplitude
Intensity	High	Low
Symmetry/asymmetry	Asymmetry	Asymmetry
Structure: Lead/delay time Cause and effect	 Long lead/delay times between turning points of different economic indicators Simple relations, small number of variables	 Short lead/delay times between turning points of different economic indicators Complex relations, numerous variables

Table 1 Morphological differences between classic and modern cycles, Source: Own study, based on R. Barczyk, Z. Kowalczyk, Metody badania koniunktury gospodarczej, PWN, Warszawa-Poznań, 1993, p.29

Note that the Table 1 is based on a research conducted in 1990's, however, the term 'modern' still applies in a more up-to-date literature. Empirical research

in that matter seem to confirm complexity of modern business cycles. For instance M. Skrzypczyńska provides a detailed analysis of modern business cycles of the Polish economy, in which she exhibits various cyclical patterns across certain sectors and the impact they have on the overall economic fluctuations (Skrzypczyńska, 2014). Also, evidence asymmetry and amplitudes for the United States and other countries is presented in (Knoop, 2015).

Currently, one of the most influential bodies examining business cycles is the National Bureau of Economic Research (NBER), which provides start and end dates for recessions in the United States. It quite interesting that NBER does not have a fixed definition of a business cycle, so its chronological judgement, comprising alternating dates of peaks and troughs in economic activity relies only on the decisions taken by its Business Cycle Dating Committee. The Committee has adopted the following approach to characterise the business cycle (www.nber.org/cycles/recessions.html, accessed on 2020-01-31):

1. Business cycles is composed of a recession phase and an expansion phase.
2. A recession is a period between a peak and a trough—a significant decline in economic activity that spreads across the economy and can last from a few months to more than a year.
3. Expansion is a period between a trough and a peak—economic activity rises substantially, spreads across the economy, and usually lasts for several years.
4. In both recessions and expansions, brief reversals in economic activity may occur.
5. The Committee does not have a fixed definition of economic activity.
6. It monitors various measures of broad activity: Real GDP measured on the product and income sides, economy-wide employment, and real income. This may be supplemented by real sales or industrial production.

The complexity of economic fluctuations results in no fixed definition adopted by NBER. Note that it is not clear what a ‘significant decline’ nor ‘substantial rise’ of economic activity is (points 2 and 3). The typical length of a cycle is also

unclear (points 2 and 3). A recession and an expansion phase can be interrupted by reversals, which are arbitrarily treated as such or as a start of a new phase of the cycle (point 4). The economic activity remains undefined as well. The Committee only states which economic aggregates are monitored (points 4 and 5).

The approach currently taken by NBER evolved from a classic definition of the cycle, which was proposed in 1940's by economists closely affiliated to NBER—A. F. Burns and W.C. Mitchell. According to them, "Business cycles are a type of fluctuations found in the aggregate economic activity of nations that organise their work mainly in business enterprises" (Burns & Mitchel, 1946). A cycle consists of expansion phase, general recession, contraction and revival—all occurring simultaneously in many economic activities.

This approach was modified later on when, during the post World War II period, economic slowdowns were quite modest and rare (Zarnowitz, 1992). The term 'growth cycle' was introduced (Mintz, 1969), which after removing the trend line, defines phases of the cycle depending on the deviation of empirical value of an aggregate from its estimated trend line (the difference is also called 'output gap'). In such a cycle, two phases are distinguished:

1. Period of relatively high growth rates (speedup)
2. Period of relatively low growth rates (slowdown)

For analytical purposes, a 'deviation cycle' is constructed. The trend line is placed on the X axis, while the Y axis represents the deviation value from the estimated trend line (as a quotient of empirical value divided by the trend line value). Naturally, the means to estimate the normal rate is not neutral, as different methods might lead to different identification of cycles. For this reason, the definition of growth and deviation cycle, as well as its measurement method are criticised (Zarnowitz, 1992) (Barczyk i in., 2006).

To avoid this problem, a concept introduced by M. Friedman and A. J. Schwarz, called step cycle, is used (Milton Friedman & Schwartz, 1963b). In this method, the analysis of fluctuations is based on the following steps (Barczyk, 2011):

1. Eliminate seasonal fluctuations form the absolute values of a given time series.
2. Calculate growth rates (e.g. month to the preceding month, month to the same month last year).
3. Calculate normal growth rate – amounting to the average growth rate in the analysed period.
4. As in the deviation cycle – place the normal growth rate on the X axis, so that the Y axis represents the deviation from the normal growth rate.
5. The values above the X axis fall into the period of relatively high growth rates, while values below the X axis belong to the Period of relatively low growth rates.

Moreover, currently conducted empirical analyses adopt time-span criterion to determine a cycle, which are believed to last from 1.5-2 years up to 8-10 years. In addition, the cyclical component of the GDP or industrial production are usually employed in the analyses (Skrzypczyński, 2010). The approach currently employed by many economists is consistent with the approach suggested in classic papers (Lucas Jr, 1977) (Kydland & Prescott, 1990), which agree that a business cycle can be defined as movements about trend in GDP, but also comovements in different aggregative time series are observed. Lucas in his paper did not define trend, while Kydland & Prescott did. They refused to determine trend using a linear function of time as determinants such as technological change are not constant either. They suggested Hodrick and Prescott method as a proper way to decompose trend in economic aggregates. Finally, they used standard deviation for measuring cycles' volatility.

In summary, over the last century or thereabout, the approach towards defining business cycles shifted towards a conclusion that it is not necessarily regular nor homogenous. They vary in their length and amplitude, and do not have sharp turning points often (but rather turning zones instead). It seems that for the purpose of this dissertation a general definition of the business cycle can be formulated:

Economic cycle – consecutive positive and negative changes of general economic activity oscillating around a long-term trend. The economic activity

is measured by constructing deviation or step cycles of main economic indicators, preferably the real Gross Domestic Product. In case of deviation cycles, trend can be determined by Hodrick and Prescott filter (or similar), while in case of step cycles, average value for the period represents the normal growth rate.

2.1.2 Economic cycle morphology

Cycles extracted from the data series can be analysed in terms of their morphology. The term itself has been adopted from other sciences, e.g. biology and linguistics. From Ancient Greek μορφή (morphḗ, "form, shape"), λόγος (logos, "reason, study). It is important to understand certain terminology related to cycles structure and characteristics, as some terms used in everyday language can be confusing in the academic discussion.

The mode of determining turning points is probably the most confusing. The importance of it lies in the fact that, based on location of turning points, starting/end points of phases and whole cycles are determined.

Turning points – determine boundary between phases or cycles. Upper and lower turning points are distinguished. On that basis, it can be stated that a cycle is the time span between two consecutive turning points of the same type. In some cases, each upper turning point (local maximum in the growth cycle – see Figure 1) is called 'downturn' or 'peak'. Each lower turning point is called 'upturn' or 'trough'. In case of a growth cycle (empirical data with seasonal fluctuations removed), downturns occur at local maxima (marked as 'Gd'), while growth cycle upturns occur at local minima (marked as 'Gu'). The cycle presented in the figure is an arbitrary time series with clearly visible turning points, which is hardly ever the case in the time series of economic aggregates. Oftentimes, spotting inflection points might be problematic. An algorithm is usually applied (this is out of scope of this dissertation; for details see a classic paper on programmed selection of cyclical turning points by G. Bry and C. Boschan (Bry & Boschan, 1971). Turning points might not be sharp and they often bear resemblance to 'turning zones', especially in modern

cycles, but the issue was raised in reference to classic cycles; e.g. some authors suggested that they should be treated as a separate phase (Haberler, 2017).

As it was indicated in the chapter 3.1.1, the current approach towards business cycles is that they can be analysed in the form of growth, deviation or step cycles. In each of them, turning points can be determined differently, which would affect time periods assigned to starting/end point of the cycle. In case of a deviation cycle, the determination procedure is similar to the growth cycle. However, note that there can be a difference in time when turning points occur—e.g. it can be clearly observed that the first downturn 'Gd' occurs in the period 5, while the first downturn 'Dd' in the period 4. This is caused by the relative difference between empirical values and the trend line. It shall be noted that the methodology employed by NBER follows the first procedure, meaning local inflection points observed in the growth cycle (Barczyk & Kowalczyk, 1993).

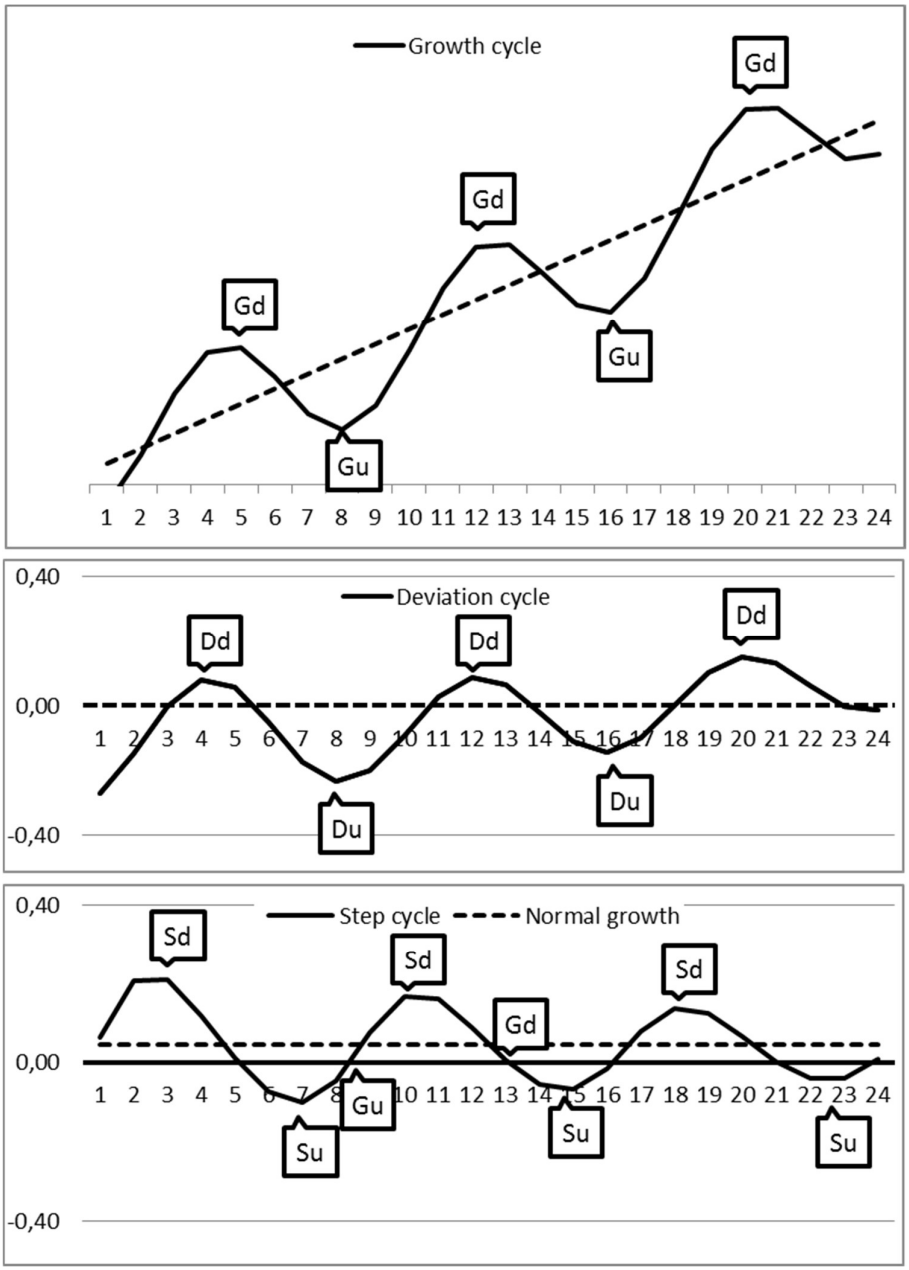


Figure 1 Graphical presentation of turning points in different types of business cycles. Source: Own study, based on R. Barczyk, Z. Kowalczyk, Metody badania koniunktury gospodarczej, PWN, Warszawa-Poznań, 1993, p.21

NBER methodology can be also applied to step cycles. However, a modification to the definition needs to be made. In the NBER's methodology, the X axis should not represent normal growth rate, but the zero rate. In this case, points corresponding to 'Gu' and 'Gd' can be marked at the intersection of the step cycle with the X axis. It is interesting to find that inflection points of the step cycle ('Sd' and 'Su') occur earlier than in case of the inflection points in corresponding growth and deviation cycles, which clearly carries value for prediction purposes.

Once the turning points are defined, phases of business cycles can be determined.

Phases – a time span between two consecutive and opposite turning points (Barczyk & Kowalczyk, 1993). Phases are periods of either high or low growth rates. Depending on the cycle type, which determines the way in which turning points are defined, we arrive at different identification of phases (see Table 2).

Cycle Type	Period of relatively high growth rates (speedup, expansion)	Period of relatively low growth rates (slowdown, contraction)
Growth Cycle (NBER)	Gu --- Gd	Gd --- Gu
Deviation Cycle	Du --- Dd	Dd --- Du
Step Cycle	Su --- Sd	Sd --- Su
Step Cycle (NBER)	Gu --- Gd	Gd --- Gu

Table 2 Identification of phases in various types of business cycles. Source: Own study, based on R. Barczyk, Z. Kowalczyk, Metody badania koniunktury gospodarczej, PWN, Warszawa-Poznań, 1993, p.23

As it was already indicated (see chapter 3.1.1), the classic approach towards cycles resulted in identification four phases. In the past, this caused further

confusion in terms of the number of phases within a cycle, as well as disjunctive nomenclature, e.g. (Bry & Boschan, 1971):

- Recovery, prosperity, recession, depression
- Upswing, boom, downswing, depression
- Primary rise, secondary rise, boom, capital shortage, crisis, recession
- Recovery, growth, contraction

I modern literature, this problem has been eliminated by distinguishing two phases. Currently, we define the following phases of a business cycle:

1. Period of relatively high growth rates, also defined as expansion phase, or speedup period
2. Period of relatively low growth rates, also defined as contraction phase, or slowdown period

Phases are defined as periods between two consecutive and opposite inflection points in the growth cycle and (corresponding) intersection points of the step cycle with the zero line. This approach is in line with the NBER methodology.

Length – length of a cycle its duration, e.g. from one upturn to the next upturn. Similarly, length of a phase is its duration., e.g. from an upturn to the next downturn. Consequently, the length of the cycle equals to the sum of lengths of its phases. For instance, in the Figure 2, the length of the expansion phase amounts to 3 quarters, slowdown— 5 quarters, while the whole cycle lasts for 8 quarters.

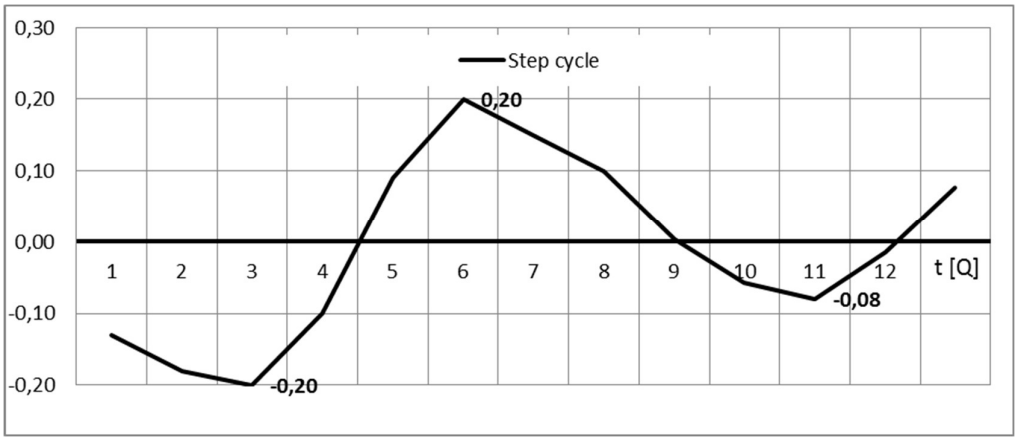


Figure 2 Graphical representation of sample morphological features of a step cycle, Source: Own study

Frequency – it is the inversion of the length, which means it indicates how many cycles occur within a given time span.

Amplitude – there are several ways in which the amplitude can be defined and measured (Barczyk i in., 2006).

The first approach is based on absolute values. In this case, the amplitude of the phase amounts to the absolute value of the difference between values obtained at two consecutive and opposite turning points. In Figure 2, the amplitude of the expansion phase amounts to 0.40, while the amplitude of the slowdown amounts to 0.28. The amplitude of the cycle is the difference between amplitudes of its phases. In this case, it amounts to 0.12.

The second approach focuses on the relative distance of the turning points from the trend line (X axis) in case of the step cycle. In this case, as we define the cycle start from the upturn in quarter 3 and its end in another upturn in the quarter 11, the amplitude of the cycle is defined as a distance from the downturn to the X axis, which amounts to 0.2.

It can be seen that both approaches differ in the results obtained and cannot provide a full picture of the cycle. For this reason, it is useful to measure

amplitude of each phase separately or employ also other measures like cycle intensity.

In case of analysing a period in which several business cycles occur, their fluctuations might be characterised as:

1. Constant – with similar values of amplitudes in each phase
2. Explosive – when amplitudes of phases increase with time
3. Damping – when amplitudes of phases decrease with time

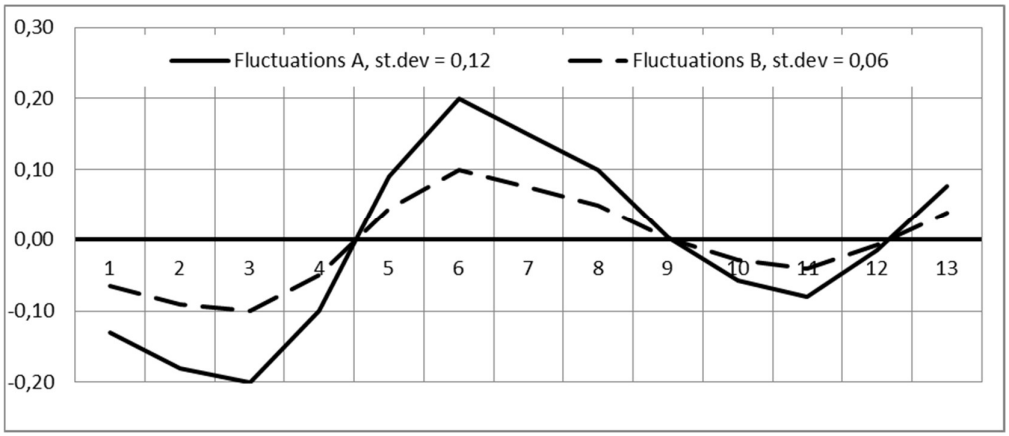


Figure 3 Example of fluctuations intensity, Source: Own study.

Intensity (volatility) – measures the strength of growth or decline in each phase, or the whole cycle. A common tool widely employed in measuring volatility of a time series is standard deviation of oscillations as suggested by (Kydland & Prescott, 1990). Economic fluctuations are more volatile if values attained by the cyclical component of economic aggregates are widely distributed around the trend line. Figure 3 shows two sample step cycles. Fluctuations A are 100% more volatile than fluctuations B.

For the purpose of the research conducted in this dissertation, measuring intensity (volatility) of fluctuations will be of utmost importance.

3 LITERATURE REVIEW OF ECONOMIC FLUCTUATIONS THEORIES IN THE CONTEXT OF ECONOMIC FREEDOM

Economic fluctuations can be analysed from the point of view of various theoretical perspectives. This chapter presents the spectrum of theories with a view to pointing out the difference in their origin, scope of their focus and consequences they could have if adopted in an economic system. Each of them provides its own set of concepts, thought patterns and postulates, which results in—following Thomas Kuhn's terminology originally used only for natural sciences (Kuhn, 1962) — constituting its own paradigm. Oftentimes, they are completely contradictory, while sometimes are (partly) coherent. Still, economics as a science has not adopted one common paradigm and there are some serious doubts in the academic society that it is likely to happen in the nearest future (Wojtyna, 2008). A separate discussion is, what are the advantages and disadvantages of this state and what are the implications for the surrounding world.

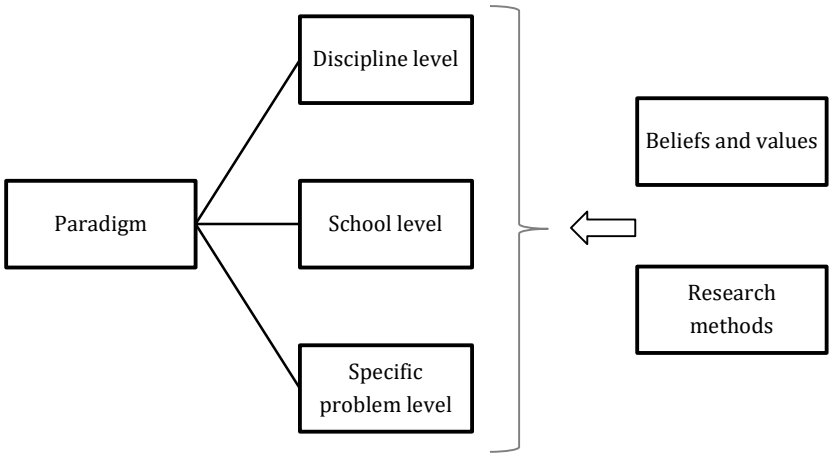


Figure 4 Paradigms in science and the impact of external determinants. Source: own study, based on (Madej, 2011)

Paradigms in economics, as in other sciences, can be divided into three main categories (Figure 4). They can relate to the whole discipline (e.g. biology, physics, economics, etc.), certain schools within each discipline which group together similar lines of thinking (e.g. Keynesianism, monetarism, Austrian School, etc.), or approach a specific problem, which might be similar despite differences between schools (e.g. postulates regarding low level of government spending claimed by monetarists and Austrian economists). In the context of this dissertation, the 'school level' and the 'specific problem level' are the obvious focus, as they provide different theoretical views on economic fluctuations. It is important to point out that different schools are not only separated by their dominating theories or set of theories, but as T. Kuhn (Kuhn, 2001) argues, also by a broader sense known as "metaphysical parts of paradigms". These are beliefs and values shared by researchers, as well as "formulas", understood as dominating research methods (e.g. introducing large portion of mathematics to economic research in the course of Formalist Revolution in the mid-20th century). As a conclusion of the above, and an introduction to economic theories, it must be clearly stated that

economics as a social science subjective to a large extent. Hence, it is affected by culture, ideology and beliefs.

3.1 Economic Growth and Business Cycles

Economic growth and business cycles are commonly understood as separate, but in fact, naturally interconnected phenomena. While studies around economic growth focus on the long-term equilibrium, business cycle studies investigate oscillations of economic activity around the trend line (see Chapter 2.1.1). Separation of the phenomena was largely caused by limitations of mathematical tools dominating mainstream economics after the WW II (Assous i in., 2016). Nevertheless, since the beginning of the XX century, numerous theories linked economic volatility and growth. As Schumpeter noted, "Analysing business cycle means neither more nor less than analysing the economic process of the capitalist era" (Shumpeter, 1939 in Zarnovitz, 1991), followed by Burns and Mitchel "The problem of how business cycles come about…is inseparable from the problem of how a capitalist economy functions" (Burns and Mitchell, 1946 in Zarnovitz, 1991).

Most business cycle theories seemed to indicate that the main driver for the long-run growth are innovations resulting in productivity growth. Perhaps, the most popular is the Kondratiev's technological wave (1925), incorporated into Shumpeter's theory of economic development. It was combined with shorter cycles of Juglar and Kitchin (Schumpeter, 1939). According to this three-cycle scheme, major technological breakthroughs determine long-run (50-60 years) growth trend, around which shorter cycles interfere with each other, superimposing each other as in the case of the Industrial Revolution (Assous i in., 2016).

Business cycle models that linked fluctuations with growth have their roots in the Harrod-Domar model, which was one of those bringing dynamism to the Keynesian growth model. The models developed by R.F Harrod (1939) and E. D. Domar (1946) lead to similar conclusion. They are often referred to as the Harrod-Domar model. Interestingly, an equation describing growth rate of a simple one-sector economy (output growth rate = savings rate /

(capital/production) seen in Harrod and Domar had been derived earlier on in 1935 by M. Kalecki (Jakimowicz, 2005). The model implies that the probability of stable economic growth amid full employment is extremely low (so-called Harrod's first problem). Second implication (so-called Harrod's second problem), is that there is no self-stabilising mechanism in the economics system, so any differences between anticipated saving and anticipated investment (see Equation 8, page 38) can only diverge in time. Growth in the model is determined by quantity of labour and capital accumulation, which is driven by investment. Kalecki's view on this was different. He stated that technology advancements are required for establishing a long-term growth trend.

The model which superseded the Harrod-Domar's, was a model developed independently by R. Solow and T. Swan, thus called Solow-Swan's. The model set within the framework of neoclassical theories became an important organising structure in macroeconomics in the area of growth, volatility or public finance. The key implication of the Solow's growth model is that productivity grows at a constant rate (Solow, 1970).

The concept above was rejected amid emergence of the Real Business Cycle Theory (see Business Cycle According to the New Classical Macroeconomics, page 52), which returned to Schumpeterian views on exogenous shocks to production. It determined output growth and volatility. A viral discussion on the nature of economic fluctuations was raised as a consequence of the paper by Ch. Nelson and Ch. Plosser, in which they claimed that macroeconomic time series are better characterised as non-stationary processes with no tendency to return to their deterministic trend line (Nelson & Plosser, 1982).

