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SPIS TREŚCI

EDITORIAL

We are passing the successive, third in 2020, issue of the quarterly *Myśl Ekonomiczna i Polityczna* [*Economic and Political Thought*] to you. By tradition, the third issue is developed in English. The present one is composed of two parts: the first one contains scientific articles and the second one reviews of scientific works.

The first article written by Ewelina Florczak and Tomasz Gardziński is titled *Economic transformation through social market economy and social enterprise*. The authors, as the title suggests, discuss the issue of transformation in Eastern and Central Europe in the 90s in the context of the implications of social market economy assumptions. As it is acknowledged, the time of transformation, which actually started after the collapse of the Soviet Union, was a complicated and difficult period not only for the states of Central and Eastern Europe but first of all for those countries' societies.

In the second article Salome Sakvarelidze raises extraordinarily topical issues. There is no country in the world that has not suffered from the COVID-19 pandemic that has been affecting us since 2019. In her article titled *The World during the Coronavirus: Remote Work and Virtual Teams in Georgia*, the author analyses the impact of the pandemic on working from home in the public and private sectors from the Georgian point of view. Moreover, the text identifies and examines factors influencing employees' remote work and tries to determine in what conditions remote work and virtual teams can be a profitable investment in public and private organisations.

The third and the most abundant scientific article in this issue is the text by Deepanshu Lakhwan (and Aaradhya Dave as the co-author) titled *Determining the most efficient technical indicator based on trend, volume, momentum, and volatility for investing in financial markets*. The author, an MA student of economics tries to present the activities and the application of technical factors used in trade in various financial instruments on the American stock exchange.

The author of the next article is Akerke Demeubayeva. The text is titled *The Impact of Bilateral Trade Between the US and Mexico on the US Industrial Production Before and Under the Presidency of Donald Trump*. The article provides an interesting overview of Donald Trump's tenure and his impact on US-Mexican trade relations.

The title of the sixth article is *Attitudes of Medical Students towards the Covid-19 Pandemic in the Sociology of Medicine* and its author is Marcin Madziała. By conducting empirical research, the author shows the important issue of the attitude of medical students towards the COVID-19 pandemic.

The author of the last article is Mariusz Karbowski. The text is titled *Discourse on Organisational Memory in Evidence-Based Management*. The article focuses on highlighting the approach of historical evidence-based management in the plane of organizational memory. The author treats the subject as a discursive interpretation. Based on the analysis of the literature on the subject, he presents an analogy between evidence-based management and management in the context of turning the past into the present.

Two reviews close the just released issue of *Economic and Political Thought*. One of them, written by Iana Okrhimenko, is about a book titled *Humanomics. Moral Sentiments and the Wealth of Nations in the Twenty-First Century* published by the prestigious Cambridge University Press in 2019. The other one, written by Adrian Chojan, presents opinions about a book by Józef M. Fiszer, Tomasz Stępniewski and Konrad Świder titled *Polska–Ukraina–Białoruś–Rosja. Obraz politycznej dynamiki regionu* [*Poland–Ukraine–Belarus–Russia: Picture of the region's political dynamics*]. The reviewed work was published by the publishing house of the Institute of Political Studies of the Polish Academy of Sciences in 2019.

We wish you a pleasant reading experience and encourage you to cooperate with our Editorial Board and Lazarski University, one of the best higher education institutions in Poland.

Adrian Chojan, PhD
Editor-in-Chief

ARTICLES AND STUDIES

Ewelina Florczak*, Tomasz Gardziński**

ECONOMIC TRANSFORMATION THROUGH SOCIAL MARKET ECONOMY AND SOCIAL ENTERPRISE

DOI: 10.26399/meip.3(70).2020.15/e.florczak/t.gardzinski

Introduction

The period of transformation was not only a time of political and economic changes. The social outlook, the system of values and the development strategy of particular countries were changing. Transformation was preceded by the experience of Western countries in the introduction of economic systems. The article presents economic paradigms that have been implemented over the years: Keynesian economics, social market economy, and neoliberal economics. However, economic systemic changes in Central and Eastern Europe that began in the 1990s also triggered negative consequences in the form of unemployment, inflation and economic disparities. This was linked with the difficulties in conducting transformation in the Eastern bloc countries. The important thing is that the introduction of transformation was shaped when threads related to institutional and behavioural economics, and above all the socialization of economic activity started to appear in economic sciences. As the next two decades have proven, in the economic system there are no entities that can achieve a social goal in terms of market system and

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independently of systemic economic paradigms. The authors argue that as a result of lack or incomplete or inconsistent implementation of the concept of social market economy in the process of economic transformation in the countries of Central and Eastern Europe social enterprises are gaining more and more importance in performing social functions.

1. Literature Review and Methodology

Piotr Pysz (Pysz 2006; 2008; 2012) and Elżbieta Mączyńska (Pysz, and Mączyńska 2003), Michał Moszyński (2014; 2015; 2016), Anna Jurczuk (Pysz, Jurczuk, and Moszyński 2014), Martin Dahl (2013; 2015; 2017), Grzegorz Kołodko (2010), Maciej Miszewski (2012), Urszula Zagóra-Jonszta (1999; 2018) are the leading Polish researchers of the social market economy and transformation. Jacek Brdulak, Ewelina Florczak, and Tomasz Gardziński (2016; 2017; 2019), Katarzyna Duczkowska-Małysz (2012), Katarzyna Głąbicka (2011), Jan Herbst (2006) are Polish scientists who study social enterprises.

The methodology of the paper consisted in the analysis of source texts and works of leading scientific experts. The authors use deductive, comparative and historical methods of selected scientific publications to compare the dominant concepts of economic policies: Keynesian, supply-side economics and the social market economy, as well as to compare Eucken's ordoliberal principles with the principles of the Washington Consensus. The adopted methodology was chosen because of the way of forming the thesis in terms of order, which makes the authors apply the interdisciplinary approach described in literature by the above-mentioned leading researchers as a methodological holism complementing the methodological individualism that prevails in economic sciences. Theoretical considerations obtained as a result of the deduction method are compared with the observations in the field of economic practice of social enterprises, determining, in the final analysis, the statistical method of their social usefulness according to the employment rate in the EU countries. The authors are aware that the results do not exhaust the issue and signal the need for in-depth research on social enterprises in the order of the social market economy, which exists in the countries of Central and Eastern Europe.

2. Economic Impact Theories: Ordoliberalism, Neoliberalism, Keynesism

The introduction of liberal democracy in a country transforming itself as a recipe for success is too simplistic. Nowhere was economic liberalism able to solve the problem of unemployment, or find a cure for the biggest socio-economic problem of the end of the 20th and the beginning of the 21st century (...) without demanding optimal regulatory solutions from the state, apart from limiting its role. Approaching full employment, as well as greater equality and social justice in rejecting strictly socialist solutions is ensured by Social Market Economy in which the state, through the use of ordoliberal principles, takes full responsibility for shaping the socio-economic order, as shown in the Table 1.

Table 1

Ordoliberalism, neoliberalism and Keynesian – comparative analysis

Concepts of economic policy	**Economic order**	**The course of the management process**		
	shaping order	**macroeconomic dimension**	**microeconomic dimension**	**human units and their emotions**
Ordoliberalism	Yes	Yes	Yes	Yes
Neoliberalism	No	Yes	Yes/No	No
Keynesianism	No	Yes	No	Yes/No

Source: Pysz 2012.

Building social welfare, especially in the transition countries, requires economic governance in terms of order. Economic order is a stable form and framework conditions for the course of the management process, defining the applicable rules of the economic game within which the state, enterprises, households and individuals make decisions and implement economic activities (Pysz 2008: 37).

In the ordoliberal theory of economic order, we distinguish economic governance from the economic process, which should take place without state intervention.

> Just as a judge has no right to participate in a match, the state cannot take part in the game (Erhard 2000: 135).

This order should be understood in terms of "Ordnung" order and the "ordo" (Mączyńska 2010: 179) equilibrium system from which the term ordoliberalism derives. On the other hand, ordoliberalism itself is the economic doctrine on which the West German economy was based after World War II, and generally it can be said that it is "orderly" liberalism, combining liberal views with elements of conservative thought and Catholic social teaching (Dahl 2013: 70).

The currently dominant form of capitalism in the form of neoliberal doctrine is experiencing a deep crisis, which for a very long time not only did not alleviate economic inequalities and often did not include ethical values, but it did not include social and ecological issues. As Martin Dahl rightly points out,

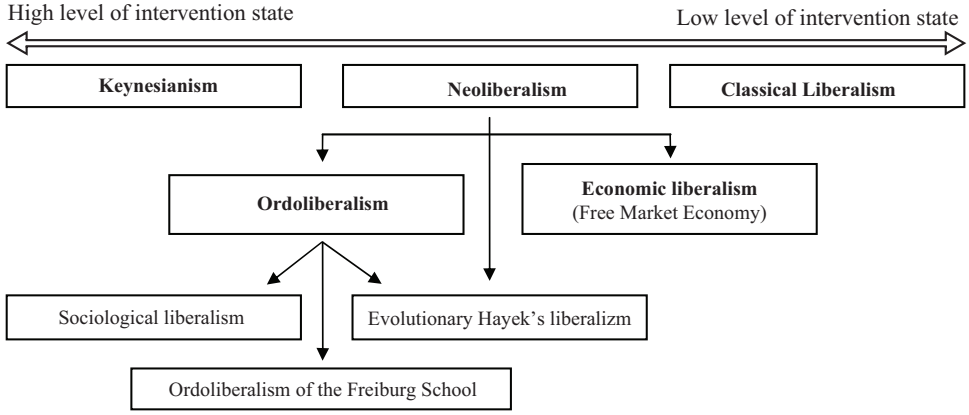
> the consequence of the dominance of the neoliberal approach in socio-economic policy is the violation of the global, regional and local balance of socio-economic life. It manifests itself in growing uncertainty and risk in the lives of people, but also in business entities. Rising unemployment, increased disproportion of property and income, and the vulnerability of many countries to crises contribute to the popularization of anti-systemic attitudes, including those rejecting the free market and democracy (Dahl 2015: 71).

Many economists share these views, and Grzegorz Kołodko, a well-known Polish economist, states that finally the second great utopia of the end of the twentieth and early twenty-first century – that collapsing neoliberalism, which leaves such a poor legacy – will go to the past (Kołodko 2010: 125).

Of course, given the economic transformation, one should balance views and admit that capitalism as such has contributed to economic, competitive, innovative and thus technological development, building social well-being in Western countries in particular, but also led to deep inequalities and social tensions, often dehumanizing human dignity. It does not need to be argued that current capitalism based on neoliberalism requires a thorough change; however, with great criticism in the face of its crisis, one should not condemn liberal economic and social thought as such, as well as perceive conceptual differences between liberalism, neoliberalism and ordoliberalism, pictured in Figure 1.

Figure 1

The place of ordoliberalism in relation to other economic theories



Source: Dahl 2015: 53.

As you can see above, ordoliberalism is a variation of German neoliberalism, which also derives from classical liberalism to a large extent. In addition, the concept of neoliberalism was created by the ordoliberal Alexander Rüstow at the 1983 Lipman Colloquium in Paris, which had the overtones of social liberalism. This concept has evolved through the representatives of other schools, including F. von Hayek and liberalism with the theory of the spontaneous order, and the trend of neoliberalism currently dominant, and originating mainly from the Chicago School represented by the "pope monetarist" Milton Friedman. In addition to these neoliberal versions, German neoliberalism was formed around the spiritual leader of ordoliberalism, Walter Eucken, who founded the "Freiburg School" in 1930 with Franz Böhm and Hans Grossmann-Doerth (Eucken 2005). The theory of the competitive economic order grew out of ordoliberalism and forms the basis of the Social Market Economy introduced by Ludwig Erhard together with the currency reform in 1948 in post-war Germany, whose success was defined as an "economic miracle".

Being on the verge of the economic transformation of the country or in the course of it and taking the path of reforms, we should firstly answer the question what the most important differences in theories of economic order are. The recent crisis clearly showed that both Keynesianism and neoliberalism are focused on interventions in the course of the management process. Indeed, already one of the first loudest crises of the 1930s and

the threat of totalitarianism allowed, in opposition to ordoliberalism, the Keynesian doctrine assuming direct interference in the course of the management process to spread, because, as John Maynard Keyenes urged, an imbalanced economy is not always able to recover its equilibrium. First of all, it served fiscal policy and public procurement of the state stimulating demand and consumption, even at the expense of debt and inflation, or subsequent discretionary actions in the course of the management process. Keynes's concept focused on global demand, not on economic order, was calculated and is for a short period, contrary to ordoliberalism designed for a long period. Nevertheless, Erhard accepted that the recommendations of Keyenes in the area of monetary and credit policy are useful when dealing with a deep economic crisis (Wünsche 2010: 116).

However, the proof of the superiority of ordoliberal economic policy is the failed experiment of Keynes's introduction of Karl Shiller's concept to the Social Market Economy in 1967–1982 in the Federal Republic of Germany. Despite the similarities of Keynesianism to ordoliberalism in pursuit of full employment, support for those excluded as a result of the market game, or the inclusion of human spirits, and its behaviour in economic life, the basic charge of intervention in the economic process was the recognition of monopolies as natural by Keynesianism. In contradiction to Christian ordoliberal ethics, the Keynesian approach to the role of savings remained. (...) According to ordoliberals, today's savings determine tomorrow's consumption. They meant putting off demand, not reducing it (Zagóra-Jonszta 1999: 32). Excessive look at John Maynard Keynes, through the prism of mathematics, on economics made virtue recognizing consumerism and saving money.

The dissolution of Keynesianism took place during the stagflation of the 1970s through neoliberalism reflected in the application of monetarism and supply economics based on spontaneous order in the US economic policy during the regime of Roland Regan and the formula TINA (There is no alternative) in Great Britain used by the British Prime Minister Margaret Thatcher. Despite the contradictions between both economic doctrines, the common denominator, as Piotr Pysz also notes, is the direct impact on the course of the management process. According to Keynes, this means that the state controls the course of the economic process using fiscal and monetary policy in a discreet way on the global demand side. In turn, the neoliberal concept of supply and monetarism affects the state through fiscal and tax policy and the rules defined by Milton Friedman specifying the increase in the amount of money in circulation depending on GDP growth or production potential of the economy, the size of aggregate supply and price stability

(Pysz 2012: 9). To sum up, the eyes of economists were always turned to demand or supply economics instead of the economic order and the course of the management process. Nevertheless, despite a number of similarities of Keynesianism to ordoliberalism, neoliberalism is nearer to him. The ordoliberalism's proximity to the Anglo-Saxon version of neoliberalism stems from the fact that ordoliberals tend to accept the validity of Saya's law. In their interpretation, this means that in the conditions of properly constructed competitive economic order, supply, and not global demand, exerts a decisive influence on the course of the management process (Mączyńska, and Pysz 2015: 11). At the same time, there is a fundamental difference between neoliberalism and ordoliberalism. According to Elżbieta Mączyńska and Piotr Pysz, in the greatest simplification, neoliberalism characterizes market fundamentalism and marginalizing the role of the state in shaping the socio-economic order, whereas in the ordoliberal concept, issues of order are of the foreground nature. Neoliberalism, unlike ordoliberalism, is characterized by the assumption that the free market will spontaneously form socio-economic order so efficiently that the role of the state can be minimized, reduced to the role of a "night watchman". Also characterized by neoliberalism "washing away" from ethical-moral and social considerations is the consequence of the assumption that the free market perfectly solves these issues (Mączyńska, and Pysz 2013: 13).

The first Prime Minister in Poland after 1989, Tadeusz Mazowiecki, was looking for Ludwig Erhard's counterpart to introduce a Social Market Economy. Unfortunately, as Tadeusz Kowalik writes, he "committed a" Columbus' error"– he was looking for a pattern in Bonn, and he was given designs from Chicago and Washington (Kowalik 2009: 273). Thus, economic reforms in Poland were closer to the "Washington Consensus" pattern than to the Social Market Economy, although a significant part of ordoliberal principles coincided with the Consensus prescriptions in the common denominator, in the free market economy for both approaches.

3. Ordoliberal Principles of the Social Market Economy and the Washington Consensus Rules

The Social Market Economy, which was founded on ordoliberalism, combines the effectiveness of management with the noble idea of social justice (Gardziński 2015: 6) and, as Alfred Müller-Armack put it, is a synthesis of freedom on the market with the implementation of social

security goals (Mączyńska and Pysz 2003: 311), which the implementer of the "economic miracle" in Germany – Ludwig Erhard supplements with the moral responsibility of every human being in relation to society as a whole (Erhard 1998: 515). The concept of the Social Market Economy, in the first place to the main principles, included in the axiological sphere freedom and responsibility, followed by the principle of social justice, human dignity, the principle of competition and a strong rule of law.

The main assumptions boil down to: resolute rejection of central planning, recognition of the market as the most important element of the economic system, the fight against monopolies, legal determination of the scope of state intervention and competition, securing private property, individual freedom and economy (Zagóra-Jonszta 1999: 17). A characteristic feature of the Social Market Economy that distinguishes it from other concepts is that the economic sphere is closely related to the social sphere. This is confirmed by Piotr Pysz, who states that:

> the coexistence of a competitive market economy and a relatively wide range of state intervention, aimed at correcting the market distribution of income in the name of the value of equality and social peace (Pysz 2006: 5).

is the essence of this economic policy.

Particularly, in a transforming country, the implementation of economic reforms should take place along with equalizing social issues to prevent social tensions and the reversal of society from the free market or democracy. As indicated by Urszula Zagóra-Jonszta, freedom should be an expression of social equality, understood not only as the equality of the individual towards the law (as interpreted by the neoclassical economists), but as material equality that limits excessive property disparities (Zagóra-Jonszta 2018). In order not to limit freedom as in the political socialist system, it is necessary to design a socio-economic policy that reforms and equalizes disproportions in society while maintaining the legal and institutional order so that freedom of liberal democracy will not be violated in the name of equality or security.

Human subjectivity first of all determines man's freedom regardless of the economic and political system in the state, which is the first and most important value in itself. This is emphasized by Friedrich August von Hayek that we must show that freedom is not only one of values, but remains the source and condition of most moral values (von Hayek 2012: 20). The

guarantor of liberal freedom understood in this way is a strong democratic state not only with shaped and constantly improved economic and political order in the era of technological development, but also with legal and social order that have a direct impact on the final shape of the economic condition of the conscious society in its parts and entirety. This is confirmed by the words of Franz Böhm, who stated that:

> The most important requirement of any economic order that deserves to be called is that the political leadership would control the economy in its entirety as well as parts (...) However, this will only be possible if when the economy is transparent and strictly orderly, and when this order is a legal and political order, it will be nurtured by the state with knowledge of things, understood and internally accepted by the citizens, and respected with devotion and discipline (Böhm 1937: 10).

Formal institutions introduced by the state set rules that must be accepted by society in order to be respected. For this, you need confidence in state institutions and public legal awareness. We assume that institutions consist of a set of restrictions imposed on behaviour in the form of rules and regulations; from a set of procedures for detecting deviations from rules and regulations; from a set of moral, ethical behavioural norms that define the scope within which the way in which rules and regulations are created and secured is limited (North 2009: 204).

It should be remembered that while formal institutions can be quickly changed, informal ones, which include traditions, customs or religion, require a lengthy process. Outlining broadly the scope of behaviour of business entities, we come to the conclusion that they stem from a culture defined as:

> a relatively integrated whole covering people's behaviour according to patterns common to social community, developed and absorbed in the course of interaction and containing products of such behaviours (Brdulak 2012).

To sum up, the ordoliberal Social Market Economy refers to the institutional economy and sociological approach to market functioning in its full awareness that the behaviour of economic entities have an impact on economic order, and are stimulated by the constituent principles (Eucken's Principles in Table 2) and regulation, which distinguishes this concept from all others through their interdisciplinary approach.

Table 2

Comparison of the principles of economic order according to Eucken and the Washington Consensus

Eucken's rules	The Washington Consensus rules
Functional price system	Introduction of market interest rates
The primacy of monetary policy	Maintaining a single exchange rate
Open markets / Freedom to enter into contracts	Liberalisation of the exchange / attracting investment / deregulation
Private property	Privatization / Warranty of property rights
Stability of economic policy	Budget discipline / Priorities in public spending
Responsibility	-
-	Tax reform

Source: developed based on: (Moszyński 2015: 195).

The ordoliberal order thus constructed bases the economy not only on knowledge and human capital, but also on values such as freedom, responsibility, justice and equality through equal material and formal chances of competing for all economic entities in society. As emphasized by Grzegorz Kołodko, an economy without values is like life without sense (Kołodko 2013: 164).

When discussing the subject of order, one should distinguish between the order made by the state and the spontaneous order as a grassroots initiative of economic entities among which there are social enterprises. As noted by Michał Moszyński:

> Differences in views on the economic order in the understanding of Eucken and Hayek, and mainly concerning its genesis, were reflected in the adopted division of institutions into formal institutions (representing the organised order), originating from the state and its organs, and on informal rules related to the behaviour and attitudes of market game participants representing the spontaneous order (Pysz, Grabska, and Moszyński 2014: 164–165).

Modern capitalism should therefore be supplemented with values and take into account human, social and moral capital apart from knowledge. In such a system economic order fulfils its material task, i.e. prosperity for everyone (Erhard 2011) which "a priori" does not include the principle of the "Washington Consensus".

The set of seven principles presented in Table 1, which should be implemented in a complete way at an appropriate historical moment, creates a system based on competition supplemented with regulatory principles. The regulatory principles allowing for state intervention include the issue of market distraction in the case of a monopoly, progressive tax in the situation of drastic income differences, the issues of non-inclusion of external effects in the economic calculation of enterprises, and the occurrence of abnormal reactions on the supply side, especially the labour market. Other assumptions included minimum co-determination in enterprises, collective agreements and statutory minimum wage guarantees, support for small and medium enterprises and social functions within the framework of income compensation such as family benefits, high unemployment benefits, housing concessions, or supporting low-cost housing.

The Washington Consensus which did not correspond to social security, was proposed by the economist J. Williamson in the form of ten points (Williamson 1990):

1) maintaining financial discipline
2) targeting public spending in areas that guarantee high efficiency of expenditure incurred and contribute to improving the structure of income distribution;
3) tax reforms aimed at reducing marginal tax rates and extending the tax base;
4) liberalization of financial markets in order to harmonise interest rates;
5) maintaining a single exchange rate at a level guaranteeing competitiveness;
6) trade liberalization;
7) elimination of barriers to foreign direct investment;
8) privatisation of state enterprises;
9) deregulation of markets in terms of market entry and fostering competition;
10) guarantee of property rights.

The author proposed a set of reforms as he was convinced of the universal agreement of economists representing the most important institutions in Washington, i.e. the International Monetary Fund, the World Bank and the US Department of the Treasury, on their use for reforming the economies of Latin American countries. The announcement of 10 principles coincided with the disintegration of the centrally planned system in the post-communist economies of Central and Eastern Europe, in which the transformation under this prescription began. Joseph Stiglitz, who was an outspoken critic of John Williamson, makes the following comparison:

> shock therapy in the approach to reforms proved to be as unreliable as the Cultural Revolution and the Bolshevik Revolution (Stiglitz 2004).

In turn, Grzegorz Kołodko, described the Leszek Balcerowicz Plan in Poland, which included consensus prescriptions as "shock therapy without therapy" and Poland's achievements mainly from the relatively rapid transition from shock policy to treatment policy after shock, and success beliefs that it was achieved not thanks to but despite the shock therapy (Kołodko 2015: 302).

This criticism was justified because the prepared set of reforms for Latin America was repeated sequentially in post-socialist countries in Europe without adapting to local conditions and adjusting the pace of change, and even ignoring local experts. Reforming has come down to the following:

> Liberalise as much as you can, privatise as quickly as you can and be hard on fiscal and monetary matters! (Kołodko 1998: 1).

Due to excessive liberalisation that did not translate into economic growth as well as the impression of implementing the interests of the institutions in Washington, not a transforming country, the principles of consensus were modified after several years in relation to the exchange rate policy, liberalisation of the capital market, a strong tax office, an independent central bank and the judiciary, and supplemented in the following areas: strengthening the financial system by increasing the country's resilience in the face of currency crises, care for the social security system, strengthening the institutional framework of the functioning of the economy, increasing expenditures on education.

Summing up the convergence between the ordoliberal principles of the Social Market Economy with the principles of the Washington Consensus presented in Table 1, the result is that this first concept is based on liberalism and overlaps where there is convergence in the universal and constitutive liberal principles of the market economy (there is a partial convergence of monetarism with ordoliberalism in terms of the universal principles of a market economy). It should be remembered that the principles of consensus were not designed in terms of order, and only the post-Washington consensus has only been approached a bit by reaching the institutional framework and social security as important - to be treated as part of the economic order. Bearing in mind the above, one cannot definitively question the Washington Consensus. As Martin Dahl points out, external interference often determines the success of reforms, especially in the initial phase at the stage of establishing

new institutions and emerging difficulties in the social and economic sphere that discourages society from following the path of reforms consistently. This happened in West Germany, where the changes were supported by the United States. In Central Europe, international organizations such as the International Monetary Fund, the World Bank and the European Union have played this role (Dahl 2017).

The state as an institution in a transforming country should not, however, release from the responsibility of shaping the economic order and if there is a contradiction between the recommendations of external institutions and the formation of ordoliberal order, the state should show assertiveness in conducting its economic policy, even at the expense of lower funding or reduction debt reduction through diplomatic negotiations.

4. Forms of the Social Economy as Tools to Perform Prosocial Actions in Economy

The period of transformation, both in Poland and in other parts of Europe, caused many disproportions in shaping the socio-economic space. In circumstances when the benchmark is the quality of citizens' life, reference should be made to prosocial categories in economic development. The necessity for the development of the social economy is most often indicated in literature in the context of various models of the presence of state institutions in ensuring prosperity for the citizens and, above all, in the crisis of a welfare state.