J. Stiglitz added two remarkable insights on the nexus between growth and volatility (Stiglitz, 1993). One, recessions may not only result in temporary losses through which markets clear themselves from ineffective enterprises and processes (Figure 5, A), but in case of a severe drop in R&D (research and development), the future long-run productivity is lowered (Figure 5, B). And two, it is not only innovations that drive business economic activity, but this relationship is mutual. This means that even temporary slowdown in business

activity might decrease innovation potential, viewed in many theories as a necessary condition of the economic growth.

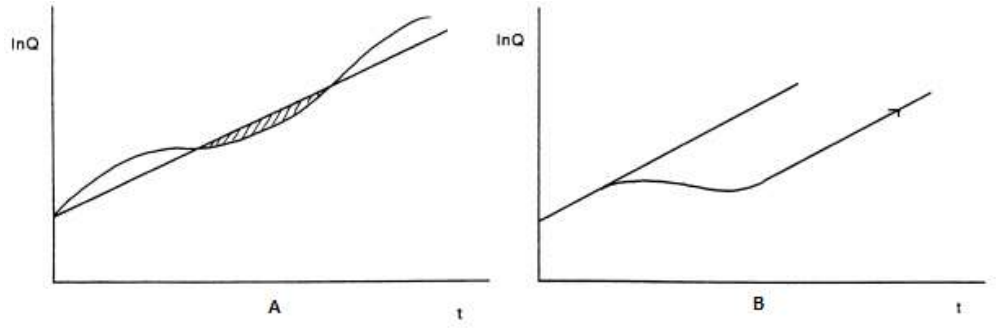


Figure 5 Impact of a recession on the long-run productivity growth. Source: (Stiglitz, 1993)

Based on Stiglitz's analysis, it may de concluded that the sign of relationship between volatility and growth is negative (higher volatility may result in lower economic growth). That issue has been widely discussed since Ramay and Ramey's research provided empirical evidence on the negative link (Ramey & Ramey, 1994). This was contradictory to previously dominating tradition of Schumpeter-Kuznets (Schumpeter (1961) and Kuznets (1967) in (Altman, 1995). The negative sign of the relationship has been supported by further research (Hnatkovska & Loayza, 2004) and (Kharroubi, 2006; Aghion and al., 2005; Fatás, 2002; Aghion and St Paul, 1998; Kroft and Huw, 2002 and Faruk, 2006, in (Alimi, 2016a). On the other hand, it seems that the relationship is not entirely clear for different ranges of volatility (see reassessment of (Altman, 1995) by (Mills, 2000), as well as general country development (Alimi, 2016b).

To sum up the above consideration, it may be stated that economic growth and fluctuations are an intricately connected phenomena, despite some methodological constraints separating them. On the theoretical ground, they are mainly connected by productivity changes, resulting from innovations or other technological breakthroughs. There is a two-way relationship between growth and volatility, sign of which is (although it is still not fully clear) rather negative.

3.2 Business Cycle – Review of Main Economic Doctrines

3.2.1 Views on Business Fluctuations Before XX Century

Geographical Discoveries during the Renaissance and inflow of gold to Europe fostered development of economic thought known as mercantilism (term coined by Jean-Baptiste Colbert). Under this term, during XV – XVIII centuries, various economic concepts emerged across several European countries, which aimed at ruling the economic realm as they did in the diplomatic. They did not refer to economic fluctuations *per se*, but pointed out certain policies aimed at increasing welfare, such as accumulating monetary reserves through a positive and permanent trade balance, imposing high tariffs on imported goods leading to autarky (self-sufficiency) (Smaga & Władyka, 2018).

The first scientific notice of business cycle was made by a French economist Clement Juglar in his essay published in 1860 entitled "*Des Crises commercial"' ("Business Cycles")* (www.britannica.com/biography/Clement-Juglar, accessed on 2020-03-01). According to him, a typical cycle lasted approximately 7-11 years and depended on credit cycle. At this time, classical views dominated the economic discourse, that observation was not widely approved. Classical economists (notably James Mill, Jean-Baptiste Say, David Ricardo) stated that the crisis of 1763-1843 was caused by external factors and economic fluctuations are totally coincidental (Marczak & Piech, 2008). Classical economics noticed this phenomena: "When the profits of trade happen to be greater than ordinary, overtrading becomes a general error both among great and small dealers" (Smith, 1776). It was believed that overproduction of goods is impossible, while any supply-demand mismatch can occur temporarily only in a selected area of the economy. Thus, any state interventions are unnecessary or even harmful to self-regulating market. Classical economics still resonates in various forms across modern economists around the world, such as Cracow-based scholars of A. Krzyżanowski (Smaga & Władyka, 2018).

3.2.2 Business Cycle According to the Keynesian School

3.2.2.1 Trade Cycle By J.M. Keynes

The Great Depression of the 1930's turned out to be a trigger for J. M. Keynes to redefine economics as a discipline and became fundamentals for economy stabilising methods for decades to come. His line of thinking brought a new paradigm to economics, commonly referred to as a 'Keynesian School' or 'Keynesian Economics'. He also contributed to development of the system of national accounts and their employment in econometric models—specifically business cycle statistical testing already in 1930's (Tinbergen, 1939), but also later formalizing of economics (Samuelson, 1948).

Keynes himself, in "The General Theory of Employment, Interest and Money" stressed the importance of the studying business cycles, stating that "*our theory must be capable of explaining the phenomena of the Trade Cycle*" (Keynes, 1936). Variables of the Keynes' model can be summarised in a form of a diagram, as presented in the Figure 6.

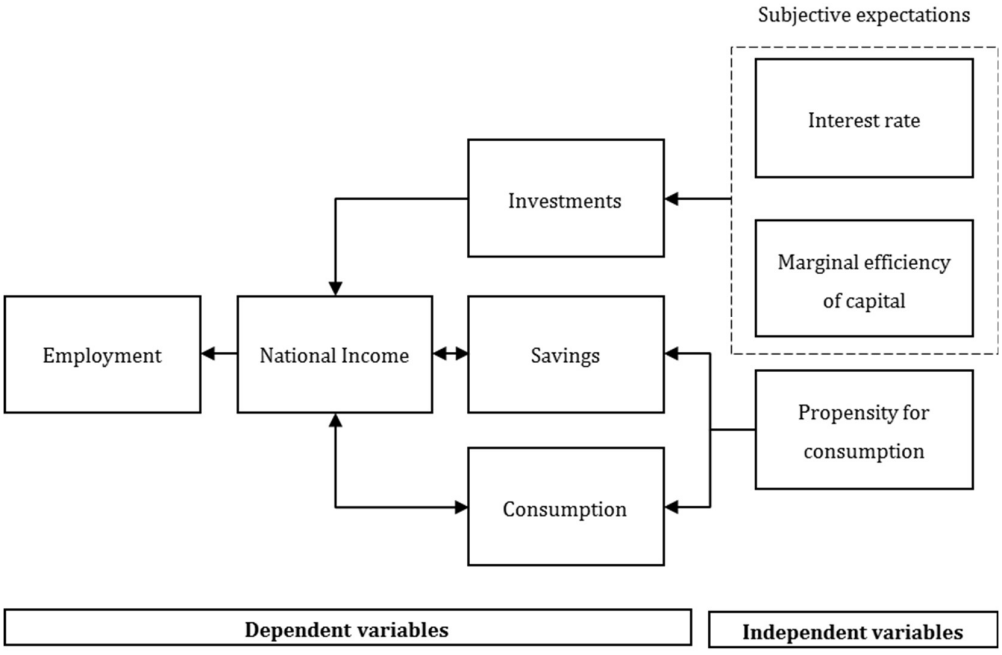


Figure 6 Dependent and independent variables in the Keynes's model. Source: own study, based on (Górski & Sierpiński, 1979) in (Jakimowicz, 2005).

NATIONAL INCOME

The key indicator of economic performance is the national income, which Keynes defined as:

$$Y = A - A_1 + \Gamma - \Gamma' + B' \qquad \text{Equation 1}$$

Y – total national income; A – value of total national production; A_1 – value of all transactions among companies; Γ – value of production assets at the end of examined period; Γ' – hypothetical value of production assets at the end of the period if the society decided to stop using it and spent the amount B' on its maintenance and improvement.

Total national income is set to be the difference between the value of the total national production (A) and total costs resulting from use and development of production assets. Breaking down Equation 1, we arrive at the following dependencies:

$$C = A - A_1 \qquad \text{Equation 2}$$

$$I = \Gamma - \Gamma' + B' \qquad \text{Equation 3}$$

$$Y = C + I \qquad \text{Equation 4}$$

C – total consumption, being equal to the difference between national production and the value of transactions between companies; I – investments, which is the increase in the value of production assets.

CONSUMPTION

Consumption, on the other hand, is defined as a function of the national income:

$$C = a + cY \qquad \text{Equation 5}$$

$a>0,\ 0<c<1$

The equation states that consumption level is a function of a fixed autonomous figure 'a', representing basic needs of individuals, while 'c' stands for a fraction of the income (marginal propensity to consume). Note that:

(1) Keynes excluded parameters such as interest rate and future income. This issue was fixed by other economists, e.g. model of intertemporal choice by

Fisher (1930), life-cycle hypothesis by Modigliani (1950s), permanent income hypothesis by Friedman (1957).

(2) 0<c<1 means only a fraction of additional income is consumed. The difference between these two aggregates is considered as households' savings (Equation 7). However, when consumption is above income, households are forced to dissave, meaning they use their savings to cover for their consumption.

(3) Average propensity to consume decreases amid increased income. The rich save a higher fraction of their income than the poor. This view was challenged for the long-run perspective (Kuznets, 1946).

INVESTMENTS

One of the implications of the above considerations is that the increase of national income is a multiple of the increase of investments, which can be derived from the 1st derivative of Equation 6 with respect to change in investments:

$$\frac{dY}{dI} = \frac{dC}{dY} \cdot \frac{dY}{dI} + 1 = \frac{1}{1 - \frac{dC}{dY}} = \frac{1}{1-c} = \frac{1}{s} = m_i \quad \text{Equation 6}$$

Where m_i – investment multiplier, $c=dC/dY$ – marginal propensity to consume, $s=dS/dY$ – marginal propensity to save. Thus, as illustrated in the Figure 6, subjective expectations regarding expected rate of return (MEC compared to interest rate) determine level of investments. This is attributed to the multiplier drive national income (as always $m_i>1$). Conversely, the higher propensity to save, the lower value of investment multiplier, thus the lower national income.

SAVINGS

Another consequence resulting from the fact stated in point (2) is that savings amount to the difference between national income and the total consumption. The relationship indicated earlier on by Equation 4, is that the equilibrium in the economy can be reached when aggregate demand and supply of goods are equal. Because, according to Keynes, propensity for consumption in a given

society is constant in the short run and depends on the level on of the national income. Thus, at a given level of national income, the equilibrium can occur only if savings equal to investments.

$$S = Y - C \qquad \text{Equation 7}$$

$$S = I \qquad \text{Equation 8}$$

As Equation 8 is inconsistent with Keynes' statement that it is human nature to save rather than to invest, a clarification was provided in the Swedish Theory of Expansion by B. Ohlin in 1935, to which Keynes never opposed (Jakimowicz, 2005). It stated that one must distinguish values of savings and investments *ex post* (those that actually occurred) and *ex ante* (anticipated, planned for the future). If so, then economic equilibrium may occur on if $S^a=S^p=I^p=I^a$, which is not likely to happen as both aggregates are driven by independent variables as shown in Figure 6. It is also considered that entrepreneurs execute their investments according to their plan ($I^p=I^a$), so inequality is caused by the relation of anticipated savings as compared to investments. As a result, an output gap occurs, which can take two forms (Jakimowicz, 2005):

1. Deflationary gap, when $S^a>S^p=I^p=I^a$ – society plans to save more (thus consume less) than entrepreneurs plan to invest. Aggregate demand will be lower than aggregate supply.
2. Inflationary gap, when $S^a<S^p=I^p=I^a$ – society plans to save less (thus consume less) than entrepreneurs plan to invest. Aggregate demand will be higher than aggregate supply.

ECONOMIC FLUCTUATIONS

The above consideration of the Keynes' model leads to explaining economic fluctuations. Economic growth (slowdown) is driven by an increase (decrease) in investment and/or consumption, resulting from an increase (collapse) in the marginal efficiency of capital (MEC) as compared to the interest rate (in line with earlier concepts by Wicksell (1898) and Fisher (1907) – see in: Zarnowitz, 1991). MEC is dependent on individuals' subjective expectations and uncertainty about future returns of their business decisions.

Consequently, changes in marginal efficiency of capital result in investment fluctuations, which, if not offset by a corresponding change in consumption, cause occurrence of a business cycle.

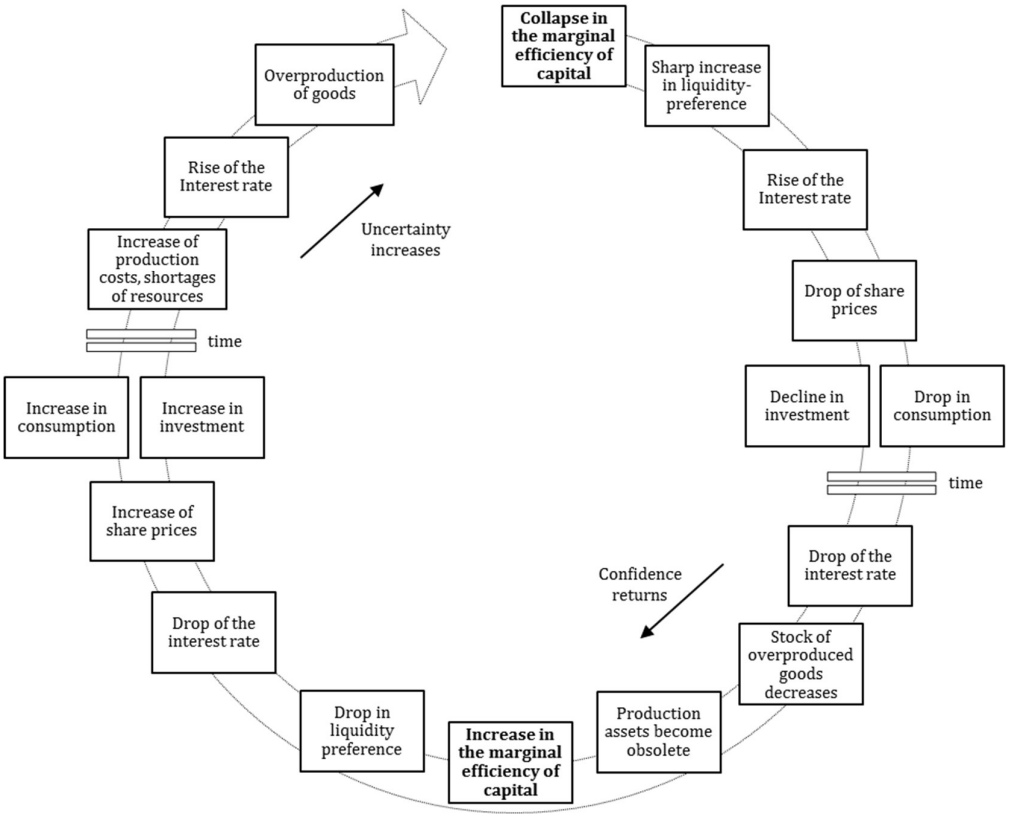


Figure 7 Trade Cycle Model According to J.M. Keynes Source: own study, based on (Keynes, 1936) and (Jakimowicz, 2005).

Trade cycle model according to Keynes is presented in the Figure 7. The whole process of economic slowdown is initiated by entrepreneurs' subjective lack of confidence regarding further economic growth and lower expectations towards future investment returns. Declining MEC causes increase in liquidity preference along with the rise of the interest rates and a slump in the stock market. An inevitable part of the economic performance is the phenomenon of a crisis, which often takes a violent form. At this point two processes take place:

a) Investment declines, especially in those areas where substantial investment were made in the previous boom. This, due to the investment multiplier effect, will decrease national income.

b) Consumption declines as a function of lower income and amid stock market slump, especially, to quote Keynes, in a "stock-minded public (…) in which a rising stock-market may be an almost essential condition of a satisfactory propensity to consume" (Keynes, 1936).

Dejection continues in the society and no practicable reduction in the interest rate will be enough to change it. As the stock of overproduced goods decreases along with obsolescence of production assets, confidence gradually returns. Once that happens, a reverse process starts. Subjective expectations towards MEC increase initiates a recovery phase of the trade cycle.

It is important to note that although J.M. Keynes won worldwide recognition as a one of the founders of modern macroeconomics, it was also a Polish economist M. Kalecki who developed similar concepts, especially those related to business cycles prior to Keynes (Kalecki, 1933). His works, when translated to English many years after being published, substantially contributed to the Keynesian School, often referred to as '(Post) Kaleckian School'. (Sadowski & Szeworski, 2003). Kaleckian model of the business cycle was probably the first endogenous model in history (meaning it is not affected by external factors such as wars and weather condition). He stressed the importance of innovation for establishing a long-term growth trend. For the short-term fluctuations, he developed a demand-based model. Unlike Keynes, his model was already dynamic, took into account income distribution within society, and clearly formulated the concept of ex ante investments (Lityńska, 2016). As Kalceki is associated with the Keynesian concepts, being classified as endogenous, it must also be noted that Kalecki's views also point out some exogenous factors for short-term fluctuations, such as "government intervention in the matter of employment", being a foundation of political business cycle (Kalecki, 1943).

3.2.2.2 Further Development of Keynesian Theories

The concept of the economic system instability found its continuation in other works among representatives of the Keynesian School, who improved the original model. In most cases, however, they were limited to a mechanical treatment of relations between economic aggregates (Zarnowitz, 1991).

SAMUELSON-HICKS

One of the notable advancements of the Keynes' model was the 'multiplier-accelerator model' developed by P. Samuelson (Samuelson, 1939) and improved by J. Hicks (Hicks, 1950), so the model is commonly called Samuelson-Hicks'. The starting point is similar to Keynes' (Equation 9), however, the model distinguished between induced and autonomous investment. There is no strict boundary between those two. Samuelson suggested that all investments made as a result of the past events (increased demand) are inducted, while those aimed at satisfying the increasing demand in the future are autonomous (Samuelson, 1939). Currently, induced investment is associated as those made by business sector, based on the level of income or production. Autonomous investment, on the other hand, is not based on the level income or production, generally made by public sector). The following equations also include subscripts *t*, as it will be important to distinguish parameters' values in different periods of time.

$$Y_t = I_t + C_t \qquad \text{Equation 9}$$

$$I_t = I_t^{ind} + I_t^{aut} \qquad \text{Equation 10}$$

$$C_t = cY_{t-1} \qquad 0 < c \leq 1\ ,\ c = 1 - s \qquad \text{Equation 11}$$

$$I_t^{ind} = \nu(Y_{t-1} - Y_{t-2}) \qquad \nu = const\ ,\ \nu > 0 \qquad \text{Equation 12}$$

$$I_t^{aut} = A_0(1+r)^t \qquad A_0, r = const,\ A_0 > 0 \qquad \text{Equation 13}$$

Y – national income, I – total investments, C – total consumption, I^{ind} – induced investments, I^{aut} – autonomous investments, c - marginal propensity to consume, s – marginal propensity to save, v – acceleration coefficient, A_0 – initial level of autonomous investments, r – the rate of increase in the autonomous investments, t – time.

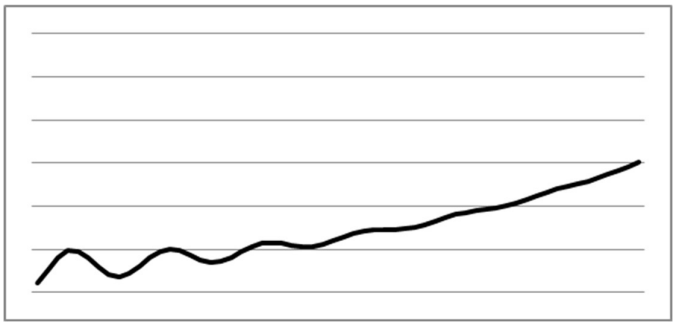
Samuelson-Hicks model is important because it introduced the concept of acceleration coefficient, which was developed in many other models throughout decades to come. Their common feature is that accelerator coefficient is greater than zero, resulting in ascending development trend of the national income. It is also necessary to include some external assumptions into the model to avoid unlimited fluctuations when $v>1$ (see Figure 8, points *c* and *d*), for instance reaching maximum employment of production resources, or nonlinearity of the consumption function when national income increases substantially. On the other hand, some models based on Hansen's concept of so-called 'stable' and 'unstable' (driven by external shocks) economic cycles, state that cycles driven by endogenous factors would attain damping amplitude (weak accelerator effect), if there was no external factors like innovations, wars, etc. (Hansen, 1951).

Combining basic Hicks' equations, results in the following form:

$$Y_t = cY_{t-1} + v(Y_{t-1} - Y_{t-2}) + A_0(1+r)^t \quad \text{Equation 14}$$

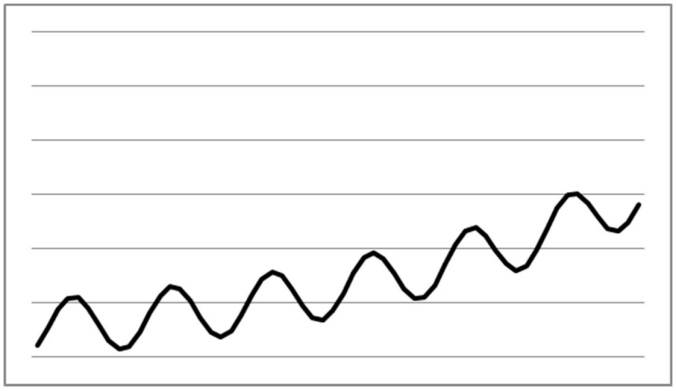
Impact of the investment accelerator on the national income presented in the Figure 8 indicates four possible scenarios. Looking at cases *a* and *b*, it can be stated that oscillations of the national income are either of a damping or constant amplitude when determined solely by the model's constant endogenous variables. H. B Chenery improved this assumption, claiming that the acceleration coefficient cannot be constant, as capital required to match current market demand also changes over time (Chenery, 1952). The boundaries established by this adjustment are similar to the original version proposed by Hicks, however, fluctuations of the national income tend to be smoother.

Growth path is positively correlated with propensity to consume, induced investment accelerator and increasing autonomous investment. Fluctuations are caused by the interactions between multiplier and accelerator, while growth trend is determined by the level and growth rate of autonomous investments (state interventionism being a part of them).



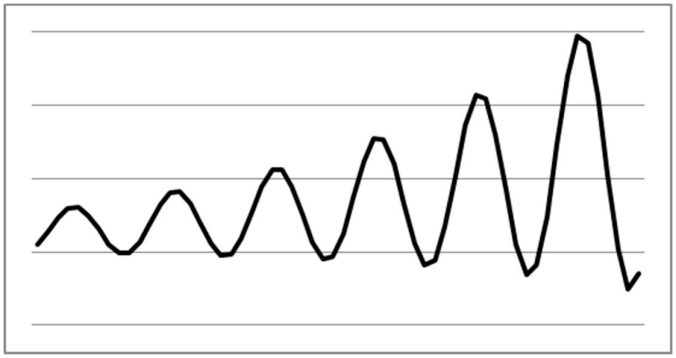
a) 0<v<1

no fluctuations or damping amplitude



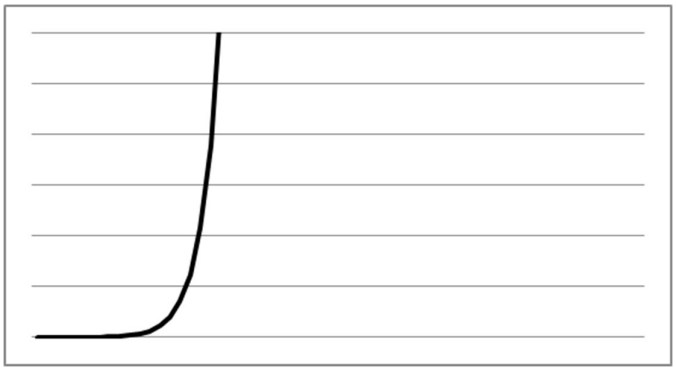
b) ν = 1

oscillations having constant amplitude



c) $1 < v < (1+\sqrt{s})^2$

oscillations having increasing amplitude (thus additional assumptions required)



d) $v \geq (1+\sqrt{s})^2$

rapid growth (thus additional assumptions required)

Figure 8 Impact of Investment Accelerator on National Income According to the Hicks' Model. Source: Own study, based on (Jakimowicz, 2005).

GOODWIN

Simplicity of the linear models presented so far and their limitations were known within Keynesian School soon after their release. Nonlinearity as a substantial limitation was pointed out by R.M. Goodwin already in 1951 (Goodwin, 1951). Goodwin based his considerations on earlier works by Kalecki, Harrod & Domar and Shumpeter. Goodwin's model is said to still be very useful, while its features explaining economic fluctuations are found even in models based on catastrophe theories (Jakimowicz, 2005). He claimed that "the system's equilibrium position is unstable, but there exists a stable limit cycle toward which all motions tend". Goodwin's model is solely endogenous. Fluctuations are self-sustaining and non-sinusoidal, with growth phase longer than decline phase.