Social economics and social economy usually appear as a normative term that is always placed in the context of external social, economic and political conditions in a given country or a community of states – especially the European Union.

As Katarzyna Duczkowska-Małysz (Duczkowska-Małysz 2012: 492) rightly notes, the development of social economy projects was observed in the 1970s and in the 1990s – every time the world economy records economic and social signals of a crisis. In such situations there is a need to search for the forms of entrepreneurship that can be adapted for a specific group of beneficiaries and can affect the corrective effects of the supply deficit (e.g. for specific services) and problems of the labour market. Despite the fact that social entrepreneurship is already known globally, it is an attribute of local areas, and its effectiveness and impact on the local environment should be considered in these categories. On the other hand, such understanding of

social entrepreneurship may lead to equating it with problem areas. Such a stance is represented by a group of scientists who identify social enterprises with a specific type of area referred to as holistically peripheral and economically developmentally delayed. This is of course a justified concept of using the attributes of a social enterprise to generate development impulses. As it is described in literature, social enterprises are created in areas where (Ibid 2012: 3):

- Unemployment rate is much higher than the average, and the permanently unemployed have no chance of finding a job. This points at directing social enterprises to socially excluded environments.
- Defective economic structures are unable to modernise themselves and produce innovative products. The shortcomings of the technical and infrastructure facilities in the local economy are complemented by social capital, local solidarity and cooperation.
- Defective demographic structures indicate difficulties in the labour market, which will require special solutions that also indicate a specific type of service demand reported by the local community.
- There is registered degradation of the natural and cultural functions of the region's resources.
- Poorly developed technical and social infrastructure blocks the processes of economic development.

Social enterprises are an important sign of the social economy. Various forms of social enterprises can be identified within the framework of economic systems. However, it is important to indicate what common goals they want to achieve while functioning in the economy. These common goals can be determined by what distinguishes them from typically commercial entities. The main 5 differences regarding commercial and social enterprises are:

1. Reasons for being founded. A social enterprise is characterised by the fact that it is established for the reasons and social purposes of implementing changes in the socio-economic environment. In the case of commercial enterprises, they are founded for the purpose of maximizing profit and market expansion (Florczak 2017: 93–108).
2. Mission. For social enterprises, pursuing social goals is clearly connected with the mission of the enterprise, and profit is a tool to achieve these goals. Corporate social responsibility of commercial enterprises is often an additional activity that also has marketing reasons that lead to maximisation of the company's financial profits.

3. Double economic and social value. Social enterprises strive to achieve profits that are socially useful as well as have indirect and direct social impact.
4. The final goal. Goals in the case of social enterprises and commercial enterprises differ over what the accent is on. For social enterprises, the social goal is a priority with an auxiliary process of showing profits. Commercial enterprises strive to achieve financial goals and social considerations complement them.
5. Social innovations. Social enterprises in the context of economic activity seek solutions to social problems that are neither solved by public nor by non-governmental sector (Florczak, and Gardziński 2018: 101–116).

A social enterprise was not defined in literature for a long time. The evolution in defining a social enterprise is evident in the proposals of the Social Enterprise Alliance. Its original version was: a social enterprise is any business activity or strategy for generating its own revenues, undertaken by a non-profit organisation to raise funds to support its charity mission. In 2006, a new version of the definition was introduced, which was no longer limited to a "non-profit organisation" but the enterprise was considered to be a separate entity; in addition, "the charity mission" was replaced by a "social mission". That is why

> a social enterprise is an organisation or other undertaking that strives to implement a social mission through entrepreneurial action oriented towards developing its own income (Herbst 2006: 9–10).

It is worth tincluding the point of view of Muhammad Yunus, who seems most accurate. Yunus proposes two types of social enterprises (Yunus 2011: 225). One of them is a popular definition of entities not focused on maximising profits and those that provide socially useful products or services. The second type, in turn, means enterprises focused on financial profit, with a remark that their owners are poor people, and social benefits result from the ownership. In this case, thanks to the surpluses, they gain the same opportunity to exit from the socio-economic exclusion.

The presented approaches and ways of defining a social enterprise prove the ambiguity in the interpretation of this concept. Analysing the above, it can be stated that the authors agree on making reference to the desired goals and functions in the process of constructing the definition of a social enterprise. Finally, after adopting the definition of a social enterprise for the purpose of this topic, the criterion of concentrating profit on social goals

and at the same time any institutional and legal form of such an enterprise was taken into consideration. Therefore, **a social enterprise is defined as a company that pursues social goals within the relevant part of the profit – significant due to the pursued goal**. Social goals are reduced to 5 groups: Economic (enabling functioning in market conditions); Human (quantitative, qualitative); Environmental; Scientific and technological progress; Legal, structural, international (Brdulak, and Florczak 2016). Within these issues, one should refer to the broad aspect of not only the socialisation of economic activity, but also the socialisation of capital (Brdulak et al., 2019: 74–95).

In the context of social economy, the role of social enterprises is important because of their local rooting (Brdulak, et al. 2017).

It is the local nature of social enterprises that allows for the involvement of local residents' own labour resources – members of the local community, which demonstrates that, as part of local development strategies, social enterprises will become a means of achieving common goals and common needs (Prokopowicz 2015; 2016).

In addition to the issues presented, attention should be paid to the additional considerations of the emergence of social enterprises that are not related to extreme socio-economic exclusion and underdeveloped areas. A new enterprise segment appears, whose motives are related to:

- Social self-fulfilment of the entrepreneur. It is connected, above all, with an individually defined business mission;
- Social family life. Economic activity does not maximise direct profits for the entrepreneur, but it is conducted due to the weaknesses of social security of state institutions;
- Social innovations. The economic activity of a social enterprise is a tool to introduce a qualitative and alternative change to socio-economic life.

Considering the concept of a social enterprise in the context of endogenous development, one should refer to particular **factors that influence local development** (Parysek 2001) and determine a place, and share of a social enterprise in individual development determinants.

1. The needs of local communities – local economic development is directly related to meeting the growing social needs. It is also the basic sphere of activity of a socially sensitised enterprise, which is one of the assumptions of offering services to the local community and satisfying needs that are not implemented by the state and the market – that is why a social enterprise has a significant potential for improving the local development factor. Increasing

the quality of life of residents, combined with innovation is an activity consistent with the criteria and statutory purposes of a social enterprise, and the creation of convenient living conditions is the starting point for the implementation of further, more sophisticated activities.

The observation of the functioning of social enterprises demonstrates that most of them implement these types of activity in the form of social services. Katarzyna Głąbicka (Głąbicka 2011) classifies them as the following categories of services: employment, therapeutic, educational, preventing social exclusion, assistance for those who are exposed to violence or discrimination. This perspective is also accepted in the Act on social enterprise and social entrepreneurship, which is being developed. Article 5 of the Act defines the scope of services that a social enterprise can provide:

Article 5.1. Economic activity of a social enterprise
1) *is aimed at professional reintegration (...) or*
2) *is conducted only in the scope of:*
   a) social welfare (...);
   b) childcare (...);
   c) running non-public kindergartens or other forms of pre-school education (...);
   d) mental health protection (...);
   e) supporting people with disabilities (...);

2. Natural resources constitute another factor. The qualities characterising social enterprises include flexibility and innovation as well as actions for the promotion of the region. In the context of an enterprise, natural assets and significance of the place are important. Social enterprises may offer tourist and recreational services and at the same time build an external and internal image of the area; a social enterprise in Bałtów which is a significant tourist complex in Poland is an examle.

The undertaking was based on the initiative of the Association for the Development of the Commune of Bałtów "BAŁT". Currently, the complex is a leading institution in the development of tourism and promotion of the entire Świętokrzyskie Province. 120 people were involved in the founding of the association and it was the beginning of changes in the commune. Taking advantage of the environmental potential of the existing Jura Park Bałtów and other tourist attractions: rafting, Zaginiony Świat Dinozaurów (the Lost World of Dinosaurs), Kraina Koni (the Land of Horses), Zwierzyniec Bałtowski (Bałtowski Wild-life Sanctuary), Ski Slope, Stary Młyn (the Old

Mill) attract great interest of tourists. The official opening of the Jura Park Bałtów took place in 2004. In 2007 as many as 200,000 tourists visited the complex, unemployment in the municipality fell from 30% to 7–8%, and the municipal budget revenue increased from PLN 4.5 to 9 million (Bałtów info).

3. The next factor is labour force. In the local development, the human factor (level of education, occupation, professional experience, additional qualifications as well as professional traditions in the family and place of residence and personal characteristics) is of key importance. The problem arises in the case of structural unemployment and unemployment resulting from specific situations of individual people (difficult life experiences, dysfunctional family, illnesses). A social enterprise is a kind of remedy for deepening unemployment. The activity of Muhammad Yunus (Nobel Peace Prize laureate in 2007) is an example on a global scale. In 1976 founded Grameen Bank in Bangladesh – a financial institution that introduced a microcredit tool to combat unemployment and poverty of Bengalis. Since the very beginning, the bank has been directing the offers to poor women by granting them loans even to start a gainful activity. The characteristic feature of the bank is that borrowers have 93% of shares; the rest belongs to the government. By 2011, the bank granted loans to 8.3 million people (96% to women) with a total value of USD 11 billion (Yunus 2011: 193). Professional activation and vocational reintegration is based on stimulating the development of professional skills that will allow an unemployed or unskilled person to find a place in the labour market. Social cooperatives, social integration centres and social integration clubs have included such statutory activities in the Act. These projects are a way to counteract local problems, i.e., above all, unemployment that significantly inhibits local development through not using human potential, and is a chance to fight against vicious circles of poverty.

4. Infrastructural investments – in addition to the technical infrastructure commonly mentioned in the local development, institutional infrastructure plays an important role in social enterprises. We are talking about centres stimulating the development of the social economy, entities offering training, courses and educational programmes in the field of entrepreneurship and economic activation.

5. Economic potential is a factor that consists in a socio-economic, financial, political and educational structure. In the context of local development and the development of small and medium-sized enterprises, we should pay attention to local communities and regions that have achieved self-made significant economic progress. The best example is the so-called

"The Third Italy", which has been involved in the development of light and agri-food industry. The variety of products, specialisation of work, innovation and cooperative relations determined rapid development of the region with a clear tendency to increase employment in the services sector. Moreover, it should be added that the developed cooperative activity and prosocial activity of many enterprises have made social enterprises an important element of the development of this region. "The Third Italy" is the area of Northeast and Central Italy, next to "The First Italy" and "The Second Italy". A serious development of this region (based on an endogenous model) began in the late 1970s. Small enterprises acted mainly as sub-suppliers for large companies, then they undertook independent market expansion and started to operate on the basis of a variety of cooperative relations. In the years 1981–1991 employment in services in this region increased by 39.8% and the share of "The Third Italy" in total employment was 34.8%. Józef Chmiel indicates that the third Italian model was an effective alternative to the so-called traditional model of regional development (Chmiel 1997: 108–109).

6. Local and external market. The impact of the market is related to the demand for particular goods and services. The factor of local development oriented towards external markets is, as Jerzy Parysek (Parysek 2001: 110) writes, the use of uncommon local resources, unique productive skills of the local population, professional traditions, and the heritage of local culture. A social enterprise also fulfils its role here as an entity oriented on the propagation of cultural values. What is characteristic of the enterprise in the local environment is that it develops a brand to increase market recognition as well as competitiveness. It turns out that the advantages, such as the "social brand" or the "ability to carry out unusual orders", are more beneficial than winning by lowering the price. As Ryszard Skrzypiec notes, in the context of local demand, the advantage of the social enterprise mission over maximisation of profit also manifests itself in the price aspects, although for economic reasons it does not seem to be a particularly developmental factor. In the context of local market development, the issue of the so-called "local product", representing the type of craft characteristic of the area (Skrzypiec 2008: 46). This is particularly important for combining economic activity with the preservation of cultural heritage.

7. Investment capital and financial resources – When reflecting on local development, we should mention investment capital. It means that it will directly or indirectly contribute to the creation of new jobs (Parysek 2001: 110). Considering endogenous development in the context of social enterprises, financial resources should also be kept in mind, as Beata Bieńkowska writes,

focusing on acquiring external capital (e.g. foreign investors) with more and more attractive conditions, and disregarding the importance of capital in the nearest surrounding might lead to internal and external destruction (Bieńkowska 2004: 154). A social enterprise, because of its mission, may be a way to avoid financial barriers, as entities of the social economy may receive subsidies to start up in accordance with the Act. A social enterprise that focuses its activity on professional and social reintegration is privileged to enjoy tax reliefs (e.g. in the case of a social cooperative – according to the Act, at least 40% of the financial surplus for reintegration purposes, in part not included in the tax deductible expenses, is exempted from tax income). In addition, social economy entities have the right to obtain support from local governments and other partners creating instruments for financing social enterprises. As the specialists from the system point out, only a local government or other local structures linked with a local government are able, due to their competences, to focus the development on solving basic socio-economic problems of the given territorial unit and promote the supremacy of the general social interest over the individual (Parysek 2001: 213).

Conclusions

Over the years economic paradigms have been shaped in the context of historical events, changes in the political arena as well as economic transformations. In Poland at present, the provisions of the Constitution define the economic system as the social market economy. It should be noted that in the ordoliberal system of the social market economy, there is a natural place for a social enterprise based on cooperation, which, as part of self-help based on trust and a sense of common issue, is handed over by the state (Brdulak, et al. 2017: 107). In addition, the ordoliberal system of the social market model supplemented with a social enterprise is an optimal, natural and complementary social and economic solution to the problems of modern economy (Gardziński 2016: 75).

However, according to the economic practice, the greatest ability to perform social functions is played by social enterprises operating in various legal forms and various industry sectors. This is due to their direct involvement in a social goal, the way of running the business, the management model as well as the impact on the socio-economic environment. Thus, a social enterprise is a tool that can perform social functions in various systems involving the market, economic exchange, and above all, human, social

and relational capital. In addition, we usually talk about a social enterprise in terms of local development and shaping local communities, which also increases its rank in the field of endogenous local and regional development.

As Carlo Borzaga and Alceste Santuarii (2005) quotes, in 1994, in France employment in social entrepreneurship was 4.2%, while in 2002 it increased to 8.7%. Based on the Report prepared at the European Social and Economic Committee's request by CIRIEC (Centre International de Recherches et d'Information sur l'Economie Publique, Sociale et Coopérative – International Centre for Research and Information on Public, Social and Cooperative Economy), the text available on www.ngo.pl. In the UK, in the mid-1990s, social economy entities employed 4% of citizens and in 2002 about 7%. The employment dynamics in Italy are surprising: in 1994 social economy entities employed 1.8% of the population and generated 1.9% of the GDP, while in 2002 the rates were 7.5% of the employed and over 7% of the GDP. In Europe, the highest employment rate in the non-profit sector was in the Netherlands – 10,7% and Ireland – 10.6%. The ranking also includes Finland – 8.5%, Belgium – 8%, and Austria – 7.9%. (Brdulak et al., 2017: 87). Based on the above data, we can conclude that the development of social entrepreneurship in Central and Eastern Europe, i.e. in the countries that have recently joined the EU, including Romania, will not only reduce unemployment while fulfilling social functions but will also implement the Regulation of the European Parliament and of the Council on the European Union Programme for social change and innovation, which sets space and a greater role for social enterprises in the modern development process, recognizing that

> The social economy and social entrepreneurship constitute an integral part of Europe's pluralist social market economy, and play an important role in ensuring greater social convergence in Europe (Regulation of the European Parliament and Council (European Parliament 2013).

There are indicators that are worth mentioning and according to which employment in social economy evolved in the years 2003–2010 and increased in most EU countries, e.g. in Belgium, Estonia, Greece, Spain, Slovenia by approx. 62%, in Luxembourg by 122%, in Sweden and Hungary by 140%, in Malta over 600% (The Social Economy in the European Union 2013). According to current estimates resulting from research in Central and Eastern Europe, the share of social enterprises in the economy in the region is currently (2018) approx. 4%, and in Western Europe up to 11% (Brdulak, and Florczak 2016; Brdulak, et al. 2017: 74–95, 2019).

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Economic Transformation Through Social Market Economy and Social Enterprise

Abstract

The article refers to the issue of transformation of the 1990s in Central and Eastern Europe in the face of the problem of implication of the assumptions of the social market economy. The first part of the article compares the paradigms of Keynesian economics, neoliberal economics and social market economy. This part discusses the main assumptions of these trends, their differences and similarities as well as the consequences they have brought to economic systems. In the next part the authors present the problem of the Washington Consensus and the changes introduced to the Polish economy. The discussed content aims to indicate the difficulty of implementing classic principles of the social market economy in Poland.The aim of the article is to verify the thesis that social enterprises can be an alternative to the systemic market economy. In the article, social enterprises were defined as entities that are locally rooted, and are part of the process of endogenous local development.

Keywords: social market economy, ordoliberalism, Washington Consensus, economic transformation, social enterprise

Transformacja gospodarcza poprzez społeczną gospodarkę rynkową i przedsiębiorstwo społeczne

Streszczenie

Artykuł odnosi się do zagadnienia transformacji lat 90. w Europie Środkowo-Wschodniej w zestawieniu z problemem implikacji założeń społecznej gospodarki rynkowej. Pierwsza część artykułu porównuje ze sobą paradygmaty ekonomii keynesowskiej, ekonomii neoliberalnej oraz społecznej gospodarki rynkowej. W artykule zostały omówione główne założenia tych nurtów, ich różnice i podobieństwa, oraz konsekwencje, jakie wniosły do systemów gospodarczych. W kolejnej części autorzy przedstawiają problem konsensusu waszyngtońskiego i zmian, jakie wprowadził do polskiej gospodarki. Omawiane treści zmierzają do wskazania na trudności wdrożenia klasycznych

zasad społecznej gospodarki rynkowej na gruncie polskim. Celem artykułu jest weryfikacja tezy, że przedsiębiorstwa społeczne mogą być alternatywą dla systemowej gospodarki rynkowej. Przedsiębiorstwa społeczne w artykule zostały określone jako podmioty lokalnie zakorzenione i wpisujące się w proces endogenicznego rozwoju lokalnego.

Słowa kluczowe: transformacja ekonomiczna, Konsensus Waszyngtoński, społeczna gospodarka rynkowa, ordoliberalizm, przedsiębiorstwo społeczne

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Salome Sakvarelidze*

THE WORLD DURING THE COVID-19 PANDEMIC: REMOTE WORK AND VIRTUAL TEAMS IN GEORGIA

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INTRODUCTION

In the modern world, the nature of work has changed significantly. The development of information technology and creation of fast and reliable communications networks enabled organisations to become more geographically proliferated. As a result, there has been a significant growth in organisations' use of remote work and virtual teams over the past few decades, and this trend is going to continue in the future. According to the survey, 85% of 1,372 business respondents from 80 countries did remote work and 48% reported that over half their virtual team members were representing different cultures (Hoch, and Dulebohn 2017a: 569).

In a number of sectors, from cell phones to banking and financial institutions, team-working strategies and techniques have been used. Some of the earliest examples can be found in the manufacturing sector, where multi-skilled operator teams were working together to create a product (Gyllenhammar 1977: 45). Nevertheless, the same trend can be seen during the product development process, where people from different parts of the organisation work together from different places in order to create a new product or in the service sector, where people with different qualifications work together to deliver services to customers (Kimble 2011: 7).

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According to Lisa Kimball over the last years the nature of employees has changed significantly because of the changes made in the organisations and the nature of work that employees do. Organisations have become more proliferated all over the world, and the development of new technologies has led to the creation of virtual workplaces (Kimball 1997: 8).

The main purpose of the paper is to determine the current situation of the public and private sector employees in Georgia that resulted from the restrictions adopted by the country in order to reduce the threat of the coronavirus spread. In addition, the research seeks to identify and examine the factors that influence employees' remote work effectiveness and to determine under what conditions remote work and virtual teams can be a worthwhile investment in a public or private organisation.

The research has exposed the main challenges that need to be faced and dealt with in order to ensure effective and efficient functioning of remote work and virtual team systems in the country.

1. Literature Review and Theoretical Framework

Teams are organisational units that share a common objective and their members have a sense of shared responsibility for the results obtained by the team (Kimble 2011: 7). Chris Kimble (2011: 6) states that the age of globalisation, international trade, and fast communications networks enabled team members located in different buildings, different cities, or even on different continents to work together towards a common goal. Anthony Townsend et al. have defined virtual teams as a

> groups of geographically and/or organisationally dispersed co-workers that are assembled with the use of a combination of telecommunications and information technologies to accomplish an organisational task (Townsend et al. 1998: 17).

According to Bradford Bell, and Stewe Kozlowski (2002: 14) virtual teams are located in different geographical areas, have limited face-to-face contact and are using electronic communications systems in order to achieve a common organisational goals.

As Jessica Lipnack, and Jeffrey Stamps state

> a virtual team is a group of people who work on interdependent tasks guided by a common purpose. But unlike traditional, co-located teams, a virtual team works across space, time, and organisational boundaries that often extend across nations on a global basis (Lipnack and Stamps 2000: 15).

Differences in culture and time zones can affect virtual teams' performance. For example, scholars advise to take into consideration the differences in time zones since these can affect the success of remote work and virtual teams (Bringas 2008: 39). According to Pauleen (2003: 75–87), there are many different variables that can result in the remote work effective functioning. Pauleen states that collaborative behaviour such as communication, trust and leadership style can have a fundamental influence on it.

Kimball also argues that doing remote work is not about using old management methods; it is rather about expanding available tools in order to create the effective collaborative work. For instance, Kimball Fisher, and Mareen Fisher (2001: 42) found out that many companies, employees and teams routinely collaborate virtually. Some of the scholars believe that the technological expertise is not a key factor for successful virtual teams. According to them, the key factor consists in transparent and clear understanding of what it takes to get the company ready to operate virtually (Bringas 2008: 4).

Virtual teams are significantly different from traditional ones. Members of traditional teams work next to each other and have face-to-face communication, while in virtual teams they work in different locations. Moreover, virtual teams rely on electronic communication.

Sirkka Jarvenpaa, and Dorothy Leidner (1999: 811–813) have identified virtual teams' four characteristics:

- Temporary: Virtual teams are organised to perform a particular task. Virtual teams have a lot of possibilities to work in a global environment and it gives them an opportunity to have access to a range of people.
- Culturally diverse: Virtual teams' competitive advantage is that their members were born in different countries, have different nationalities and use different languages. This diversity helps a team to generate new ideas to accomplish a specific task.
- Geographically dispersed: Members of the teams are in various locations and good example of it is the IT sector.
- Communicates electronically: Information technologies are used by virtual teams to communicate. Technology offers team members the possibility of connecting with each other across time and space.

Most scholars think that managing and handling virtual teams is crucial (Hoch, and Dulebohn 2017a: 570). In the 1990s, virtual teams were established by organisations in order to work on temporary and short life cycle projects. These teams were formed mainly based on a need to gather

necessary information with the aim to solve complex or non-routine problems. In the early period virtual teams afforded limited opportunities to form social relationships, but nowadays organisations are establishing and forming virtual teams to perform ordinary daily tasks. Furthermore, companies encourage workers to work from whatever remote location they prefer (Alsharo et al. 2017: 480).

Stacie Furst et al. (2004: 9–11) mentions the importance of Tuckman's stage model of virtual team development. The model includes forming, storming, norming, and performing stages. The scholars say that virtual teams are progressing across these development stages but there are differences in the speed and development pattern, in particular:

- In the forming stage, managers provide coaching for the team members, establish a common sense of the team identity and understanding, create a clear goal and receive support from senior leaders.
- The storming steps include: face-to-face team building communication, training and finding solutions to the existing problems.
- During the norming steps, managers create team charters and set individual accountability. Also, the procedures for information sharing are being established.
- Finally, the performing steps include company culture support for the virtual team's work. Additionally, the provision of resources for the team to perform work successfully (Furst et al. 2004: 9–11).

Reducing relocation time and travel costs, greater degree of freedom to individuals involved in the development of the projects, greater productivity, shorter development times, better outcomes and attraction of better employees, higher degree of cohesion, pollution reduction, creating and dispersing improved business processes across organisations, creating competitive advantage from limited resources, allowing organisations to access the most qualified individuals for a particular job regardless of their location and better team outcomes (quality, productivity, and satisfaction), are the advantages of remote work and virtual teams that scholars have identified (Ebrahim et al. 2009: 2657–2658). Furthermore, Wayne Cascio (2000: 85) has also identified five main disadvantages of virtual teams:

- Lack of physical communication;
- Loss of face-to-face synergies;
- Lack of trust;
- Concern on predictability and reliability;
- Lack of social interaction.

Scholars have also identified seven factors for success of remote work (Serrat 2009: 3):

- Human resources policies;
- Training and on-the-job education and development;
- Standard organisational and team processes;
- Use of electronic collaboration and communication technology;
- Organisational culture;
- Leadership support for virtual teams;
- Team-leader and team-member competencies.

1.1. Input-process-outcome framework (IPO)

To function effectively, the IPO is a valuable theoretical framework that defines the key inputs, processes and outcomes for virtual teams (Ilgen et al. 2005: 527). According to Daniel Ilgen et al.

> the IPO framework assumes that input factors influence team emergent states and process factors, and that emergent states and processes impact team outcomes and mediate the relationship between input factors and team outcomes (Ilgen et al. 2005: 531).