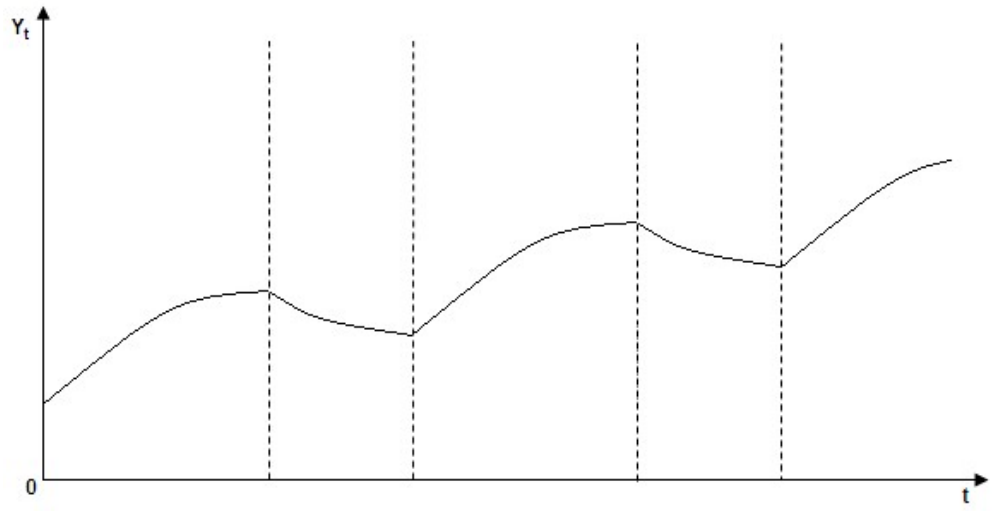


Figure 9 Graphical Representation of the Goodwin's model: Fluctuations of national income. Source: Own study

SMITHIES

An interesting input into endogenous linear models was proposed by Smithies, whose model incorporated consumption function dependent not only on the current national income but also on the highest one in the past (Smithies, 1957). Thanks to this feature, there is a ratchet effect observed, i.e. different impact of the past events in each phase of the cycle which, as in the Goodwin's model, results in less severe depressions (Jakimowicz, 2005).

PHILLIPS

Basic Keynesian models neglected monetary phenomena, which was amended by a model proposed by Phillips (Phillips, 1961) based on a static and inverse relation of unemployment and inflation (Phillips, 1958).

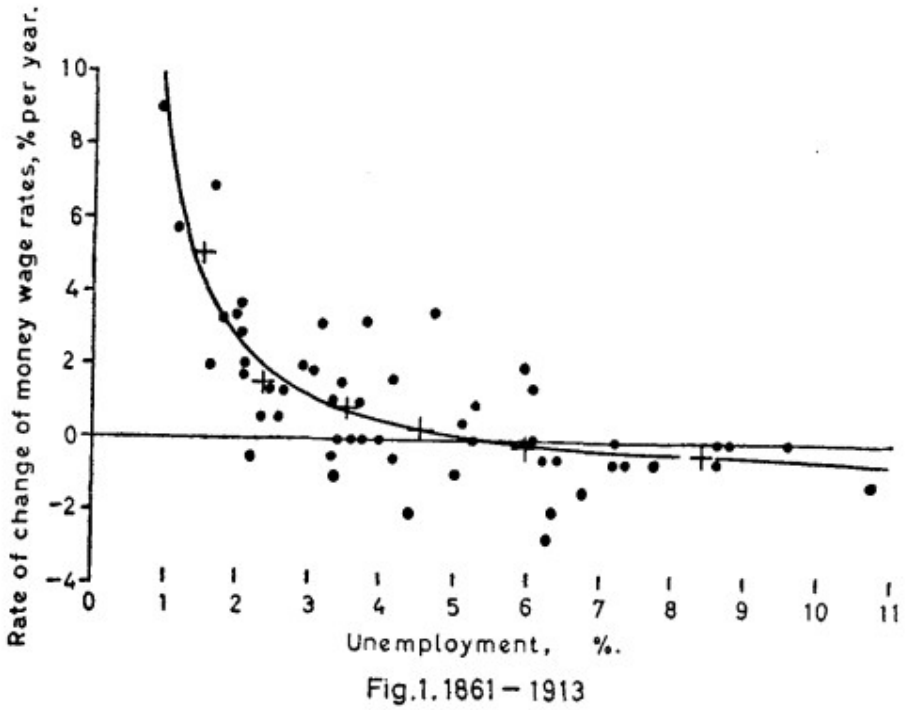


Figure 10 A scatter diagram of the rate of change of wage rates and the percentage unemployment for the years 1861-1913 originally published by (Phillips, 1958).

According to Phillips, high inflation occurs amid low unemployment level and *vice versa*, which could pose a tool for policy makers to reduce unemployment by increasing monetary supply. Such policy led to stagflation. It was eagerly conducted in 1960's and 1970's: High inflation amid high unemployment and market depression. Philips's curve, which is one of the most important and controversial relations in macroeconomics, has been developed immensely by many economic schools. It was a starting point for development of monetarism, but also had a great influence on the new Keynesian economics. With real wage rigidities assumed, there is a positive but only short-term correlation between inflation and the level of demand, which is negative with respect to unemployment. For this, increased inflation cannot lower

unemployment permanently. However, this new standard framework, so-called New Keynesian Phillips curve (NKPC), implies that stabilising inflation stabilises the output gap (Blanchard & Gali, 2005) and that optimal monetary policy incorporates inflation targeting (Clarida i in., 1999).

3.2.3 Monetarist Theory of Business Cycles

The view that money supply drives the business cycle was the key element of the monetarist theory. The theory grew on concepts by T. Gresham and N. Oresme dating back centuries ago, for s

instance the insight that money is a measure of common market value and that money fixed artificially cheaply will tend to drive out the dearer (known as Gresham–Copernicus' law). Copernicus also became the first one to state that prices vary directly with the supply of money, which developed into the 'quantity theory of money' (Rothbard, 1995).

The first explanation of economic fluctuations through monetary factors was presented by D. Ricardo, who claimed that when banks' credit policy exceeds current gold reserves e.g. Bank of England covering the British government's war expenditures), growing inflation affects international trade by making domestic goods more expensive and less attractive to customers, thus resulting in increase in import of goods and decrease in export of goods. This phenomenon causes outflow of gold, thus forces banks to limit their credit policy. Ricardo was aware that this process "would be attended with the most disastrous consequences to the trade and commerce of the country" (Ricardo, 1810). For this he advocated to gradually limit the quantity of paper credit, accepting temporary market imbalance, until the nominal price of gold be lowered to the mint price.

Dynamic development of the quantity theory was initiated in the early XX century. I. Fisher who, apart from substantial influence on quantity theory of money and popularising MV=PT (known as a 'quantity equation', in which money multiplied by its circulation velocity equals prices multiplied by the volume of transactions), investigated relation between business fluctuations and monetary factors. After analysing US fluctuations in 1914-1922, he came

to the conclusion that there was approximately 80% correlation observed between the volume of trade and the rapid change of prices. For this, he gave the article a title and coined the quote that "the business cycle is largely a dance of the dollar" (Fisher, 1923). Also, one of the notable inputs was done by R.G. Hawtrey, who elaborated a dynamic model linking monetary factors to national output (Hawtrey, 1927). In his view, starting from the equilibrium point, when the interest rate drops, market participants are encouraged to take a loan, thus money is created. The process has cumulative effect on the output, as any increase in money supply is accompanied by an increase in velocity of circulation (Hawtrey's view was contrary to Fisher, but in line with the view of his friend J.M. Keynes). Growth is limited, depending on the banking system in the country, either by reaching the limit of the gold reserves, or by monetary/political decisions (Barczyk i in., 2006).

Monetarism today, is mainly associated with M. Friedman who, together with A. Schwartz, analysed historical time series of the US economy to provide further evidence for a relationship between money supply and business fluctuations (Milton Friedman & Schwartz, 1963a). Monetarists, opposed to Keynesians, do not perceive recessions as an unnatural condition of the inherently relatively stable economic system, but rather a natural consequence of the optimal choices of the market participants. For this, M. Friedman strongly advocated that monetary policy determining money supply growth should be kept at a stable level. Similar to Keynes, he believed that wages and prices are rather sticky, so any excessive increase in the money supply causes inflationary condition with increased economic output, while too strict monetary policy would cause the economy to contract. Development of the concept of these exogenous money shocks (i.e. money supply changes) was largely influenced by two events: The Great Depression of the 1930's and stagflation of the 1970's, when FED (Federal Reserve, the US central banking system) inappropriately responded to market conditions, which monetarist theory seemed to explain quite accurately.

The cycle, according to monetarists, starts with an increase of the money supply, which causes an increase aggregated demand, allowing companies to

increase their production volume and sale prices, not noticing increasing production costs and nominal wages at this stage. When the initial euphoric state ends and market participants start to realise the real wages and sales level (i.e. inflation adjusted values), there comes disappointment driving production volume down, increase in unemployment, and eventually economic slowdown (Marczak & Piech, 2008). Friedman was aware, that the relationship between money supply and the national output was not precise, and today's output depends not only on the current money supply but also by its historical level. There is also a difference in the timespan analysed. In the short-run, money supply primarily affects fluctuations in output, while in the long run output is shaped by real factors (entrepreneurship, innovations, productivity, etc.) whereas money supply only determines prices. Consequently, the original Phillips curve does not apply, as "inflation is always and everywhere a monetary phenomenon" (M. Friedman, 1970). The regulations imposed on banking sector)—for instance regulations to increase Common Equity Tier 1 (CET1 - capital held by a bank)—decrease credit supply and contributes to slower economic growth (Pipień i in., 2018).

3.2.4 Austrian Theory of the Business Cycle

Austrian school builds on some elements of classical theory (preference trade-off between consumption and investment) as well as on monetarism (impact of monetary factors on the national output). Being considered a heterodox thought, it explicitly advocates for a low role for government in the economy, which resulted in competition throughout decades with Keynesians (Garrison, 2000). The Austrian thought today is mainly associated with L. von Mises and F.A. Hayek due to their focus on methodological individualism, rather than mathematical modelling in their so-called Mises-Hayek business cycle theory (Hayek, 1933).

The key element of the Austrian business cycle theory is the interest rate being understood as a relation between the present and the future value of money, considering liquidity preference, and risk premium. However, L. von Mises also introduced individual determinants, shaping human actions by "the ratio of the value assigned to want satisfaction in the immediate future and the value

assigned to want satisfaction in remoter periods of the future". This is called 'originary interest' (Von Mises, 1949). If the interest rate determined by the central bank is too low compared to this rate, entrepreneurs (similarly to Hawtrey and Keynes' theories) are encouraged to take loans for their investments, but because the interest rate is artificially low, thus often lower than anticipated rate of return from their investments, capital misallocation and overproduction of goods occur. When the market saturation level is reached, products need to be sold at a lower price level to provide liquidity to entrepreneurs to pay back their loans. If disturbances in the sales process occur, opposite chain reaction starts. Deflation processes are activated, revenues drop, and some market participants go bankrupt. The theory, often called overinvestment theory, refers to the fact that monetary supply through bank loans causes misinformation and consequently disproportions between supply and demand in the market (Barczyk i in., 2006). The inevitable consequence of the artificial 'boom' is the market 'bust'. Austrians point out only one remedy: To wait until capital wasted in the boom phase will have been restored through saving, amid decreased consumption. Any expansionary policy at this stage would only postpone necessary structural adjustment, thus making the recovery desultory (Oppers, 2002). The characteristic of the cycle presented by the Austrians: (1) The longer and sharper the expansion, the more severe recession, and (2) Restricted credit expansion in the contraction phase, resulted in 'hangover theory', as mentioned by some critics (Krugman, 1998).

3.2.5 Financial Instability Theory

Financial instability theory links Keynesian views on generally unstable free market economy with overinvestment theory, stressing the role of the financial markets. They are internal components of generating business cycle (H. Minsky, 1974). The theory, developed by H. P. Minsky, also roots back to I. Fisher's 'debt-deflation theory of great depressions', in which explanation of business cycle slow-down was largely related to (1) High debt ratio of market participants, and (2) The deflationary processes following high debt ratio period (Fisher, 1933).

Minsky analyses the economy from a company's balance sheet point of view and points out that aggregated capital structure, i.e. the debt/equity ratio, of companies plays a vital role in the economy (which is contradictory to the Modigliani–Miller theorem stating that that the capital structure of a company, under several conditions, does not have any impact on its value (Modigliani & Miller, 1958)). As Minsky explains, economic prosperity encourages companies move from equity financing to taking up excessive debt financing for speculative investments, or even apply Ponzi's methods (H. P. Minsky, 1992). This also involves banks and intermediaries (brokers, advisors) as a profit-seeking business. Excessive liability financing decreases capital safety margins both of borrowers, but also puts more risk on lenders. This makes the whole system fragile, even to seemingly immaterial factors. As the economic growth approaches full employment (as in Keynes' model), further expansion is limited by insufficient demand, which is already satisfied by supply generated thanks to earlier investments. At this point, revenues are insufficient to cover all costs and pay off debt. Those market participants with a highly geared capital structure, will face financial distress and eventually go bankrupt. This is called 'Minsky moment', a financial crisis being inbuilt in the upper boundary of the economic cycle, a natural consequence of a rapid economic expansion.

The financial instability theory also has its international dimension (Barczyk i in., 2006). Liberal rules on international flow of capital foster economic growth of a country in its growth phase (e.g., carry trade phenomenon in emerging markets), which makes the growth more rapid or even 'euphoric'. This increases frailness of the system over time and as soon as the first fracture is observed, foreign capital is being withdrawn, causing a more severe market collapse. The link between economics often has a negative connotations as it may transfer crises from one country to another (see 'contagion effect' in (Rigobon, 2002). On the other hand, it can also foster Mundell's optimum currency areas, which tend to work better if its participants' business cycles are synchronised (Bruzda, 2011), (Grodzicki & Beck, 2014).

Minsky's theory also explains fluctuations in a certain branch of the economy. For instance, mild monetary policy causes increase of real estate prices. High real estate price level improves balance sheets of companies, and financial condition of individuals, which together with low interest rates, allows them to contract even more debt. On one hand, individuals use this opportunity to speculate, putting their real estate properties as a collateral. On the other hand, banks and intermediaries underestimate the risk of lending money to indebted individuals. Any attempt to fight against price increase in the sector by increasing interest rates may result in piercing the speculative bubble. Real estate prices drop, individuals cannot pay back their liabilities and banks are left with toxic financial assets. This affects other sectors in the economy. Economic slowdown starts (Nawrot, 2009). According to the 'financial accelerator' model, the negative effect is amplified by the size of development of the financial sector in the economy (Bernanke i in., 1999).

Minsky's theory, although not considered as particularly influential in the mainstream economics, was used by e.g. Ch. P. Kindleberger in his hegemonic stability theory, and definitely gained some popularity in the 2007-2009 global financial crisis.

3.2.6 Business Cycle According to the New Classical Macroeconomics

LUCAS

Just as in case of monetarism, the new classical macroeconomics largely grew on inability of Keynesian theories to explain stagflation of the 1970's. Business cycle theories emerging from it do not constitute a homogenous framework but rather a set of various concepts with several key assumptions (Barczyk & Kowalczyk, 1993):

1) Rational expectations of market agents, since "they are informed predictions of future events, are essentially the same as the predictions of the relevant economic theory" (Muth, 1961).
2) Due to perfectly elastic prices, market is naturally at equilibrium and in a permanent self-clearing process. National output depends on the

'Lucas aggregate supply function' determined by the difference between past expectations regarding prices and actual prices (Lucas Jr, 1972).

The concept of money or price "surprise" is the key element of the 'Lucas equilibrium model of the business cycle' (Lucas Jr, 1975). With money supply being essentially neutral, and market agents being aware of cyclical nature of the economy, thus adjusting their decisions to rational expectations, any fluctuations in the economy are driven only by:

(1) Unexpected monetary/fiscal shocks (or other external random factors), and/or

(2) Imperfect information or delay in information propagation, as the economic system resembles islands (distinct markets) between which trade is carried.

Pro-cyclical movements in prices (and wages), share of output devoted to investment, and (in a limited sense) nominal interest rate are associated with output fluctuations. Lucas did not relate output fluctuations to movements in the availability of production factors.

REAL BUSINESS CYCLE

In the 1980's, the dominant belief was that the economy can no longer go through such perturbations as in 1930's due to institutional development (e.g. US Federal Deposit Insurance Corporation founded as a result of the Great Depression), also market crash on Black Monday 1987 did not affect the real economy as FED (Federal Reserve, the US central banking system) developed responses providing liquidity to the markets in such events (Christiano i in., 1999). This led to growing popularity of the 'real business cycle theory (RBC)' (Kydland & Prescott, 1982). RBC theories assume that the only source of impulses to modern business cycles are exogenous shocks to technology. Today, the RBC theory is built-in into the DSGE models (D – dynamic, taking time as a parameter, S – stochastic, including random shocks, GE – assuming Walrasian general equilibrium), which rely on real and nominal frictions to transmit unanticipated shocks to the economy, driving movements in output,

consumption, investment, hours worked, and employment, amid flexible prices. Modern DSGE models also account for systematic changes in monetary policy, which makes them employed by central banks around the world (Plosser, 2012). Of course, the concept of exogenous factors affecting economic output is not new, as it is rooted not only in classical concepts dating back to A. Smith (market equilibrium) and the supply-side economics (Say's law – supply drives demand), but also in so called 'Schumpeter's gale' (or 'creative destruction', derived from the work of Karl Marx). Supply can be affected by real shocks, such as unfavourable weather condition for agricultural production, a hurricane, wars, unexpected policy changes, etc. It can also be caused by innovation shocks when "process of industrial mutation that continuously revolutionizes the economic structure from within, incessantly destroying the old one, creating a new one" (Schumpeter, 1942). J. Schumpeter (1939) popularised the concept of a hypothesized 50-60 year long waves in the economy driven by major technology advancements discovered by N. Kondratiev (1925).

In summary, the new classical macroeconomics sees economic fluctuations as a result of (1) Unexpected monetary/fiscal/political shocks and imperfect information or delay in information propagation, based on which market participants rationally alter their level of consumption and labour supply; (2) Technology shocks to the supply side of the economy, which then trigger adjustment on the demand and labour side.

4 ECONOMIC FREEDOM

4.1 Defining Economic Freedom

Similar to economic fluctuations discussed in the Chapter 3.2, economic freedom is a subject of non-homogenous paradigm in economics both at the 'school level' and the 'specific problem level'. Their views in the context of business fluctuation will be discussed in the Chapter 4.2. Firstly, economic freedom shall be defined.

In an overly broad sense, economic freedom at its maximum level is the main characteristic of market economy. It also constitutes an important part of political and moral philosophies (such as liberalism, from Latin *liber* "free"), which generally, among other postulates, support free markets, free trade, limited government, unbounded personal freedom. In the contemporary research related to economic freedom, authors (Alimi, 2016a; Berggren, 2003; De Haan & Sturm, 2000; Lipford, 2007) often refer to definitions, which indicate several aspects of economic freedom, such as voluntary exchange based on personal choice of market participants, freedom to enter and compete in markets, predictable rule of law and protection of personal and property rights and limited role of government. The authors often directly link defining economic freedom to the statement from one of the first annual reports, which measure economic freedom across the globe: "Individuals have economic freedom when property they acquire without the use of force, fraud, or theft is protected from physical invasions by others and they are free to use, exchange, or give their property as long as their actions do not violate the identical rights of others" (Gwartney i in., 1996).

Degree of economic freedom plays a key role in the economy as it determines quality of institutions, meaning constrains, both formal rules (constitutions, laws, property rights) and informal ones (sanctions, taboos, customs, traditions, and codes of conduct). "Together with the standard constraints of

economics, they define the choice set and therefore determine transaction and production costs and hence the profitability and feasibility of engaging in economic activity." (North, 1991). Hence, institutions might be understood as the 'rules of the game', according to which market participants interact. Their role is to create order and reduce uncertainty in exchange. A systematic overview of definitions was performed by J. Godłów-Legiędź (Godłów-Legiędź, 2010). The importance of institutions is stressed by the so-called New Institutional Economics (NEI), an economic perspective which has been gaining popularity, not only due to investigating role of institutions in the economy, but proposing a shift from formalised orthodox economics towards classical approach taking into consideration social aspects of the economy. NEI brought attention to the aspect of transaction costs, understood as use of resources to conclude transactions, and the role of government in shaping and improving law for minimising transaction costs. It was highlighted that economic growth depends not only on technological advancement itself, but on society's ability to put them into use (Coase, 1990).

There is a rich evidence supporting importance of the quality of institutions for economic performance. Institutional instability largely determines political, financial and macroeconomic problems, which had been the main focus of the numerous mainstream economic research, e.g.

1) Why efforts to defend fixed exchange rates often lead to crises (Krugman, 1979),
2) Why there is little effect of real wage flexibility on volatility (as per Keynesian school), but financial variables (role of banks and securities markets) as well as market openness were found to be significant determinants of volatility (Easterly i in., 2001).

Studies linking volatility to long-run institutional causes were presented by Rodrik, who showed that participatory democracies enable higher-quality growth than non-democratic regimes (Rodrik, 2000), handle shocks much better, their economic performance is much more predictable, and they pay higher wages (Rodrik, 1997). D. Acemoglu et al. explained post WWII cross-country differences in volatility, crises absorption and growth performance,

by stating that institutionally-weak societies face higher volatility and lower growth (Acemoglu i in., 2003). The main reasons which might justify these statements are:

1) Political factors: Firstly, groups that happen to gain political power attempt to redistribute benefits to themselves, which might lead to economic turbulence through wealth relocation. Secondly, amid lack of control over political power, there are greater gains of coming to power. Thus, a fight over coming to power might be more violent, resulting in the country's instability. Thirdly, politicians can be easily pushed to implement various regulations to satisfy different pressure groups, which also disturbs the market.
2) Business cooperation: Weak institutions cooperation is supported by repeated games strategies (trust), which is vulnerable to unexpected shocks. This may lead to terminating cooperation and consequently output collapse.
3) Capital markets: Countries with weak financial institutions experience more severe crises, as entrepreneurs may choose sectors/activities from which they can withdraw their capital more quickly.

Given the above, the following definition of economic freedom is adopted for the purposes of this dissertation:

Economic freedom is a non-homogenous measure of market economy, both quantitative and qualitative, in several areas:

1) Efficiency of legal system – providing high quality of regulatory institutions and law stability.
2) Freedom of monetary institutions – stability of prices and domestic currency.
3) Business freedom – ease of doing business amid transparent and stable regulations, low level of transaction costs, low taxes imposed on the society.
4) Limited government size and its integrity – the degree to which government intervenes in economic activity by its policies or state-

owned organisations. Also, how the government obeys its budget constraints and fights corruption.

5) Market openness – ease of investment in new ventures and free cross-border flow of capital, goods, services and people.

4.2 Impact of the Economic Freedom on Economic Performance in the Light of Main Doctrines

Based on the main economic doctrines presented in the Chapter 3.2, we might conclude that each of them has its own paradigm of business cycle and its relationship with economic freedom. A synthesis of their views is outlined in the Table 3.

	Keynesian School	Monetarism	Austrian School	Financial Instability Theory	New Classical Macroeconomics
Efficient Legal System	negative	negative	negative	negative	negative
Limited Government	positive	negative	negative	n/a	negative
High Business Freedom	positive	negative	negative	positive	negative
High Monetary Freedom	positive	negative	negative	n/a	negative
High Market Openness	positive	negative	negative	positive	negative

Table 3 Impact of Components of Economic Freedom on Business Cycle Volatility in The Light of The Main Economic Doctrines. Source: Own study.

Out of five schools of economic thought, all agree that efficient legal system (high quality of institutions) is not only crucial to economic growth, but also to low business cycle fluctuations. However, when it comes to other areas of economic freedom, each doctrine focuses on different aspects. Keynesians

would focus on the necessity of stimulating aggregate demand and investment to keep marginal efficiency of capital higher than the interest rate. According to Keynesians, the economy is unable to stabilise itself, thus "the duty of ordering the current volume of investment cannot safely be left in private hands" (Keynes, 1936). Tools which can be used include adjusting (usually lowering) interest rate, redistribution of income, autonomous investment, etc. This implies, that the Keynesian School advocates for a positive relationship between economic freedom and the business cycle volatility. This is contradictory (in majority of cases) to paradigms presented by other doctrines. For instance, representatives of monetarism stress not only stable monetary supply as a determinant of a stable economic output, but also advocate for a high business freedom, market openness and limited role of government (Milton Friedman & Friedman, 1990). In the context of economic fluctuations, monetarism seems to suggest that economic freedom is negatively related to economic fluctuations. Similarly, however being focused on methodological individualism, the Austrian School explicitly advocates for a low role of government in the economy and a high level of liberty in economic activities (Hayek, 1944). A different view is presented by the financial instability theory, which combines Keynesians' views of unstable free market economy with the Austrian overinvestment theory: Rapid business growth, expansion of financial sector and liberal rules on international flow of capital foster economic instability. These imply positive relationship (the theory does not focus on the areas of monetary freedom and limited government). Lastly, the views of the new classical macroeconomics root back to A. Smith's market equilibrium and claim output fluctuations to be the result of either unexpected monetary/fiscal/political shocks or technology shocks. For this, the implied relation between business cycle volatility and the degree of economic freedom is negative.

4.3 Knowledge Gap

There is abundant amount of evedience suggesting that economic freedom plays a vital role in explaining cross-country differences in economic growth.

The problem has been the area of focus of most economic doctrines as well as empirical research (see Table 4).