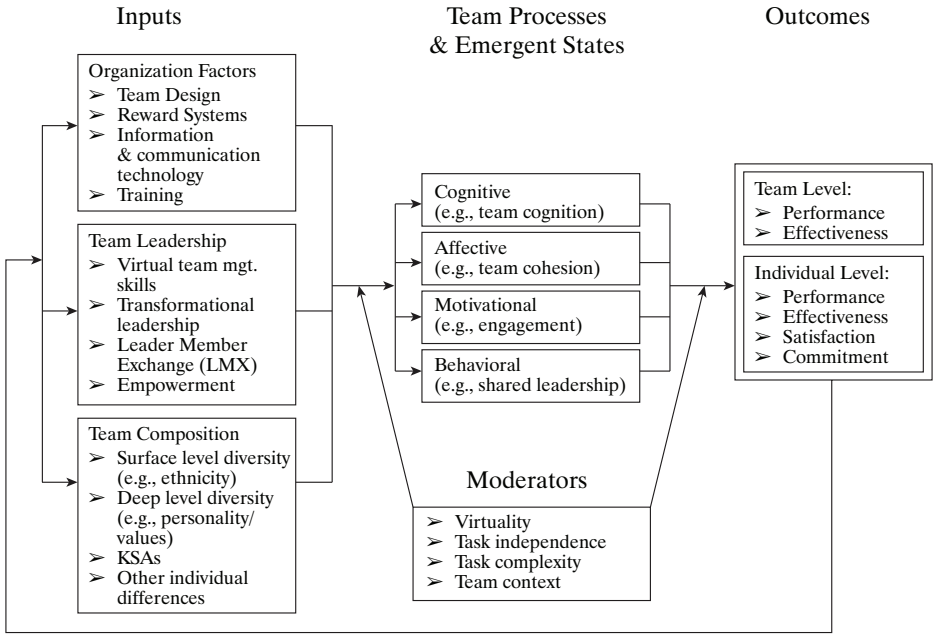
From the beginning the IPO was created and applied to make research for face-to-face teams, but nowadays the IPO model is also applied to study virtual teams. The IPO framework offers to recognise the essential factors, which is important for face-to-face or virtual teams in order to improve their efficiency and performance. See Figure 1.

The input category includes organisational, team leadership and team composition factors. The organizational level component includes such variables as team design, reward system, information and communication technology and training. In the design of virtual teams these variables represent organisational actions (Hoch, and Dulebohn 2017a: 569–570).

The second input factor is leadership. This includes leaders with advanced communication skills, strong knowledge of digital technologies, ability to promote team member participation, cultural diversity awareness, establishing trust in employees, who are geographically dispersed (Hoch, and Dulebohn 2017a: 570).

Figure 1

Input-process-ourcome model of virtual teams



Source: Hoch, and Dulebohn 2017: 571.

The third category in team composition, according to Julia Hoch, and James Dulebohn represents

> both surface level and deep level diversity and individual differences, which are expected to impact team processes and outcomes (Hoch, and Dulebohn 2013: 118).

The processes and emergent states category means the mediators between the input and outcomes components. The team processes refer to the interdependent acts of team members that transform inputs into outcomes. The team emergent states come out from complex team process interaction. The emergent states and processes include cognitive, affective, motivational and behavioural processes: cognitive processes such as team cognition, affective processes such as team coherence, motivational processes such as commitment to teamwork and finally the behavioural processes, for example shared leadership and technology usage (Hoch, and Dulebohn 2017a: 571–572).

Hoch and Dulebohn have identified such moderators as a component of processes and emergent states categories. According to the scholars

> these include factors that may moderate the input and team process pathway as well as the team process and outcomes pathway by affecting the direction and/or strength of the relationships in the model (Hoch, and Dulebohn 2017a: 572).

The moderator components are virtuality, team context, task complexity and interdependence.

The final component of the IPO framework is outputs. The outputs reflect the results of processes that turn team inputs into organisationally valued outcomes. This includes a team level, such as performance and effectiveness components and an individual level, such as performance, effectiveness, satisfaction and commitment aspects (Hoch, and Dulebohn 2017a: 572).

According to the scholars, trust, leadership, communication and technology have significant impact on success and effectiveness of remote work.

1.2. Trust

In the era of e-commerce and also for virtual teams, establishing trust in online transactions is a serious challenge (Kimble 2011: 10). Jarvenpaa et al. (2004: 255) argue that trust has direct as well as mediating impact on team effectiveness. Kaisa Henttonen, and Kirsimarja Blomqvist (2005: 107–119) think that trust in virtual teams is the key component to achieve high quality team effectiveness. They believe that trust helps in building commitment and cohesion. Additionally, it makes it possible to develop new ideas. Trust helps team members to concentrate on a given task and maximise their contribution in order to increase the organisation productivity (Bringas 2008: 28).

Pauleen (2003: 117) thinks that virtual teams need to have trust in order to operate. Scholars agree it is important to build trust and managers must use the following strategy (Ford et al. 2017: 25–34):

- Develop and reinforce leadership skills in goal setting, rewarding, team appraisal, communication, team building, and conflict resolution components;
- 'Train the leader in virtual skills such as recognition of technological aspects of communication, time zone and cultural variations across team members, unique events at team members' localities, and early warning

signs of team conflict and team member isolation/withdrawal' (Ford et al. 2017: 33);
- Require that leaders have face-to-face communication with the team members;
- Train leaders to establish and have effective management systems;
- Leaders should organise virtual events in order to recognise team members' accomplishments;
- Leaders should include employees in organisational life to avoid the reaction of isolation.

According to Robert Ford et al. (2017: 25–34), to build trust in virtual team members through organisational cues, managers should:
- Establish formal policies, performance evaluation and recognition programmes;
- Announce team building, collaboration and formal leadership policy requirements;
- Define formal policies to ensure team activities;
- Arrange financial support for leaders to physically visit each team member at least annually;
- Require team meetings with virtual team members.

1.3. Communication

Without an effective communication system in the organisations effective teamwork becomes a challenge. While some elements of this issue can be solved by technical means, others are more deeply connected with how people work and are treated (Kimble 201: 11). Communication and collaboration are the two most important factors in remote work (Bringas 2008: 5). Researchers think that in the case of cultural differences the communication between teams will be difficult (Bringas 2008: 38).

Due to the fact that virtual team members work from different locations, communication has particular importance. Talking on the phone, teleconferencing, messaging, emailing, chatting on Skype, etc. are possible interaction methods of communication (Bhat et al. 2017: 35).

According to Merrill Warkentin, and Peggy Beranek

> all the computer-mediated communication technologies face the same drawback due to the lack of verbal and non-verbal cues, compared to traditional face-to-face communication. The verbal cues (i.e. tone of voice, verbal hesitation, volume) and

> non-verbal cues (i.e. facial expression, body movement, emotion) are however important sources to process information from team members for tasks (Warkentin, and Beranek 1999: 273–274).

Kaul Bhat et al. (2017: 35) thinks that remote work employees face obstacles such as lack of communication, social interaction and emotional expression. Human and technological issues must be managed efficiently in order to have high performance, high commitment, effective communication and cooperation within the company employees. The scholars also outline that individuals suffer absence of informal meetings during the remote work (Bhat et al. 2017: 35).

1.4. Leadership

The main function of a leader is to track team members' actions he and to react when appropriate. Leaders at the same time have to monitor the progress of task accomplishment and the team's performance. In the case of problem detection, a leader must collect full information in order to assess the essence of the problem and use this information to formulate efficient solutions (Hackman, and Walton 1986: 51–55).

According to Bell, and Kozlowski

> monitoring functions include vigilance, diagnosing group deficiencies, data gathering skills, forecasting impending environmental changes, and information use in problem solving. Taking action includes preventing deleterious environmental changes or their effects, enabling performance situations, providing material resources, and developing and managing personnel resources (Bell, and Kozlowski 2002: 23–24).

Prina Shachaf, and Noriko Hara (2005: 97) think that virtual team leadership should have effective communication systems. In particular, a leader always clarifies tasks, engages in regular communication and provides feedback. Additionally, a leader appreciates team members' opinions and suggestions, cares about members' problems and expresses personal interest. A leader clearly defines remote work employees' responsibilities and mentors them. Leadership attitude, such as the caring nature, also plays a significant role.

John Adams (2001: 381–391) identifies five areas for successful management of dispersed teams:

- Management style – coaching and flexibility, results focus and technology tools.

- The remote employee – effective communication, commitment to be a team player, trustworthiness, discipline, independent work, and management skills.
- New employee orientation – it is important that managers provide employees with orientation and mentoring.
- Meetings – successful managers should aim to organise the minimum of quarterly face-to-face meetings, offer some informal time, video conferencing and communication.
- Teamwork – it is proposed that managers should have a clear charter for the team, agree on rules and procedures, define clear roles and responsibilities and understand a team's specific goals.

The development of a fair reward system is also an important issue. Virtual team performance must be recognised and rewarded (Ebrahim et al. 2009: 2662).

1.5. Technology

Technology is a vital element (Bringas 2008: 26). In the last decades, with the rapid development of technology, work distributed by the media has become much easier, faster and more efficient. Additionally, the rapid development of new communications technologies such as the Internet has accelerated the trend so that today, organisations employ remote work (Hertel et al. 2005: 71). A team's digital work involves sharing sensitive information and data over the Internet; as a result, security is often a cause for concern. Managers have to identify all level security needs for remote work employees (Ebrahim et al. 2009: 2662). See Table 1 for the tools and software that can make virtual job easier and facilitate communication.

Ford et al. (2017: 25–34) offer strategies for building effective virtual team through technological and organisational cues. The scholars give the following technological indications:

- Purchase, manage and upgrade the best available technology, because having connection and support has particular importance for employees who do remote work;
- Ensure that the technology used by virtual employees is completely compatible with the users' and the organisation's ones;
- Contingency plan for maintaining communication when there is a sudden breakdown;
- Team members should have access to supporting information systems;

- Setting and implementing requirements for communication (e.g. maximum response time);
- Adjust the transparent organisational information flow for virtual team members (e.g. SharePoint);
- Investment in conferencing.

Table 1

Tools and software's used to organise remote work

Type of Tool	Type of Software
Chat	Slack, Twist, Google Hangouts
Project Management	Trello, Jira, Asana
Web and Video Conferencing	Google Meet, Zoom, Cisco Webex
Collaboration and Prototyping	Invision, Marvel, Adobe XD
Scheduling	Calendly, Doodle
Workflow Automation	Zapier, Microsoft Flow, Monday

Source: Harvard Professional Development 2018.

Remote work employees must have clear roles, because lack of visibility may cause virtual team members to feel less accountable for the results. It is important to have coordination mechanisms such as scheduling deadlines (Ebrahim et al. 2009: 2663).

Furthermore, Deborah Duarte, and Nancy Tennant Snyder (1999: 60–69) identified the strategies for managers in order to increase the effectiveness of information flow and shared responsibility:

- Managers have to focus on showing that they trust employees. They can do this by sharing information with the team members as fully and quickly as possible. It is also important to include the members in the decision--making process and acknowledge their contribution.
- Company managers must allow employees to see them behave virtually by modeling the actions they expect.
- Furthermore, when designing a collaboration strategy, managers must make sure that team members have access to compatible technologies.

The number of employees who are not working most of the time in the same location is increasing rapidly as the development in the technology have allowed to have a flexible work style. These changes have created a truly global economy. Nowadays it is not uncommon for managers to be in one place and their team in another location (Bringas 2008: 28).

2. Methodology and Results

The aim of the survey was to establish the objectives, to determine the target population, to select the respondents and to prepare the questionnaire. This inquiry was designed to examine how employees in Georgia are working and what challenges they face.

A quantitative method of research was used to discover trends in thoughts and opinions. Methodologically, the work is based on an analysis of available literature and the results of statistical research based on the survey (some of the questions were multiple-choice) of a random sample of 187 respondents, employees of different Georgian private and public sector enterprises.

During the research, 187 public and private remote work employees were surveyed. 60% of the participants were women and 40% were men. Additionally, 50% of the participants were 20–30, 38% 31–40, 11% 41–50 and 1% over 51 years old. 53% of the respondents have a Master's degree and 42% a Bachelor's degree. It should be also noted that only 5% of them have a highest scientific degree. According to the survey, 54% of these employees have been working in the organisation for up to 5 years, 28% for 6 to 10 years and 18% for more than 10 years. See Table 2.

Table 2

Demographics of the employees – respondents

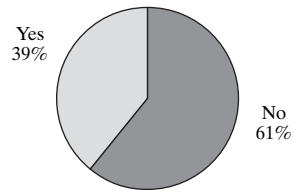
		Percentage
Gender	Male Female	40 60
Age	20–30 31–40 41–50 Over 51	50 38 11 1
Education	Bachelor's degree Master's degree Highest scientific degree	42 53 5
Duration of working in the organization	0–5 year 6–10 year 11–15 year Over 17 year	54 28 14 4

Source: author's own elaboration based on the survey.

68% of the employees find their organisations to provide a modern-liberal environment, 18% of them consider that there is traditional bureaucratic governance in their agencies and only 14% find it difficult to answer the question. One of the most important parts of the research was to examine if the respondents had a remote organisation and virtual teams' working experience. According to the data analysis, 61% of the respondents had no such experience before the COVID-19 pandemic. Only 39% of the respondents appeared to have a know-how and experience. See Figure 2.

Figure 2

Remote work experience



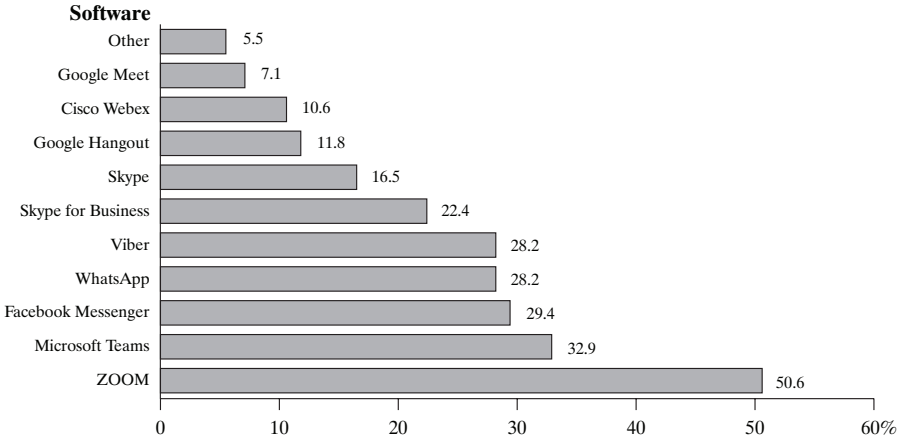
Source: author's own elaboration based on the survey.

The research aimed to find out which software tools the employees were using during the remote work. According to the research findings, 50.6% of the employees are using ZOOM, 32.9% – Microsoft Teams, 29.4% – Facebook Messenger, 28.2% – WhatsApp, 28.2% – Viber, 22.4% – Skype for Business, 16.5% – Skype, 11.8% – Google Hangout, 10.6% – Cisco Webex and 7.1% of the respondents are using Google Meet. Moreover, 5.5% of the respondents also noted that during the remote work they were using Slack, Ding Talk, Goto Meeting, BlueJeans, Bitrix 24 and Workplace. See Figure 3.

According to the survey, 60.9% of the employees were satisfied with remote working. The research also found out that a flexible working schedule, independence, increased productivity, no traffic jams, and better conditions at home were the advantages of remote working. See Figure 4. Furthermore, respondents also named all the disadvantages they have faced since they started working virtually.

Figure 3

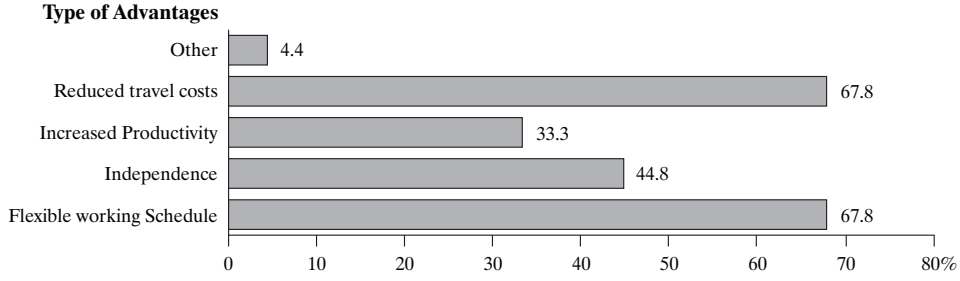
Software tools used by Georgian employees



Source: author's own elaboration based on the survey.

Figure 4

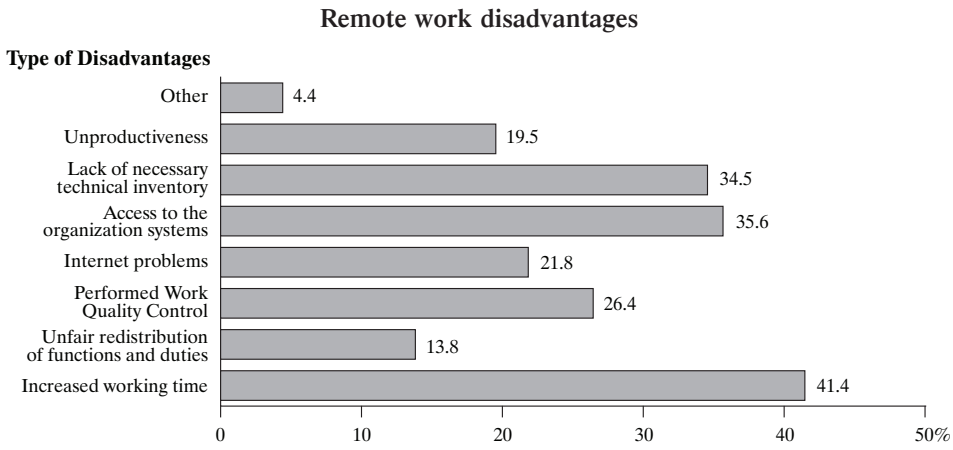
Remote work advantages



Source: author's own elaboration based on the survey.

Answering the question whether the respondents face some disadvantages and challenges during the remote working process, in the first place, they (41.4%) named increased working time. In addition, they named unfair redistribution of functions and duties, quality control of the work performed, Internet problems, access to the organisation systems, lack of necessary technical inventory, unproductiveness, lack of face-to-face communication and their marital status (e.g. baby). See Figure 5.

Figure 5

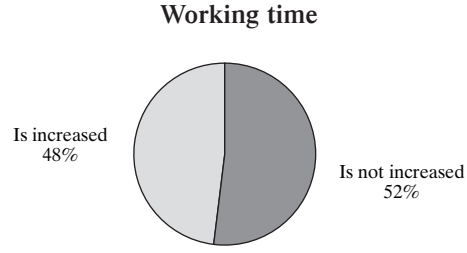


Source: author's own elaboration based on the survey.

Furthermore, 39.1% of the respondents never and 50.6% of them rarely have Internet problems. Only 10.3% often appeared to have Internet problems.

The research aimed to find out if the working time during remote work and virtual teams' work period was increased. According to the results, 52% of the respondents don't think so and 48% assume that their working time increased. See Figure 6.

Figure 6

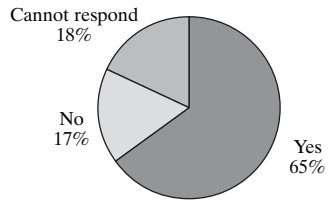


Source: author's own elaboration based on the survey.

In the case of the question whether the respondents' duties and responsibilities are fairly distributed, 65% of the respondents feel that it is fair, 17% disagree and 18% of the respondents cannot answer the question. See Figure 7.

Figure 7

Fairly distributed duties and responsibilities



Source: author's own elaboration based on the survey.

Finally, 48.2% of the respondents totally and partially agree that in the process of working from remote location, the frequency of contact with the management or employees during non-working hours is being increased.

3. Virtual teams and remote work – findings

Technological development and globalisation have created the environment in which teams interact and collaborate across boundaries of time, geographic locations, and organisations. Today, in many organisations, most teamwork collaboration takes a virtual form.

Scholars argue that doing remote work and managing virtual teams is not about taking old management methods; it is rather about expanding the available tools in order to create the effective collaborative work. Some of the scholars also believe that the technological expertise is not a key factor for successful remote work. According to them, a key factor is a transparent and clear understanding of what it takes to get the company ready to conduct operations virtually.

Virtual teams are significantly different from traditional ones. Members of traditional teams work next to each other, while in virtual teams they work in different locations. Also, virtual teams rely on electronic communication. Most scholars think that managing and handling remote work and virtual teams is crucial.

Scholars state that the main advantages of remote work include: reduction of relocation time and travel costs, greater degree of freedom to individuals involved in the development of the projects, greater productivity, shorter development times, better outcomes and attraction of better employees, higher degree of cohesion, pollution reduction, creation and dispersion of

improved business processes across organisations, creation of the competitive advantage from limited resources, allowing organisations to access the most qualified individuals for a particular job regardless of their location, and better team outcomes (quality, productivity, and satisfaction). Scholars also identify main disadvantages of virtual teams: lack of physical communication, loss of face-to-face synergies, lack of trust, concern on predictability and reliability, and lack of social interaction.

Furthermore, scholars have also identified seven factors for remote work success: human resource policies, training and on-the-job education and development, standard organisational and team processes, use of electronic collaboration and communication technology, organisational culture, leadership support for virtual teams, and team-leader and team-member competencies.

Additionally, the IPO framework offers to recognise the essential factors, which is important for face-to-face or remote work in order to improve the efficiency and performance of employees.

There are many different variables that affect the remote work functioning, but collaborative behaviour such as communication, trust and leadership style can have a fundamental influence on it. It is also important to consider the differences in culture and time zones, which can affect virtual teams' performance.

In e-commerce and also for virtual teams, establishing trust in online transactions is a serious challenge. Scholars argue that trust has direct as well as mediating impact on team effectiveness. In addition, trust in remote work is a key component to achieve high quality team effectiveness. Scholars believe that trust helps to build commitment and cohesion. Additionally, it makes it possible to develop new ideas and creative new ways of thinking and problem solving. Trust helps team members to concentrate on a given task and maximise their contribution in order to maximise the organisation's productivity.

Remote work employees face obstacles such as lack of communication, social interaction and emotional expression. Human and technology related issues must be managed efficiently in order to have high performance, high commitment, effective communication and cooperation within the team members. Scholars also outline that individuals suffer absence of informal meetings during remote work.

Furthermore, virtual team leadership should have effective communication systems. In particular, a leader always clarifies tasks, engages in regular communication and provides feedback. Additionally, a leader appreciates team members' opinions and suggestions, cares about members' problems and

expresses personal interest. A leader clearly defines virtual team members' responsibilities and mentors them. Leaders also should think of a fair reward system development, because employees' remote work performance must be recognised and rewarded.

Technology is a vital element. In the last decades, with the rapid development of technology, work distributed via the media has become much easier, faster and more efficient. Digital teams' work includes sharing sensitive information and data over the Internet; as a result, security is often a cause for concern. Managers have to identify security at all levels.

During the research, 187 public and private remote work employees were surveyed. According to the data analysis, 61% of the respondents had no experience of remote working before the COVID-19 pandemic. The research found the following software tools that are used by Georgian remote work employees: ZOOM, Microsoft Teams, Facebook Messenger, Skype for Business, WhatsApp, Viber, Cisco Webex, Google Hangout, Google Meet. Moreover, 5.5% of the respondents also noted that during the remote work they were using Slack, Ding Talk, Goto Meeting, BlueJeans, Bitrix 24 and Workplace.

The research also found out that a flexible working schedule, independence, increased productivity, no traffic jams, and better conditions at home were the advantages of remote work. Furthermore, the respondents also named all the disadvantages they have faced since they started working virtually: increased working time, unfair redistribution of functions and duties, quality control of the work performed, Internet problems, access to the organisation systems, lack of necessary technical inventory, unproductiveness, lack of face-to-face communication and their marital status (e.g. baby).

According to the research findings, 54% of the respondents would like to continue to do remote work in the future and to be part of a virtual team, and 46% of them would like to return to the old, traditional working environment.

Conclusion

Remote work and virtual teams will constitute the future working environment and Georgian public and private companies must be ready to adjust to the situation and the demand of the market. Working from home to avoid the threat of the COVID-19 pandemic in the country has shown that we need to have a transparent strategy for remote work. According to

the research results, at the first attempt, the Georgian private and public companies more or less managed to meet the challenge. However, this is not enough and requires gradual development. Besides, managers need to work on minimising the existing challenges. In order to implement the above effectively, managers and employees must cooperate. Furthermore, it is already desirable that companies should establish quality control over the work performed as long as remote work is going to last.

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The World during the COVID-19 Pandemic: Remote Work and Virtual Teams in Georgia

Abstract

The nature of work in today's organisations is becoming more and more complex, dynamic, and global. Nowadays, remote work and virtual teams have become a vital component of modern corporate organisations. The goal of the research is to examine some of the main problems that the Georgian public or private sector's remote employees have faced.

The main purpose of the paper is to determine the current remote work situation of the public or private sector employees in Georgia in accordance with the restrictions adopted by the country in order to reduce the threat of the coronavirus spread. In addition, the research seeks to identify and examine the factors that influence employees' remote work effectiveness and to determine under what conditions remote work and virtual teams can be a worthwhile investment in a public or private organization.

Studies have shown that employees doing remote work in Georgia face challenges, such as: increased working time, unfair redistribution of functions and duties, performed work quality control, internet problems, access to the organizational systems, lack of necessary technical inventory, unproductiveness and lack of face-to-face communication. Methodologically, the work is based on the analysis of available literature and the results of the statistical research based on the survey of 187 respondents, a random sample of different Georgian private and public sector employees.

Consequently, managers should be aware of modern communication, technology and leadership methods that can be used in effective and efficient

way to increase the virtual work quality. The article concludes that both the technological and the organisational approaches need to be addressed in parallel in order to work effectively.

Key words: remote work; virtual teams; technology; tools; communication; leadership; trust building

Świat podczas pandemii COVID-19: praca zdalna i zespoły wirtualne w Gruzji

Streszczenie

Praca we współczesnym przedsiębiorstwie przybiera coraz bardziej złożony, dynamiczny i globalny charakter. Praca zdalna i zespoły wirtualne stały się obecnie niezbędnymi częściami składowymi nowoczesnych organizacji korporacyjnych. Badania mają na celu przeanalizowanie głównych problemów z jakimi zmierzyli się pracownicy gruzińskiego sektora publicznego i prywatnego.

Głównym celem artykułu jest określenie aktualnej sytuacji pracowników sektora publicznego i prywatnego w Gruzji w związku z pracą zdalną zgodnie z restrykcjami wprowadzonymi w kraju w celu ograniczenia zagrożenia rozprzestrzeniania się koronawirusa. Ponadto, badania mają na celu identyfikację i analizę czynników wpływających na efektywność pracowników świadczących pracę zdalnie oraz w jakich warunkach praca zdalna i wirtualne zespoły mogą być opłacalną inwestycją w przedsiębiorstwach sektora publicznego i prywatnego.

Badania wykazały, że przed pracownikami w zdalnym systemie pracy pojawiają się wyzwania takie jak wydłużony czas pracy, niesprawiedliwa redystrybucja funkcji i obowiązków, kontrola jakości wykonanej pracy, problemy z Internetem, dostęp do systemów organizacyjnych, brak potrzebnego wyposażenia technicznego, nieproduktywność oraz brak komunikacji bezpośredniej (twarzą w twarz). Jeśli chodzi o metodologię, niniejsze opracowanie jest oparte na analizie dostępnej literatury oraz wynikach badań statystycznych przeprowadzonych w oparciu o sondaż wybranych losowo 187 respondentów zatrudnionych w różnych gruzińskich firmach sektora publicznego i prywatnego.

W rezultacie, menadżerowie powinni mieć świadomość, jakie metody nowoczesnej komunikacji, technologii i przywództwa można efektywnie i sku-

tecznie stosować w celu poprawy jakości pracy wirtualnej świadczonej przez pracowników. Artykuł kończy konkluzja, że aby pracować skutecznie, należy równolegle stosować podejście technologiczne, jak i organizacyjne.

Słowa kluczowe: wirtualne zespoły, technologia, komunikacja, przywództwo, budowa zaufania

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DETERMINING THE MOST EFFICIENT TECHNICAL INDICATOR OF INVESTING IN FINANCIAL MARKETS BASED ON TRENDS, VOLUME, MOMENTUM AND VOLATILITY

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Introduction

In economics and finance, stock markets are of utmost importance. There are different practices and techniques used by traders and investors to make gains from stock price movements. Even though the time horizon of the investment along with risk appetite governs most investment decisions, the objective of every investor is to maximise his/her returns. To attain this purpose, traders employ various strategies.

Predicting stock market prices by using historical data would be in contradiction to weak market efficiency, which says that market should reflect all past information in its prices and hence stock market forecasts using technical analysis should not be possible. However, the efficient market and random walk hypotheses contradict this approach by proclaiming that the publicly available information on the market is instantly reflected in terms of prices, and that it is impossible to achieve abnormal returns made on the basis of knowing historical data (Malkiel, and Fama 1970: 383–417).

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This paper attempts to fit a model of stock market prices to check the accuracy of the forecasts. It also employs a comparative evaluation of traditional indicators such as Bollinger Bands, SMA, EMA, VWAP, MACD and RSI to ascertain the most efficient way to comprehend and forecast future price trajectories.

Forecasting financial time series of the stock market has induced significant attention among applied researchers because of the impact of the stock market on the growth of any nation. The autoregressive integrated moving average (ARIMA) model has been the most widely used time series model for forecasting stock market series. This tool for the stock market prediction has attracted vast literature on empirical analysis because of its importance in the development of national economy.

For the research presented below, we have successfully applied the ARIMA model to the stock prices of 2 major indices namely IXIC (NASDAQ Composite Index) and SPY (SPDR S&P 500 ETF Trust) for the time period of 20 years (Adebayo, Sivasamy, and Shangodoyin 2014: 65–77).

1. Literature Review

The purpose of the analysis of the topic is to understand the working and application of the technical indicators used in trading in various financial instruments on the US stock market. Financial markets mean any marketplace where the trading in securities takes place. This includes forex, bonds, stock, commodities, and derivatives among other financial instruments. For the smooth operation of capitalist economies, financial markets are of vital importance (Taylor, and Allen 1992: 304–314). A technical analysis studies the historical price patterns, trends, and other hints responsible for the indication of price movements in the future; it has been increasingly famous over recent years among the financial practitioners to make investment decisions to maximise profitability. In a survey, it was found that at least 90% of respondents use technical analysis in making decisions about their portfolios on the UK market (Chong, and Ng 2008: 1111–1114). According to the basic definition by Robert D. Edwards, John Magee, W. H.C. Bassetti (2018), fundamental prerequisites of a technical analysis are market prices that reflect all events, repeated historical prices and financial instrument's charts changing trends. It can be further divided into two groups, namely technical indicators and price action. When it comes to trading options, the combination of using Bollinger bands with double deviation forms a variety

of option strategies where others are shown to offer a wide range of exotic ones like binary or digital options discussed in the paper by Adrea Kolková (2017: 35–40). Trading on these markets means the purchase and sale of financial instruments to profit from short term gains from price fluctuations for themselves or for their clients. To do so, every trader must have an edge in their trading systems by implication of indicators that are helpful in predicting the price movements of these instruments. Lukas Menkhoff, and Mark Tylor (2007: 936–972) showed that a technical analysis is much wider than a fundamental analysis. According to Mark Taylor, and Hellen Allen (1992: 304–314), 90% of the investors polled used it for trading. It was the first time they empirically presented that a technical analysis is one of the most important tools when it comes to making good decisions not only about stock but also about the foreign exchange market.

We are going to focus on 5 major types of indicators that are used worldwide by traders to gain an upper hand in trading on these markets.

1. Bollinger Bands were developed by John Bollinger. This indicator is based on volatility in the form of bands placed above and below a moving average. Volatility is based on the standard deviation that responds to changes as volatility increases or decreases; the expansion in the bands takes place due to higher volatility and it shrinks to show lower volatility. There are 3 major lines in this indicator, the middle one is a simple moving average accompanied by upper and lower bands, which are typically two standard deviations from the middle line (Bollinger 1992: 47–51).

However, it can be modified based on the user's preference. The phenomenon of a squeeze shows bands coming close to each other, which signals low volatility in the present and traders consider it to be a sign of high volatility in the future, offering possible trading opportunities. In the opposite scenario, the widening up of the bands shows higher current volatility and greater chances of exiting the trade, almost 90–92% of the price action happens between the bands and anything outside them is considered an outlier. These outliers are mostly caused by the change in interest rates, release of earning reports by a company and major geopolitical events.

However, John Bollinger bands come with certain limitations: they only consider volatility as their primary focus point. Bollinger suggested that these must be used with at least two of their non-correlated indicators to provide more precision. These bands are primarily reactive, meaning they cannot be used as a predictive tool for the price action making them a lagging indicator (Lento, Gradojevic, and Wright 2007: 263–267).

2. The relative strength indicator (RSI) was developed by J. Welles Wilder and was published in the book titled „New concepts in technical trading systems" (Wilder 1978). It is a momentum-based indicator, which measures the velocity and magnitude of the price movement. These directions are used to measure the current and historical weakness or strength of the stock market based on the closing price of a recent trading period (Taran-Morosan 2011: 5855–5862).

This indicator is mostly used on the 14-day time frame, which ranges from the scale of 0 to 100. Typically, when the indicator line is above 70, it signals the instrument being overbought, and when it is below 30, it is considered being oversold. When it is above or below 80 and 20 respectively, it is considered that the prices are in a stronger momentum (Hamid, Akash and Asghar 2011: 6342–6349).

An overbought instrument indicates a potential selling opportunity and an oversold one signals a potential buying opportunity for traders. The RSI is directly proportional to the velocity of a change in the trend and the magnitude of the move. The divergence between the price action and relative strength index means that the market turning around is highly possible. However, the RSI can also remain overbought for extended time periods if the stock chart is in an uptrend and below 30 if the stock is in a downtrend. This can be confusing for a new trader: when in a downtrend, the RSI is more likely to peak up near the 50% level rather than 70%. This signals traders the long-term downtrend confirmation and vice versa. It is also helpful in improving the chances of getting successful trades. However, it is strongly advised not to solely rely on the RSI but to combine it with other trend-following indicators (Nitin 2020). The appearance of higher highs and higher lows signals the confirmation of a bullish trend on the chart, which is helpful in determining a stable long-term trend, and the same applies to the downtrend identification when the RSI is forming lower highs and lower lows. The concept of swing rejection shows an indicator line reaching the overbought territory above the level of 70%, and then crossing back below it.

In the next step, the RSI forms another high without entering the overbought territory and breaking its most recent low in a bearish swing rejection (Murphy 2009). In a bullish swing rejection, it falls into the oversold area, and then crosses back above 30%, forming another bump without entering an oversold territory. This ultimately breaks its most recent high, indicating a strong uptrend offering a buying opportunity.

The RSI = 100 – 100/(1 + RS), where RS represents the average gain of up periods/the average loss of down periods over a session of 14 trading

days (Sahin and Ozbayoglu 2014: 240–245). The RSI can be a very useful indicator for setting up entry and exit points, but it also comes with a set of disadvantages. In the real market conditions, it may not always line up and agree with other technical indicators, which is perfectly normal, as the markets are dynamic and more often irrational; therefore the RSI can only be used as an indicator and not as a predictor. This is also a lagging indicator; it shows the stock is overbought, which does not necessarily mean that it is the time to enter the shorts. The stock can stay oversold for extended periods of time until a reversal occurs; it has a success rate of 49–50%, which is like tossing a coin.

The RSI with given parameters and daily optimisation was compared with other strategies by Blanka Šedivá, and Patrice Marek (2017). It showed that the RSI was still able to produce significantly positive results but when it came to longer time periods, the simple buy and hold strategy also worked.

3. The next one on the list is volume-weighted average price indicator. Granger (1968) found a positive correlation between the daily volume and stock daily price height difference. It provides the average price of the traded security throughout the day based on the price and volume of the trading session. It looks like moving averages appearing as a single line on intraday charts (includes all time frames). The mechanisms to use this indicator are rather easy. If the VWAP is rising and the prices of the security are above it, this indicates an uptrend. Similarly, prices below the line and a declining VWAP are considered an indication of a downtrend.

Investors usually assess the price of this security using this indicator, if the price is higher than the VWAP line at the end of the day, they have overpaid and vice versa.

Osborne (1959: 145–173) studied the relationship between the price and volume, showing the price movement is a diffusion process through establishing a model. This model states that the variance depends on the number of transactions, which suggested positive correlation between an absolute value of changes in the price and volume.

Large institutions and big players on the market use the VWAP ratio to enter and exit markets without creating much impact. They buy below the VWAP level and prefer to sell when the prices are above it; this pushes the prices back to the average, whereas retail traders consider VWAP to confirm the overall trend by entering long positions when prices are above the line and taking shorts when they are below it. Investors asking for the VWAP execution agree to postpone or sequence their trades to reduce their

trading cost and market impact while buying and selling large quantities of shares.

The VWAP is calculated as the summation of the dollar value traded for every transaction divided by total shares. The VWAP not only shows traders the trend confirmations but also the value of the security that is being traded.

Another advantage of this indicator is that it cannot be manipulated; hence, it improves both market transparency and efficiency (Cushing, and Madhavan 2001: 12–19). However, it also comes with certain limitations. This is a single day indicator and resets itself as the new day begins, this could indicate that the average price can diverge from the actual VWAP reading. The VWAP is based on the historical values and volume; therefore, it is incapable of predicting the price of the security, and high seasonality hampers its proper functioning. One way to prevent this problem is to focus on the market or the transaction market scale instead of the calendar timings. Andrew Lo and Jang Wang (2000: 257–300) were the first to propel the CAPM model to the volume. In a paper published by edrzej Bialkowski, Serge Darolles, and Gaëlle Le Fol (2008: 1709–1722), it was found that by separating the market part from the observed volume, two additional goals were obtained. Firstly, the liquidity measure for a firm is a more accurate indicator of the arbitrage activity than the observed volume. Secondly, decomposition helps to measure changes in seasonality more accurately in recent years. Many scholars from China started to use the analytical tools and theory backing them away from western scholars. They made a significant analysis on the volume price relation in the stock market of China. Chen and Song (2000: 62–68) did a multi-level empirical research into the relationship between price change and trading volume in Chinese stock market by using a random sample of 31 stocks. Peiyuan, and Donghui (2002: 64–70) have empirically tested the linear and non-linear Granger causality relationship between the price and volume for the Chinese stock market. They presented the results showing that there is a linear Granger causality relationship between volume and bi-directional non-linear Granger causality and between these time series. Zhou Weixing (2010) empirically analysed the volume price variation and the trading volume relation on a deep level by using high-frequency data and found that the price variation and trading volume are correlated along with a non-linear convex function shown by the volume price curve.

4. The simple moving average is a calculation examining the data points by the creation of a series of means of various subsets of full datasets.

The SMA is the unweighted mean of previous *n* data in the series also known as a rolling or moving mean. The time that is selected for trading opportunities can be short, medium, and long. In financial terms, moving-average levels can be explained as support when the market is falling and resistance when the market is rising. When the given data are not circled around the average, a simple moving average lags the single datum point by half-width of the sample. A simple moving average is highly susceptible to the disproportionate effect of old datum points, which are going out or if the new data are coming in (Chande 1992).

If the data have a periodic fluctuation, the application of a simple moving average will discard the variation while the mean will always contain one complete cycle. However, a perfectly regular cycle is rarely encountered (Ellis and Parbery 2005: 399–411).

With a wide range of applications, it is crucial to mitigate the shifting caused by using only historical data; therefore, a central moving average should likely be calculated for better predictions. These are equally spaced on either side of the series point where the average is computed, which requires using an odd number of datum points in the sample window.

The downside of the simple moving average is overlooking a significant number of signals shorter than the window length making the situation worse by inverting it. This creates peaks and troughs, which further leads to the result being less smooth for the analysis. This happens due to the unorganised frequencies appearing during the session (Johnston et al. 1999: 1267–1271).

5. The exponential moving average is a type of moving average, which focuses on most recent data points, also known as exponentially weighted moving average (Klinker 2011: 97–107).

Also, unlike the simple moving average, it reacts more significantly to recent price changes while the SMA applies equal weight to all observations in that period. Just like every other indicator we discussed above, it also provides us with signals for buying and selling based on the divergence and crossovers from the historical average price points.

The EMA can be used on the chart with different time periods like 20, 30, 90 and 200 days, depending on the time perspective for trading (Li, and Zhu 2014: 436–439). If a trader is scalping, it is best to use shorter time frames and medium time frames for day trading.

On the other hand, when it comes to swing trading or investing, larger time frames provide a better idea for the buying and selling signals. The 12-and 26-day exponential moving average is most popular among traders

who look for short-term opportunities. When the indicator line crosses a 200-day moving average, it signals that a reversal has occurred for longer period opportunities. It is also used to create indicators like a price percentage oscillator and moving average convergence divergence (MACD). By nature, all the moving averages that are used in technical analysis are lagging indicators by default. Predicting the price solely based on these can create more havoc if they are misinterpreted even by a slight difference. The EMA is having an edge over other moving averages, as it grabs the recent price movement more firmly. This makes it a very insightful indicator for entry points in trading (Kolková 2017).

The EMA indicators are better for trading in trending markets. A strong bullish market is shown by an upward trending EMA line and vice versa. A trader should not only look at the direction of the line but also the rate of change of the line from one bar to another. In a strong uptrend, the rate of the EMA heading upwards is strong; when the trend starts to fade, it starts to grow at a diminishing rate until the rate of change is zero followed by the reversal of the trend.

Metastock is primarily considered the most complete and complex tool to trade on the markets; it can show the graphics along with the stock prices in real time (Rosillo, Fuente and Brugos 2013: 1541–1550).

Traders use it primarily on minute and hourly time frames to adjust the operating schemes to analyse a real time scenario. It requires expert-level knowledge to operate due to more than 150 indicators suited for different trading styles. In addition to providing alerts via mobile phone and email, it is widely used by analysts to figure out a reversal scenario.

Visual Chart focuses on providing a vast variety of products and services at its consumer's disposal showing exchange inversion, meeting the consumer's needs. The main charts are Visual chart V, Visual chart Java edition, Visual chart pocket station and Visual chart Direct Access; all these tools require fast and reliable internet connection to function properly. The third tool is called a personal broker, and it is extensively used in the analysis of financial markets and calculation of investor's profitability portfolio (Rosillo, Fuente and Brugos 2013: 1541–1550). However, this comes with a price of 90 euros for quotes with a fixed annual cost of 45 euros for updating and renovation.

Wing-Keung Wong, Meher Manzur, and Boon-Kiat Chew (2003: 543–551) described the role of a technical analysis and how rewarding it is in the real market scenario. It is used to test the performance of the most popular and established trend-following moving averages and the counter-trend indicator RSI – relative strength index.

The results obtained by the researchers show that the indicators for trading on the markets can produce significantly positive returns. The Singapore stock exchange (SES) members, stockholders and traders enjoy substantial profits through these technical indicators. Many firms have their own teams of traders; these teams significantly rely on a technical analysis of real market conditions. However, despite the enormous literature on a technical analysis, it is still far from being clearly understood.

A technical analysis is a norm for financial markets; therefore, the entire topic of financial management remains fascinating as concerns market efficiency in real-time.

Jeffrey Frankel and Kenneth Froot (1990: 181–185) documented that practitioners, i.e. professionals who forecast the big moves, depend heavily on a technical analysis. They found out a shift away from a fundamental analysis to a technical one in the 1980s.

In the real market conditions, the existence of a technical analysis is stated by the fact that most real-time financial services like Telerate and Reuters provide elaborate, comprehensive, and latest technical information.

The ARIMA stands for the autoregressive integrated moving average, and it has numerous applications in varied fields which is used as a tool to predict the future value of a series based entirely on its own inertia. Kalid Yunus, Torbjörn Thiringer, and Peiyuan Chen (2016: 2546–2556) used the ARIMA models to encapsulate time correlation and possibility distribution of determined wind-pace time collection records (Vaccaro et al. 2015).

Several researchers have been developing models such as the regression model, exponential method and GARCH approaches. However, there are a few works that implemented the ARIMA model in predicting stock market data (Kenny, Meyler, and Quinn 1998: 23–43).

The forecasting accuracy of the ARIMA model gradually decreases at the stage of the growth process, depending on the assumed period. This method is applicable to cases of the high-technology market, especially for the financial institutions and banks since it gives a reliable indication for the future (Almasarweh, and Alwadi 2018).

Generally, it is reported in literature that prediction can be done from two perspectives: statistical and artificial intelligence techniques (Wang 2012: 33–38).

They are also considered robust and efficient in forecasting time series for financial data especially for the short-term prediction. The stock prices can be predicted with larger accuracy compared to other models than even the most popular ANNs techniques (Merh, Saxena, and Pardasani 2010: 23–43).

2. Data and Methodology

This paper uses IXIC (NASDAQ Composite Index) and SPY (SPDR S&P 500 ETF Trust) data collected in the period from April 2000 till early May 2020. The IXIC index is a large market-capitalisation weighted index of over 2500 stocks. Since it encapsulates a large percentage of traded stocks on the US market, it gives a good indicator of movement of all traded stocks. SPY is the largest Exchange-Traded Fund in the world, which is referred to as S&P 500 index[1] in financial terms. The paper first does tests for stationarity, corrects non-stationarity, finds the appropriate ARIMA model and runs various tests to find the most efficient ARIMA (p, d, q) model. The software R has been used for visualisation and an analysis.

Thereafter, major indicators used by traders (Bollinger Bands, RSI, VWAP, SMA, EMA) are used for computation of expected prices. A detailed graphical analysis and accuracy tests are done to ascertain the most efficient indicator. The forecasts from the ARIMA model are also compared with these results to gain a better understanding of the market movements.

2.1. Empirical Analysis

Tests for stationarity

1) Plotting the series: the data of IXIC index prices for the entire range are plotted. The graph is observed to check if there are any trends or patterns of seasonality. If these are observed, then non-stationarity exists in the data.
2) Augmented Dickey-Fuller test (ADF): ADF tests for the presence of a unit root in a data set. The presence of a unit root indicates non-stationarity in a data set. It allows for higher order auto-regressive processes.

$$\Delta y_t = \alpha + \beta t + \gamma y_t - 1 + \delta \Delta y_{t-1} + \delta_2 \Delta y_{t-2} + \ldots$$
$$H_0: \gamma = \delta = \delta_2 = 0$$

The null hypothesis is the presence of a unit root and therefore non-stationarity in the data set, while the alternative hypothesis is a stationary time series.

[1] S&P 500 market index is a good indicator of the US stock prices since the market capitalisation of its stocks constitutes 80% of the free float market capitaliszaion of all listed stocks on the US stock markets.

3) Kwiatkowski-Phillips-Schmidt-Shin test (KPSS): KPSS tests check the null hypothesis that the series is stationary against the alternative that it is not.

$y_t = \alpha + \beta t + \mu_t + u_t$
$\mu_t = \mu_{t-1} + \varepsilon_t, \varepsilon_t \sim N(0, \sigma_\varepsilon^2)$

The KPSS test statistic is the Lagrange multiplier and used to test:

H_0: $\sigma_\varepsilon^2 = 0$
H_1: $\sigma_\varepsilon^2 < 1$

Based on the results of these tests, we can conclude whether the time series under consideration is stationary or non-stationary.

Transforming from non-stationary to stationary

If the tests indicate the presence of non-stationarity, the data series is differenced, and the tests are run again to check if the results indicate the presence of stationarity. In cases where the variance is volatile, logarithmic transformations can stabilise the time series.

Identifying the appropriate ARIMA model

After a series has been made stationary, the next step is to identify the correct model.

1) Auto correlation function plots (ACF): Autocorrelation function plots give us the correlation of any series with its lagged values.
2) Partial autocorrelation function (PACF) plots: A partial autocorrelation function plots the autocorrelation of the residuals of the series and its lagged values along, meaning it gives the correlation of a series and its lagged values that are not explained by all lower order lags.
3) If the ACF plot ends geometrically, the PACF plot ends sharply and is insignificant after p lags; then we can say that it follows AR(p).
4) If the PACF plot ends geometrically, the ACF plot ends sharply and is insignificant after p lags; then we can say that it follows MA(p).
5) If both plots are geometrically declining, then it likely follows an ARMA process.

To identify the correct ARIMA model, R also uses maximum likelihood estimation (MLE). It tries to maximise the log-likelihood for given values of *p*, *d* and *q* while finding a parameter; it estimates to maximise the probability of obtaining the data that we have observed.

Testing the ARIMA model

1) AIC test:
   The test statistic is given by:

   $$AIC = (1/n - 1) \sum_{i=1}^{n} (x_i - \bar{x})^2 + 2k$$

   where n is the number of sample points of data x, and k is the number of parameters to be estimated. A lesser value is generally considered substantial support for the model.

2) BIC test:
   The test statistic is given by:

   $$BIC = (1/n - 1) \sum_{i=1}^{n} (x_i - \bar{x})^2 + k \ln(\ )$$

   where n is the number of sample points of data x, and k is the number of parameters to be estimated. From the two given models, the lower value of *BIC* is preferred. It tells us that the model is a better fit.

3) Ljung-Box test: Ljung-Box tests for autocorrelation between the different lag terms. The test statistic Q is given by:

   $$Q = T(T + 2) \sum_{k=1}^{s} [r_k^2/(T - K)]$$

   where T is the number of observations, s is the number of lags to test autocorrelation, and r is the autocorrelation coefficient. The hypothesis tested is that the residual is white noise against the alternative that it is not.

Since we are dealing with financial data here, it is very common to find heteroskedasticity or non-constant variance. It calls for more sophisticated models that can capture this volatility. The ARCH (Auto Regressive Conditional Heteroskedasticity) model captures this real-world volatility. There are other extensions like GARCH (Generalized Autoregressive Conditional Heteroskedasticity), EGARCH (Exponential GARCH), IGARCH *et cetera*. The GARCH model is often used in the market to model stock volatility, returns and price.

Once the fitted ARIMA model fails diagnostic checks, the following step is to check if there are any ARCH effects in the time series. This is tested by the LM ARCH Test.

LM ARCH Test

To test the presence of the ARCH effects, a Lagrange Multiplier Test is conducted, where a mean equation is estimated. The mean equation can be a regression of the variable on other variables or even a constant. The residuals from this regression equation are squared and regressed on their lagged terms. The number of lags it is regressed on determines the order of ARCH.

The following equation is referred to as the mean equation. AR and MA terms are also included in some models in this equation:

$$R_t = \mu + \varepsilon_t$$

The squares of ε_t are regressed on its lag values. If the coefficient of the LAD (Least absolute deviation) term is significant to zero, there is absence of the ARCH effects (Null Hypothesis).

The LM test Statistic:

$$(T–q)\ R \wedge 2$$

where T is the sample size, q is the number of squared error terms in the regression equation, and R^2 is distributed as chi squared distribution with q (order of lag) degrees of freedom. The null hypothesis is rejected when the test statistic value is greater than the tabulated value.

Estimating an appropriate model

The ARCH models are estimated using the Maximum Likelihood method. The GARCH models can be represented by the mean equation and the following equations. σ_t is the variance for the residuals from the mean equation. Since z follows standard normal distribution, the variance of ε_t is σ_t^2. This is also the conditional variance of stock returns, which is clear from the mean equation. Thus, equation (*) gives us the desired property of variance, and large (small) variances are followed by large (small) volatility changes.

$$\varepsilon_t = \sigma_t * z_t$$
$$\sigma_t^2 = \omega + \alpha_1 \sigma_{t-1}^2 + \beta_1 \varepsilon_{t-1}^2 \ (*)$$
$$z_t \sim N\ (0,1)$$

The objective is to capture the changing variance of the returns of the stock, which is accomplished in all orders and forms of GARCH. Often, the ARMA terms are also included in the mean equation.

In both time series considered here, the ARFIMA or Autoregressive Fractionally Integrated Moving Average Terms will be included. This is a generalisation of ARIMA and uses non-integral values for a differencing component. This is popular in series that have a long memory property.