Studies	Dependent Variable	Independent Variable	Effect
Dawson 1998, forthcoming; Gwartney, Lawson, and Holcombe 1999; de Haan and Sturm 2000, 2001; Adkins, Moomaw, and Savvides 2002; Pitlik 2002; Weede and Kampf 2002	Growth	Change in the EFI	Significant, positive
Gwartney, Lawson, and Holcombe 1999; de Haan and Sturm 2000, 2001; Heckelman and Stroup 2000; Adkins, Moomaw, and Savvides 2002	Growth	Level of the EFI	Not significant
Ali 1997; Easton and Walker 1997; Goldsmith 1997; Dawson 1998, forthcoming;1 Wu and Davis 1999; Hanson 2000; Ali and Crain 2001, 2002; Carlsson and Lundstrom 2002; Pitlik 2002; Scully 2002; Weede and Kampf 2002	Growth	Level of the EFI	Significant, positive
Hanke and Walters 1997; Leschke 2000	GDP/ cap	Level of the EFI	Significant, positive
Heckelman and Stroup 2000	Growth	Level of a version of the EFI with different weights	Significant, positive
De Vannsay and Spindler 1994	Growth	Level of the Scully-Slottje economic freedom index	Significant, positive
de Haan and Siermann 1996, 1998	Growth	Level of the Scully-Slottje economic freedom index	Significant, positive

Table 4 The Effect of Economic Freedom on Growth and GDP/Capita. Source: (Berggren, 2003).

Most studies seem to indicate significant and positive relationship between them, meaning that the greater level of economic freedom, the higher ecomomic growth. Taking into consideration the relationship between economic growth and volatility (see Economic Growth and Business Cycles, page 31), which although not fully explained seems to be negative, it might be expected that economic freedom is also negatively related to business cycle volatility. There is, however, very limited evidence supporting this statement:

- Empirical research in this area is extremaly scarce (see synthesis in the Table 5). The first attempts to investigate the relationship between economic freedom and economic volatility were made only recently, while their number, to the author's best knowledge, is limitted to four publications.
- Due to the fact that economic freedom has been monitored (i.e. measured across the globe) only since mid 1990's, the time span covered does not exceed 30 years.
- The analysis by Lipford (Lipford, 2007), Dawson (Dawson, 2010), Campbell & Snyder (Campbell & Snyder, 2012) apply the same methodology (ordinary least squares method) and similar data set. Lipford's, whose paper seems to be the first emprirical research on the phenomenon, did not break down economic freedom into its areas, which results in limitative conclusions.
- Athough there is no reason to doubt the impartiality of the authors, a possible suspicion is that some of them might opt for higher degree of economic freedom in the world (e.g. Dawson's paper was published in Economic Freedom of the World 2010 Annual Report).
- Only Alimi's works applies a specific mathematical tool to decompose GDP time series to extract its cyclical component (Hodrick-Prescott filter) and different methodology than the previous works (Alimi used generalized method of moments). He also used EFI index instead of EFW, but did not break it down into its components and focused on developing countries only.

No.	1	2	3	4
Author	Lipford	Dawson	Campbell & Snyder	Alimi
Year	2007	2010	2012	2016
Time Span	1970-2000	1980-2007	1990-2005	1995-2012
Number of Countries	49	85	109	109 developing countries
Variables	- St. dev. of real GDP per capita - EFW index chain-weighted	- St. dev. of real GDP per capita - EFW index; average level, relative change, volatility (st.dev.); breakdown of EFW into 5 areas	- St. dev. of real GDP per capita - EFW index relative change; breakdown of EFW into 5 areas	- St. dev. of real GDP cyclical component (Hodrick-Prescott filter) - EFI index average level (ex of areas potentially correlated with other variables in the model)
Methodology	Ordinary least squares method (OLS)	- Ordinary least squares method (OLS) - Instrumental variables estimation (IV)	Ordinary least squares method (OLS)	Generalized method of moments (GMM)
Results	Economic freedom decreases fluctuations	- Statistically significant negative relationship for all areas of economic freedom, except of 'limited government' - Change in economic freedom and its volatility - insignificantly related to economic volatility	- Statistically significant negative relationship for all areas of economic freedom, except of 'limited government' - Nonlinear effect, meaning improvement in volatility diminishes as freedom increases	- Economic freedom fosters stability in high-income developing countries. For other income levels relationship insignificant. - Changes in Exchange Rate regime cause volatility in lower middle income level group and high-income level group of developing countries. - Financial openness weakens business cycle volatility in low income developing countries - Trade openness increases volatility in developing countries.

Table 5 Empirical Cross-Country Studies of the Relationship Between Economic Freedom and Economic Volatility. Source: Own study.

Despite some limitations listed above, all authors suggest that economic freedom might be negatively correlated with economic fluctuations. However, this might differ when considering different areas of economic freedom (Dawson, Campbell & Snyder).

4.4 Chapter summary

Based on the literature review—taking into consideration the fact that most of the main economic doctrines and empirical evidence suggest negative relationship between economic freedom and business cycle fluctuations—we might conclude that the main hypothesis of the research is accurate:

Hypothesis A: There is a negative relationship between the degree of economic freedom and the volatility of the business cycle fluctuations.

Given that the term 'economic freedom' is a non-homogenous measure of market economy, it can be measured across several areas and supplementary hypotheses might be formulated:

Hypothesis B: There is a negative relationship between the degree of Legal System Efficiency and the volatility of the business cycle fluctuations.

Hypothesis C: There is a negative relationship between the degree of Government Size and the volatility of the business cycle fluctuations.

Hypothesis D: There is a negative relationship between the degree of Business Freedom and the volatility of the business cycle fluctuations.

Hypothesis E: There is a negative relationship between the degree of Monetary Freedom and the volatility of the business cycle fluctuations.

Hypothesis F: There is a negative relationship between the degree of Market Openness and the volatility of the business cycle fluctuations.

The following chapter outlines methodology that is employed to test the above hypotheses.

5 METHODOLOGY

In this chapter, the methodology for the research is outlined. Firstly, the research strategy is explained, including selection of proper research paradigm, research orientation and research method. This is to ensure that the analysis follows a logical sequence from data collection to final results.

Secondly, research variables are presented, which include overall economic freedom and its components, as well as business cycle volatility. For the latter, a detailed explanation of extracting cyclical component of fluctuations from the time series is presented.

Thirdly, the final scope of the research is presented, followed by econometric model used to determine relationship between business cycle volatility and economic freedom.

5.1 Research Strategy

Key definitions related to economic cycles and their morphology were already introduced in Chapter 2, while economic freedom was defined in Chapter 4.1. This chapter aims at presenting methodological choices for empirical analysis of the relation between economic freedom and business cycle fluctuations. To conduct the analysis, it is required to firstly design it so that it follows logical sequence, linking data collection with conclusions the study shall finally provide (Yin, 2011). For this, in order to formulate research strategy, it is necessary to select: Research paradigm, research orientation, applied reasoning, method, and data collection techniques.

RESEARCH PARADIGM

Research paradigm chosen for this dissertation is *positivism*—following criteria proposed by (Guba & Lincoln, 1994) and (Healy & Perry, 2000). Positivism quantitatively measures independent facts about a single

apprehensible reality. It also implies that the data and its analysis are value-free, and data does not change because they are being observed.

	Paradigm			
Element	Positivism	Critical theory	Constructivism	Realism
Ontology	reality is real and apprehensible	"virtual" reality shaped by social, economic, ethnic, political, cultural, and gender values, crystallised over time	multiple local and specific "constructed" realities	reality is "real" but only imperfectly and probabilistically apprehensible.
Epistemology	objectivist: findings true	subjectivist: value mediated findings	subjectivist: created findings	modified objectivist: findings probably true
Common methodologies	experiments/ surveys: verification of hypotheses: chiefly quantitative methods	dialogic/dialectical: researcher is a "transformative intellectual" who changes the social world within which participants live	hermeneutical / dialectical: researcher is a "passionate participant" within the world being investigated.	case studies/convergent interviewing: triangulation, interpretation of research issues by qualitative and by some quantitative methods such as structural equation modelling
Note: Essentially, ontology is "reality", epistemology is the relationship between that reality and the researcher, and methodology is the technique used by the researcher to investigate that reality.				

Table 6 Categories of Scientific Paradigms and Their Elements. Source: (Healy & Perry, 2000).

RESEARCH ORIENTATION

The term '*orientation'* originates from Latin word 'oriens' meaning 'sunrise' or 'east', being related to pointing directions of the world. The term is widely used across many disciplines, e.g., biology to determine vector of motion of organisms or their sexual orientation. Methodological orientation in the field of scientific research is narrowed to "the concept of orientation is presented as an instrument for research identification and self-identification, especially when it is employed to designate subjective and collective inclinations towards specific research strategies or approaches, e.g. qualitative, quantitative, or mixed" (Pasikowski, 2019). In other words, methodological orientation may be understood as a set of general ontological and epistemological assumptions.

Quantitative research in a 'traditional' terms includes true experiments, quasi-experiments, correlational/passive observations, and ex post facto/causal comparatives (Cook and Campbell (1979), Gall et al. (2003), and Krathwohl (1998) in (Hutchinson & Lovell, 2004). Its characteristic feature lies in its numerical nature. A systematic investigation of quantifiable data is conducted using mathematical techniques. Quantitative research can also be primary (where a researcher collects data directly from the studied environment, e.g., conducts a survey) or secondary (data is collected from existing data sources like the internet, government resources, libraries, research reports, etc.).

Given the nature of this research, secondary quantitative approach seems to be an appropriate methodological orientation.

APPLIED REASONING

Philosophical notions on reasoning introduced by Charles Sanders Peirce outlay a logical system of reasoning applied in scientific research. The system consists of three types of reasoning: Deduction, induction, and abduction. "Deduction proves that something must be; Induction shows that something is actually operative; Abduction merely suggests that something may be" (Peirce, 1903). More specifically, we might characterize reasoning types in as in the Table 7.

Reasoning Type	Main Characteristics	Limitations
Abduction	- contributes to conceptual understanding of an existing phenomena - generates new ideas or hypotheses	- is a type of critical thinking rather than symbolic logic - might exclude other hypotheses after having found most probable one
Deduction	- contributes to qualitative or conceptual understanding of phenomena - draws logical consequence from premises - refines and evaluates the hypotheses	- logical consequences are true only if premises are true
Induction	- adds quantitative details to the qualitative or conceptual knowledge - justifies of the hypothesis with empirical data	- is undefinable in a single case - generates empirical laws but not theoretical laws, as predictions are made only under certain specified conditions

Table 7 Reasoning Types in Scientific Research. Source: own study, based on (Yu, 1994).

Clearly, all reasoning types have their specific purposes but, at the same time, substantial limitations. For the purpose of this research, abduction is necessary to formulate hypotheses based on the current knowledge. Deduction, following Pierce, is a necessary condition, but a sufficient one, to create new knowledge. Finally, induction is necessary to justify hypotheses and formulate empirical laws. It seems that the Peircean logical system implies that all three reasoning types must work together, thus for the purpose of this dissertation no one dominating reasoning is selected.

METHOD DATA COLLECTION TECHNIQUES

Having chosen secondary quantitative approach for this study, a detailed description of procedures applied is presented in subsequent chapters. Firstly, there is a need to use mathematical tools to extract cyclical component of economic aggregates to measure business cycle volatility. Secondly, it is necessary to provide a proxy to measure economic freedom. Thirdly, it is also

necessary to employ statistical tools to verify the relationship between business cycle volatility and the level of economic freedom.

The following chapters also provide detailed overview of data collection techniques. The main criterium is to use a reliable online database, providing data for both economic aggregates, as well as for economic freedom.

To sum up, the strategy for the empirical part of this thesis, apply positivism as a research paradigm, secondary quantitative approach as a research orientation, use three types of reasoning, use mathematical filters and statistical tools as preliminary research method, and finally employ reliable online data bases as the source of input data.

5.2 Research variables

5.2.1 Measuring Economic Freedom

5.2.1.1 Choosing the Economic Freedom Indicator

Although it is not the focus of this dissertation, it must be clearly stated that 'economic freedom' does not mean 'political freedom' nor 'civil freedom'. By political freedom, we understand unimpeded participation of the society in political process, competition for political power, and free and fair elections. Coding authority characteristics to measure democracy level across countries is conducted by e.g. The Polity Project (www.systemicpeace.org/polityproject) or the V-Dem Project (www.v-dem.net). Civil freedom, on the other hand, implies protection of human rights, freedom of assembly, religion and speech (Berggren, 2003). Of course, all three are related and it might be justified to suspect high correlation between them, however one could also imagine a state with liberal economic regulations having, but low political and/or civil freedom, or vice versa. An annual global report on political rights and civil liberties is published by The Freedom House (www.freedomhouse.org). There is also another popular index dedicated entirely to intellectual and physical property rights: The International Property Rights Index (IPRI) (www.internationalpropertyrightsindex.org). Since it does not measure other aspects of economic freedom, while property

rights are included also in EFW and EFI indices, IPRI will not be used in this research.

There are two large scale reports which aim at measuring the degree of economic freedom in the world's nations:

- Economic Freedom of the World (EFW) – ranking created by The Fraser Institute (www.fraserinstitute.org)
- Index of Economic Freedom (EFI) – ranking created by The Heritage Foundation and The Wall Street Journal (www.heritage.org)

Table 8 presents summary of main characteristics of both indices. Both are published annually since mid-1990's by non-governmental organisations, which openly advocate for market openness, limited role of government, and consistent institutional environment. EFW report published since 1996 (Gwartney, Lawson, and Block, 1996) was one of the first reports measuring economic freedom and was a result of cooperation of notable economists such as Milton and Rose Friedman, Douglass North, Gary Becker, William Niskanen, and Gordon Tullock.

Their approach towards measuring economic freedom is similar. They breakdown the concept of economic freedom into its components (as outlined in the Chapter 4.1) to measure their individual performance. For each category, multiple international and local data sources are used (e.g., International Monetary Fund, World Bank, World Economic Forum, Global Competitiveness Report, United Nations National Accounts, European Bank for Reconstruction and Development and official government publications of each country, etc.). Based on the data gathered, a subindex is formed for each category. Its average is reported as a country's overall economic freedom score.

Index	Economic Freedom of the World (EFW)	Index of Economic Freedom (IEF)
Publisher	The Fraser Institute	The Heritage Foundation and The Wall Street Journal
Periodicity	Annual	Annual
Time span covered with annual data	Since the year 2000	Since the year 1995
Number of countries monitored (as of the latest edition)	162	186
Scale	0-10	0-100
Areas monitored	5 major areas (broken down to 26 components): - Size of Government - Legal System and Security of Property Rights - Sound Money - Freedom to Trade Internationally - Regulation	4 major areas (broken down to 12 components): - Rule of Law (property rights, government integrity, judicial effectiveness) - Government Size (government spending, tax burden, fiscal health) - Regulatory Efficiency (business freedom, labour freedom, monetary freedom) - Open Markets (trade freedom, investment freedom, financial freedom)
Data lag time	As of 2020-12-31 edition for the year 2018 is the latest.	Edition for the year 2020 is based on data for 2018 and 2019-H1, while some factors take 3-year weighted average data.

Table 8 Comparison of Indices Measuring Economic Freedom. Source: own study based on methodology provided by the publishers (www.fraserinstitute.org/economic-freedom/approach, www.heritage.org/index/pdf/2020/book/methodology.pdf).

An important factor for this dissertation is the areas that are covered by each index. Although each publisher breaks down economic freedom into different subindices (EFW into 5 major categories of 26 components, while IEF into 4

majors of 12 components), the area they cover largely overlaps. As a result, final indices indicate similar level of economic freedom for corresponding countries. Table 9 shows correlation between main indices of EFW and IEF. For 160 countries monitored by both of them in the 5 years checked, correlation was high and varied from 0.82 to 0.89, with the average value of 0.85. Due to the lag time in availability of data based on which indices are constructed, as well as different approach towards naming of the reports, for each year, the following report editions were used: year X, EFW edition for the year X, IEF edition for the year X+2.

Year Monitored	2000	2005	2010	2015	2018
EFW report edition	2000	2005	2010	2015	2018
IEF report edition	2002	2007	2012	2017	2020
Correlation between EFW and IEF	0.82	0.89	0.86	0.84	0.87

Table 9 Pearson Linear Correlation Coefficient Between EFW and IEF. Source: Own study.

It might be concluded that both EFW and IEF provide similar outcomes. The latter provides annual data for a longer timespan, monitors more countries, and provides cleared division of economic freedom into its underlying areas. It is chosen to be employed in the further analysis.

5.2.1.2 Index of Economic Freedom

The Index of Economic Freedom (IEF) has been published annually by The Heritage Foundation and The Wall Street Journal since the year 1995. Each year, it ranks countries according to their degree of economic freedom graded on a scale 0-100. The latest report (edition 2000) provided data for 186 countries. To avoid further confusion, it must be noted that the 2020 edition is based on data for 2018 and 2019-H1, while some factors take 3-year weighted average data. Thus, to appraise economic freedom in a given country in a year X, one should look at IEF index for the year X+2. (see more: www.heritage.org/index/about).

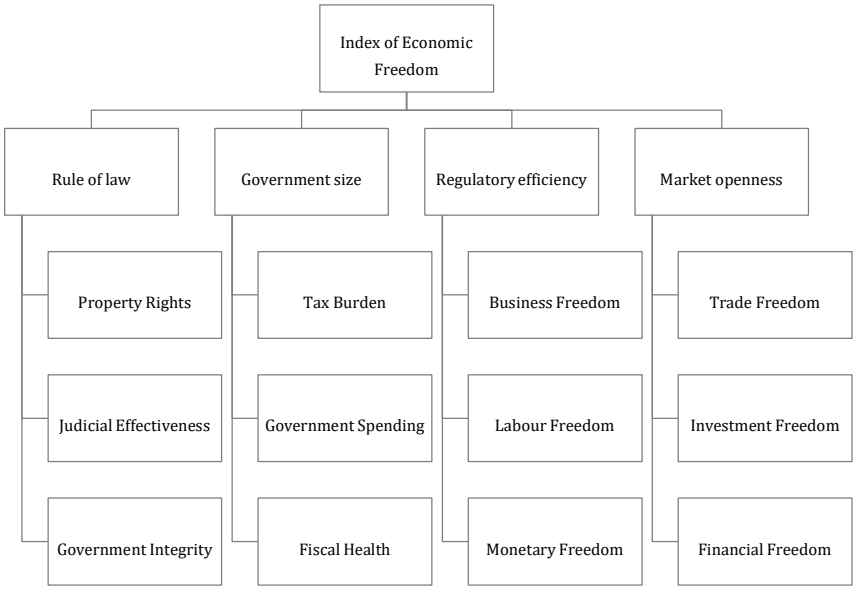


Figure 11 Components of Economic Freedom of The Economic Freedom Index. Source: Own study.

IEF breaks down the concept of economic freedom into 4 major areas consisting of 12 components (overlapping with the definition presented in the Chapter 4.1). Scores on each of those are based on numerous sub-variables provided by international agencies as well as local official governmental statistics. What is important for the overall IEF score, is that scores on each component are equally weighted and averaged. It might raise the question of whether it is correct to treat each component as equally important. One might point out that high score in one area is a necessary condition for improvement of another, or that reaching a minimal level in one of them is a sufficient condition enabling others to improve. Explaining such dependencies are, however, beyond the scope of the IEF report as well as of this dissertation. In this research, it seems to be justified to acknowledge that the components are weighted equally and that the overall score is not biased towards neither of its components. A short summary of each of the component is presented below. For details, please refer to IEF methodology: www.heritage.org/index/pdf/2020/book/methodology.pdf.

RULE OF LAW

1. PROPERTY RIGHTS

"The property rights component assesses the extent to which a country's legal framework allows individuals to acquire, hold, and utilize private property, secured by clear laws that the government enforces effectively" (ibidem). The more effective the legal protection is, the higher the score. It is the weighted average of the following sub-factors: Physical property rights, Intellectual property rights, Strength of investor protection, Risk of expropriation, and Quality of land administration. Each of these sub-factors is derived from numerical data sets that are normalized for comparative purposes among analysed countries. The underlying data is a mix of survey data and assessments by World Economic Forum, World Bank and Credendo Group.

2. JUDICIAL EFFECTIVENESS

The component assesses the extent to which a country's judicial system is effective across the following sub-factors, all averaged and weighted equally: Judicial independence, Quality of the judicial process, and Favouritism in obtaining judicial decisions. The higher assessment of effectiveness, the higher the score. Each of these sub-factors is derived from numerical data sets that are normalized for comparative purposes among analysed countries. The underlying data is a mix of survey data and assessments by World Economic Forum and World Bank.

3. GOVERNMENT INTEGRITY

This component assesses a country's government integrity by averaging scores for the following five sub-factors, all of which are weighted equally: Irregular payments and bribes, Transparency of government policymaking, Absence of corruption, Perceptions of corruption, and Governmental and civil service transparency. Each of these sub-factors is derived from numerical data sets that are normalized for comparative purposes among analysed countries. The higher the assessment, the higher the score. The underlying data is a mix of survey data and assessments by World Economic Forum, World Justice Project, Transparency International and TRACE International.

GOVERNMENT SIZE

4. TAX BURDEN

This component assesses a country's tax burden across the following sub-factors, all averaged and weighted equally: The top marginal tax rate on individual income, The top marginal tax rate on corporate income, and The total tax burden as a percentage of GDP. The lower the tax burden is, the higher the score (quadratic function is used, so increase in tax burden is penalised with a much lower score). The underlying data on the tax rates come from international consultancy firms, International Monetary Fund, countries' investment agencies or government authorities. The underlying data on the tax burden as a percentage of GDP come mainly from database of OECD, Eurostat, IMF, etc.

5. GOVERNMENT SPENDING

"The government spending component captures the burden imposed by government expenditures, which includes consumption by the state and all transfer payments related to various entitlement programs" (ibidem). The lower the government spending as a percentage of GDP in the most recent 3 years, the higher the score. The minimal score in this category is zero. Quadratic function is used, so increase in spending is penalised with a much lower score. According to the author of the report: "In theory, debt financing of public spending could make a positive contribution to productive investment and ultimately to economic growth. However, mounting public debt driven by persistent budget deficits, particularly spending that merely boosts government consumption or transfer payments, often undermines overall productivity growth and ultimately leads to economic stagnation rather than growth" (ibidem). No attempt was made to identify optimal government spending level, as it is not the area of the IEF report. Underdeveloped countries with low spending can score high in this category, however, they are also likely to score low in other due to limited capacity to provide sufficient public goods (such as rule of law). The main data source are databases of OECD, Eurostat, IMF, etc.

6. FISCAL HEALTH

This component assesses a country's fiscal health based on weighted average score of two factors: Average deficits as a percentage of GDP for the most

recent three years (80% of score) and Debt as a percentage of GDP (20% of score). The lower deficit and debt are, the higher the score. Quadratic function is used, so worse fiscal health is penalised with a much lower score. Whenever possible, the index includes all levels of government deficit and debt such as federal, state, and local. The underlying data on the fiscal health come from IMF, official government publications of each country, other sources.

REGULATORY EFFICIENCY

7. BUSINESS FREEDOM

This component assesses a country's ability to provide the environment for efficient operation of businesses, based on 13 subfactors derived directly from the World Bank's "Doing Business" report. The subfactors are weighted equally and include: Number of procedures, time required and cost to start/close a business, obtain a license, get electricity. Sub-factor score is based on the ratio of the country data for each sub-factor relative to the world average. The higher degree of relative business freedom, the higher the score.

8. LABOUR FREEDOM

This component assesses a country's legal and regulatory framework of its labour market. The score is the average of 7 sub-factors all weighted equally: Ratio of minimum wage to the average value added per worker, Hindrance to hiring additional workers, Rigidity of hours, Difficulty of firing redundant employees, Legally mandated notice period, Mandatory severance pay, and Labour force participation rate. Sub-factor score is based on the ratio of the country data for each sub-factor relative to the world average. The higher degree of relative business freedom, the higher the score. The underlying data source is mainly World Bank's "Doing Business" report and official government publications of each country.

9. MONETARY FREEDOM

This component assesses a country's monetary freedom based on 2 sub-factors: (1) Convex function (√) of the weighted average inflation rate for the most recent three years, and (2) A qualitative judgment about the extent of government manipulation of prices through direct controls or subsidies (it

assigns value of 0–20 penalty points based on the extent of price control). The higher degree of monetary freedom, the higher the score. The underlying data come mainly from IMF, various World Bank country reports, various news and magazine articles, and official government publications of each country.

MARKET OPENNESS

10. TRADE FREEDOM

This component assesses a country's extent of barriers affecting international trade by: (1) Quantitative measure standing for 50% of the component—weighted average tariff rate based on the share of imports for each good, and (2) Qualitative measure standing for another 50%—non-tariff barriers (NTBs), which evaluate factors that are difficult to measure, such as regulatory restrictions, customs restrictions, restrictions on quantity and direct governmental interventions (e.g. subsidies, state trading, government monopolies, and exclusive franchises). The higher degree of trade freedom, the higher the score. The underlying data comes mainly from World Bank, WTO, World Economic Forum and official government publications of each country.

11. INVESTMENT FREEDOM

This component assesses a country's level of constraints on capital investments. The lower the constraints, the higher the score. The measurement depends on evaluation of restrictions in such areas as: National treatment of foreign investment, Foreign investment code, Restrictions on land ownership, Sectorial investment restrictions, Expropriation of investments without fair compensation, Foreign exchange controls, Capital controls, and "security problems, a lack of basic investment infrastructure, or other government policies that inject a considerable degree of uncertainty and indirectly burden the investment process and limit investment freedom" (ibidem). The underlying data come mainly from official government publications of each country, World Bank, OECD, etc.