Residual diagnostics

Ljung-Box test is to check if the residuals behave as white noise. The null hypothesis is that there is no autocorrelation in the residuals. This is rejected only if the p value is less than 0.05 (level of significance).

Another test to check the presence of any remaining ARCH effects is the LM ARCH test. Furthermore, plots of empirical distribution of error terms and QQ norm plots are observed. These help to determine whether the errors follow a standard normal distribution. The QQ plot is often a straight line if there is presence of the said theoretical distribution.

2.2. Analytical and Graphical Approach

Stock market indicators

A detailed analysis of the predicted values from indicators like Bollinger Bands, MACD, RSI, SMA, EMA and VWAP is presented in the result section along with accuracy measures to assess the relatively efficient indicator. The concept and the steps involved in the computation of these indicators for the corresponding 20-year period are presented below.

1. Bollinger Bands

Bollinger Bands indicator was developed in the 1980s by technical analyst John Bollinger. It comprises three bands, namely, upper, middle and lower, which indicate the pricing channels and incorporates volatility in the series. The idea of plotting moving averages was taken a step further by using the concept of standard deviations to define upper and lower rate boundaries. Standard deviation is a measure of dispersion. It helps to assess volatility in the series. 68% of the observations lie in one standard deviation from the mean on the bell curve. 95% lie in two standard deviations. About 99.7% observations lie in three standard deviations from the mean.

2. $\sigma = \sqrt{\sum(x_i - \bar{x})/n}$

Middle Band calculates a simple moving average of the 20-day price. A longer period may also be considered, but this will result in increasing the number of standard deviations employed too.

$$\bar{x} = (\sum x_i)/n$$

Upper band is the summation of the moving average and twice the value of standard deviation for the corresponding time period.

$$Upper\ band = \bar{x} + 2\sigma$$

Lower band is the difference between the moving average and twice the value of standard deviation for the corresponding time period.

$$Lower\ Band = \bar{x} - 2\sigma$$

The actual prices are plotted along with the three bands to assess the accuracy of Bollinger Bands in predicting price movements.

3. SMA (Simple Moving Average)

This indicator helps traders to ascertain the trend for short-, medium- and long-term investments. It is calculated like a simple arithmetic mean. However, one limitation of this indicator is that it gives equivalent weight to all the data points for which the average is calculated.

Short-term trends and trading are analysed best using 5–20 period averages. Where medium term traders prefer the 20–60 period moving average, and long-term investors may consider 100 or even more time periods for the computation.

Here, a time period of 10 is taken to compute the moving average for the entire time period under study.

4. EMA (Exponential Moving Average)

As opposed to SMA, EMA eliminates the lag in the indicator and hence, reflects the price movements faster than SMA. It gives higher weightage to the recent observations. The typical time period taken by short-term traders is 12 or 26 days, whereas long-term investors use 50-day or 200-day EMA.

The paper uses the 12-day look back period and computes EMA using the following formula:

$$EMA = [Closing\ price * multiplier] + [EMA(previous\ period) * (1 - multiplier)].$$

where, $multiplier = 2/(n + 1)$

Here, we take n time period as 12.

5. VWAP (Volume Weighted Average Price)

The inputs involved in computation of this index are the high, low and closing price along with the volume traded for the intraday period. The typical price is calculated by taking an average of the intraday high, low and closing price.

This typical price is multiplied by the volume. Thereafter, a cumulative summation of this product (Volume* Typical Price) is taken. Similarly, a cumulative sum or a running total of the volume is calculated. Finally, a ratio of the running total of the price-volume to the running total of the volume provides us with the indicator values.

6. MACD (Moving Average Convergence Divergence)

MACD or the hybrid indicator inculcates both trends along with momentum concepts. It can generate buy and sell signals indicating the zones above the zero line as bullish and below it as bearish.

The MACD line is formed by taking a difference of the values of a 12-day EMA and a 26-day EMA. Further, signals are generated by taking a 9-day EMA of theMACD line/values. A histogram can be plotted by taking the difference between the MACD values and the signal values.

7. RSI (Relative Strength Indicator)

The RSI value oscillates between 0 and 100 indicating overvalued (or overbought) and undervalued (or oversold) stocks or other assets. A value over 70 indicates overvaluation and a value under 30 indicates undervaluation conditions. An overvalued stock/asset may be in for a pullback in prices reversing the trend. This kind of analytical conclusions from RSI helps traders make buy-sell decisions.

First, day over day percentage changes in price are calculated; these changes in price help to distinguish between gains and losses for each time point. Thereby, a moving average of 12-day gains and losses is calculated

separately. Relative strength or ratio of average gains to average losses is then computed for each time point. RSI is then calculated using the following formula:

$$RSI = 100 - [100/(1 + RS)]$$

However, if the average loss is zero at any time point, then *RSI* is equal to 100.

A graphical analysis against actual price observations is carried out for all 6 indicators. Since the period under study (2000–2020) is quiet long, to track and compare the actual prices against the projected values, we need to consider a slimmer time frame. Hence, the graphs for the financial crisis period, i.e., 2007–2008, and the recent period (2019–2020), are studied in detail. The period of financial crisis is chosen because it was highly volatile for all securities.

The recent period is chosen to gain a better understanding of the market in the current scenario.

The accuracy measures such as RMSE and MSE further assist in ascertaining the most efficient indicator of the price movements on the market.

3. Identification and Results

3.1. Results for SPY ETF

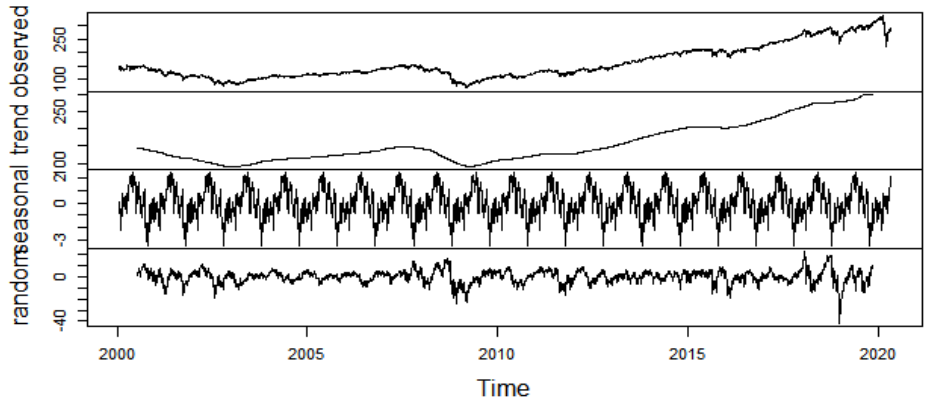
The results for SPY ETF have been presented. The econometric analysis is followed by the graphical analysis of different indicators. The forecasts from the fitted model are thereby analysed with the predicted values from the indicators.

Tests for non-stationarity

1. Plot of adjusted closing price of IXIC indicates that there is a trend in the data. This means that the data exhibits non-stationarity. Furthermore, from the decomposition, we can see there is a seasonal component and the variance is not constant throughout. This gives a further indication that the data is non-stationary.

Figure 1.1

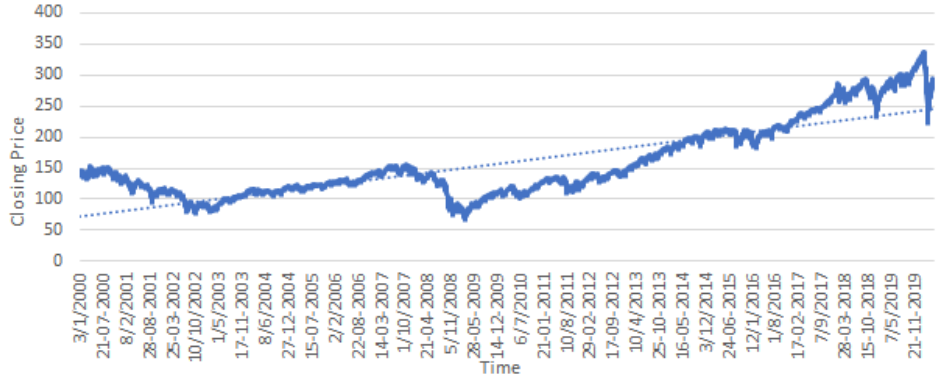
Decomposition of additive time series from 2000–2020



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Figure 1.2

Closing price of SPY ETF



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

2. Augmented Dickey-Fuller test

Dickey-Fuller	Lag order	p-value
-2.300	17	0.4513

Source: author's own elaboration using R software.

3. KPSS test

KPSS trend	Truncation lag parameter	p-value
8.8067	10	0.01

Source: author's own elaboration using R software.

A high p-value is observed in the ADF test and the null hypothesis is accepted. However, a low p-value for the KPSS test leads to a rejection of the null hypothesis. Thus, the results of the KPSS and ADF tests indicate that there is presence of non-stationarity.

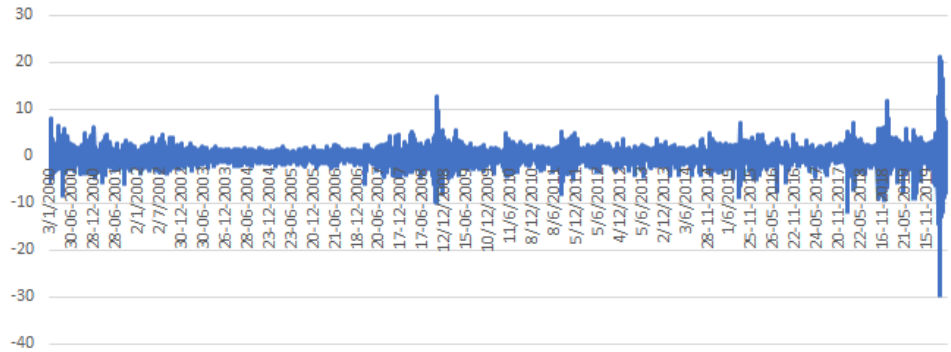
Transforming non-stationary series to stationary series

Since non-stationarity has been identified, first differencing is done to see if it is converted into a stationary series. Tests for non-stationarity are run again and the following results are obtained.

1. Change in stock prices after first differencing: The plot appears to be randomly distributed around zero indicating the possibility that the log transformed first differenced series is stationary.

Figure 1.3

Change in prices of SPY ETF



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

2. ADF test after differencing

Dickey-Fuller	Lag order	p-value
-82.685	0	0.01

Source: author's own elaboration using R software.

3. KPSS test after differencing

KPSS trend	Truncation lag parameter	p-value
0.025028	10	0.1

Source: author's own elaboration using R software.

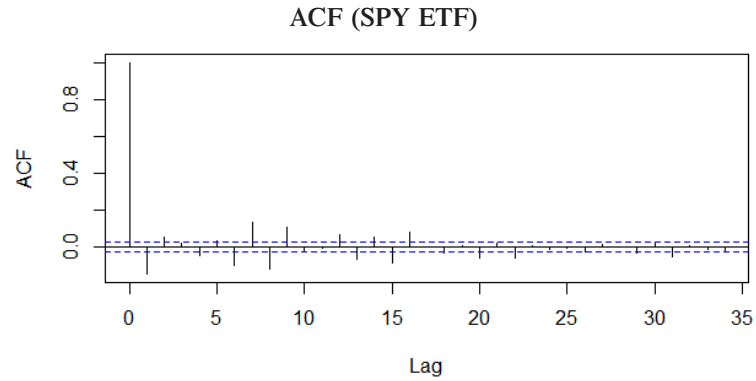
In comparison to the results obtained before first differencing, we obtain the opposite results, indicating that the first differenced series is stationary. Subsequently, the paper proceeds to use the ACF and PACF plots of the differenced series to identify the correct model.

Identifying the model

To identify the p, d, q values of the ARIMA model, the ACF and PACF are observed.

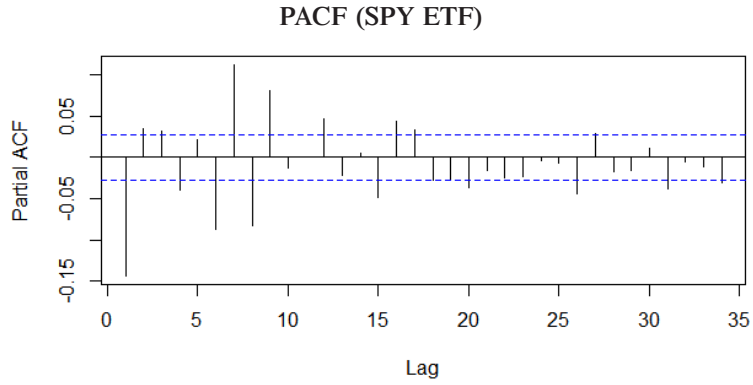
1) ACF plot of transformed first differenced series

Figure 1.4



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Figure 1.5



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

The PACF plot is insignificant after the seven-time lag indicating a value for p (AR terms). However, the significant lines in the ACF plot are not enough to determine the value for q (MA terms).

Testing to find the most efficient model

The results for ARIMA (2,1,0), ARIMA (4,1,1), ARIMA (3,1,1), ARIMA (5,1,0) & ARIMA (5,2,0) are computed[2]. According to the results, ARIMA (5,2,0) has the best fit since it has the lowest AIC and BIC values. Now, a check needs to be done so as to conclude it is the best fit model.

Best fit model

ARIMA (5,1,4) with drift

	VALUES
Sigma Squared	3.703
Log Likelihood	-10608.18
AIC	21236.36
AICc	21236.4
BIC	21301.77

Source: author's own elaboration using R software.

[2] See Appendix I.

	AR1	**AR2**	**AR3**	**AR4**	**AR5**
Coefficients	-0.290043	0.759003	-0.262654***	-0.861737	-0.041298**
	MA1	**MA2**	**MA3**	**MA4**	
Coefficients	0.182671	-0.752859	0.358009***	0.753016	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: author's own elaboration using R software.

A lower BIC & AIC value implies that ARIMA (5,1,4) is the best fit model for our analysis.

Before interpreting this result, first diagnostic checks are carried out to check the robustness of the model. Since most of the coefficients are not significant even at 5% level and the financial time series is known to have increasing variance, these checks are important before finalising the model.

Diagnostic checking

The next step is to check the significance of autocorrelation coefficients. The output for the Ljung-Box test is as Table.

Q*	**DF**	**p-value**
37.211	3	4.152e-08

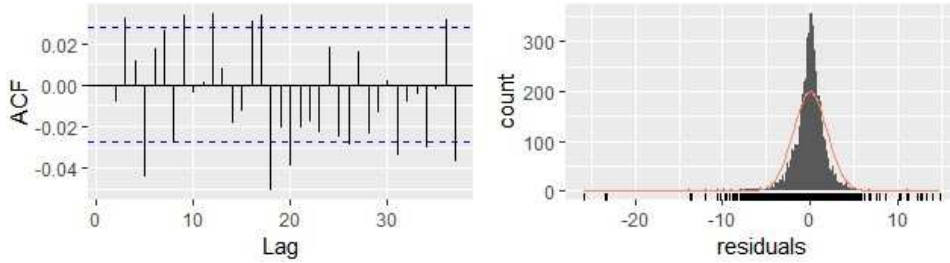
Source: author's own elaboration using R software.

The null hypothesis is rejected at 1% level of significance implying that the residuals do not follow a white noise process; hence, it is not completely random.

Additionally, an introspection of the histogram of residuals indicates that the residuals follow normal with mean zero and non-constant variance.

Figure 1.6

ACF and Lag residuals (SPY ETF)



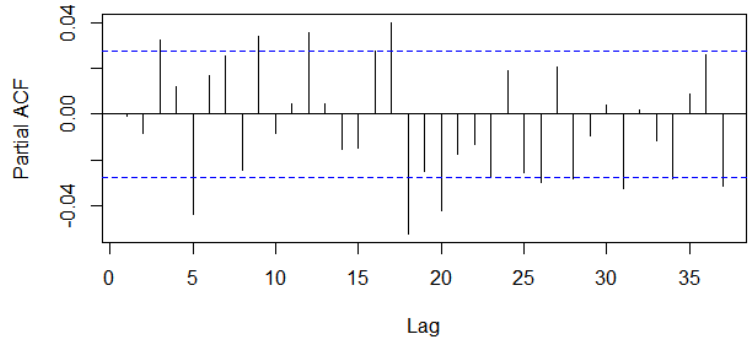
Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

ACF and PACF of residuals

If there are spikes outside the insignificant zone for both ACF and PACF plots, we can conclude that residuals are non-random with information in them. From the plots, we can see that the mean of the residuals is very close to zero; however, the correlation between residuals is non-zero. The time plot of the residuals shows that the variation in the residuals will differ over time.

Figure 1.7

Partial ACF vs. PACF (SPY ETF)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

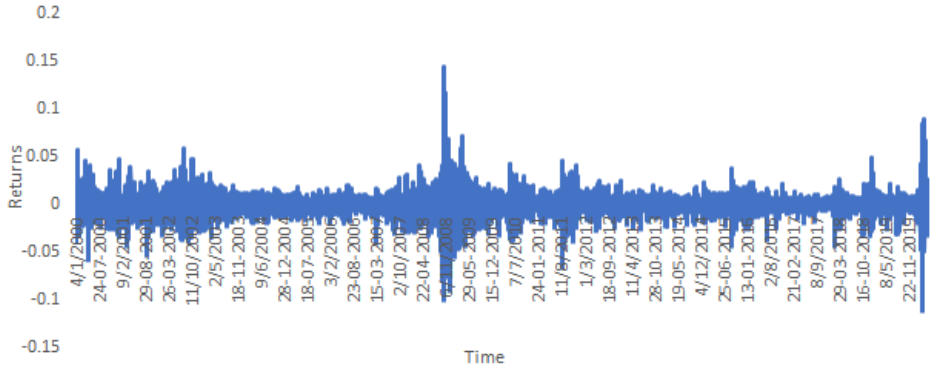
Since this confirms autocorrelations in the residuals, a model that captures the non-constant variance feature of the time series must be employed.

Volatility models

To examine the series again, a graph of daily returns of SPY is plotted over time.

Figure 1.8

Daily returns of SPY ETF (2000–2020)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Here, we observe a period of large changes followed by further large changes and those of smaller changes followed by further smaller changes. The values fluctuate unpredictably from period to period, hence indicating a volatile time series.

Testing the ARCH Effects

ARCH LM test

The mean equation is estimated, and the residuals obtained are squared and regressed on one lagged squared residual.

Chi-squared	df	p-value
336.88	1	< 2.2e-16

Source: author's own elaboration using R software.

A low p-value is observed in the ARCH LM test and the null hypothesis of no ARCH effect is rejected. Thus, the results of the test indicate that there is presence of the ARCH effects.

Estimating GARCH models

ARFIMA (1,0,1) GARCH (1,1)

	mu	omega	Alpha 1	Beta 1	AR 1	MA 1
Coeffi-cients	0.000582**	0.000000***	0.092664***	0.916989***	0.786767.	-0.830544*
SE	0.000089	0.000001	0.014780	0.012656	0.151314	0.137052

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: author's own elaboration using R software.

Information criterion statistics

	VALUES
HQIC	-6.4381
AIC	-6.4408
BIC	-6.4331
SIC	-6.4408

Source: author's own elaboration using R software.

$$R_t = 0.000582 \quad 0.786767\, R_{t-1} - 0.830544\, \varepsilon_{t-1} + \varepsilon_t$$
$$(\varepsilon_t = \sigma_t * z_t)$$
$$\sigma_t^2 = 0.000000 + \quad 0.092664\, \sigma_{t-1}^2 + 0.916989\, \varepsilon_{t-1}^2 \text{-----}*$$
$$(z_t \sim N(0,1))$$

A $ 1 increment in the previous period in SPY returns with respect to its previous period. On average, it will lead to a $ 0.79 increase in the returns value of SPY in the current period.

Also, from the third equation, small (or large) volatility changes are followed by similar smaller (or larger) changes.

Diagnostic checking (Standardised residuals tests)

The next step is to check the significance of coefficients. The output for the Ljung-Box tests, LM ARCH test and a few other tests are as Table.

Tests	Statistic	p-value
Weighted Ljung-Box Test [on standardised residuals]	0.03183	0.8584
Weighted Ljung-Box Test [on standardised squared residuals]	1.252	0.26311
LM ARCH Test [TR ^ 2]	1.049	0.3057

Source: author's own elaboration using R software.

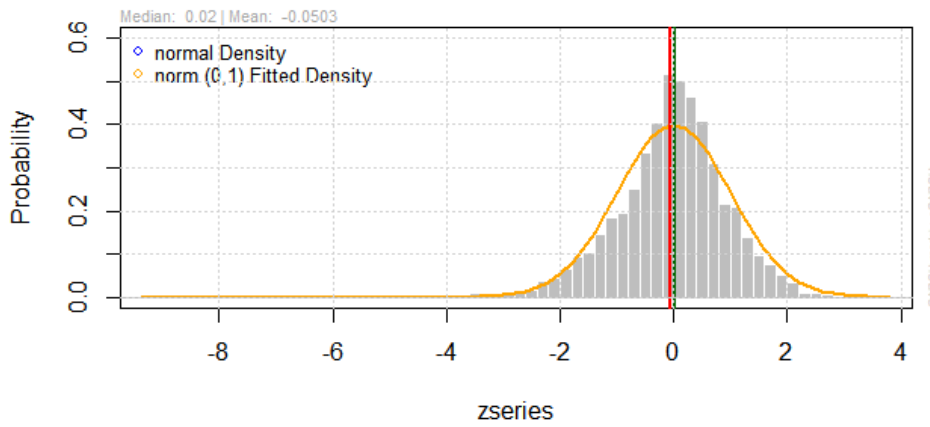
Ljung-Box test on standardised and standardised squared residuals and LM ARCH test accept the null hypothesis and are significant at 5% level of significance.

Thus, it is concluded that the errors store no additional relevant information and have no serial correlation. The errors behave like a white noise process. Also, there are no further arch effects.

Thus, the model ARFIMA (1,0,1) GARCH (1,1) passes the diagnostic checking and is the best fit model for the SPY ETF time series. Further, to confirm the robustness of the model over the time series, we plot the following graphs.

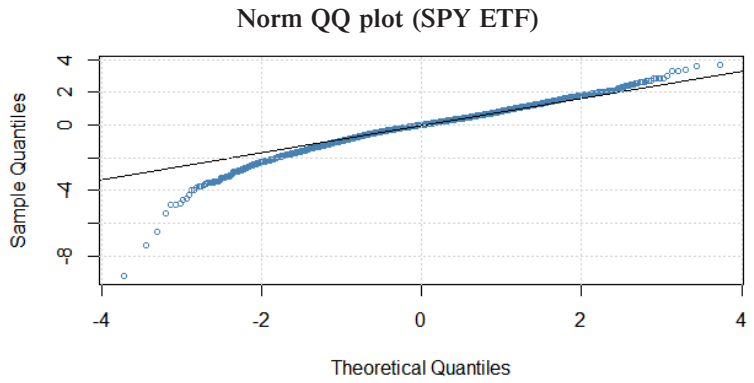
Figure 1.9

Empirical density of standardised residuals



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Figure 1.10



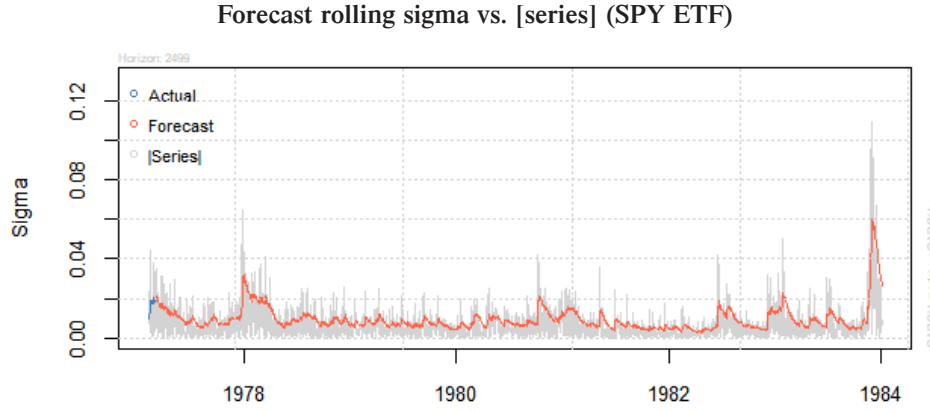
Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

The two graphs shown above confirm the randomness of the residuals. The QQ plot of residuals, further suggests the normal distribution of errors. The QQ plot resembles a straight line (with a few exceptions of outliers) suggesting the standard normal distribution with the mean zero and standard deviation one. This plot arranges the sample data in an ascending order and plots them against quantiles from a theoretical distribution (here, standard normal distribution).

These plots and the results from Ljung-Box tests confirm no autocorrelation in the errors; therefore, the robustness of the model ARFIMA (1,0,1) GARCH (1,1).

Forecast

Figure 1.11



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Here, the predicted conditional volatility is represented as Forecast Rolling Sigma. This is a conditional mean of the series at time $t + h$. The model efficiently predicts the volatility paths such as spikes and dips, and validates the long-term mean of the series. However, the initial spike or dip is not predicted since it depends on the past values of the time series.

Results from various indicators for SPY

The detailed analysis of the values predicted from indicators such as Bollinger Bands, MACD, RSI, SMA, EMA and VWAP is hereby presented along with a few accuracy measures to assess the relatively efficient indicator.

Since the period under study is 2000–2020, this is to track and compare the actual prices against the projected values and we need to consider a slimmer time frame. Hence, the graphs for the financial crisis period, i.e. 2007–2008 and the recent period (2019–2020) are presented for each indicator.

The period of the financial crisis is chosen because it was highly volatile for all securities; however, the recent period is chosen to gain a better understanding of the market in the current scenario.