12. FINANCIAL FREEDOM

This component assesses a country's level of financial freedom, which evaluates 5 sub-areas: The extent of government regulation of financial

services, The degree of state intervention in banks and other financial firms through direct and indirect ownership, Government influence on the allocation of credit, The extent of financial and capital market development, and Openness to foreign competition. The higher degree of financial freedom, the higher the score. Maximum score (100) is granted to those countries, whose "government oversight is limited solely to the enforcement of contractual obligations and preventing fraud" (ibidem). Whereas nil score is received by repressive countries, where "supervision and regulation are designed to prevent private financial institutions from functioning. Private financial institutions are non-existent" (ibidem). The underlaying data comes mainly from Economist Intelligence Unit, IMF, OECD, official government publications of each country, World Bank, and various news and magazine articles on banking and finance.

5.2.2 Measuring Business Cycle

Following the takeaways of the Chapter 2.1.1, business cycles are typically measured by extracting cyclical components of such economic aggregates as real GDP, which was suggested already in classic papers by (Lucas Jr, 1977) (Kydland & Prescott, 1990) and contemporary research conducted by e.g., NBER.

In this research, the following data source is used: Gross domestic product - expenditure approach, Per Head, US dollars, volume estimates, fixed PPPs, OECD reference year, seasonally adjusted. Source: OECD database, indicator's symbol: HVPVOBARSA, data downloaded on 2021-01-10.

Time period under examination: 1996-Q1 – 2018-Q4, 92 quarters. For periods before 1996-Q1, there is substantial number of countries with missing data. On the other hand, data after 2018-Q4 will are irrelevant as the Index of Economic Freedom, which was published in 2020 is based mainly on 2018 data. Thus, to examine business cycles and economic freedom in the same time span, regrettably, it should be limited to 1996-Q1 – 2018-Q4. It seems to be important to analyse business cycle in quarterly intervals to eliminate

flattering effect of aggregation of quarterly results into one value for a full year. This assumption unfortunately limits reliable data sources to OECD database.

Total sample of 34 countries: OECD countries minus Turkey and Colombia (no data), as well as Japan and Mexico (no sufficient historical data), plus one non-OECD country for which OECD's data are available—Bulgaria. The sample is smaller than in earlier studies in that field (see Table 5) but seem to allow for more accurate examination of economic fluctuations, due to a commonly considered reliable data source.

The next step is to measure cycles' volatility for each country. This is typically done by calculating standard deviation of either (1) GDP growth rates or (2) Output gap (Hnatkovska & Loayza, 2004). The advantage of the first approach is its simplicity; however. it is restricted by the assumption of constant slope of the trend line. The second approach requires extracting cyclical component from the time series using a statistical filter and then calculating output gap's standard deviation. Thus, the latter approach is preferred (Altman, 1995; Dawe, 1996 ; Becker and Mauro, 2006; Chauvet and Guil-laumont, 2009; Afonso and Furceri, 2010) in (Alimi, 2016a).

5.3 Extracting Cyclical Component From Time Series

Statistical data sets hardly provide ready-to-use time series of economic data, which could be employed in an analysis of business cycles. Consequently, it is required to employ one of the de-trending tools, which are band pass filters isolating component of a time series in a particular band of frequency. At this point, let us stress that methods for cycles decomposition is a controversial issue in the modern literature, as there is no consensus regarding the best approach (Pipien & Lenart, 2012).

Nevertheless, in vast majority of the research currently there are three filters commonly used:

- HP filter named after Robert Hodrick and Edward Prescott (Hodrick & Prescott, 1997)
- BK filter named after Marianne Baxter and Robert King (Baxter & King, 1999)

- CF filter named Lawrence Christiano and Terry Fitzgerald (Christiano & Fitzgerald, 1999)

A summary of the most important features of each filter is given below. For details, please refer to (Skrzypczyński, 2010) and (Nilsson & Gyomai, 2011).

HODRICK-PRESCOTT FILTER

Hodrick-Prescott filter was originally presented in 1980. It became the most popular filter among all three and today can be found is several variations (see: MHP, which stands for modified Hodrick-Prescott filter in (Kaiser & Maravall, 2012)). Although it is not formally required, it shall only be applied to non-stationary time series in which seasonal fluctuations have also been removed. It provides trend-cycle decomposition across the whole sample, meaning number of input data is equal to the number of de-trended values (e.g., BK filter is limited here—see below). The output two time series are obtained: Trend and cyclical component. Filters' sensitivity towards a given frequency is determined by a smoothness parameter λ (ratio of the short-term and long-term variances), which Hodrick and Prescott suggested to set to 1600 for quarterly data of a 10-year cycle. λ can be calculated in the following manner (Pipien & Lenart, 2012):

$$\lambda = \frac{1}{4(1-\cos\left(\frac{2\pi}{L}\right))^2} \qquad \text{Equation 15}$$

Where L represents cycle length in quarters. As such, one can adjust smoothness parameter for cycles other than the standard 10 years indicated by Hodrick and Prescott. As modern cycles are shorter than that, cycle decomposition in this analysis is also performed for an 8-year cycle (which results in corresponding λ=700) and a 6-year cycle (λ=200). This is to ensure robustness of the results. Notion used in the dissertation is the following:

- HP1600 means Hodrick-Prescott filter for 10-year cycles, so with smoothness parameter 1600
- HP700 means Hodrick-Prescott filter for 8-year cycles, so with smoothness parameter 700

- HP1200 means Hodrick-Prescott filter for 6-year cycles, so with smoothness parameter 200

Disadvantage of the HP filter is that its accuracy tends to decrease towards the ends of a sample. Also, adding new data to the time series results in modification of previously obtained results.

BAXTER-KING FILTER

This filter can be used for stationary and non-stationary processes, however, as in HP filter, it shall be used for non-stationary time series. Seasonal fluctuations shall also be removed. For quarterly data, minimum length of fluctuations is set to 6 quarters while maximum to 32 quarters. Baxter and King recommend that the parameter responsible for filter accuracy shall be set to 12, which has one disadvantage: At each end of the time series, 12 quarters lack output results. Increasing the parameter value improves filter's accuracy but also decreases the number of the output data. Alternatively, one could run a forecast for preceding 12 and consecutive 12 quarters for original time series and then apply the filter. This raises further questions around the accuracy. An advantage of the filter is that adding new input data to the time series does not change results in previously examined time span.

CHRISTIANO-FITZGERALD FILTER

This filter has some common features with the former two. As the HP filter, it produces series of the cyclical component across the whole sample. On the other hand, decomposition methodology is similar to BK filter. It also requires that the input data is seasonally adjusted. Just like the BK filter, they are set to 6 and 32 for quarterly data. The main difference is the formal requirement to determine whether the input data series is stationary or not, and if not, then what type it is. For this unit, root test must be conducted (most often the ADF, augmented Dickey-Fuller test is used) and z KPSS (Kwiatkowski-Phillips-Schmidt-Shin) test. One of the disadvantages is that adding new data to the time series results in modification of previously obtained results. Another is that filter's accuracy decreases towards ends of a sample.

Taking the above into consideration, it seems justified to check whether the filters produce similar results on the sample size selected for the purpose of this research. The test run for the sample of 34 counties in the period of 92 quarters provided cyclical components of GDP. A graphical representation of some of them is shown in the Figure 12. It can be observed that all three filters seem to produce similar results. The main difference is: (1) BK output data is missing at the beginning and the end of each time series, and (2) HP1600 output is less smooth than the other two.

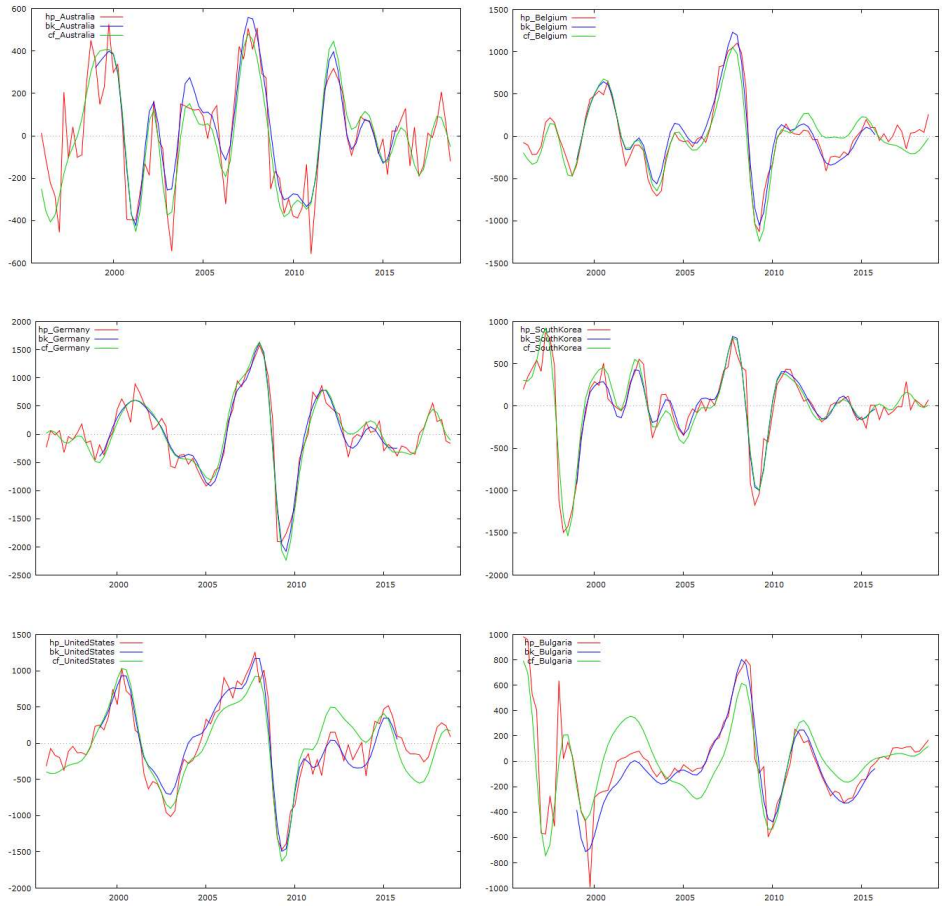


Figure 12 Graphical Representation of Cyclical Components of GDP Extracted with Three Different Band-pass Filters. Source: Own study.

Because BK filter does not provide output in the first 12 and the last 12 quarters, correlation is examined in the time span of 68 quarters. Summary of the results are as in the Table 10.

	HP - BK	HP – CF	BK - CF

Average Linear Correlation	0.94	0.87	0.89
Standard Deviation	0.05	0.08	0.08

Table 10 Summary of the Linear Correlation Between HP, BK and CF Filters on the Research Sample. Average of Correlation Coefficients For Each Country. Source: Own study.

It may be concluded that there is a robust positive correlation between all three filters at the level of approximately 0.9. However, BK seems to be least favourable due to substantial data loss. On the other hand, HP and BK are strongly correlated, but their correlation with CF is slightly lower, which makes this filter less favourable in the further research. Finally, HP might have a weaker performance in absolute numerical precision than CF (Nilsson & Gyomai, 2011). Thus, Hodrick-Prescott's filter with the smoothness parameter λ=1600 is chosen as a primary filter to be used in this dissertation. The other two filters, as well as HP700 and HP200, shall also be employed for robustness check of the results.

After application of the filter for each country, trend and cyclical component of their business cycles were extracted.

To measure the cycles' intensity, typically standard deviation of oscillations is measured (as explained in the Chapter 2.1.2). However, such approach would come down to a static comparison of the standard deviation with the average economic freedom level for each country. To allow for comparison of intensity across a group of countries also taking into account each observation within the time span, the following approach was taken to build a model in which:

$$CYCLE\_INTENSITY_{kt} = \frac{Cyclical\_component_{kt}}{Trend_{kt}} \times 10000 \qquad \text{Equation 16}$$

Variable CYCLE_INTENSITY is the dependent variable in this analysis. It represents business cycle intensity for a country *k* in a quarter *t.* Multiplication by 10000 allowed for easier assessment of results as values of cyclical component are much lower than the trend values.

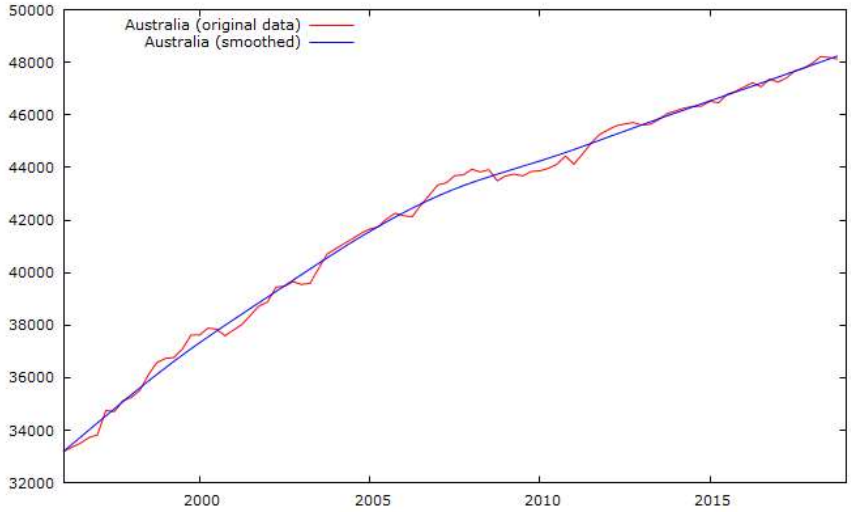


Figure 13 Economic Fluctuations and Trend on the example of Australia, Filtered With Hodrick-Prescott's filter at λ=1600. Source: own study based on GDP Per Head, US dollars, volume estimates, fixed PPPs, OECD reference year, seasonally adjusted. Source: OECD database, accessed on 2020-01-10.

5.4 Scope of the research

TIME SPAN

The sets of business cycle data and economic freedom data have the intersection: 34 countries (listed below) in the time span of 92 quarters (1996Q1 – 2018Q4).

COUNTRIES

List of the 34 countries analysed is the following:

1	Bulgaria	12	South Korea	23	Belgium
2	Chile	13	Greece	24	Germany
3	Latvia	14	Israel	25	Sweden
4	Poland	15	New Zealand	26	Iceland
5	Lithuania	16	Spain	27	Austria
6	Hungary	17	Italy	28	Denmark
7	Slovakia	18	France	29	Netherlands
8	Estonia	19	United Kingdom	30	United States
9	Slovenia	20	Finland	31	Ireland
10	Czech Republic	21	Canada	32	Norway
11	Portugal	22	Australia	33	Switzerland
				34	Luxembourg

Table 11 List of Countries in the Analysis. Source: own study.

BUSINESS CYCLE VOLATILITY

None of the data points are missing in the set of business cycle intensity (dependent variable).

ECONOMIC FREEDOM

Some data is missing in the set of the economic freedom:

1. For all countries, Judicial Effectiveness has been monitored since 2015-Q1(only 16 quarters of data available)
2. For all countries, Fiscal Health has been monitored since 2015-Q1(only 16 quarters of data available)
3. For all countries, Labour Freedom has been monitored since 2003-Q1(only 64 quarters of data available)
4. In some individual cases, mainly in Government Spending, where the original data was missing, values were estimated as either (1) Average of the score before and after the period where the data was missing, or (2) Score amounting to the first value attained if there was no data at

the beginning of the time series. Scores were estimated for 84 data points.

Data missing in points 1-3 substantially limit time span of the analysis, thus are excluded from the analysis. As such, economic freedom is examined across the following areas:

- Overall Score of each country
- 9 components:
    1) Property Rights
    2) Government Integrity
    3) Tax Burden
    4) Government Spending
    5) Business Freedom
    6) Monetary Freedom
    7) Trade Freedom
    8) Investment Freedom
    9) Financial Freedom

5.5 Verifying relations between variables

The data set collected pools together observations across countries (cross-sectional dimension) as well as over time (time-series dimension), which allows for panel data analysis This type of analysis provides multiple advantages, such as (Hsiao, 2014):

A. Employment of large data set, thus increasing efficiency of econometric estimates.
B. Simultaneous investigation of several items (countries in this case) enable better identification of relationship between independent and dependent variables.
C. Control of non-observable variables for each country.

Employing panel data in econometric models considers differences between countries and processes change over time. Such models are called 'error component regression models' and they are very useful to test economic theories.

There are three main methods used to construct econometric regression models using panel data (Muszyńska, 2006):

1. Pooled estimator (Pooled OLS – ordinary least square) – this approach assumes homogeneity of items, so it treats all observations as if they were related to one, neglecting individual characteristics. For this, it is often called 'naive analysis'. As in most cases—this research included—items (countries) differ.
2. Fixed effect (FE) – assumes that the items within the sample differ from one another and controls non-observable variables by replacing all of them with one fixed and time-invariant parameter α for each item.
3. Random effect (RE) – assumes that the items within the sample differ and controls for all non-observable variables by replacing all of them with one random parameter α for each item. It means that any random effect model would consist of two random parameters: Random individual effects parameter α and, as in other regression models, error terms ε (white noise).

In this dissertation, it is assumed that countries in the sample differ from one another, while the differences are generally stable in time. To verify this approach, the following procedure is used (Muszyńska, 2006):

1. Check if individual effects are different for different items (Wald test). If they are the same, then OLS model is appropriate.
2. Check if variance of the parameter $\alpha \neq 0$ (Breusch-Pagan test). If so, then random effect model is appropriate.
3. Check if the parameters α for each country are not correlated with each other (Hausman test). If they are not, fixed effect model is appropriate.

Test results are presented in the Appendices.

The relationship between variables will be verified using fixed effect regression model given by the following equation:

$$Y_{kt} = \beta_0 + \beta_1 X_{1kt} + \beta_2 X_{2kt} + \cdots + d_t + \alpha_k + \varepsilon_{kt} \qquad \text{Equation 17}$$

Where:

Y_{kt} – the dependent variable (in our case, cycle intensity), i = country, t = point in time

X_{kt} – independent variables (in our case, overall score of economic freedom, either overall or in each of its areas, or control variables)

β – coefficient for each independent variable

α_k is the unknown intercept for each entity.

d_t – time dummy whose role is to control for time varying but panel constant unobserved effects. It affects every panel and changes over time.

ε_{kt} - error term

To control determinants affecting economic fluctuations other than economic freedom and its components, supplementary models shall be created. The full list of control variables included in supplementary models is given below. They combine those indicated in the theoretical part of this dissertation as well as those included in earlier related research on economic fluctuations. They capture not only economic aggregates but also structural factors such as population growth and human capital index.

Control variable	Source of data
Population growth (annual %)	OECD database, accessed on Mar 31st 2021
Unemployment, total (% of total labour force)	
Final consumption expenditure (% of GDP)	
Adjusted savings: net national savings (% of GNI)	
Exports of goods and services (% of GDP)	
Imports of goods and services (% of GDP)	
Ores and metals exports (% of merchandise exports)	
Inflation, consumer prices (annual %)	
Foreign direct investment, net inflows (% of GDP)	
Net investment in nonfinancial assets (% of GDP)	
Human capital index (average years of schooling)	Penn World Table 10.0, accessed on Mar 31st 2021

Table 12 List of Control Variables Employed in the Analysis. Source: Own study.

For this dissertation, in order to investigate the relationship between economic freedom and business cycles intensity, several models are constructed to check the relationship on the overall IEF score level, but also for each of its nine selected components. Additionally, as explained in the Chapter 5.3, five cycle extraction filters are used. And finally, each model is run with and without control variables. In total, twenty models are constructed. A summary is presented in the table below.

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		Cycle extraction method				
	Dependent Variables →	CYCLE.INTENSITY.HP1600	CYCLE.INTENSITY.HP700	CYCLE.INTENSITY.HP200	CYCLE.INTENSITY.CF	CYCLE.INTENSITY.BK
Independent Variables	IEF Overall Score	Model no. 1	Model no. 3	Model no. 5	Model no. 7	Model no. 9
	IEF Overall Score + Control variables	Model no. 2	Model no. 4	Model no. 6	Model no. 8	Model no. 10
	9 Components of IEF	Model no. 11	Model no. 13	Model no. 15	Model no. 17	Model no. 19
	9 Components of IEF + Control variables	Model no. 12	Model no. 14	Model no. 16	Model no. 18	Model no. 20

Table 13 Summary of Models Constructed in this Research. Source: Own study.

5.6 Methodology Summary

This chapter outlined the methodology for this dissertation. To ensure logical sequence of the process, the research strategy was developed—application of positivism as a research paradigm, secondary quantitative approach as a research orientation, use three types of reasoning, use mathematical filters and statistical tools as preliminary research method, and finally employ reliable online data bases as the source of input data.

The cyclical component of GDP (expenditure approach, Per Head, US dollars, volume estimates, fixed PPPs, OECD reference year, seasonally adjusted) is extracted using five different extraction filters (3 types of Hodrick-Prescott's filter, Baxter & King's, and Christiano & Fitzgerald's). Economic freedom is

measured by the Index of Economic Freedom as it provides long-enough timespan of data for a large number of countries and clear into its underlying areas (9 components were chosen for the analysis). Scope of the research includes 34 countries (mostly OECD) and 92 quarters (1996-Q1 – 2018-Q4).

Finally, 20 econometric models are created (see Table 13)—fixed effects regression models with time dummies and control variables including structural factors to ensure robustness of the results.

6 RESEARCH RESULTS

This chapter presents research results, verifying 6 hypotheses outlined in the chapter 4.4 in order to understand the impact of economic freedom in business cycle fluctuations.

One of the key issues is the root-cause effect'; the relationship between economic freedom and economic fluctuations. As multiple economic theories indicate that it is the economic freedom which drives stability, it is also possible that economic freedom changes as policy makers respond to e.g., high volatility of the economy. In general, earlier studies addressing the problem of economic freedom endogeneity, pointed out that it is the economic freedom that affects fluctuations. Several studies in the area of economic growth, by using Granger tests, indicated that in the vast majority of cases economic freedom proceeds the economic performance (Dawson, 2003) (Heckelman, 2000). The reverse effect was observed in the case of government size, meaning that the higher economic growth, the higher government size becomes.

Table 14 summarizes sample statistics of this research:

- 5 dependent variables (DV) extracted with 5 different filters, being business cycle volatility measures as per Equation 16, page 82.
- 10 independent variables (IV) – overall score of the Economic Freedom Index, and 9 of its components.
- 11 control variables.

There are 816 missing observations for Baxter-King filter, which is in line with expectations, as indicated in the Chapter 5.3. The filter does not provide output for the first 12 and last 12 quarters for each of the 34 countries in the sample. Also, high values of standard deviation as compared to mean values of dependent variables are justified as these variables represent intensity of fluctuations.

Variable	Var. Type	Mean	Median	Minimum	Maximum	Std. Dev.	Missing obs.
CYCLEINTENSITYHP1600	DV	130.56	84.284	0.026924	1280.2	153.62	0
CYCLEINTENSITYHP700	DV	112.29	72.392	0.026348	1163.1	133.70	0
CYCLEINTENSITYHP200	DV	89.763	54.880	0.098419	1116.2	108.51	0
CYCLEINTENSITYCF	DV	122.42	84.361	0.060215	1135.6	133.50	0
CYCLEINTENSITYBK	DV	136.56	93.174	0.034178	1209.3	153.88	816
OverallScore	IV	70.682	70.800	45.700	84.400	6.8422	0
PropertyRights	IV	77.074	83.750	30.000	96.100	15.439	0
GovernmentIntegrity	IV	69.172	72.000	27.000	100.00	18.799	0
TaxBurden	IV	62.831	62.900	29.800	94.000	13.957	0
GovernmentSpending	IV	42.038	42.950	0.50000	90.100	19.572	0
BusinessFreedom	IV	79.200	79.050	53.700	100.00	9.9843	0
MonetaryFreedom	IV	81.467	82.100	25.200	94.200	6.3714	0
TradeFreedom	IV	82.972	85.800	46.800	92.400	5.8669	0
InvestmentFreedom	IV	75.211	70.000	50.000	95.000	11.219	0
FinancialFreedom	IV	70.435	70.000	30.000	90.000	13.366	0
Populationgrowthannual	CTRL	0.47304	0.45578	-2.2585	2.8910	0.79222	0
Unemploymenttotaloftotal	CTRL	8.0283	7.0800	1.8100	27.470	4.1943	0
Finalconsumptionexpenditure	CTRL	74.599	75.311	42.923	91.669	7.6530	0
Adjustedsavingsnetnational	CTRL	6.4030	6.2748	-23.966	34.574	6.6105	0
Exportsofgoodsandservices	CTRL	48.930	41.169	9.0431	221.20	29.592	0
Importsofgoodsandservices	CTRL	46.897	39.287	11.940	187.17	24.787	0
Oresandmetalsexportsofm	CTRL	6.3340	3.0192	0.00000	64.455	10.409	0
Inflationconsumerpricesann	CTRL	4.1985	2.1369	-4.4781	1058.4	38.077	0
Foreigndirectinvestmentnet	CTRL	5.2813	2.9849	-58.323	86.589	10.300	0
Netinvestmentinnonfinancial	CTRL	1.6191	1.6247	-1.8116	5.8226	1.1023	0
Humancapitalindex	CTRL	3.2304	3.2509	2.1071	3.8488	0.32374	0

Table 14 Summary Statistics, using the observations: 34 countries over 92 quarters (missing values were skipped). Source: own study.

6.1 Output for Models Based on IEF Overall Score

The study's output is the grand total of 20 fixed effects regression models, 10 of which employ IEF Overall Score as an independent variable. A summary of the output for these 10 models is presented in the Table 15. Note that all models included time dummies, while 5 of them also control variables (output for time dummies and control variables skipped for clarity of presentation, please see Appendices for detailed output). All models have coefficient of determination at the level between 0.42-0.53 (largely attributable to time dummies), while in each model the joint test result on named regressors (F-test) rejects the hypothesis that the model does not fit the data well.