1. Bollinger Bands

For the entire period, Bollinger Bands **studied under (2000–2020)**[voc/st] are not presented as a longer time scale compresses the observations at each time point. It is unable to give a clear picture of the movement of the bands. A magnified version for the years 2007–2008 and 2019–2020 is presented below (Figure 1.12.).

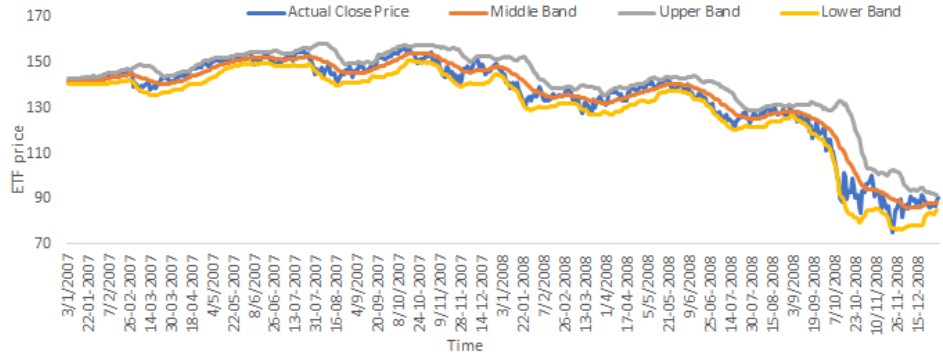
The blue band, indicating the actual prices is observed to be quite volatile, especially towards the end of 2008. All the bands initially, at the beginning of 2007, are quite close and spread out later in 2008 incorporating the higher volatile nature of the market. One useful observation here is that the actual prices oscillate between the upper and lower bands but never cross these boundary rates (Figure 1.13.).

One major similarity that is observed is the expansion of the Bollinger bands with the onset of financial stress on the market. However, this time, volatility is much higher as the lower and upper band widen up considerably in the first quarter of 2020. Increased volatility in the first quarter of 2020

is successfully incorporated in the wider ranges of the upper and lower bands. Once again, it is worth noting the actual price movements never cross the boundary bands, hence proving the efficiency of the volatility indicator.

Figure 1.12

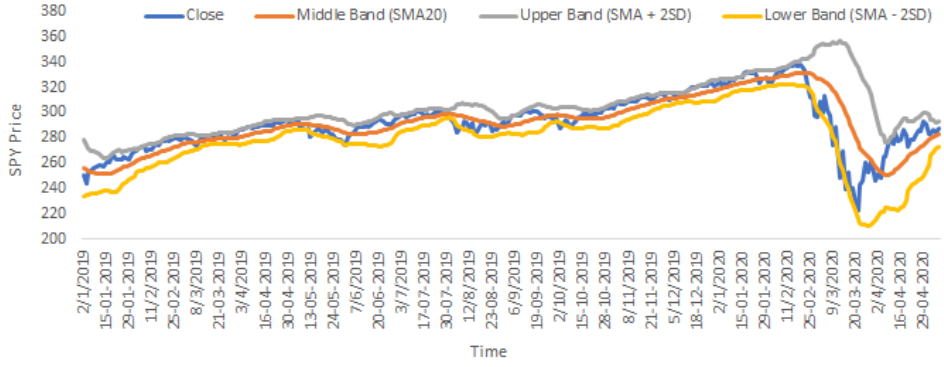
Actual prices of SPY v/s Bollinger Bands (SPY ETF)



Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

Figure 1.13

Actual prices of SPY v/s Bollinger Bands (SPY ETF)



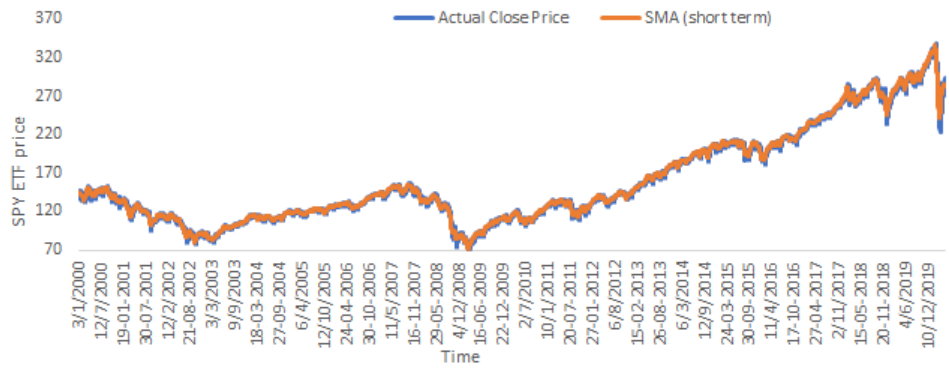
Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

2. SMA (Simple Moving Average)

The graph comparing actual prices and the SMA projections for SPY ETF is presented for the period under study, i.e. 2000–2020.

Figure 1.14

Actual prices of SPY v/s SMA projections (SPY ETF).

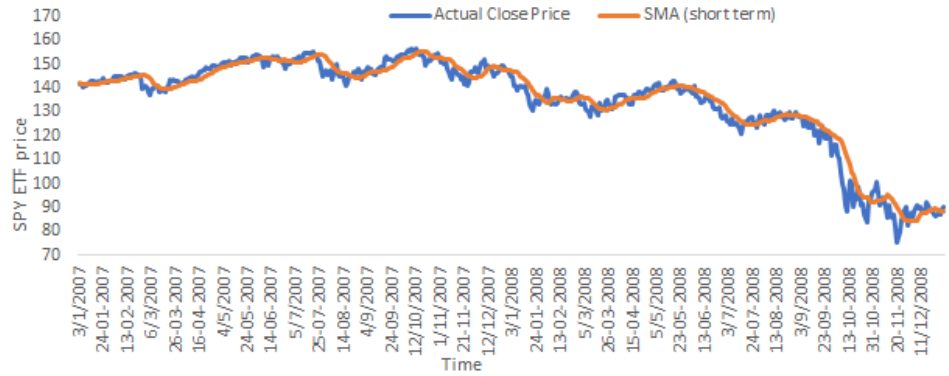


Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Since the time period under study is very long, it is unable to paint a clear picture when it comes to forecast errors. A detailed and microscopic analysis is necessary to visualise the effectiveness of the indicator. The following graphs are for the period of 2007–2008 and 2019–2020.

Figure 1.15

Actual prices of SPY v/s SMA projections (SPY ETF)



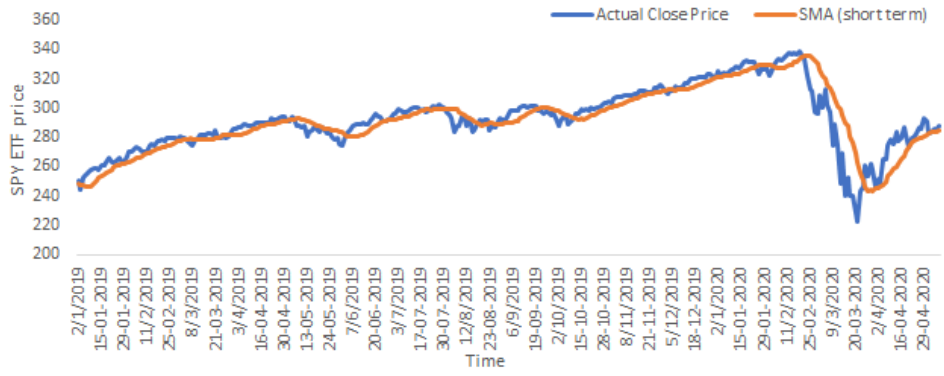
Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

It is observed that the actual closing price has a much more volatile motion than the projected values. It is also very useful to observe that any trend change is incorporated in the SMA line a few periods later. It is thus deductible that SMA is a little slower in realising the change in price movements.

This is also consistent with the theoretical fact that it assigns equal weightage to all observations and hence reflects any opposite movement with a lag.

Figure 1.16

Actual prices of SPY v/s SMA (Short term)



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

A similar observation is made in the graph for the period of 2019–2020. A lag in the realisation of sudden and adverse price movements is noticed in the predicted values. A significant drop in prices witnessed from February 2020 onwards is attributed to the COVID-19 pandemic.

Accuracy Measures

	ME	RMSE	MAE	MPE	MAPE
Training set	0.1803078	3.944103	2.566009	0.0460829	1.704767

Source: author's own elaboration using R software.

Above, there are a few accuracy measures for the model. For this analysis, the following is observed.

Mean Percentage Error (MPE)

The Mean Percentage Error is the computed average of the percentage errors by which a forecast of a model differs from actual values of the quantity being forecasted. The MPE value obtained is 0.0460829, implying that the difference between the forecasted values and the actual values is not significant[3].

Root Mean Squared Error (RMSE)

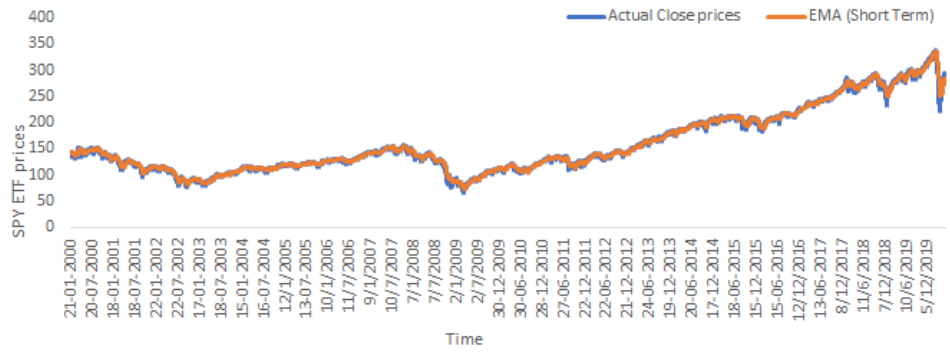
The Root Mean Squared Error is a measure of the concentration of the actual data points around the best fit. It is the standard deviation of the errors. A lower value depicts an overall good fit. The RMSE value obtained is 3.944103 implying a good fit.

3. EMA (Exponential Moving Average)

EMA for a 12-day period is computed and plotted. This is specifically useful for short-term traders. This look back period is increased when medium-or long-term investments are considered.

Figure 1.17

Actual close prices of SPY v/s EMA projections



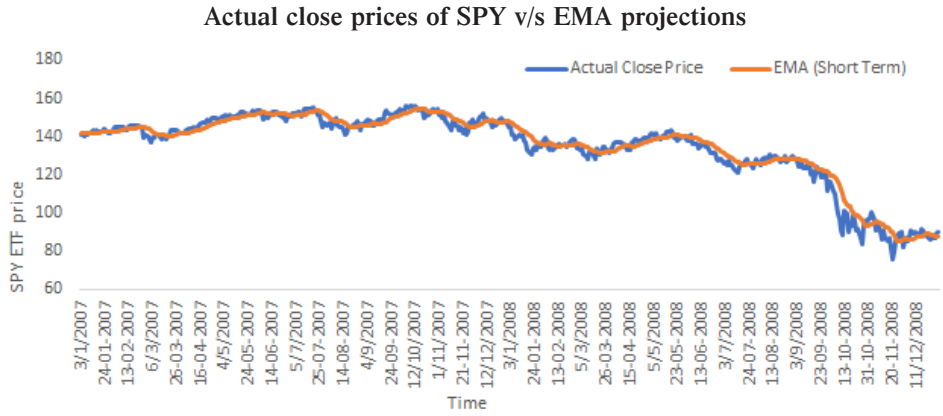
Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Once again, the long time period makes it difficult to visually track the actual and predicted movements. Thus, two different shorter time frames are studied separately for 2007–2008 and 2019–2020 (Figure 1.18).

EMA is faster in incorporating price changes than SMA since it gives more weightage to recent observations (Figure 1.19).

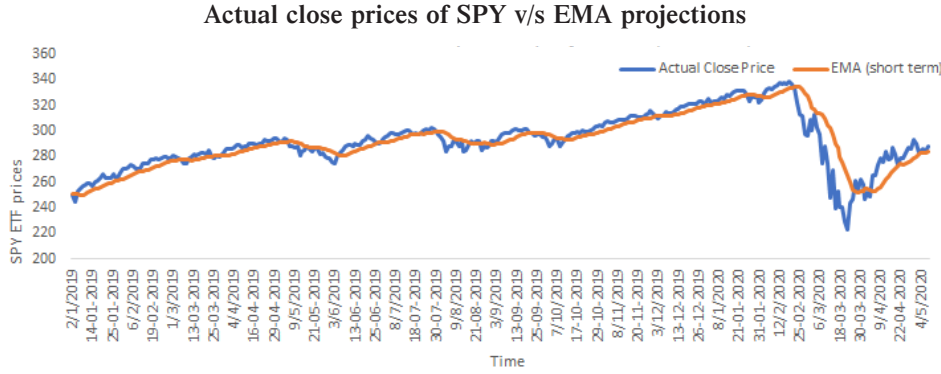
[3] See Appendix II.

Figure 1.18



Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

Figure 1.19



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

The shock from the black swan event is realised with a slightly small lag. The lag times in the realisation of adverse movements of the series are present but are lesser than in the SMA projections.

Accuracy measures

	ME	RMSE	MAE	MPE	MAPE
Training set	0.2591323	4.684283	2.55217	0.09049056	1.698478

Source: author's own elaboration using R software.

Above, there are a few accuracy measures for the model. For this analysis, the following is observed.

Mean Percentage Error (MPE)

The Mean Percentage Error is the computed average of the percentage errors by which a forecast of a model differs from actual values of the quantity being forecasted. The MPE value obtained is 0.09049056 implying that the difference between the forecasted values and the actual values is not significant[4].

Root Mean Squared Error (RMSE)

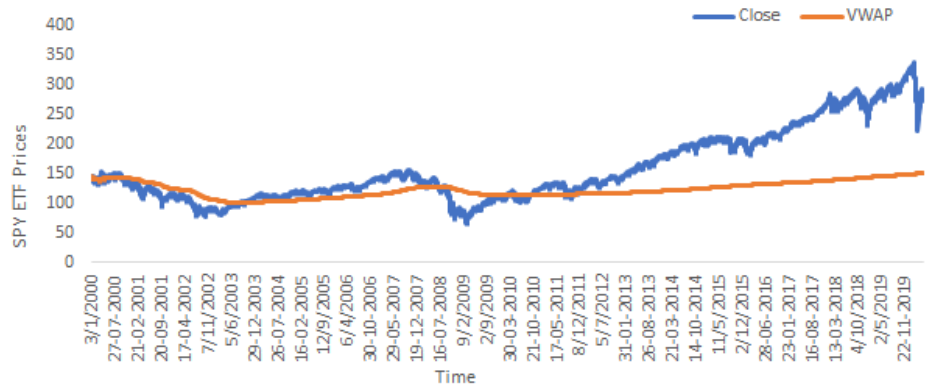
The Root Mean Squared Error is a measure of the concentration of the actual datum points around the best fit. It is the standard deviation of the errors. A lower value depicts an overall good fit. The RMSE value obtained is 4.684283 implying a good fit.

4. VWAP (Volume Weighted Average Price)

A ratio of running the cumulative of price-volume to that of the volume is plotted along with actual price movements for the entire period under study (2000–2020).

Figure 1.20

Actual close prices of SPY v/s VWAP projections



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

[4] See Appendix II.

The VWAP indicator line does not reflect the trend or volatility of the actual price movements effectively. The indicator line is rather flat and is not at all conclusive. It reflects the overall trend but not at a similar scale to that of the price. The gap between actual and predicted values widens after 2013.

Accuracy measures

	ME	RMSE	MAE	MPE	MAPE
Training set	36.31693	63.11259	43.72535	14.71358	22.44715

Source: author's own elaboration using R software.

A few accuracy measures have been shown above for the model. For this analysis, the following MPE and RMSE are observed.

Mean Percentage Error (MPE)

The Mean Percentage Error is the computed average of the percentage errors by which forecast of a model differs from actual values of the quantity being forecasted. The MPE value obtained is 14.71358 implying that the difference between the forecasted values and the actual values is significant[5].

Root Mean Squared Error (RMSE)

The Root Mean Squared Error is a measure of the concentration of the actual datum points around the best fit. It is the standard deviation of the errors. A lower value depicts an overall good fit. The RMSE value obtained is 63.11259 implying not a good fit.

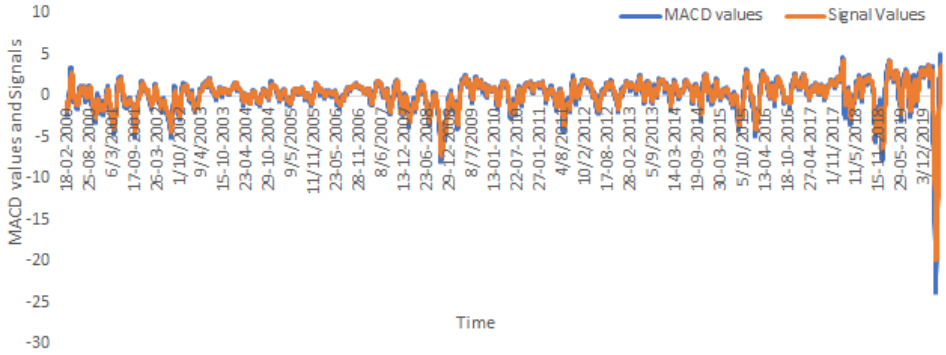
5. MACD (Moving Average Convergence Divergence)

The following plot depicts the MACD line, i.e. difference between slow and fast averages for the entire period under study (2000–2020). It also plots necessary signal lines for the corresponding period. A positive or upward momentum in the price movement of the stock is marked when the signal line crosses over MACD line and a negative movement in the price when MACD line crosses the signal line.

[5] See Appendix II.

Figure 1.21

MACD and signal lines for SPY ETF

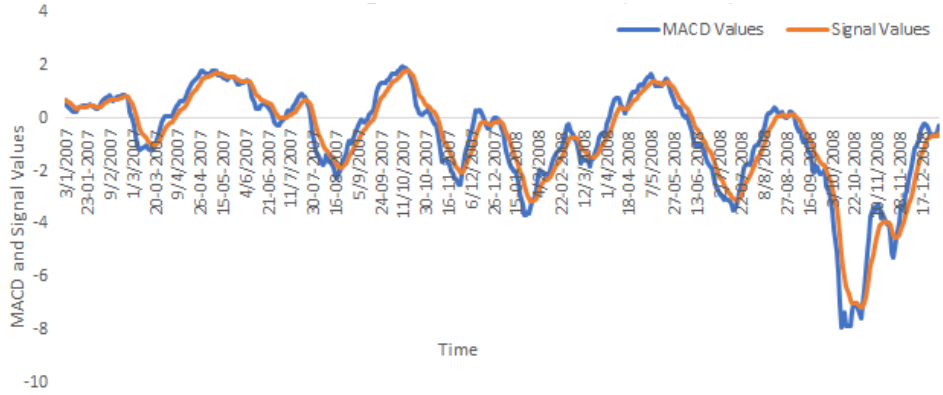


Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

The consolidated graph for 20 years does not clearly indicate the bullish or bearish nature due to its sheer scale. The following graphs consider 2007-2008 and 2019–2020 periods for a comprehensible analysis.

Figure 1.22

MACD and signal lines for SPY ETF



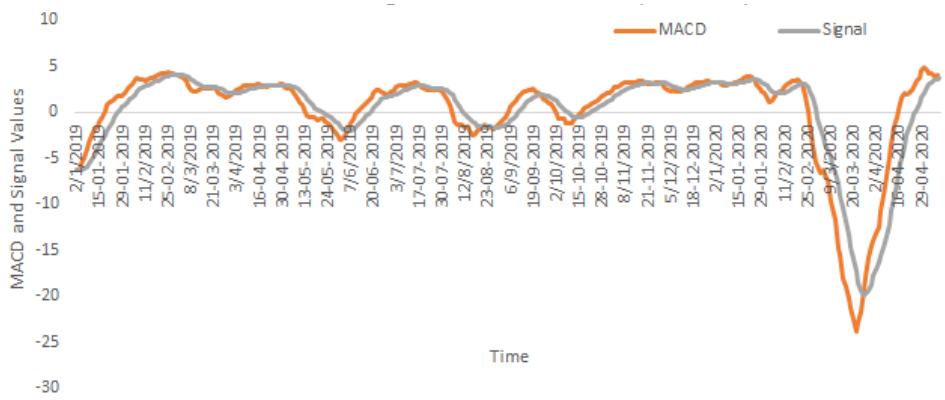
Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

Buying opportunities are presented in mid-2007 and April–May 2008. A buying opportunity is recognised when the MACD line crosses over the signal line in the first quadrant.

Selling opportunities are presented in the periods of July–August 2007, December 2007–January 2008 and August–October 2008. When the MACD line crosses under the signal line, it is taken as an accurate signal for selling.

Figure 1.23

MACD and signal lines for SPY ETF



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

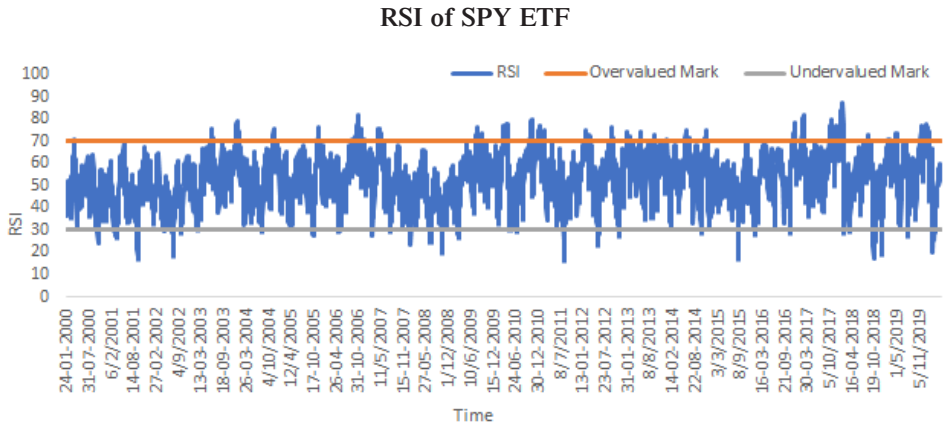
The plot for the 2019–2020 period indicates that there were selling opportunities towards the end of the first quarter of 2020. This may be since the market was able to realise the consequence of the pandemic that may have lasting effects throughout the year in the market, hence indicating a potentially capped loss if one sells as early as possible.

The market shows signs of the bullish nature throughout 2019 with a few exceptions. However, it clearly entered the bearish phase from early 2020 onwards.

6. RSI (Relative Strength Indicator)

RSI is on a scale of 0 to 100. It indicates whether a security or asset is overvalued or undervalued. Hence, it gives an idea whether it may reverse the trend and indicate a potentially correct time to buy or sell (Figure 1.24).

Figure 1.24

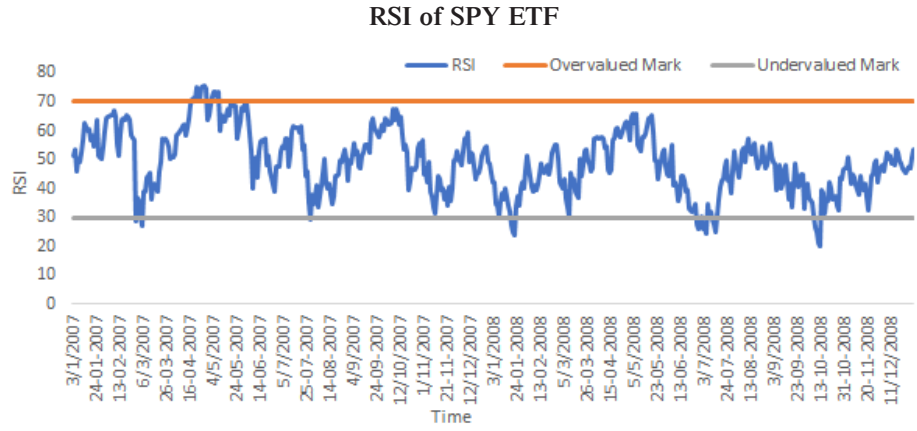


Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

A comprehensive graph over 20 years shows that there are relatively fewer times when the index price was undervalued compared to when it was overpriced.

To get clear signals to buy or sell, RSI for a relatively lower time scale is plotted below.

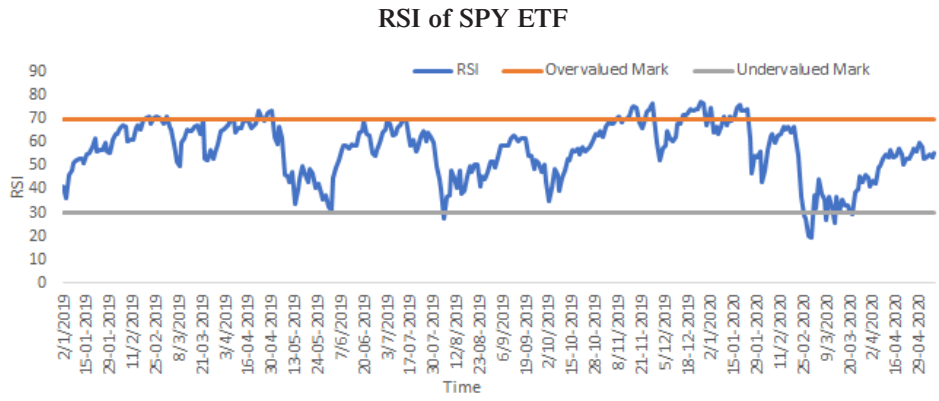
Figure 1.25



Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

For the period of 2007–2008, the SPY ETF price was neither overvalued nor undervalued with a few exceptions (April–May 2007, July and October 2008). RSI for SPY fluctuates between 30 and 70, indicating it was fairly valued during the financial crisis.

Figure 1.26



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

The SPY ETF value is observed being overpriced during November 2019, January 2020 and April 2019. The price shows signs of undervaluation in February–March 2020 followed by a rise in the RSI, which brings it back to the fair valuation bracket.