	Model 1			*Model 2*			*Model 3*			*Model 4*		
Dependent Variable	CYCLE.INTENSITY.HP1600						CYCLE.INTENSITY.HP700					
Control variables (Y/N)	no Control variables			with Control var.			no Control variables			with Control var.		
B coef. and its significance	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.
const	669,10	<0.0001	***	985,88	<0.0001	***	593,91	<0.0001	***	970,02	<0.0001	***
OveralScore	-8,24	<0.0001	***	-6,40	<0.0001	***	-7,35	<0.0001	***	-5,77	<0.0001	***
N	3128			3128			3128			3128		
R-sqared	0,43			0,44			0,43			0,45		

	Model 5			*Model 6*			*Model 7*			*Model 8*		
Dependent Variable	CYCLE.INTENSITY.HP200						CYCLE.INTENSITY.CF					
Control variables (Y/N)	no Control variables			with Control var.			no Control variables			with Control var.		
B coef. and its significance	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.
const	470,45	<0.0001	***	887,31	<0.0001	***	642,27	<0.0001	***	837,67	<0.0001	***
OveralScore	-5,80	<0.0001	***	-4,45	<0.0001	***	-7,03	<0.0001	***	-5,08	<0.0001	***
N	3128			3128			3128			3128		
R-sqared	0,42			0,45			0,52			0,55		

	Model 9			*Model 10*		
Dependent Variable	CYCLE.INTENSITY.BK					
Control variables (Y/N)	no Control variables			with Control var.		
B coef. and its significance	coef.	p-val	s.lev.	coef.	p-val	s.lev.
const	803,76	<0.0001	***	668,02	0.0209	**
OveralScore	-10,19	<0.0001	***	-7,28	<0.0001	***
N	2312			2312		
R-sqared	0,51			0,53		

Table 15 Summary of Output for Models Based on IEF Overall Score. Source: Own study.

In all the models within this group, Overall Score of IEF has a negative β coefficient varying from -5 to -10, all of which are statistically significant (p-value < 0.05). It means, that the higher (lower) level of economic freedom, the smoother (more volatile) business cycle. More precisely (bearing in mind that the dependent variable includes multiplication by 10^4), it may be stated that: Increase of the Economic Freedom Overall Score by 1 point translates into decrease of volatility of deviation cycle by 0.05 to 0.1 percentage point with respect to its trend line. The question arises: Are the values significant as compared to average deviation? Let us examine this issue based on Model 1, in which HP700 filter produced average dependent variable DV (cyclical_component/trend *10000) amounting to 131. In that model, the estimated parameter β amounts to -8.24. If so, then it might be concluded that each point of IEF Overall Score inversely stands for 6% of the average deviation. Consequently, in a hypothetical extreme scenario assuming linear effect, increasing economic freedom by approximately 16 points would result in bringing deviation cycle to its trend line, which effectively means no fluctuations. Calculating the same for other model, we arrive at the results presented in the Table 16. On average, each point of IEF Overall Score inversely stands for 6% of the business cycle deviation.

Model #	1	2	3	4	5	6	7	8	9	10	Average
DV	131	131	112	112	90	90	122	122	137	137	118
$\lvert\beta\rvert$	8.24	6.40	7.35	5.77	5.80	4.45	7.03	5.08	10.19	7.28	6.76
DV / $\lvert\beta\rvert$	15.8	20.4	15.3	19.5	15.5	20.2	17.4	24.1	13.4	18.8	17.5
$\lvert\beta\rvert$ / DV	6%	5%	7%	5%	6%	5%	6%	4%	7%	5%	6%

Table 16 Impact of IEF Overall Score on Business Cycle Deviation. Source: Own study

Results are in line with earlier studies indicating that, in general, increasing economic freedom decreases fluctuations (Lipford, 2007; Dawson, 2010; Campbell & Snyder, 2012; Alimi, 2016). It must be remembered that economic freedom is not a homogenous concept. For this, linking research result to economic theories, other than purely classical ones, does not seem justified. To the classical school of thought, claiming that any state interventions are

unnecessary or even harmful to self-regulating market, the result of this part of the study would be satisfactory. However, to better understand the impact of economic freedom on the business cycles, and explain it on the theoretical grounds, one must analyse its components.

CONCLUSION #1

To conclude, research result does not provide evidence for rejecting Hypothesis A, that there is a negative relationship between the degree of economic freedom and the volatility of the business cycle fluctuations. The study indicates that that the higher (lower) level of economic freedom, the smoother (more volatile) business cycle, while each point of IEF Overall Score inversely stands for 6% of the business cycle deviation. Taking into consideration the fact that economic freedom is a non-homogenous concept, the conclusion above might not show the full picture, nor can it be explained on the theoretical grounds other than purely classical.

6.2 Output for Models Based on IEF Components

The second part of the study resulted in producing another 10 fixed effects regression models, all of which employ IEF components as independent variables. Summary of the output for these 10 models is presented in the Table 17. All models included time dummies, while 5 of them also control variables (output for time dummies and control variables skipped for clarity of presentation, please see Appendices for detailed output). All models have coefficient of determination at the level between 0.44-0.57 (largely attributable to time dummies), while in each model, the joint test results on named regressors (F-test) rejects the hypothesis that the model does not fit the data well.

	Model 11			*Model 12*			*Model 13*			*Model 14*		
Dependent Variable	CYCLE.INTENSITY.HP1600						CYCLE.INTENSITY.HP700					
Control variables (Y/N)	no Control variables			with Control var.			no Control variables			with Control var.		
B coef. and its significance	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.
const	667,22	<0.0001	***	818,59	0.0001	***	633,87	<0.0001	***	783,51	<0.0001	***
PropertyRights	-0,05	0.8997		0,04	0.9177		-0,26	0.4389		-0,37	0.2873	
GovernmentIntegrity	-0,78	0.0756	*	-0,56	0.2323		-0,46	0.2210		-0,44	0.2794	
TaxBurden	1,91	0.0002	***	2,00	0.0001	***	2,09	<0.0001	***	2,09	<0.0001	***
GovernmentSpending	-1,00	0.0005	***	-0,79	0.0203	**	-0,48	0.0516	*	-0,35	0.2325	
BusinessFreedom	-1,68	<0.0001	***	-1,57	0.0001	***	-1,53	<0.0001	***	-1,25	0.0004	***
MonetaryFreedom	-4,41	<0.0001	***	-4,48	<0.0001	***	-4,28	<0.0001	***	-4,19	<0.0001	***
TradeFreedom	-0,31	0.6983		1,15	0.1656		-0,65	0.3535		0,78	0.2795	
InvestmentFreedom	0,17	0.6431		0,31	0.4105		0,12	0.7166		0,31	0.3366	
FinancialFreedom	-1,16	0.0002	***	-0,94	0.0043	***	-1,30	<0.0001	***	-1,06	0.0002	***
N	3128			3128			3128			3128		
R-sqared	0,44			0,46			0,45			0,47		

	Model 15			*Model 16*			*Model 17*			*Model 18*		
Dependent Variable	CYCLE.INTENSITY.HP200						CYCLE.INTENSITY.CF					
Control variables (Y/N)	no Control variables			with Control var.			no Control variables			with Control var.		
B coef. and its significance	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.	coef.	p-val	s.lev.
const	541,41	<0.0001	***	735,29	<0.0001	***	659,26	<0.0001	***	698,02	<0.0001	***
PropertyRights	-0,29	0.2843		-0,51	0.0700	*	-0,10	0.7390		-0,46	0.1461	
GovernmentIntegrity	-0,34	0.2734		-0,47	0.1524		0,08	0.8079		0,07	0.8453	
TaxBurden	2,00	<0.0001	***	1,92	<0.0001	***	1,95	<0.0001	***	1,85	<0.0001	***
GovernmentSpending	-0,04	0.8357		-0,02	0.9261		-0,90	<0.0001	***	-0,49	0.0620	*
BusinessFreedom	-1,21	<0.0001	***	-0,82	0.0040	***	-1,50	<0.0001	***	-1,20	0.0002	***
MonetaryFreedom	-3,73	<0.0001	***	-3,48	<0.0001	***	-3,50	<0.0001	***	-3,62	<0.0001	***
TradeFreedom	-0,87	0.1281		0,36	0.5304		-1,37	0.0320	**	0,39	0.5439	
InvestmentFreedom	0,03	0.9025		0,23	0.3862		0,28	0.3336		0,58	0.0469	**
FinancialFreedom	-1,14	<0.0001	***	-0,84	0.0003	***	-1,33	<0.0001	***	-1,06	<0.0001	***
N	3128			3128			3128			3128		
R-sqared	0,45			0,47			0,54			0,57		

	Model 19			*Model 20*		
Dependent Variable	CYCLE.INTENSITY.BK					
Control variables (Y/N)	no Control variables			with Control var.		
B coef. and its significance	coef.	p-val	s.lev.	coef.	p-val	s.lev.
const	684,97	<0.0001	***	400,28	0.1995	
PropertyRights	0,63	0.2268		0,78	0.1377	
GovernmentIntegrity	-0,12	0.8233		0,71	0.2386	
TaxBurden	1,84	0.0082	***	2,37	0.0007	***
GovernmentSpending	-1,91	<0.0001	***	-1,32	0.0014	***
BusinessFreedom	-1,82	0.0002	***	-1,99	<0.0001	***
MonetaryFreedom	-5,26	<0.0001	***	-5,16	<0.0001	***
TradeFreedom	-0,39	0.6980		1,40	0.1797	
InvestmentFreedom	0,32	0.4632		0,29	0.5217	
FinancialFreedom	-1,47	<0.0001	***	-1,61	<0.0001	***
N	2312			2312		
R-sqared	0,52			0,54		

Table 17 Summary Output, Models Based on IEF Components. S: Own.

Of 9 IEF components, which are independent variables in these models, 4 turned out to be statistically insignificant, namely: Property Rights, Government Integrity (significant at p-value of 0.0756 only in one model), Trade Freedom and Investment Freedom. Another 5 show robust negative (except of Tax Burden) impact on the dependent variable. These are: Tax Burden, Government Spending, Business Freedom, Monetary Freedom and Financial Freedom. A detailed analysis of each variable is provided in the sections below. Moreover, an attempt to explain each variable on the theoretical ground is taken; refer to Table 3, page 58.

6.2.1 Efficient Legal System

Efficient Legal System turns out not to be statistically significant for economic fluctuations. IEF monitors 'Rule of Law' in three areas:

1) Judicial Effectiveness started to be measured only in 2015, thus is excluded from the models.
2) Property Rights is insignificant in all the models.
3) Government Integrity is significant at p-value of 0.0756 only in one model, however, loses significance when the model includes control variables or uses other extraction filters.

It may be concluded that an efficient legal system does not have statistically significant impact on business cycle fluctuations. This is obviously not in line with major economic doctrines, which all agree on the importance of institutions (see Table 3, page 58). It seems that 'rules of the game', to which attention was brought especially by the New Institutional Economics (North, 1991), play a vital role in the overall economic performance, which has been proved empirically on multiple occasions (Rodrik, 2000; Acemoglu at al., 2003). It only needs to provide minimum level of comfort for conducting economic activities. Changes in quality of institutions, at least within OECD countries in this research, do not cause the economy to fluctuate.

CONCLUSION #2

The research result provides evidence for rejecting Hypothesis B, that there is a negative relationship between the degree of Legal System Efficiency and the

volatility of the business cycle fluctuations. However, further research in this area is recommended: (1) Assess the impact of Judicial Effectiveness (as of now EFI provides short time span of data), and (2) Assess (if there is one) the minimal level of effectiveness of the legal system needed to keep economic fluctuations stable.

6.2.2 Tax Burden

Tax Burden measured by IEF combines marginal tax rate on individual income, the top marginal tax rate on corporate income, and the total tax burden as a percentage of GDP. The lower the tax burden, the higher the score.

Among all statistically significant independent variables (other than control variables), only Tax Burden has a positive β coefficient amounting to approximately +2 in all the models, all of which are statistically significant (p-value < 0.05). It means, that the higher (lower) taxes, the smoother the (more volatile) business cycle. Assessing the scale of the impact in a similar manner as in the section 6.1, it may be stated that on average, each point of IEF Tax Burden stands for 2% of the business cycle deviation as compared to its trend line.

Model #	11	12	13	14	15	16	17	18	19	20	Average
DV	131	131	112	112	90	90	122	122	137	137	118
$\lvert\beta\rvert$	1.91	2.00	2.09	2.09	2.00	1.92	1.95	1.85	1.84	2.37	2.00
DV / $\lvert\beta\rvert$	68.3	65.2	53.7	53.6	45.0	46.6	62.6	66.1	74.3	57.6	59.1
$\lvert\beta\rvert$/ DV	1%	2%	2%	2%	2%	2%	2%	2%	1%	2%	2%

Table 18 Impact of IEF Tax Burden on Business Cycle Deviation. Source: Own study

Earlier studies which investigated economic freedom and business cycles volatility did not analyse the impact of Tax Burden. Only Dawson (2010) found positive relationship, by considering a wider category called 'Size of Government', which includes top marginal tax rate, found positive relationship. Results obtained by Campbell & Snyder (2012) were not statistically significant in that area. Looking at other studies, it might be

noticed, that in general there is scarcity of such studies, given how important element of the economic system taxes are. A relatively recent research by NBER's C.A. Vegh and G. Vuletin (Vegh & Vuletin, 2015) indicate that tax policy is acyclical in industrial countries but mostly procyclical in developing countries (which seems to be in line with result of this study). For now, it might be stated that in (mostly) developed countries in the sample of this research, tax policy acts an automatic stabilizer for the economy. In the light of the main economic doctrines, the results are in line with the Keynesian economics, according to which tax policy shall support aggregate demand in the economy during economic downturns.

6.2.3 Government Spending

Government Spending measured by IEF includes consumption by the state and all transfer payments related to various entitlement programs. Without a doubt, this area as a part of Government Size category, is one of the disputes among major economic schools.

Research results in this area indicate negative β coefficient amounting to average of -0,9 (except of HP200 – short cycle), all of which are statistically significant (p-value < 0.05). However, a higher score in IEF Government Spending category means lower government spending. Consequently, the higher (lower) the government spending, the more volatile (smoother) business cycle. Assessing the scale of the impact in the similar manner as in the section 6.1, it may be stated that on average, each point of IEF Government Spending inversely stands for 1% of the business cycle deviation as compared to its trend line.

Model #	11	12	13	14	15	16	17	18	19	20	Average
DV	131	131	112	112	90	90	122	122	137	137	118
$\|\beta\|$	1.00	0.79	0.48	0.35	0.04	0.02	0.90	0.49	1.91	1.32	0.73
DV / $\|\beta\|$	130.7	166.0	233.0	321.7	2 151	4 094	136.7	248.8	71.6	103.4	162.2
$\|\beta\|$ / DV	1%	1%	0%	0%	0%	0%	1%	0%	1%	1%	1%

Table 19 Impact of IEF Government Spending on Business Cycle Deviation. Source: Own study

The result is not in line with Dawson (2010), who found a positive relationship between government size and economic volatility. It seems justified to conclude, that the Government Size is a term too broad to provide robust conclusions. Government Size looks at taxes (revenue for the government) as well as spending side. The result obtained indicate that, automatic stabilizers in the economy must work on both ends—taxes and government spending—to smoothen business cycle. In this research, it turns out that taxes indeed stabilise the economy, however, the money spent by the governments are in fact procyclical. The result related to Government Spending are in line with those schools of thought, which opt for limited government spending—monetarism, Austrian school and New Classical Macroeconomics. According to their representatives, the state participation in the economy should be limited to minimum (Hayek, 1944; Friedman 1990). The state shall only provide for the country integrity, as well as effective and stable legal system, leaving economic processes to free market, self-regulating mechanism. It shall not provide any services such as education or healthcare. This is naturally contradictory to all Keynesian-related schools of thought, which explicitly call for higher government spending to boost consumption and investment and avoid economic slow-downs. Looking at the β coefficients for Tax Burden and Government Spending in each model, it seems that the stabilising effect of taxes outperforms procyclical effect of government spending. Combining these two, it turns out that each point of IEF Government Size stands for 1% of the business cycle deviation as compared to its trend line. (ex of Fiscal Health variable as it was excluded from the analysis due to short timespan of data)

CONCLUSION #3

The research result provides some evidence for rejecting Hypothesis C, that there is a negative relationship between the degree of Government Size and the volatility of the business cycle fluctuations. On one hand, tax policy acts as an automatic stabilizer, but on the other hand, government spending are procyclical. On the theoretical ground, the stabilising effect of tax policy is in line with Keynesian views. However, high government spending resulting in increasing economic volatility are coherent with monetarism, Austrian school, and New Classical Macroeconomics. The net effect of tax policy and government spending seems to be anticyclical, and each point of IEF Government Size stands for 1% of the business cycle deviation as compared to its trend line. It is worth to stress that increasing taxes has its limitations resulting from the Laffer curve, so the question of the optimal level of the government spending, as well as channels of its distribution remains open.

6.2.4 Business Freedom

Business Freedom assesses regulatory efficiency in terms of providing a friendly environment for running a business by measuring number of factors such as duration and cost of administrative procedures, obtaining licenses, etc. The easier it is, the higher the score.

Research results in this area indicate negative β coefficient amounting to average of -1.5, all of which are statistically significant (p-value < 0.05). It means that the higher (lower) the business freedom in a given country, the smoother (more volatile) the business cycle. After assessing the scale of the impact, it may be stated that on average, each point of IEF Business Freedom inversely stands for 1% of the business cycle deviation as compared to its trend line.

Model #	11	12	13	14	15	16	17	18	19	20	Average
DV	131	131	112	112	90	90	122	122	137	137	118
$\|\beta\|$	1.68	1.57	1.53	1.25	1.21	0.82	1.50	1.20	1.82	1.99	1.46
DV / $\|\beta\|$	77.5	83.4	73.3	90.1	74.5	109.8	81.7	102.4	74.9	68.7	81.3
$\|\beta\|$ / DV	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Table 20 Impact of IEF Business Freedom on Business Cycle Deviation. Source: Own study

Results in this area are not comparable to any previous studies as neither of them looked specifically at this category, but only at the overall burden of regulations in several areas (credit market, labour market, business).

From the theoretical perspective, the result seems to justify views of monetarism, the Austrian school, as well as New Classical Macroeconomics. They all strongly opt for limiting government interference in business processes, as business freedom is the core of the free market. Indeed, overregulated economies, with high barriers to start a business (or complex liquidation legislation), and hinder/costly procedures of licensing, might decrease companies' ability to react to changing market conditions, disturb price level, and consequently increase economic fluctuations (Hayek, 1944; Friedman 1990). This view is criticised by Keynesian school as well as representatives of Financial Instability Theory. In their view, the economy stabilisation cannot be left in "private hands" (Keynes, 1936). The view was continued by Minsky (1992) through criticism of the 1980's deregulation, but also in contemporary discussion related to the world financial crisis of 2007-2008, for instance by P. Samuelson who stated, "Free markets do not stabilise themselves. Zero regulating is vastly suboptimal to rational regulating. Libertarianism is its own worst enemy!" (Economist, 2009-12-17)

CONCLUSION #4

The research result does not provide evidence for rejecting Hypothesis D, that there is a negative relationship between the degree of business freedom and the volatility of the business cycle fluctuations. The study indicates that that the higher (lower) the level of business freedom, the smoother (more volatile)

the business cycle, while each point of IEF Business Freedom inversely stands for 1% of the business cycle deviation.

6.2.5 Monetary Freedom

Monetary Freedom within IEF measures monetary freedom by measuring inflation (the more stable, the higher the score) and a qualitative judgment about the extent of government manipulation of prices through direct controls or subsidies.

Research results in this area indicate negative β coefficient amounting to average of -4.2, all of which are statistically significant (p-value < 0.05). It means, that the higher (lower) the monetary freedom in a given country, the smoother (more volatile) the business cycle. After assessing the scale of the impact, it may be stated that monetary freedom has the highest impact on the business cycle fluctuations. On average, each point of IEF Monetary Freedom inversely stands for 4% of the business cycle deviation as compared to its trend line.

Model #	11	12	13	14	15	16	17	18	19	20	Average
DV	131	131	112	112	90	90	122	122	137	137	118
$\|\beta\|$	4.41	4.48	4.28	4.19	3.73	3.48	3.50	3.62	5.26	5.16	4.21
DV / $\|\beta\|$	29.6	29.1	26.3	26.8	24.1	25.8	35.0	33.9	25.9	26.4	28.1
$\|\beta\|$ / DV	3%	3%	4%	4%	4%	4%	3%	3%	4%	4%	4%

Table 21 Impact of IEF Monetary Freedom on Business Cycle Deviation. Source: Own study

The research result is in line with the one presented by Campbell & Snyder (2012), who also indicated that sound money (measured by EFW) had negative relationship with volatility. Dawson (2010) excluded sound money from his analysis, as one of the control variables was inflation rate. In this study, however, we found that there is a low correlation between control variable 'Inflation, consumer prices (annual %)' and the Monetary Freedom, mainly due to the fact that Monetary Freedom assesses stability of prices in 3-year time intervals and accounts for qualitative judgement.

In the light of main economic theories, the result confirms monetarists' views, but also those of the Austrian school and New Classical Macroeconomics. At the same time, it opposes the Keynesian school, partly confirming Financial Instability Theory (more in section 6.2.6).

Monetarism, which links economic fluctuations directly to money supply and actions of the central bank (inappropriate actions might even lead to a crisis as in the years 1920-21, 1929-1933, 1937-1938 (Friedman, 2002)), naturally opts for stability of money supply and, along with the Austrians and NCM, warns against any attempts to influence prices, as that would cause misinformation of market participants, resulting in higher business cycle volatility. This is contradictory to Keynesian views, which treat monetary policy as a tool to foster economic expansion, as "There are two ways to expand output—to promote investment (by increasing capital stock) and, at the same time, to promote consumption" (Keynes, 1936). However, with the development of the New Keynesian Phillips curve (NKPC), which implies that stabilising inflation stabilises the output gap (Blanchard & Gali, 2005), inflation targeting is considered the key element of the optimal monetary policy (Clarida i in., 1999).

CONCLUSION #5

The research results do not provide evidence for rejecting Hypothesis E, that there is a negative relationship between the degree of monetary freedom (prices stability and limited state interventions) and the volatility of the business cycle fluctuations. The study indicates that that the higher (lower) the level of monetary freedom, the smoother (more volatile) the business cycle, while each point of IEF Business Freedom inversely stands for 4% of the business cycle deviation, which is the highest score of all IEF components.

6.2.6 Market Openness

IEF monitors 'Market Openness' in three areas: Trade Freedom, Investment Freedom and Financial Freedom. Results obtained in this research indicate that:

1) Trade Freedom, which assesses a country's extent of barriers affecting international trade is statistically insignificant in all the models.

2) Investment Freedom, which assesses a country's level of constraints on capital investments is insignificant in all the models.

3) Financial Freedom, which assesses a country's level of financial freedom (e.g., the extent of government regulation of financial services, the degree of state intervention in banks, government influence on the allocation of credit and openness to foreign competition, is statistically significant in all the models

Research results in the area of IEF Financial Freedom have negative coefficient amounting to average of -1.2, statistically significant at p-value < 0.05. It means, that the higher (lower) the financial freedom in a given country , the smoother (more volatile) the business cycle. After assessing the scale of the impact, it may be stated that each point of IEF Financial Freedom inversely stands for 1% of the business cycle deviation as compared to its trend line.

Model #	11	12	13	14	15	16	17	18	19	20	Average
DV	131	131	112	112	90	90	122	122	137	137	118
$\|\beta\|$	1.16	0.94	1.30	1.06	1.14	0.84	1.33	1.06	1.47	1.61	1.19
DV / $\|\beta\|$	113.0	138.6	86.4	105.5	78.9	107.4	91.8	115.9	93.2	84.7	99.4
$\|\beta\|$ / DV	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Table 22 Impact of IEF Financial Freedom on Business Cycle Deviation. Source: Own study

The research result in the area of trade freedom and investment freedom is not in line with the Dawson's (2010) and Campbell & Snyder's (2012) results, who suggested negative impact of EFW Area 4 (Freedom to Trade Internationally), which : Tariffs, Regulatory trade barriers, Black-market exchange rates, Controls of the movement of capital and people. There are several possible reasons to explain the difference:

1) Methodology used by EFW index to measure trade and investment freedom significantly differs from the one used by IEF in these areas.

2) Aggregation of these components into one area affects models' accuracy.
3) Models' specification used by Dawson and Campbell & Snyder (OLS, Instrumental Variables) provides different output for these variables.
4) OECD countries differ from the sample in previous studies. OECD being more developed might be more resistant to international shocks.

With respect to Financial Freedom, it is not possible to refer to previous studies, as neither of them provided breakdown of the economic freedom sufficient enough to analyse this area.

In the light of main economic theories, it might be stated, that statistical insignificance of the trade and investment freedom in the OECD countries, suggest that any differences between the theories might not be that relevant for developed countries (at least not when it comes to economic fluctuations, as economic growth is not the object of this study). Alternatively, bearing in mind that the results do not correspond to previous studies, it might be further investigated why developed countries are more resistant to 'contagion effect' of international shocks (Rigobon, 2002). A possible explanation might be the business cycle synchronisation in the Eurozone, which stands for most of the research sample (see Mundell's optimum currency area in (Bruzda, 2011), (Grodzicki & Beck, 2014).