After a comprehensive and holistic analysis of all 6 indicators, it is concluded that Bollinger Bands are quite efficient in predicting the pricing channels. Since they incorporate the volatility in the data series, it is a robust indicator of the stock price movements. A comparative analysis of the actual prices indicates that the actual price in real time can never cross over the upper and lower band; hence, giving a robust boundary or range for the price movements.

The indicators like MACD and RSI can also give buy-sell cues by prompting the presence of the bearish-bullish market or the overvalued-undervalued stock.

Furthermore, the choice of an indicator for trading purposes also depends on the time period of investments (short/medium/long-term) and the risk appetite of the investor.

However, coupling 2 or 3 indicators together, for instance Bollinger Bands (measuring volatility) and MACD (incorporating trend and momentum) can give robust signals to make a trade.

3.2 Results for the IXIC Index

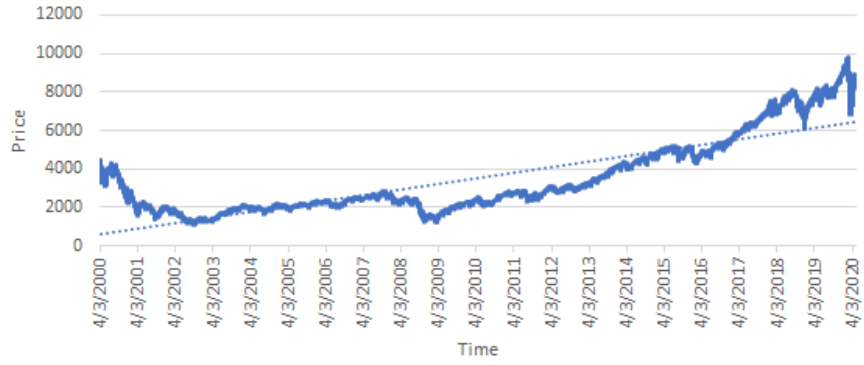
First, the results for the IXIC index have been presented. The econometric analysis is followed by the graphical analysis of different indicators. The forecasts from the fitted model are thereby analysed with the values predicted from the indicators.

Tests for non-stationarity

1. The plot of adjusted closing price of IXIC indicates that there is a trend in the data. This means that the data exhibits non-stationarity. Furthermore, from the decomposition, we can see there is a seasonal component and the variance is not constant throughout. This gives a further indication that the data is non-stationary.

Figure 2.1

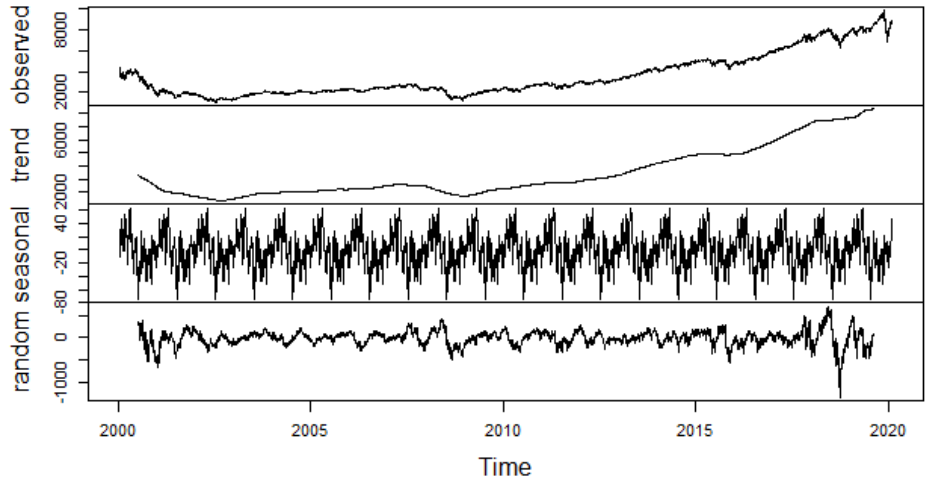
Adjusted closing price of IXIC



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Figure 2.2

Decomposition of additive time series (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

2. Augmented Dickey-Fuller test

Dickey-Fuller	Lag order	p-value
-2.254	17	0.4708

Source: author's own elaboration using R software.

3. KPSS test

KPSS trend	Truncation lag parameter	p-value
9.0788	10	0.01

Source: author's own elaboration using R software.

A high p-value is observed in the ADF test and the null hypothesis is accepted. However, a low p-value for the KPSS test leads to a rejection of the null hypothesis. Thus, the results of the KPSS and ADF tests indicate that there is presence of non-stationarity.

Transforming a non-stationary series to a stationary series

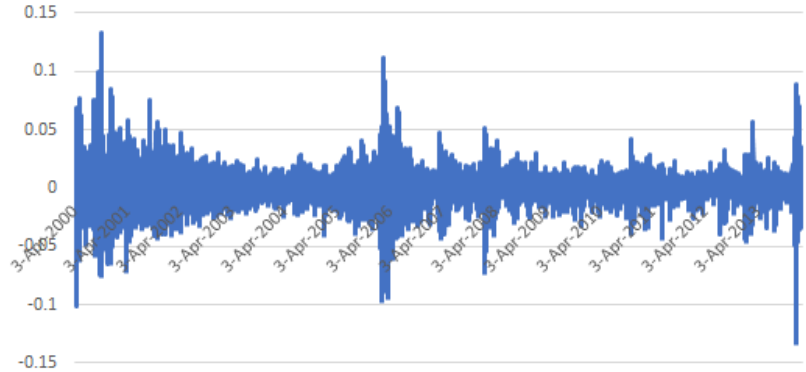
Since non-stationarity has been identified, log transformation and first differencing are done to see if it is converted into a stationary series. Tests for non-stationarity are run again and the following results are obtained.

1) Change in stock prices after logarithmic transformation and first differencing

The plot appears to be randomly distributed around zero indicating the possibility that the log transformed first differenced series is stationary.

Figure 2.3

Change in log prices (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

2) ADF test after differencing

Dickey-Fuller	Lag order	p-value
-9.6148	0	0.01

Source: author's own elaboration using R software.

3) KPSS test after differencing

KPSS trend	Truncation lag parameter	p-value
0.14245	10	0.0568

Source: author's own elaboration using R software.

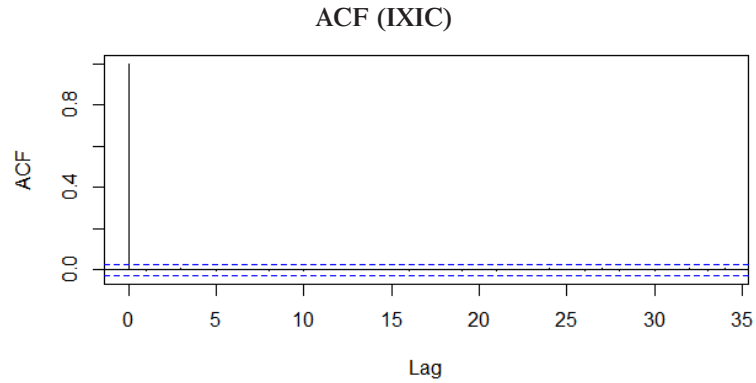
In comparison to the results obtained before the first differencing, we obtain the opposite results, indicating that the first differenced series is stationary. Subsequently, the paper proceeds to use the ACF and PACF plots of the log differenced series to identify the correct model.

Identifying the model

To identify the p, d, q values of the ARIMA model, the ACF and PACF are observed.

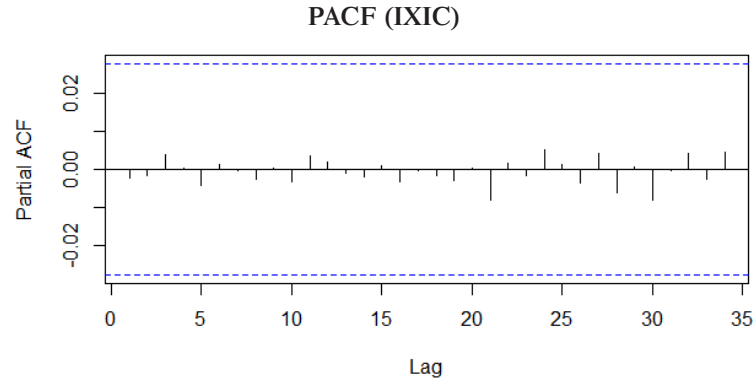
1) ACF plot of log-transformed first differenced series

Figure 2.4



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Figure 2.5



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

The ACF and PACF plot are insignificant at all time lags, indicating a value for p (AR terms) and q (MA terms). Since there is no significant line above the confidence interval of the ACF and PACF plot, this indicates the zero value for both p and q and hence, a random walk process.

Testing to find the most efficient model

The results for ARIMA (0,1,0), ARIMA (1,1,1), ARIMA (1,1,0), ARIMA (0,1,1) & ARIMA (5,2,0) are computed[6]. According to the results, ARIMA (5,2,0) has the best fit since it has the lowest AIC and BIC values. Now a check needs to be done to conclude it is the best fit model.

Best fit model

ARIMA (5,2,0) with drift

	VALUES
Sigma Squared	0.0002523
AIC	-27521.72
AICc	-27521.72
BIC	-27515.19

Source: author's own elaboration using R software.

	AR1	**AR2**	**AR3**	**AR4**	**AR5**
Coefficients	-0.8848***	-0.7235***	-0.5204***	-0.3296***	-0.1572***
SE	0.0139	0.0181	0.0194	0.0181	0.0139

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: author's own elaboration using R software.

A lower BIC and AIC value implies that ARIMA (5,2,0) is the best fit model for our analysis[7].

[6] See Appendix I.

[7] Even though the ACF and PACF plots suggest an ARIMA (0,1,0) model, R software function (auto. arima) gives the best fit model based on the lowest AIC, BIC, Maximum Likelihood Estimation and a few unit root tests combined.

Thus, the final model for our analysis is given by:

$$y_t = -0.8848y_{t-1} - 0.7235y_{t-2} - 0.5204y_{t-3} - 3296y_{t-4} - 0.1572y_{t-5}$$

where, y_t is log of prices.

A 1% change in previous period's index price, on average, will lead to a 0.88% decline in the value of IXIC in the current period. Similarly, the percentage decline in the current period's index price can be viewed with respect to changes in prices of the previous 5 periods.

A very important and interesting insight from these results is that the impact of past prices declines as the lag increases. This is consistent with the stochastic property of the asset prices.

Diagnostic checking

The next step is to check the significance of autocorrelation coefficients. The output for the Ljung-Box test is presented below:

Q*	DF	p-value
333.94	5	< 2.2e – 16

Source: author's own elaboration using R software.

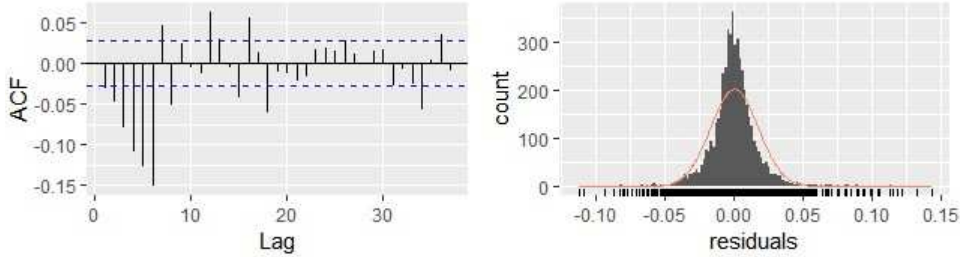
The null hypothesis is rejected at 1% level of significance implying that the residuals do not follow a white noise process and hence, are not completely random.

Additionally, an introspection of the histogram of residuals indicates that the residuals follow normal with the mean zero and a non-constant variance[8].

[8] Typically, financial data haves eteroskedasticity or non-constant variance. This is clearly observed in the first graph where we plotted prices over time. Here, logarithmic transformations were initially taken to capture this increasing variance. However, autocorrelations in variance calls for fitting ofre sophisticated models (like ARCH, GARCH, EGARCH, etc.) toonhe financial time series.

Figure 2.6

ACF v/s Lag & Count v/s Residuals (IXIC)



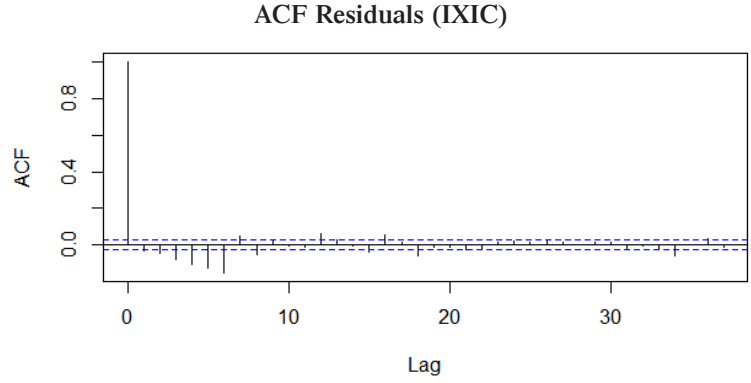
Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

ACF and PACF of residuals

If there are spikes outside the insignificant zone for both the ACF and PACF plots, we can conclude that residuals are non-random as concerns the information in them. From the plots, we can see that the mean of the residuals is very close to zero; however, the correlation between residuals is non-zero. The time plot of the residuals shows that the variation in the residuals varies over time.

Figure 2.7

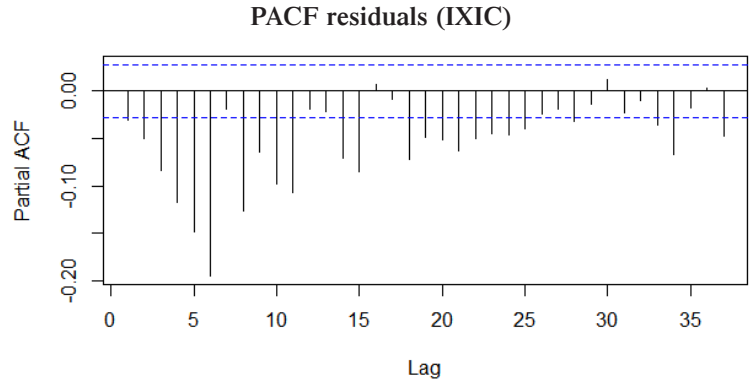
ACF Residuals (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Since, the partial ACF confirms autocorrelations in the residuals, a model that captures the non-constant variance feature of the time series must be employed (Figure 2.8).

Figure 2.8

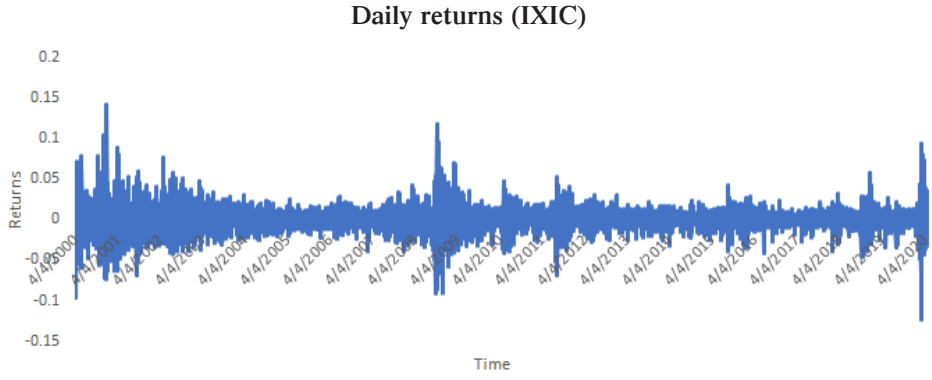


Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Volatility models

To examine the series again, a graph of daily returns of IXIC is plotted over time.

Figure 2.9



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Here, we observe a period of large changes followed by further large changes and those of smaller changes followed by further smaller changes. The values fluctuate unpredictably from period to period, hence indicating a volatile time series.

Testing ARCH Effects

ARCH LM test

The mean equation is estimated, and the residuals obtained are squared and regressed on one lagged squared residual.

Chi-squared	df	p-value
410.27	1	< 2.2e – 16

Source: author's own elaboration using R software.

A low p-value is observed in the ARCH LM test and the null hypothesis is rejected. Thus, the results of the test indicate that there is presence of the ARCH effects.

Estimating GARCH models

ARFIMA (1,0,1) GARCH (1,1)

	mu	omega	Alpha 1	Beta 1	AR 1	MA 1
Coeffi-cients	0.000830***	0.000003***	0.109776***	0.876520***	0.944054***	-0.963788***
SE	0.000092	0.000001	0.009903	0.010643	0.004667	0.000704

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: author's own elaboration using R software.

Information criterion statistics

	VALUES
HQIC	-5.9839
AIC	-5.9866
BIC	-5.9789
SIC	-5.9866

Source: author's own elaboration using R software.

$$R_t = 0.000830 + 0.944054R_{t-1} - 0.963788\varepsilon_{t-1} + \varepsilon_t$$
$$(\varepsilon_t = \sigma_t * z_t)$$
$$\sigma_t^2 = 0.000003 + 0.109776\sigma_{t-1}^2 + 0.876520\varepsilon_{t-1}^2 \text{- ---- } *$$
$$(z_t \sim N(0,1))$$

A $1 increment in the previous period in IXIC returns, on average, will lead to a $ 0.94 increase in the returns value of IXIC in the current period.

Also, from the third equation, small (or large) volatility changes are followed by similar smaller (or larger) changes.

Diagnostic checking (standardised residuals tests)

The next step is to check the significance of coefficients. The output for the Ljung-Box tests, the LM ARCH test and a few other tests are presented below.

Tests	Statistic	p-value
Weighted Ljung-Box Test [on standardised residuals]	0.08484	0.7708
Weighted Ljung-Box Test [on standardised squared residuals]	2.654	0.10331
LM Arch Test [TR ^ 2]	0.08859	0.7660

Source: author's own elaboration using R software.

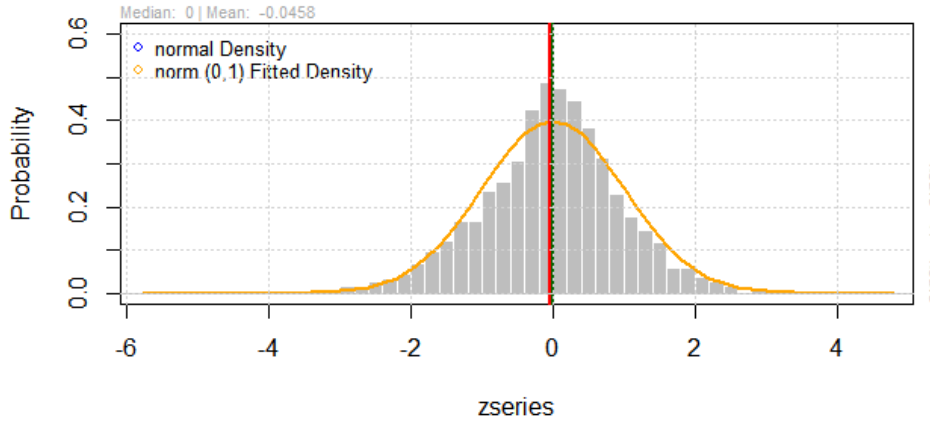
Ljung-Box test on standardised and standardised squared residuals and the LM ARCH test accept the null hypothesis and is significant at 5% level of significance.

Thus, it is concluded that the errors store no additional relevant information and have no correlation. The errors behave like a white noise process. Also, there are no further Arch effects.

Thus, the model ARFIMA (1,0,1) GARCH (1,1) passes the diagnostic checking and is the best fit model for the IXIC index time series. Furthermore, to confirm the robustness of the model over the time series, we plot the following graphs.

Figure 2.10

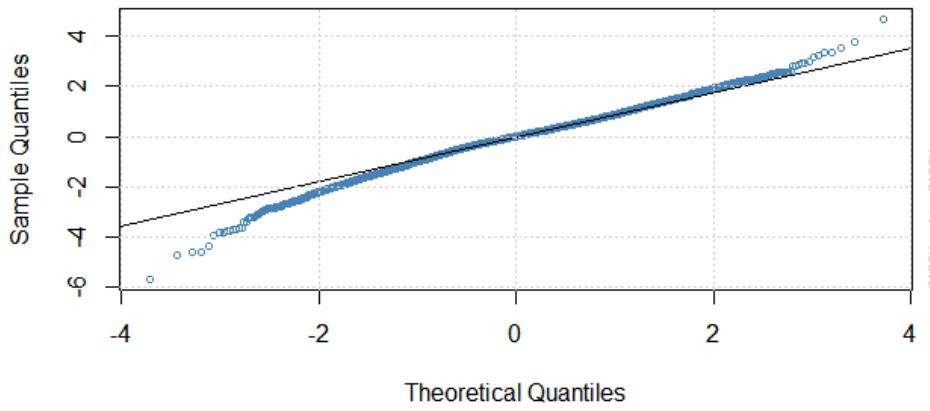
Empirical density of standardised residuals (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Figure 2.11

Norm QQ plot (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

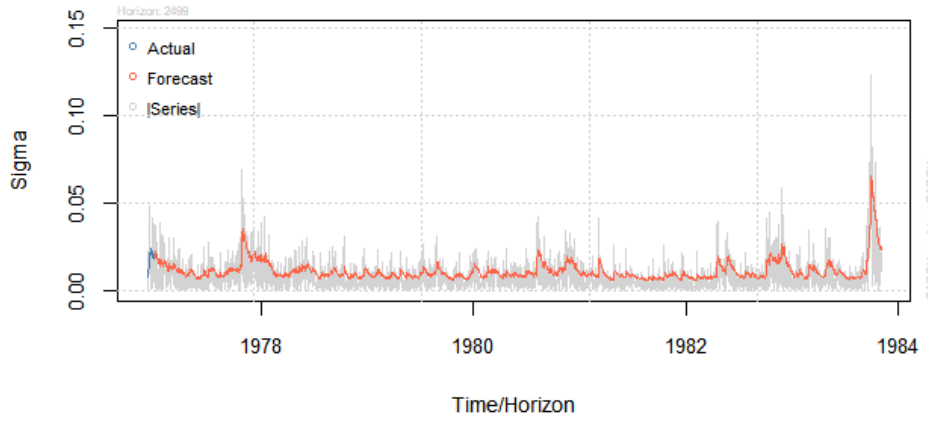
The two plots confirm the randomness of the residuals. The QQ plot of residuals further suggests the normal distribution of errors. The QQ plot resembles a straight line suggesting standard normal distribution with the mean zero and standard deviation one. This plot arranges the sample data in an ascending order and plots them against quantiles from a theoretical distribution (here, standard normal distribution).

These plots and the results from Ljung-Box tests confirm no autocorrelation in the errors and hence the robustness of the model ARFIMA (1,0,1) GARCH (1,1).

Forecast

Figure 2.12

Forecast Rolling sigma v/s [series] (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Here, the predicted conditional volatility is represented as Forecast Rolling Sigma. The conditional mean is the series at time t+h. The model predicts efficiently the volatility path, i.e. spikes and dips. However, the initial spike or dip is not predicted since it depends on the past values of the time series.

Results from various indicators for IXIC

Detailed analysis of the predicted values from the indicators like Bollinger Bands, MACD, RSI, SMA, EMA and VWAP is hereby presented along with a few accuracy measures to assess the relatively efficient indicator.

Since the period under study is 2000–2020, to track and compare the actual prices against the projected values, we need to consider a slimmer time

frame. Hence, the graphs for the financial crisis period, i.e., 2007–2008, and the recent period 2019–2020, are presented for each indicator.

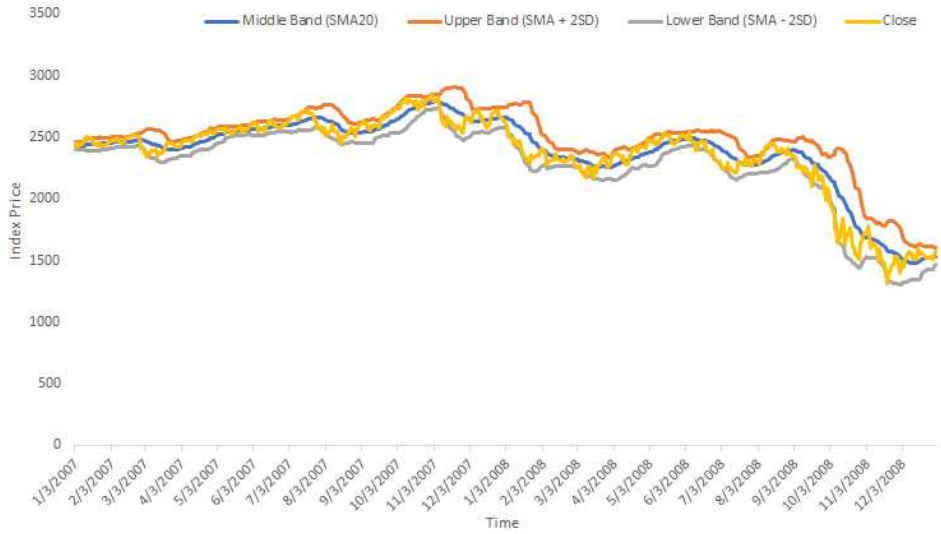
The period of the financial crisis is chosen because it was a highly volatile time period for all securities. The recent period is chosen to gain a better understanding of the market in the current scenario.

1. Bollinger Bands

The Bollinger Bands for the entire period under study (2000–2020) are not presented as a longer time scale compresses the observations at each time point and does not give a clear picture of the movement of the bands. A magnified version **for 2007–2008 and 2019–2020** is presented as follows.