Statistically, significant negative effect of IEF Investment Freedom on business cycle fluctuations is in line with the views of monetarism, the Austrian school and the New Classical Macroeconomics. It is not only contrary to Keynesian's views but also to the Financial Instability Theory, which focuses on the financial sector—swings of the financial markets generate business cycles (Minsky, 1974) —while the negative effect is amplified by the size of development of the financial sector (Bernanke et al., 1999). It seems that overregulating and interfering in the financial markets is not an effective tool for stabilising the economy. Conversely, it might disturb real-time information on price, causing careless investment decisions that market participants make, increase cost of capital and limiting competition. The Financial Instability Theory in its Keynesian-like approach towards regulating financial markets is

not confirmed by the research result. On the other hand, the theory serves well to explain economic crisis, such as the 2007-2009 global financial crisis. In this regard, its diagnosis regarding mild monetary policy seems to be justified by the research result.

CONCLUSION #6

The research result provides some evidence for rejecting Hypothesis F, that there is a negative relationship between the degree of Market Openness and the volatility of the business cycle fluctuations. IEF Trade Freedom along with IEF Investment Freedom turned out to be statistically insignificant. On the other hand, IEF Financial Freedom has a statistically significant effect—the higher (lower) the level of financial freedom, the smoother (more volatile) the business cycle, while each point of IEF Financial Freedom inversely stands for 1% of the business cycle deviation.

6.3 Chapter Summary

This research investigated the impact of the economic freedom on business cycle fluctuations through 20 fixed effects regression models, 10 of which tested the overall score of the Index of Economic Freedom (5 with control variables, 5 without) while another 10 its components against deviation cycle extracted using 5 different filters (3 HP, CF, BK). Models' coefficients of determination are within the interval of 0,42-0,57 and, based on the joint test result on named regressors (F-test), models seem to be fit the data well.

There were 6 hypotheses set out for this research. The summary of the tests result is presented in the Table 23.

Hypothesis	Test Result	Findings	Recommendation For Further Research
Hypothesis A: There is a negative relationship between the degree of Economic Freedom and the volatility of the business cycle fluctuations.	failed to reject	- EF is a non-homogenous concept - cannot relate to any theory other than classical - the higher (lower) the level of economic freedom, the smoother (more volatile) the business cycle - each point of IEF Overall Score inversely stands for 6% of the business cycle deviation	- recommended approach in further research: Break down EF into its components
Hypothesis B: There is a negative relationship between the degree of Legal System Efficiency and the volatility of the business cycle fluctuations.	rejected	- statistically insignificant or short time span of data	further research recommended to overcome short timespan of data for Judicial Effectiveness
Hypothesis C: There is a negative relationship between the degree of Government Size and the volatility of the business cycle fluctuations.	partly rejected	- net effect of stabilising tax policy and (as it turned out) procyclical government spending seems to be anticyclical - each point of IEF Government Size stands for 1% of the business cycle deviation as compared to its trend line	- optimal level of the government spending - find appropriate channels of its distribution
Hypothesis D: There is a negative relationship between the degree of Business Freedom and the volatility of the business cycle fluctuations.	failed to reject	- the higher (lower) the level of business freedom, the smoother (more volatile) the business cycle - each point of IEF Business Freedom inversely stands for 1% of the business cycle deviation	
Hypothesis E: There is a negative relationship between the degree of Monetary Freedom and the volatility of the business cycle fluctuations.	failed to reject	- the higher (lower) the level of monetary freedom, the smoother (more volatile) the business cycle - each point of IEF Business Freedom inversely stands for 4% of the business cycle deviation - the highest impact of all IEF components	
Hypothesis F: There is a negative relationship between the degree of Market Openness and the volatility of the business cycle fluctuations.	partly rejected	- IEF Trade Freedom and IEF Investment Freedom turned out to be statistically insignificant - IEF Financial Freedom - the higher (lower) the level of financial freedom, the smoother (more volatile) the business cycle - each point of IEF Financial Freedom inversely stands for 1% of the business cycle deviation	- investigate Market Openness and Investment Openness on another sample of countries

Table 23 Summary of Research Results. Source: Own study.

Results suggest that there is a negative effect of the economic freedom on business cycle fluctuations, meaning that the higher the economic freedom score, the smoother the business cycle. Although this is the case for the overall score of the economic freedom, it must be stressed that due to its non-homogeneity, it cannot be related directly to any economic doctrine (apart from purely classical), nor any specific outcome for practical application are possible. It is recommended that all future research on economic freedom break it down to its components. Nevertheless, it is worth highlighting, that each point of the Overall Score inversely stands for 6% of the business cycle deviation (non-linear effect was not investigated in this study). Comparing this figure to the score of the IEF components, which are lower, it may be concluded that a cumulative effect of increasing their score is an effective way to stabilise the economy.

Of all components of the Index of Economic Freedom, Monetary Freedom has the highest score, amounting to 4%. The higher the score, the smoother the business cycle fluctuations. The same relationship was observed for Business Freedom and Financial Freedom, although their impact was lower, amounting to appr. 1% of the business cycle deviation as compared to its trend line. This conclusion seems to be an important argument in the discussion related to regulatory policies in that respect. It seems, that stable inflation and low government/central bank interventions in the free-market price mechanism are of utmost importance. The research did not confirm that efficient legal system has a stabilising effect on the economy, however, transparent rules of doing business remains crucial (measured by Business Freedom). Due to insufficient data in the Judicial Effectiveness category, it is recommended to conduct similar research in the future or find a proxy for this variable.

The research indicates that Market Openness and Investment Freedom are not statistically significant. Perhaps, it results from the fact that countries in the sample are mostly developed members of the eurozone which benefit from cycles synchronisation and potentially higher resistance to external shocks than less developed countries. This poses a recommendation for further research.

Interesting results are obtained for the Government Size category. As expected, tax policy has a stabilising effect, however government spending does not. The net effect of redistribution policy (collecting taxes less social transfers and autonomous investments) seems to have a stabilising effect. At this point, finding the optimal level of the government spending and appropriate channels of distribution is a challenge for further research. As of now, it seems that higher taxes mitigate economic fluctuations, but government spending act in the opposite direction.

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The research result provide verification to the views on the relation between economic freedom and business cycle volatility to be found in main economic doctrines. Rooting back to the summary of it presented in the Table 3 on the page58, correctness of each in now presented in the Table 24.

Freedom Category		Research Result	Keynesian School	Monetarism	Austrian School	Financial Instability Theory	New Classical Macroeconomics
Overall Economic Freedom		the higher level, the smoother fluctuations	discrepant	confirmed	confirmed	n/a	confirmed
Economic Freedom Components:							
Efficient Legal System		the more effective, the smoother fluctuations	discrepant	discrepant	discrepant	discrepant	discrepant
Government Size	**Tax Burden**	tax policy acts as an automatic stabilizer	confirmed	discrepant	discrepant	n/a	discrepant
	Government Spending	government spending are procyclical	discrepant	confirmed	confirmed	n/a	confirmed
Business Freedom		the higher level, the smoother fluctuations	discrepant	confirmed	confirmed	n/a	confirmed
Monetary Freedom		the higher level, the smoother fluctuations	discrepant	confirmed	confirmed	n/a	confirmed
Market Openness	**Trade Freedom**	the higher level, the smoother fluctuations	discrepant	discrepant	discrepant	discrepant	discrepant
	Investment Freedom	the higher level, the smoother fluctuations	discrepant	discrepant	discrepant	discrepant	discrepant
	Financial Freedom	the higher level, the smoother fluctuations	discrepant	confirmed	confirmed	discrepant	confirmed

Table 24 Verification of The Economic Freedom Impact on Business Cycle Volatility In The Light Of The Main Economic Doctrines. Source: Own study

On the overall level of the economic freedom, more liberal theories (monetarism, Austrian school, NCM) are confirmed. At the same time, Keynesian school shows disparity. While (as in most other economic freedom components Financial Instability Theory was neither confirmed nor found discrepant as it does not provide clear views). Also, on the level of economic freedom components, in most cases, more liberal views are confirmed. Keynesian views are only confirmed with respect to stabilizing effect of tax policy. All main theories are found discrepant in those areas which turned out to be statistically insignificant. Four components, which are found statistically significant, confirm liberal views. In summary, low government spending, high economic freedom in the area of business freedom, monetary freedom and

financial freedom, have stabilizing effect based on the research result, as well as in the light of several major economic doctrines.

7 CONCLUSION

The main objective of this dissertation was to investigate the impact of economic freedom on economic cycle fluctuations. Due to lack of one comprehensive economic theory, as well as scarcity of empirical research, the study aimed at filling in this gap by conducting a thorough analysis and relating the results to each of the leading economic doctrines. The topic is important both for academic discussion, but even more important for policy makers and their economic advisors. The study clearly indicates that economic freedom affects business cycle volatility.

Research hypotheses tested the effect of economic freedom on economic cycle volatility both on the level of the overall score of the Index of Economic Freedom (IEF), as well as on the level of its components. These were independent variables of the 20 fixed effects regression models. On the other hand, economic fluctuations were represented by deviation cycle of the real GDP per capita, obtained using 5 different extraction filters, and stood for dependent variable.

KEY FINDINGS

Key findings of the research include:

- Economic freedom is a non-homogenous concept composed of several areas, which can be grouped into categories such as: Quality of institutions, government size, business freedom, monetary freedom, and market openness.
- Despite limitation for practical implication resulting from its non-homogeneity, research results indicate that there is a negative effect of economic freedom on business cycle volatility. Each point of IEF inversely stands for 6% of the business cycle deviation as compared to its trend line (non-linear effect was not investigated in this study).

- There is a cumulative effect of IEF components – high scores in several categories result in total higher impact on economic stabilization.
- Of all components, monetary freedom (stable inflation, government not intervening in price mechanism) has the highest stabilizing effect amounting to 4%.
- Business freedom (meaning ease of doing business) as well as Financial Freedom (government not interfering in the financial/banking sector) also have stabilizing effect which amounts to 1%.
- In terms of government size, tax policy was confirmed to act as an automatic stabilizer (amounting to 2%), but its effect is decreased by government spending, which in fact increases deviation cycle volatility by 1%.
- Legal system efficiency, market openness (ease of international trade), and investment freedom (constraints on capital investments) were found to have no statistically significant impact.

IMPLICATION

There are at least two implications of the study:

- Impact of the overall economic freedom as well as its components on the economic fluctuations, seems to be better explained by liberal economic doctrines such as monetarism, Austrian school, and New Classic Macroeconomics.
- Practical application of this research is that, to stabilize the economy, policy makers and their economic advisors shall refrain from attempting to steer the market.

LIMITATIONS

As every empirical study, this dissertation has several limitations:

- The number of countries in the sample was limited to 34, almost all of which are OECD members. It provided reliable data and made the sample relatively homogenous. Perhaps, a larger sample, or a sample composed of low-income countries, could provide different insights.

- Independent variables for this study were components of the Index of Economic Freedom, scores of which consist both of qualitative and quantitative judgment. This carries the risk of bias.
- The study was based on deviation cycle of the real GDP, which was obtained with the help of extraction filters, limited by their construction and filtering parameters. Also, other variables could be used in place of GDP to measure business activity, or other variables measuring poverty or income/wealth inequality.
- Models in this research were fixed effect regression models. Although they seem to be appropriate tool for this study, usage of other econometric tools would be useful to confirm the results.

RECOMMENDATIONS FOR FURTHER RESEARCH

Given scarcity of empirical works in that field, any attempt to better understand the economic freedom-business cycle relation is important. Based on this dissertation, several recommendations can be made:

- Regardless of the economic freedom index (IEF or EFW) used in the research—due to its non-homogeneity—it should be always broken down to its components.
- IEF Judicial Effectiveness provided short timespan of data. Future research should aim at finding a proxy for this variable.
- Social transfers seem to be an inevitable part of contemporary economic policy. Due to destabilising effect of the government spending on the economic cycle, its optimal level and appropriate channels of distribution shall be identified.
- In the light of some major liberal economic doctrines, market openness and investment openness should have stabilising effect on the economy. This, however, was not confirmed in the research, probably because of the countries' sample. Investigation on less developed economies is advised.

FINAL REMARKS

The research creates room for all studies based on a combination of (a) Business cycle variable and (b) Any single component, or a group of components, of economic freedom. A study focused on one area only, could provide a more in-depth understanding of the matter.

The Introduction to this dissertation, quoted the Bible, which said that Pharaoh designated Joseph to collect all the food in the prosperous years to keep it as a reserve for the country against the seven years of famine. Today, we could call it 'a stabilising effect of the governmental policy to mitigate negative effect of external supply shocks'. Throughout the ages, policy makers have made attempts to influence the economy for (let us hope so) what they believed was the best for their people. Given the research result, which found its confirmation in some of the major economic doctrines, it seems that economic fluctuations are smoother when the market and its participants are free.

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9 APPENDICES

APPENDIX 1 CHOOSING PANEL DATA MODEL – OLS, FE, RE

(choosing the model: OLS, Fixed, Random)

Model 4: Pooled OLS, using 3128 observations

Included 34 cross-sectional units

Time-series length = 92

Dependent variable: CYCLE

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	340.929	48.9390	6.966	<0.0001	***
PropertyRights	−0.992863	0.346038	−2.869	0.0041	***
GovernmentIntegrity	0.302965	0.295820	1.024	0.3058	
TaxBurden	1.83376	0.301209	6.088	<0.0001	***
GovernmentSpending	0.153540	0.189520	0.8102	0.4179	
BusinessFreedom	0.718079	0.329917	2.177	0.0296	**
MonetaryFreedom	−5.35404	0.467458	−11.45	<0.0001	***
TradeFreedom	0.655964	0.566217	1.159	0.2467	
InvestmentFreedom	1.33770	0.297243	4.500	<0.0001	***
FinancialFreedom	−0.741164	0.241384	−3.070	0.0022	***

Mean dependent var	130.5600	S.D. dependent var	153.6177
Sum squared resid	65319938	S.E. of regression	144.7388
R-squared	0.114812	Adjusted R-squared	0.112257
F(9, 3118)	44.93517	P-value(F)	1.81e-76
Log-likelihood	−19995.01	Akaike criterion	40010.03
Schwarz criterion	40070.51	Hannan-Quinn	40031.74
rho	0.770874	Durbin-Watson	0.451946

```
(Gretl: Test → Panel Diagnostics)
Diagnostics: using n = 34 cross-sectional units

Fixed effects estimator
allows for differing intercepts by cross-sectional unit

                    coefficient  std. error  t-ratio    p-value
  ------------------------------------------------------------
  const              714.550      71.2343      10.03    2.53e-023 ***
```

```
  PropertyRights       −0.689735    0.443469    −1.555   0.1200
  GovernmentIntegr~    −0.549487    0.476188    −1.154   0.2486
  TaxBurden             1.57804     0.551797     2.860   0.0043    ***
  GovernmentSpendi~     0.496798    0.303715     1.636   0.1020
  BusinessFreedom      −0.393030    0.419097    −0.9378  0.3484
  MonetaryFreedom      −7.40831     0.507404   −14.60    9.76e-047 ***
  TradeFreedom          2.41165     0.681048     3.541   0.0004    ***
  InvestmentFreedom    −1.94527     0.399269    −4.872   1.16e-06  ***
  FinancialFreedom     −0.454152    0.355421    −1.278   0.2014

Residual variance: 5.71566e+007/(3128 - 43) = 18527.3

Joint significance of differing group means: (F-statistics)
 F(33, 3085) = 13.3519 with p-value 2.173e-067 Fixed is better
(A low p-value counts against the null hypothesis that the pooled OLS model
is adequate, in favor of the fixed effects alternative.)

Variance estimators:
 between = 1532.33
 within = 18527.3
theta used for quasi-demeaning = 0.659181

Random effects estimator
allows for a unit-specific component to the error term

                     coefficient  std. error  t-ratio    p-value
  ------------------------------------------------------------------
  const              563.160      58.3759       9.647   1.01e-021 ***
  PropertyRights      −0.451147    0.408514    −1.104   0.2695
  GovernmentIntegr~    0.0500765   0.388797     0.1288  0.8975
  TaxBurden            1.18100     0.436167     2.708   0.0068    ***
  GovernmentSpendi~    0.411138    0.261273     1.574   0.1157
  BusinessFreedom     −0.114422    0.400044    −0.2860  0.7749
  MonetaryFreedom     −6.88641     0.494663   −13.92    8.72e-043 ***
  TradeFreedom         2.18847     0.636222     3.440   0.0006    ***
  InvestmentFreedom   −1.14564     0.373250    −3.069   0.0022    ***
  FinancialFreedom    −0.257246    0.321530    −0.8001  0.4237


Breusch-Pagan test statistic:
 LM = 1130.85 with p-value = prob(chi-square(1) > 1130.85) = 6.4991e-248 Random
is better
(A low p-value counts against the null hypothesis that the pooled OLS model
```

is adequate, in favor of the random effects alternative.)

Hausman test statistic:
H = 47.7153 with p-value = prob(chi-square(9) > 47.7153) = 2.88671e-007
(A low p-value counts against the null hypothesis that the random effects
model is consistent, in favor of the fixed effects model.) →Fixed is the best

APPENDIX 2 MODELS OUTPUT

DEPENDENT VARIABLE = |Cyclical_component|/Trend * 10000

Model 1: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP1600

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	669.096	62.9639	10.63	<0.0001	***
OverallScore	−8.24032	0.894738	−9.210	<0.0001	***

Mean dependent var	130.5600	S.D. dependent var	153.6177
Sum squared resid	42176496	S.E. of regression	118.5304
LSDV R-squared	0.428442	Within R-squared	0.316594
LSDV F(125, 3002)	18.00250	P-value(F)	1.1e-276
Log-likelihood	−19310.87	Akaike criterion	38873.73
Schwarz criterion	39635.80	Hannan-Quinn	39147.27
rho	0.672018	Durbin-Watson	0.639803

Joint test on named regressors -
Test statistic: F(1, 3002) = 84.8197
with p-value = P(F(1, 3002) > 84.8197) = 5.96714e-020

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 3002) = 27.6361
with p-value = P(F(33, 3002) > 27.6361) = 6.8532e-147

Wald joint test on time dummies -
Null hypothesis: No time effects
Asymptotic test statistic: Chi-square(91) = 1344.13
with p-value = 5.31331e-222

Model 2: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP1600

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	985.876	196.723	5.011	<0.0001	***
OverallScore	−6.40411	1.04996	−6.099	<0.0001	***
Populationgrowthannual	−16.3891	6.60659	−2.481	0.0132	**
Unemploymenttotaloftotal	5.04643	1.09519	4.608	<0.0001	***
Finalconsumptionexpenditure	−5.75202	1.46396	−3.929	<0.0001	***
Adjustedsavingsnetnational	0.645397	0.720132	0.8962	0.3702	
Exportsofgoodsandservices	−3.76157	0.921358	−4.083	<0.0001	***
Importsofgoodsandservices	3.37987	0.982742	3.439	0.0006	***
Oresandmetalsexportsofm	−1.88207	0.871843	−2.159	0.0310	**
Inflationconsumerpricesann	0.351527	0.0613020	5.734	<0.0001	***
Foreigndirectinvestmentnet	0.371627	0.247737	1.500	0.1337	
Netinvestmentinnonfinancial	4.09445	4.04603	1.012	0.3116	
Humancapitalindex	−9.26443	43.3206	−0.2139	0.8307	

Mean dependent var	130.5600	S.D. dependent var	153.6177
Sum squared resid	41052113	S.E. of regression	117.1547
LSDV R-squared	0.443679	Within R-squared	0.334813
LSDV F(136, 2991)	17.53968	P-value(F)	2.1e-286
Log-likelihood	−19268.61	Akaike criterion	38811.21
Schwarz criterion	39639.81	Hannan-Quinn	39108.62
rho	0.659612	Durbin-Watson	0.661052

Joint test on named regressors -
Test statistic: F(12, 2991) = 14.062
with p-value = P(F(12, 2991) > 14.062) = 6.56286e-029

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2991) = 13.1259
with p-value = P(F(33, 2991) > 13.1259) = 6.37684e-066

Wald joint test on time dummies -
Null hypothesis: No time effects
Asymptotic test statistic: Chi-square(91) = 1236.8
with p-value = 2.66316e-200

Model 3: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP700

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	593.908	54.7077	10.86	<0.0001	***
OverallScore	−7.35233	0.777415	−9.457	<0.0001	***

Mean dependent var	112.2862	S.D. dependent var	133.6994
Sum squared resid	31840887	S.E. of regression	102.9881
LSDV R-squared	0.430362	Within R-squared	0.324845
LSDV F(125, 3002)	18.14414	P-value(F)	9.0e-279
Log-likelihood	−18871.21	Akaike criterion	37994.42
Schwarz criterion	38756.48	Hannan-Quinn	38267.95
rho	0.607150	Durbin-Watson	0.775527

Joint test on named regressors -
Test statistic: F(92, 3002) = 15.6998
with p-value = P(F(92, 3002) > 15.6998) = 1.39302e-191

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 3002) = 27.0507
with p-value = P(F(33, 3002) > 27.0507) = 8.92881e-144

Model 4: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP700

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	970.018	170.160	5.701	<0.0001	***
OverallScore	−5.76904	0.908190	−6.352	<0.0001	***
Populationgrowthannual	−18.3798	5.71452	−3.216	0.0013	***
Unemploymenttotaloftotal	3.22431	0.947310	3.404	0.0007	***
Finalconsumptionexpenditure	−5.26977	1.26628	−4.162	<0.0001	***
Adjustedsavingsnetnational	0.423338	0.622895	0.6796	0.4968	
Exportsofgoodsandservices	−2.52628	0.796950	−3.170	0.0015	***
Importsofgoodsandservices	2.39428	0.850045	2.817	0.0049	***
Oresandmetalsexportsofm	−2.00289	0.754121	−2.656	0.0080	***
Inflationconsumerpricesann	0.391164	0.0530246	7.377	<0.0001	***
Foreigndirectinvestmentnet	0.346868	0.214286	1.619	0.1056	
Netinvestmentinnonfinancial	5.77276	3.49971	1.649	0.0992	*
Humancapitalindex	−33.3317	37.4712	−0.8895	0.3738	

Mean dependent var	112.2862	S.D. dependent var	133.6994
Sum squared resid	30714278	S.E. of regression	101.3356
LSDV R-squared	0.450518	Within R-squared	0.348733
LSDV F(136, 2991)	18.03165	P-value(F)	5.3e-294
Log-likelihood	−18814.87	Akaike criterion	37903.73
Schwarz criterion	38732.33	Hannan-Quinn	38201.15
rho	0.590242	Durbin-Watson	0.806581

Joint test on named regressors -
Test statistic: F(103, 2991) = 15.5494
with p-value = P(F(103, 2991) > 15.5494) = 5.81757e-207

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2991) = 13.8044
with p-value = P(F(33, 2991) > 13.8044) = 7.32646e-070

Model 5: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP200

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	470.447	44.6721	10.53	<0.0001	***
OverallScore	−5.80024	0.634806	−9.137	<0.0001	***

Mean dependent var	89.76280	S.D. dependent var	108.5131
Sum squared resid	21230555	S.E. of regression	84.09600
LSDV R-squared	0.423407	Within R-squared	0.317206
LSDV F(125, 3002)	17.63555	P-value(F)	2.7e-271
Log-likelihood	−18237.30	Akaike criterion	36726.61
Schwarz criterion	37488.67	Hannan-Quinn	37000.14
rho	0.509256	Durbin-Watson	0.975146

Joint test on named regressors -
Test statistic: F(92, 3002) = 15.1591
with p-value = P(F(92, 3002) > 15.1591) = 1.03275e-184

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 3002) = 26.7621
with p-value = P(F(33, 3002) > 26.7621) = 3.09822e-142

Model 6: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP200

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	887.305	137.830	6.438	<0.0001	***
OverallScore	−4.44974	0.735636	−6.049	<0.0001	***
Populationgrowthannual	−14.9571	4.62877	−3.231	0.0012	***
Unemploymenttotaloftotal	2.12020	0.767324	2.763	0.0058	***
Finalconsumptionexpenditure	−4.59045	1.02569	−4.475	<0.0001	***
Adjustedsavingsnetnational	0.280204	0.504546	0.5554	0.5787	
Exportsofgoodsandservices	−1.48036	0.645531	−2.293	0.0219	**
Importsofgoodsandservices	1.62293	0.688539	2.357	0.0185	**
Oresandmetalsexportsofm	−2.00968	0.610840	−3.290	0.0010	***
Inflationconsumerpricesann	0.392651	0.0429500	9.142	<0.0001	***
Foreigndirectinvestmentnet	0.364442	0.173572	2.100	0.0358	**
Netinvestmentinnonfinancial	5.80981	2.83477	2.049	0.0405	**
Humancapitalindex	−59.1874	30.3517	−1.950	0.0513	*

Mean dependent var	89.76280	S.D. dependent var	108.5131
Sum squared resid	20151769	S.E. of regression	82.08208
LSDV R-squared	0.452705	Within R-squared	0.351901
LSDV F(136, 2991)	18.19164	P-value(F)	1.9e-296
Log-likelihood	−18155.74	Akaike criterion	36585.48
Schwarz criterion	37414.08	Hannan-Quinn	36882.89
rho	0.480959	Durbin-Watson	1.030361

Joint test on named regressors -
Test statistic: F(103, 2991) = 15.7673
with p-value = P(F(103, 2991) > 15.7673) = 6.25672e-210

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2991) = 15.7442
with p-value = P(F(33, 2991) > 15.7442) = 4.6777e-081

Model 7: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYCF

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	642.269	49.9739	12.85	<0.0001	***
OverallScore	−7.03443	0.710146	−9.906	<0.0001	***

Mean dependent var	122.4232	S.D. dependent var	133.5047
Sum squared resid	26568907	S.E. of regression	94.07658
LSDV R-squared	0.523292	Within R-squared	0.389063
LSDV F(125, 3002)	26.36283	P-value(F)	0.000000
Log-likelihood	−18588.11	Akaike criterion	37428.22
Schwarz criterion	38190.28	Hannan-Quinn	37701.75
rho	0.815301	Durbin-Watson	0.354956

Joint test on named regressors -
Test statistic: F(92, 3002) = 20.78
with p-value = P(F(92, 3002) > 20.78) = 3.22279e-253

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 3002) = 44.2721
with p-value = P(F(33, 3002) > 44.2721) = 3.58449e-230

Model 8: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYCF

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	837.673	153.540	5.456	<0.0001	***
OverallScore	−5.07626	0.819485	−6.194	<0.0001	***
Populationgrowthannual	−39.9145	5.15637	−7.741	<0.0001	***
Unemploymenttotaloftotal	2.25294	0.854785	2.636	0.0084	***
Finalconsumptionexpenditure	−2.11663	1.14260	−1.852	0.0641	*
Adjustedsavingsnetnational	1.51948	0.562056	2.703	0.0069	***
Exportsofgoodsandservices	−0.745840	0.719110	−1.037	0.2997	
Importsofgoodsandservices	0.734108	0.767020	0.9571	0.3386	
Oresandmetalsexportsofm	−2.54188	0.680465	−3.736	0.0002	***
Inflationconsumerpricesann	0.367270	0.0478456	7.676	<0.0001	***
Foreigndirectinvestmentnet	−0.0730813	0.193356	−0.3780	0.7055	
Netinvestmentinnonfinancial	8.81202	3.15789	2.790	0.0053	***
Humancapitalindex	−59.4482	33.8113	−1.758	0.0788	*

Mean dependent var	122.4232	S.D. dependent var	133.5047
Sum squared resid	25007466	S.E. of regression	91.43798
LSDV R-squared	0.551308	Within R-squared	0.424967
LSDV F(136, 2991)	27.02234	P-value(F)	0.000000
Log-likelihood	−18493.38	Akaike criterion	37260.76
Schwarz criterion	38089.36	Hannan-Quinn	37558.17
rho	0.806089	Durbin-Watson	0.370891

Joint test on named regressors -
Test statistic: F(103, 2991) = 21.4606
with p-value = P(F(103, 2991) > 21.4606) = 1.7241e-283

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2991) = 22.2261
with p-value = P(F(33, 2991) > 22.2261) = 1.47809e-117

Model 9: Fixed-effects, using 2312 observations
Included 34 cross-sectional units
Time-series length = 68
Dependent variable: CYCLEINTENSITYBK

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	803.759	83.6299	9.611	<0.0001	***
OverallScore	−10.1893	1.13132	−9.007	<0.0001	***

Mean dependent var	136.5633	S.D. dependent var	153.8764
Sum squared resid	26859442	S.E. of regression	110.2433
LSDV R-squared	0.509145	Within R-squared	0.399854
LSDV F(101, 2210)	22.69651	P-value(F)	3.2e-269
Log-likelihood	−14101.05	Akaike criterion	28406.09
Schwarz criterion	28992.17	Hannan-Quinn	28619.71
rho	0.867283	Durbin-Watson	0.255340

Joint test on named regressors -
Test statistic: F(68, 2210) = 21.6535
with p-value = P(F(68, 2210) > 21.6535) = 3.69115e-195

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2210) = 26.0571
with p-value = P(F(33, 2210) > 26.0571) = 1.73726e-132

Model 10: Fixed-effects, using 2312 observations
Included 34 cross-sectional units
Time-series length = 68
Dependent variable: CYCLEINTENSITYBK

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	668.021	289.071	2.311	0.0209	**
OverallScore	−7.27697	1.37434	−5.295	<0.0001	***
Populationgrowthannual	−22.3526	7.38405	−3.027	0.0025	***
Unemploymenttotaloftotal	6.83899	1.29893	5.265	<0.0001	***
Finalconsumptionexpenditure	−7.40643	1.92567	−3.846	0.0001	***
Adjustedsavingsnetnational	0.318851	0.878202	0.3631	0.7166	
Exportsofgoodsandservices	−4.51851	1.19042	−3.796	0.0002	***
Importsofgoodsandservices	3.14141	1.27283	2.468	0.0137	**
Oresandmetalsexportsofm	−2.64587	1.04755	−2.526	0.0116	**
Inflationconsumerpricesann	5.21634	1.66717	3.129	0.0018	***
Foreigndirectinvestmentnet	−0.0443580	0.283197	−0.1566	0.8755	
Netinvestmentinnonfinancial	5.92200	4.90974	1.206	0.2279	
Humancapitalindex	154.814	60.0998	2.576	0.0101	**

Mean dependent var	136.5633	S.D. dependent var	153.8764
Sum squared resid	25945122	S.E. of regression	108.6214
LSDV R-squared	0.525854	Within R-squared	0.420283
LSDV F(112, 2199)	21.77511	P-value(F)	1.2e-277
Log-likelihood	−14061.01	Akaike criterion	28348.02
Schwarz criterion	28997.30	Hannan-Quinn	28584.68
rho	0.861016	Durbin-Watson	0.267158

Joint test on named regressors -
Test statistic: F(79, 2199) = 20.1802
with p-value = P(F(79, 2199) > 20.1802) = 1.13171e-203

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2199) = 11.3571
with p-value = P(F(33, 2199) > 11.3571) = 2.47222e-054

DET 1600

Model 11: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP1600

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	667.221	80.9629	8.241	<0.0001	***
PropertyRights	−0.0489398	0.388104	−0.1261	0.8997	
GovernmentIntegrity	−0.775561	0.436310	−1.778	0.0756	*
TaxBurden	1.91069	0.510728	3.741	0.0002	***
GovernmentSpending	−0.998787	0.286114	−3.491	0.0005	***
BusinessFreedom	−1.68497	0.390717	−4.312	<0.0001	***
MonetaryFreedom	−4.41296	0.513171	−8.599	<0.0001	***
TradeFreedom	−0.313994	0.809883	−0.3877	0.6983	
InvestmentFreedom	0.171905	0.370902	0.4635	0.6431	
FinancialFreedom	−1.15570	0.314126	−3.679	0.0002	***

Mean dependent var	130.5600	S.D. dependent var	153.6177
Sum squared resid	41046954	S.E. of regression	117.0886
LSDV R-squared	0.443749	Within R-squared	0.334897
LSDV F(133, 2994)	17.95838	P-value(F)	2.3e-288
Log-likelihood	−19268.41	Akaike criterion	38804.82
Schwarz criterion	39615.27	Hannan-Quinn	39095.72
rho	0.665184	Durbin-Watson	0.654039

Joint test on named regressors -
Test statistic: F(9, 2994) = 18.8124
with p-value = P(F(9, 2994) > 18.8124) = 7.15124e-031

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2994) = 14.4324
with p-value = P(F(33, 2994) > 14.4324) = 1.67118e-073

Wald joint test on time dummies -
Null hypothesis: No time effects
Asymptotic test statistic: Chi-square(91) = 1175.05
with p-value = 7.02969e-188

DET 1600 CTRL

Model 12: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP1600

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	818.589	210.423	3.890	0.0001	***
PropertyRights	0.0420019	0.406419	0.1033	0.9177	
GovernmentIntegrity	−0.558734	0.467717	−1.195	0.2323	
TaxBurden	2.00283	0.517798	3.868	0.0001	***
GovernmentSpending	−0.786589	0.338863	−2.321	0.0203	**
BusinessFreedom	−1.56611	0.406726	−3.851	0.0001	***
MonetaryFreedom	−4.48439	0.539046	−8.319	<0.0001	***
TradeFreedom	1.15275	0.831285	1.387	0.1656	
InvestmentFreedom	0.308506	0.374791	0.8231	0.4105	
FinancialFreedom	−0.941898	0.329994	−2.854	0.0043	***
Populationgrowthannual	−21.5533	6.77670	−3.181	0.0015	***
Unemploymenttotaloftotal	5.71453	1.13133	5.051	<0.0001	***
Finalconsumptionexpenditure	−6.26653	1.50247	−4.171	<0.0001	***
Adjustedsavingsnetnational	0.311561	0.713640	0.4366	0.6624	
Exportsofgoodsandservices	−3.42252	0.941747	−3.634	0.0003	***
Importsofgoodsandservices	2.38895	1.00800	2.370	0.0179	**
Oresandmetalsexportsofm	−2.49493	0.894528	−2.789	0.0053	***
Inflationconsumerpricesann	0.214467	0.0646452	3.318	0.0009	***
Foreigndirectinvestmentnet	0.448567	0.245286	1.829	0.0675	*
Netinvestmentinnonfinancial	6.46301	4.05845	1.592	0.1114	
Humancapitalindex	48.5862	45.1329	1.077	0.2818	

Mean dependent var	130.5600	S.D. dependent var	153.6177
Sum squared resid	39912976	S.E. of regression	115.6726
LSDV R-squared	0.459116	Within R-squared	0.353271
LSDV F(144, 2983)	17.58369	P-value(F)	1.2e-298
Log-likelihood	−19224.59	Akaike criterion	38739.19
Schwarz criterion	39616.17	Hannan-Quinn	39053.97
rho	0.652371	Durbin-Watson	0.675528

Joint test on named regressors -
Test statistic: F(20, 2983) = 12.9116
with p-value = P(F(20, 2983) > 12.9116) = 2.39748e-041

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2983) = 9.522
with p-value = P(F(33, 2983) > 9.522) = 7.24932e-045

Wald joint test on time dummies -
Null hypothesis: No time effects
Asymptotic test statistic: Chi-square(91) = 1038.01
with p-value = 1.63101e-160

Model 13: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP700

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	633.873	70.0445	9.050	<0.0001	***
PropertyRights	−0.259961	0.335766	−0.7742	0.4389	
GovernmentIntegrity	−0.462100	0.377471	−1.224	0.2210	
TaxBurden	2.09109	0.441853	4.733	<0.0001	***
GovernmentSpending	−0.481913	0.247530	−1.947	0.0516	*
BusinessFreedom	−1.53203	0.338027	−4.532	<0.0001	***
MonetaryFreedom	−4.27733	0.443966	−9.634	<0.0001	***
TradeFreedom	−0.650251	0.700665	−0.9280	0.3535	
InvestmentFreedom	0.116515	0.320883	0.3631	0.7166	
FinancialFreedom	−1.29886	0.271764	−4.779	<0.0001	***

Mean dependent var	112.2862	S.D. dependent var	133.6994
Sum squared resid	30722560	S.E. of regression	101.2985
LSDV R-squared	0.450369	Within R-squared	0.348558
LSDV F(133, 2994)	18.44583	P-value(F)	9.8e-296
Log-likelihood	−18815.29	Akaike criterion	37898.58
Schwarz criterion	38709.03	Hannan-Quinn	38189.48
rho	0.595730	Durbin-Watson	0.798023

Joint test on named regressors -
Test statistic: F(100, 2994) = 16.0196
with p-value = P(F(100, 2994) > 16.0196) = 1.3314e-208

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2994) = 14.4686
with p-value = P(F(33, 2994) > 14.4686) = 1.03228e-073

Model 14: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP700

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	783.514	181.503	4.317	<0.0001	***
PropertyRights	−0.373098	0.350562	−1.064	0.2873	
GovernmentIntegrity	−0.436468	0.403436	−1.082	0.2794	
TaxBurden	2.09327	0.446634	4.687	<0.0001	***
GovernmentSpending	−0.349085	0.292291	−1.194	0.2325	
BusinessFreedom	−1.24593	0.350827	−3.551	0.0004	***
MonetaryFreedom	−4.19252	0.464962	−9.017	<0.0001	***
TradeFreedom	0.775612	0.717036	1.082	0.2795	
InvestmentFreedom	0.310664	0.323281	0.9610	0.3366	
FinancialFreedom	−1.06482	0.284641	−3.741	0.0002	***
Populationgrowthannual	−24.9221	5.84534	−4.264	<0.0001	***
Unemploymenttotaloftotal	3.78804	0.975841	3.882	0.0001	***
Finalconsumptionexpenditure	−5.30188	1.29597	−4.091	<0.0001	***
Adjustedsavingsnetnational	0.126408	0.615560	0.2054	0.8373	
Exportsofgoodsandservices	−1.97752	0.812318	−2.434	0.0150	**
Importsofgoodsandservices	1.24077	0.869463	1.427	0.1537	
Oresandmetalsexportsofm	−2.46650	0.771587	−3.197	0.0014	***
Inflationconsumerpricesann	0.261195	0.0557607	4.684	<0.0001	***
Foreigndirectinvestmentnet	0.431142	0.211575	2.038	0.0417	**
Netinvestmentinnonfinancial	8.41036	3.50067	2.402	0.0163	**
Humancapitalindex	29.7218	38.9300	0.7635	0.4452	

Mean dependent var	112.2862	S.D. dependent var	133.6994
Sum squared resid	29695935	S.E. of regression	99.77503
LSDV R-squared	0.468736	Within R-squared	0.370326
LSDV F(144, 2983)	18.27715	P-value(F)	0.000000
Log-likelihood	−18762.13	Akaike criterion	37814.27
Schwarz criterion	38691.25	Hannan-Quinn	38129.04
rho	0.579077	Durbin-Watson	0.828430

Joint test on named regressors -
Test statistic: F(111, 2983) = 15.8052
with p-value = P(F(111, 2983) > 15.8052) = 1.15191e-222

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2983) = 10.0091
with p-value = P(F(33, 2983) > 10.0091) = 1.02547e-047

Model 15: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP200

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	541.411	56.9281	9.510	<0.0001	***
PropertyRights	−0.292235	0.272891	−1.071	0.2843	
GovernmentIntegrity	−0.336066	0.306786	−1.095	0.2734	
TaxBurden	1.99614	0.359112	5.559	<0.0001	***
GovernmentSpending	−0.0417400	0.201178	−0.2075	0.8357	
BusinessFreedom	−1.20566	0.274728	−4.389	<0.0001	***
MonetaryFreedom	−3.73181	0.360830	−10.34	<0.0001	***
TradeFreedom	−0.866777	0.569460	−1.522	0.1281	
InvestmentFreedom	0.0319656	0.260795	0.1226	0.9025	
FinancialFreedom	−1.13721	0.220874	−5.149	<0.0001	***

Mean dependent var	89.76280	S.D. dependent var	108.5131
Sum squared resid	20293764	S.E. of regression	82.32949
LSDV R-squared	0.448849	Within R-squared	0.347334
LSDV F(133, 2994)	18.33283	P-value(F)	4.9e-294
Log-likelihood	−18166.72	Akaike criterion	36601.45
Schwarz criterion	37411.90	Hannan-Quinn	36892.35
rho	0.490257	Durbin-Watson	1.010735

Joint test on named regressors -
Test statistic: F(100, 2994) = 15.9334
with p-value = P(F(100, 2994) > 15.9334) = 1.86158e-207

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2994) = 15.051
with p-value = P(F(33, 2994) > 15.051) = 4.48547e-077

Model 16: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYHP200

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	735.287	146.728	5.011	<0.0001	***
PropertyRights	−0.513737	0.283396	−1.813	0.0700	*
GovernmentIntegrity	−0.466825	0.326139	−1.431	0.1524	
TaxBurden	1.92421	0.361061	5.329	<0.0001	***
GovernmentSpending	−0.0219270	0.236289	−0.09280	0.9261	
BusinessFreedom	−0.817478	0.283610	−2.882	0.0040	***
MonetaryFreedom	−3.47936	0.375877	−9.257	<0.0001	***
TradeFreedom	0.363694	0.579655	0.6274	0.5304	
InvestmentFreedom	0.226502	0.261342	0.8667	0.3862	
FinancialFreedom	−0.836043	0.230105	−3.633	0.0003	***
Populationgrowthannual	−21.1079	4.72540	−4.467	<0.0001	***
Unemploymenttotaloftotal	2.53381	0.788874	3.212	0.0013	***
Finalconsumptionexpenditure	−4.31674	1.04767	−4.120	<0.0001	***
Adjustedsavingsnetnational	0.0720201	0.497621	0.1447	0.8849	
Exportsofgoodsandservices	−0.819732	0.656681	−1.248	0.2120	
Importsofgoodsandservices	0.521403	0.702878	0.7418	0.4583	
Oresandmetalsexportsofm	−2.37135	0.623754	−3.802	0.0001	***
Inflationconsumerpricesann	0.278841	0.0450771	6.186	<0.0001	***
Foreigndirectinvestmentnet	0.442226	0.171038	2.586	0.0098	***
Netinvestmentinnonfinancial	8.68853	2.82996	3.070	0.0022	***
Humancapitalindex	−6.47974	31.4712	−0.2059	0.8369	

Mean dependent var	89.76280	S.D. dependent var	108.5131
Sum squared resid	19406807	S.E. of regression	80.65855
LSDV R-squared	0.472937	Within R-squared	0.375859
LSDV F(144, 2983)	18.58798	P-value(F)	0.000000
Log-likelihood	−18096.83	Akaike criterion	36483.66
Schwarz criterion	37360.64	Hannan-Quinn	36798.44
rho	0.464992	Durbin-Watson	1.060109

Joint test on named regressors -
Test statistic: F(111, 2983) = 16.1835
with p-value = P(F(111, 2983) > 16.1835) = 4.95302e-228

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2983) = 11.4772
with p-value = P(F(33, 2983) > 11.4772) = 2.66672e-056

Model 17: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYCF

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	659.263	63.9966	10.30	<0.0001	***
PropertyRights	−0.102206	0.306774	−0.3332	0.7390	
GovernmentIntegrity	0.0838424	0.344879	0.2431	0.8079	
TaxBurden	1.95422	0.403702	4.841	<0.0001	***
GovernmentSpending	−0.895527	0.226157	−3.960	<0.0001	***
BusinessFreedom	−1.49832	0.308840	−4.851	<0.0001	***
MonetaryFreedom	−3.49999	0.405633	−8.628	<0.0001	***
TradeFreedom	−1.37324	0.640167	−2.145	0.0320	**
InvestmentFreedom	0.283520	0.293177	0.9671	0.3336	
FinancialFreedom	−1.33372	0.248299	−5.371	<0.0001	***

Mean dependent var	122.4232	S.D. dependent var	133.5047
Sum squared resid	25646217	S.E. of regression	92.55199
LSDV R-squared	0.539847	Within R-squared	0.410280
LSDV F(133, 2994)	26.41002	P-value(F)	0.000000
Log-likelihood	−18532.83	Akaike criterion	37333.66
Schwarz criterion	38144.11	Hannan-Quinn	37624.56
rho	0.810885	Durbin-Watson	0.367366

Joint test on named regressors -
Test statistic: F(100, 2994) = 20.8298
with p-value = P(F(100, 2994) > 20.8298) = 7.45116e-270

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2994) = 24.506
with p-value = P(F(33, 2994) > 24.506) = 4.84831e-130

Model 18: Fixed-effects, using 3128 observations
Included 34 cross-sectional units
Time-series length = 92
Dependent variable: CYCLEINTENSITYCF

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	698.016	163.655	4.265	<0.0001	***
PropertyRights	−0.459591	0.316088	−1.454	0.1461	
GovernmentIntegrity	0.0709674	0.363763	0.1951	0.8453	
TaxBurden	1.85193	0.402713	4.599	<0.0001	***
GovernmentSpending	−0.492129	0.263548	−1.867	0.0620	*
BusinessFreedom	−1.19533	0.316328	−3.779	0.0002	***
MonetaryFreedom	−3.61505	0.419238	−8.623	<0.0001	***
TradeFreedom	0.392439	0.646524	0.6070	0.5439	
InvestmentFreedom	0.579421	0.291490	1.988	0.0469	**
FinancialFreedom	−1.05630	0.256650	−4.116	<0.0001	***
Populationgrowthannual	−45.3810	5.27052	−8.610	<0.0001	***
Unemploymenttotaloftotal	2.71099	0.879879	3.081	0.0021	***
Finalconsumptionexpenditure	−2.44610	1.16853	−2.093	0.0364	**
Adjustedsavingsnetnational	1.13529	0.555027	2.045	0.0409	**
Exportsofgoodsandservices	−0.290384	0.732436	−0.3965	0.6918	
Importsofgoodsandservices	−0.346770	0.783961	−0.4423	0.6583	
Oresandmetalsexportsofm	−2.91232	0.695711	−4.186	<0.0001	***
Inflationconsumerpricesann	0.245516	0.0502772	4.883	<0.0001	***
Foreigndirectinvestmentnet	−0.00414493	0.190769	−0.02173	0.9827	
Netinvestmentinnonfinancial	10.3232	3.15642	3.271	0.0011	***
Humancapitalindex	−4.02857	35.1017	−0.1148	0.9086	

Mean dependent var	122.4232	S.D. dependent var	133.5047
Sum squared resid	24142605	S.E. of regression	89.96331
LSDV R-squared	0.566825	Within R-squared	0.444854
LSDV F(144, 2983)	27.10672	P-value(F)	0.000000
Log-likelihood	−18438.33	Akaike criterion	37166.67
Schwarz criterion	38043.65	Hannan-Quinn	37481.45
rho	0.800666	Durbin-Watson	0.385242

Joint test on named regressors -
Test statistic: F(111, 2983) = 21.5348
with p-value = P(F(111, 2983) > 21.5348) = 6.25111e-300

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2983) = 17.2357
with p-value = P(F(33, 2983) > 17.2357) = 1.45302e-089

Model 19: Fixed-effects, using 2312 observations
Included 34 cross-sectional units
Time-series length = 68
Dependent variable: CYCLEINTENSITYBK

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	684.970	120.264	5.696	<0.0001	***
PropertyRights	0.630728	0.521680	1.209	0.2268	
GovernmentIntegrity	−0.120242	0.538550	−0.2233	0.8233	
TaxBurden	1.83694	0.693806	2.648	0.0082	***
GovernmentSpending	−1.90665	0.334551	−5.699	<0.0001	***
BusinessFreedom	−1.82403	0.482628	−3.779	0.0002	***
MonetaryFreedom	−5.26420	0.693727	−7.588	<0.0001	***
TradeFreedom	−0.392157	1.01049	−0.3881	0.6980	
InvestmentFreedom	0.323744	0.441238	0.7337	0.4632	
FinancialFreedom	−1.46576	0.363620	−4.031	<0.0001	***

Mean dependent var	136.5633	S.D. dependent var	153.8764
Sum squared resid	26031495	S.E. of regression	108.7279
LSDV R-squared	0.524276	Within R-squared	0.418354
LSDV F(109, 2202)	22.26358	P-value(F)	3.9e-278
Log-likelihood	−14064.85	Akaike criterion	28349.70
Schwarz criterion	28981.75	Hannan-Quinn	28580.08
rho	0.864339	Durbin-Watson	0.264805

Joint test on named regressors -
Test statistic: F(76, 2202) = 20.8395
with p-value = P(F(76, 2202) > 20.8395) = 3.88262e-204

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2202) = 13.992
with p-value = P(F(33, 2202) > 13.992) = 4.9187e-069

Model 20: Fixed-effects, using 2312 observations
Included 34 cross-sectional units
Time-series length = 68
Dependent variable: CYCLEINTENSITYBK

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	400.280	311.870	1.283	0.1995	
PropertyRights	0.783317	0.527510	1.485	0.1377	
GovernmentIntegrity	0.705648	0.598638	1.179	0.2386	
TaxBurden	2.37035	0.697903	3.396	0.0007	***
GovernmentSpending	−1.32017	0.411497	−3.208	0.0014	***
BusinessFreedom	−1.98697	0.492076	−4.038	<0.0001	***
MonetaryFreedom	−5.16432	0.780788	−6.614	<0.0001	***
TradeFreedom	1.39947	1.04267	1.342	0.1797	
InvestmentFreedom	0.286644	0.447284	0.6409	0.5217	
FinancialFreedom	−1.61243	0.385338	−4.184	<0.0001	***
Populationgrowthannual	−23.8550	7.51941	−3.172	0.0015	***
Unemploymenttotaloftotal	7.82135	1.34480	5.816	<0.0001	***
Finalconsumptionexpenditure	−8.53760	1.95990	−4.356	<0.0001	***
Adjustedsavingsnetnational	−0.0588587	0.862367	−0.06825	0.9456	
Exportsofgoodsandservices	−5.66487	1.21330	−4.669	<0.0001	***
Importsofgoodsandservices	3.38425	1.27896	2.646	0.0082	***
Oresandmetalsexportsofm	−2.64313	1.08163	−2.444	0.0146	**
Inflationconsumerpricesann	1.40732	1.85944	0.7569	0.4492	
Foreigndirectinvestmentnet	0.140371	0.279679	0.5019	0.6158	
Netinvestmentinnonfinancial	2.59559	5.04009	0.5150	0.6066	
Humancapitalindex	223.403	62.2716	3.588	0.0003	***

Mean dependent var	136.5633	S.D. dependent var	153.8764
Sum squared resid	24986528	S.E. of regression	106.7903
LSDV R-squared	0.543372	Within R-squared	0.441702
LSDV F(120, 2191)	21.72683	P-value(F)	2.1e-289
Log-likelihood	−14017.49	Akaike criterion	28276.98
Schwarz criterion	28972.23	Hannan-Quinn	28530.39
rho	0.857827	Durbin-Watson	0.276965

Joint test on named regressors -
Test statistic: F(87, 2191) = 19.9245
with p-value = P(F(87, 2191) > 19.9245) = 1.63511e-215

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(33, 2191) = 9.67589
with p-value = P(F(33, 2191) > 9.67589) = 7.69377e-045