Figure 2.13

Actual Index price v/s Bollinger bands (IXIC)



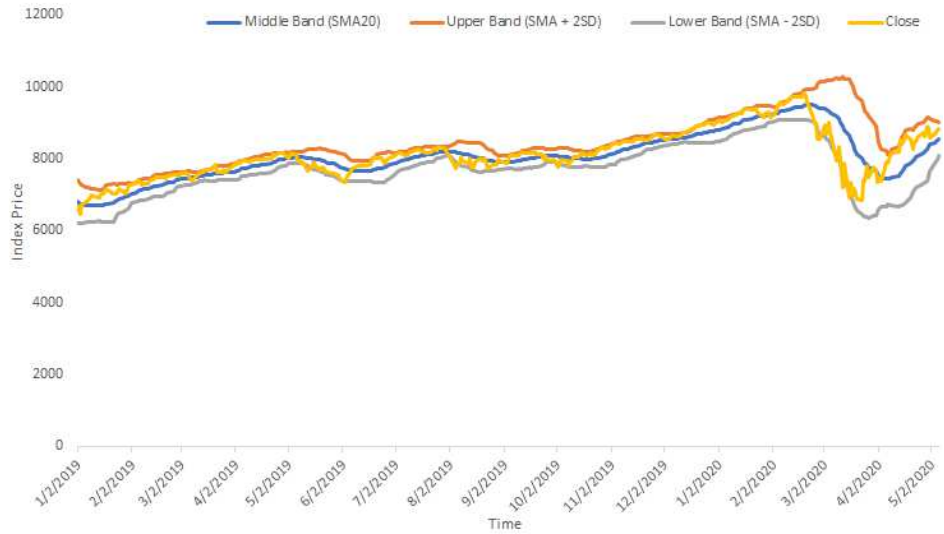
Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

The yellow band, indicating the actual prices is observed to be quite volatile throughout. All three bands are quite close at the beginning and spread out later in the year, next incorporating the higher volatile nature of the market. One useful observation here is that the actual prices oscillate between the upper and lower bands but never cross these boundary rates (Figure 2.14).

One major similarity that is observed is the expansion of the Bollinger Bands with the onset of financial stress on the market. As this was later observed in 2007 and 2008, a similar trend is observed from February 2020 onwards. Increased volatility in the first quarter of 2020 is successfully incorporated in the wider ranges of the upper and lower bands. Once again, it is worth noting that the actual price movements never cross the boundary bands, hence proving the efficiency of the volatility indicator.

Figure 2.14

Actual Index price v/s Bollinger bands (IXIC)



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

2. SMA (Simple Moving Average)

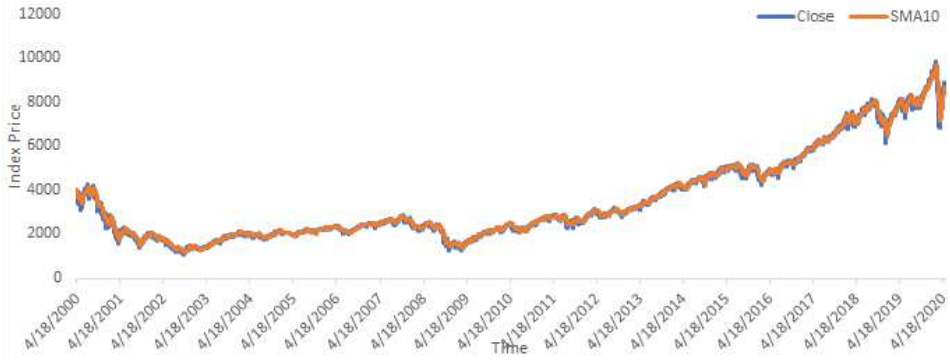
The graph comparing the actual prices and the SMA projections is presented for the period under study, i.e., 2000–2020 (Figure 2.15).

Since the time period under study is very long, it does not paint a clear picture when it comes to forecast errors. A detailed and microscopic analysis is necessary to visualise the effectiveness of the indicator. The following graphs are for the period of 2007–2008 and 2019–2020 (Figure 2.16).

It is observed that the actual closing price has a more volatile motion than the projected values. It is also very useful to observe that any trend change is incorporated in the SMA line a few periods later. It is deductible that SMA is a little slower in realising the change in price movements.

Figure 2.15

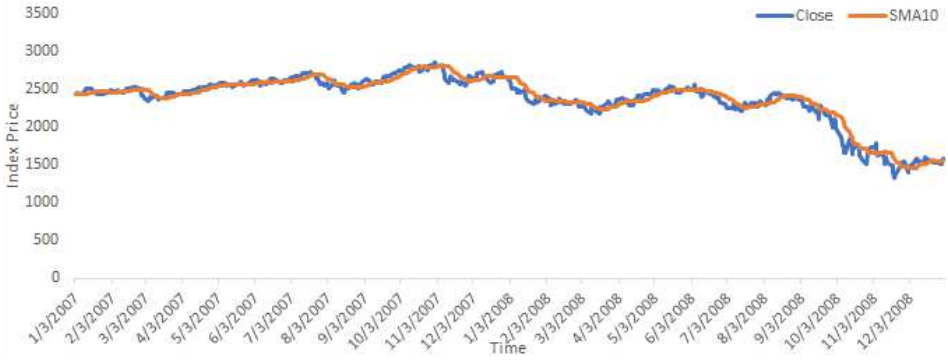
Actual Index price v/s SMA projections (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Figure 2.16

Actual Index price v/s SMA projections (IXIC)



Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

This is also consistent with the theoretical fact that it assigns equal weightage to all observations and hence reflects any opposite movement with a lag (Figure 2.17).

A similar observation is made in the graph for the period 2019–2020. A lag in the realisation of sudden and adverse price movements is noticed in the predicted values.

Figure 2.17

Actual Index price v/s SMA projections (IXIC)

Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

Accuracy measures

	ME	RMSE	MAE	MPE	MAPE
Training set	6.328891	115.653	73.8213	0.03834196	2.272291

Source: author's own elaboration using R software.

A few accuracy measures for the model are mentioned in the table above. For this analysis, the MPE and RMSE are observed.

Mean Percentage Error (MPE)

The Mean Percentage Error is the computed average of the percentage errors by which the forecast of a model differs from actual values of the quantity being forecasted. The MPE value obtained is 0.03834196 implying that the difference between the forecasted values and the actual values is not significant.

Root Mean Squared Error (RMSE)

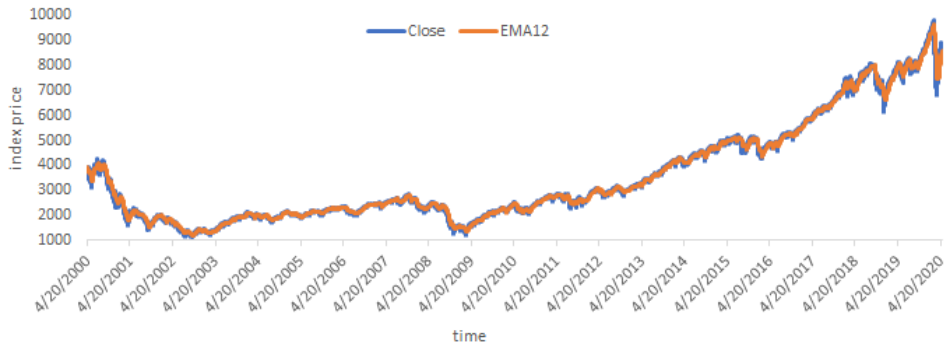
The Root Mean Squared Error is a measure of the concentration of the actual datum points around the best fit. It is the standard deviation of the errors. A lower value depicts an overall good fit. The RMSE value obtained is 115.653, implying a not good fit.

3. EMA (Exponential Moving Average)

EMA for a 12-day period is computed and plotted. This is specifically useful for short-term traders. This look back period is increased when medium-or long-term investments are considered.

Figure 2.18

Actual Index price v/s EMA projections (IXIC)

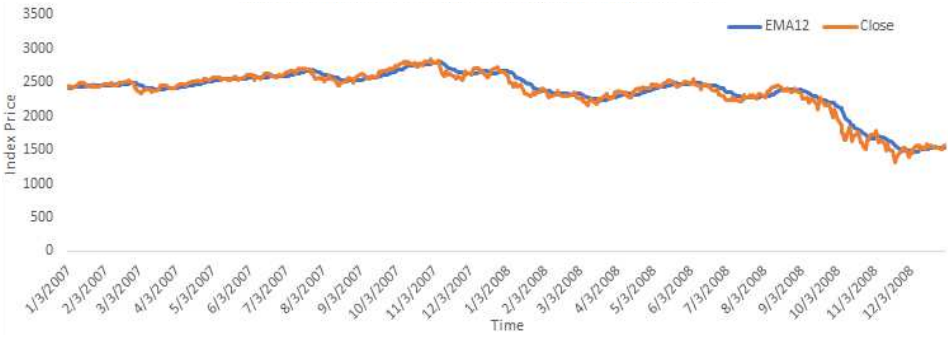


Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

Once again, the long time period makes it difficult to visually track the actual and predicted movements. Thus, two different shorter time frames are studied separately for two periods (2007–2008 and 2019–2020).

Figure 2.19

Actual Index price v/s EMA projections (IXIC)

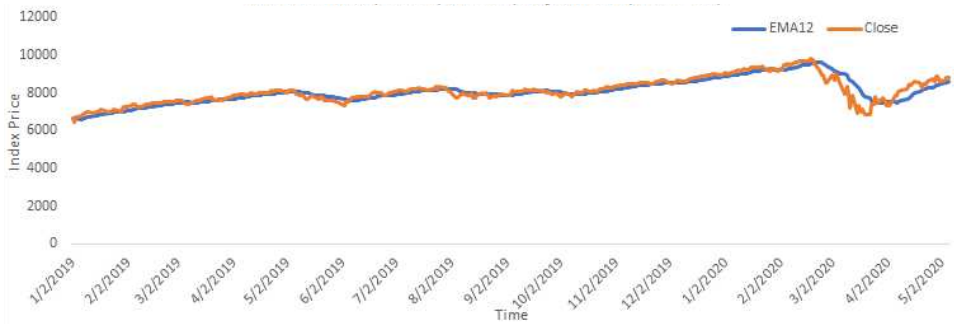


Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

EMA is faster in incorporating price changes than SMA since it gives more weightage to recent observations. The effects of the financial crisis are clearly visible in the early 2008.

Figure 2.20

Actual Index price v/s EMA projections (IXIC)



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

The shock from the black swan event is not effectively captured in the early 2020. However, the downward trend is realised after a small lag and so is the (temporary) recovery in April 2020. The volatile motion, however, is not mirrored on the indicator line.

Accuracy measures

	ME	RMSE	MAE	MPE	MAPE
Training set	8.690561	139.5241	73.72134	0.07838845	2.264921

Source: author's own elaboration using R software.

A few accuracy measures for the model are mentioned in the table above. For this analysis, the following is observed.

Mean Percentage Error (MPE)

The Mean Percentage Error is the computed average of the percentage errors by which forecast of a model differs from the actual values of the quantity being forecasted. The MPE value obtained is 0.07838845, implying that the difference between the forecasted values and the actual values is not significant.

Root Mean Squared Error (RMSE)

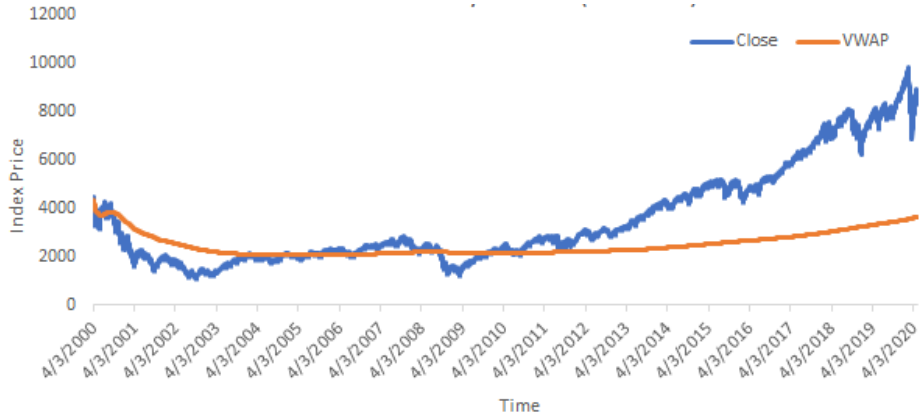
The Root Mean Squared Error is a measure of the concentration of the actual datum points around the best fit. It is the standard deviation of the errors. A lower value depicts an overall good fit. The RMSE value obtained is 139.5241, implying a not good fit.

4. VWAP (Volume Weighted Average Price)

A ratio of running- cumulative of price-volume to that volume is plotted along with actual price movements for the entire period under study (2000–2020).

Figure 2.21

Actual Index price v/s VWAP (IXIC)



Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

The VWAP indicator line does not reflect the trend or volatility of the actual price movements effectively. The indicator line is rather flat and is not at all conclusive. It reflects the overall trend but not at a similar scale to that of the price. The gap between actual and predicted values widens after 2013–2014. The closing price upward trend is followed by the VWAP but is not at the same scale.

Accuracy measures

	ME	RMSE	MAE	MPE	MAPE
Training set	1039.626	2000.735	1358.959	12.73405	31.62165

Source: author's own elaboration using R software.

Above, there are a few accuracy measures for the model. For this analysis, the MPE is observed.

Mean Percentage Error (MPE)

The Mean Percentage Error is the computed average of the percentage errors by which forecast of a model differs from actual values of the quantity being forecasted. The MPE value obtained is 12.73405 implying that the difference between the forecasted values and the actual values is significant.

Root Mean Squared Error (RMSE)

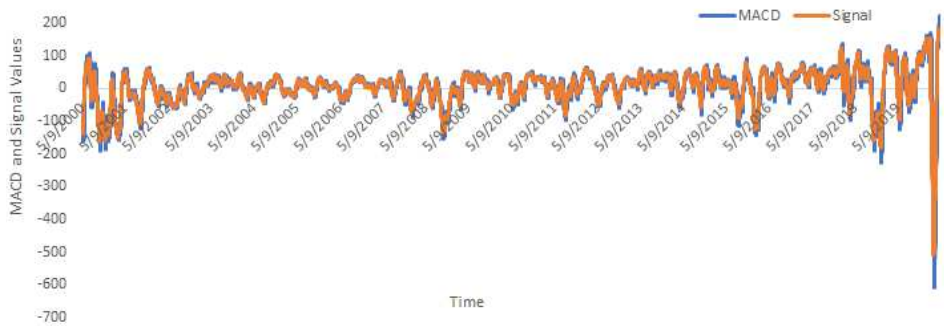
The Root Mean Squared Error is a measure of the concentration of the actual datum points around the best fit. It is the standard deviation of the errors. A lower value depicts an overall good fit. The RMSE value obtained is 2000.735, implying it is not a good fit.

MACD (Moving Average Convergence Divergence)

The following plot depicts the MACD line, i.e. the difference between slow and fast averages for the entire period under study (2000–2020). It also plots a signal line for the corresponding period. A positive or upward momentum in the price movement of the stock is marked when the signal line crosses over the MACD line, whereas a negative movement in the price when the MACD line crosses the signal line.

Figure 2.22

MACD and signal lines (IXIC)

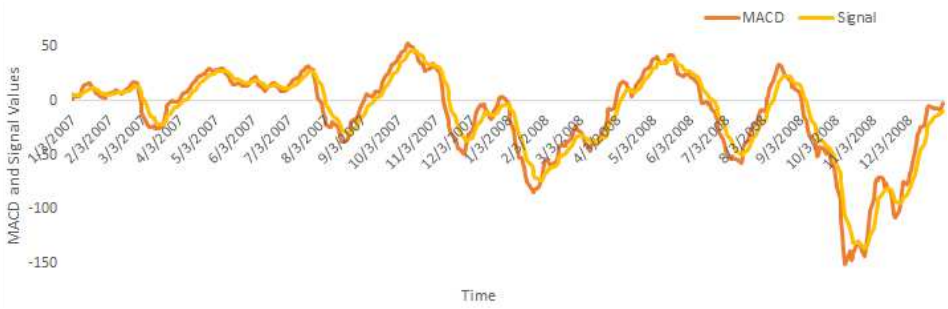


Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

The consolidated graph for 20 years does not clearly indicate the bullish or bearish nature due to its sheer scale. The other graphs present a period between **(2007–2008 and 2019–2020)** for a comprehensible analysis.

Figure 2.23

MACD and signal lines (IXIC)



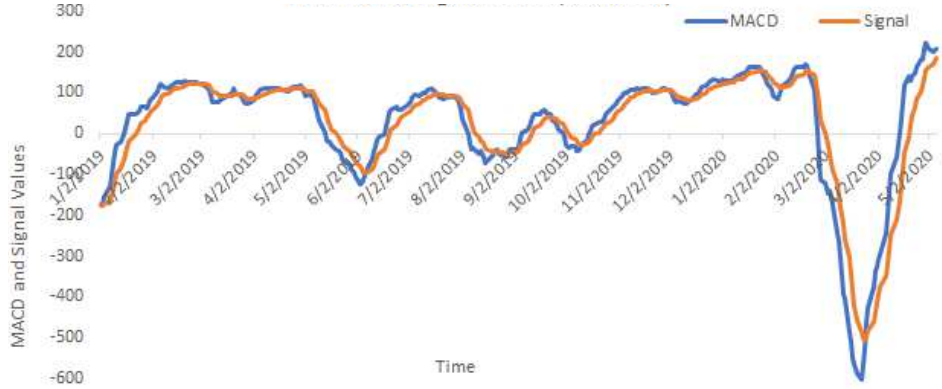
Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

Buying opportunities are presented **in March–April 2007, September–October 2007 and April–May 2008**. A buying opportunity is recognised when the MACD line crosses over the signal line in the first quadrant.

Selling opportunities are presented in **January–February 2008, October–November 2008.** When the MACD line crosses under the signal line, it is taken as an accurate signal for selling.

Figure 2.24

MACD and signal lines (IXIC)



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

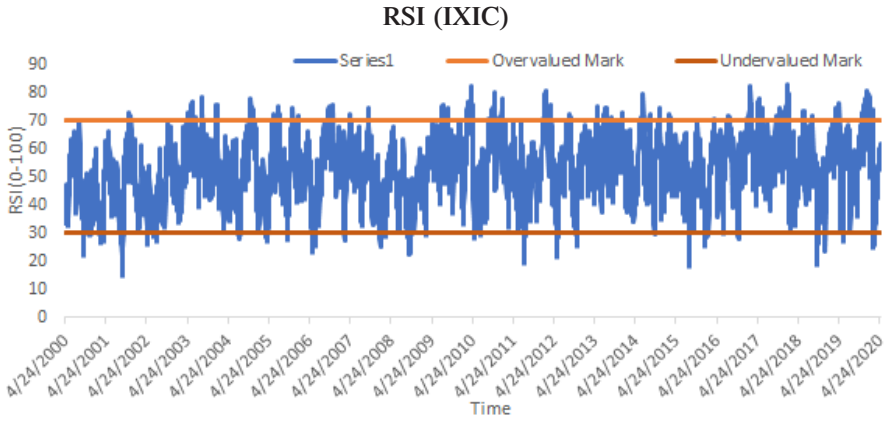
The plot for the 2019–2020 period indicates that there were selling opportunities towards the end of the first quarter of 2020. This may be since the market was able to realise the consequence of the pandemic, which may have lasting effects on the market throughout the year, hence, indicating a potentially capped loss if one sells as early as possible.

The market shows signs of the bullish nature throughout 2019 with a few exceptions. However, it clearly entered the bearish phase from the early 2020 onwards with a little sign of recovery from the very latest data (May 2020).

RSI (Relative Strength Indicator)

RSI is on a scale of 0 to 100. It indicates whether a security or asset is overvalued or undervalued. Hence, it gives an idea whether it may reverse the trend and indicate a potentially correct time to buy or sell.

Figure 2.25



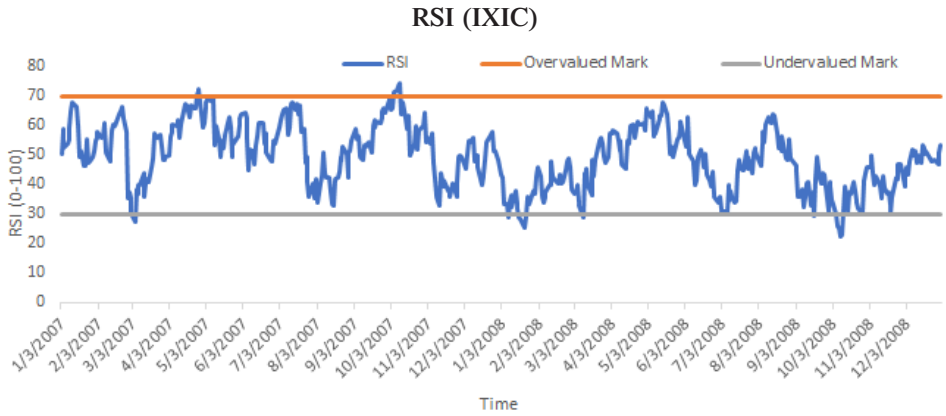
Source: author's own elaboration based on SPY ETF (2000–2020) using R software.

A comprehensive graph over 20 years shows that there are a relatively fewer times when the index price was undervalued than it was overpriced.

To get clear signals to buy or sell, RSI for a relatively lower time scale is plotted as follows.

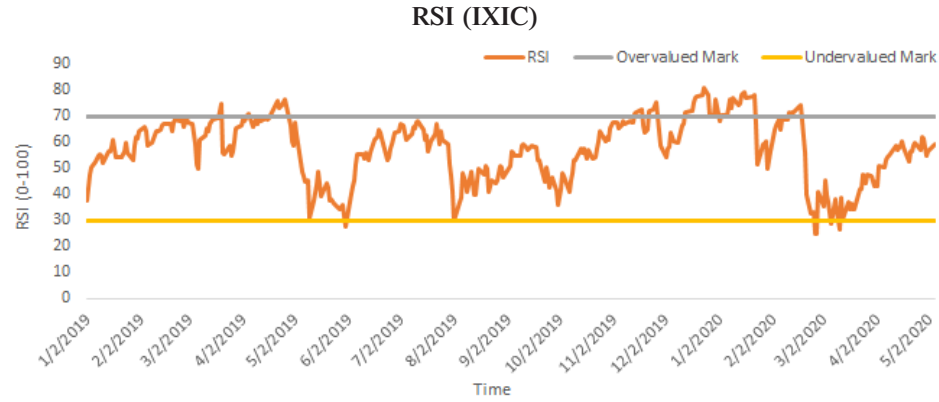
For the period of 2007–2008, the IXIC index price was neither overvalued nor undervalued with a few exceptions (March 2008). RSI for the IXIC index fluctuates between 30 and 70, indicating it was fairly valued during the financial crisis (Figure 2.27).

Figure 2.26



Source: author's own elaboration based on SPY ETF (2007–2008) using R software.

Figure 2.27



Source: author's own elaboration based on SPY ETF (2019–2020) using R software.

The IXIC index value is observed being overpriced during **December 2019 to February 2020 and in March and May 2019**. The index price shows signs of undervaluation in March 2020 followed by a rise in the RSI, which brings it back to the fair valuation bracket.

After a comprehensive and holistic analysis of all 6 indicators, it is concluded that Bollinger Bands are quite efficient in predicting the pricing channels. Since this incorporates the volatility in the data series, it is a robust indicator of the stock price movements. A comparative analysis with the

actual prices indicates that the actual price in real time can never cross over the upper and lower band. Hence, giving a robust boundary or range for the price movements.

Indicators like MACD and RSI can also give buy-sell cues by prompting the presence of the bearish-bullish market or overvalued-undervalued stock.

Furthermore, the choice of an indicator for trading purposes also depends on the time of investments (short/medium/long- term) and the risk appetite of the investor.

However, coupling 2 or 3 indicators together, for instance, Bollinger Bands (measuring volatility) and MACD (incorporating trend and momentum), can give robust signals to make a trade.

Conclusion

The research aimed to filter out the most efficient indicator for the stock market. Two time series, IXIC (NASDAQ Composite Index) and SPY ETF, for the time from 2000 to 2020 were extensively analysed for this purpose. Advanced econometrics (time series) models were used to fit the data and to make further predictions about the prices. ARFIMA along with the GARCH model were the best fit models for both time series (with separate orders). The models passed the diagnostic checks and hence the forecasts from them are considered to be quite accurate.

Traditional indicators, like Bollinger Bands, SMA, EMA, MACD, VWAP and RSI, used by traders on the financial markets, were also analysed alongside the actual closing prices to ascertain the best practice to comprehend price movements. Bollinger Bands, which capture the volatility efficiently, sorted to be a distinguished indicator. Pricing decisions should be based on thorough analysis using a combination of 2–3 indicators, like Bollinger Bands (to capture volatility) and MACD (to have trend and momentum components). The RSI indicator can also give an explicit valuation of an asset or security.

However, it should be noted that the models and indicators do not absorb new qualitative information and are a part of technical analysis. The econometric models were proven to be an efficient predictor for pricing channels but are mathematically tedious for traders. Traditional indicators are quick and simpler replacements with marginally higher forecast errors.

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Determining the Most Efficient Technical Indicator of Investing in Financial Markets based on Trends, Volume, Momentum and Volatility

Abstract

In this paper, we investigate the most efficient technical indicator of the top five selected indicators of investing in financial markets. The indicators are based on a trend on the entire market, volume in each time period, momentum, and volatility of the financial instruments, e.g. Bollinger Bands, SMA, EMA, VWAP, MACD, RSI respectively. Our primary focus is on financial markets of the United States; however, our research findings can be applied to any index throughout the world. This dissertation strongly supports the idea of utilisation of technical analysis to have an edge while trading on financial markets. This paper uses IXIC (NASDAQ Composite Index) and SPY (SPDR S&P 500 ETF Trust) data concerning the period from 2000 to 2020. To empirically test the predictability of these indicators, however, we used the time spans of 2007–2008 and 2019–2020. Due to the economic recession and the COVID-19 pandemic in the respective periods, the time is suitable for testing our indicators because of comparatively higher volatility on the markets.

Advanced econometrics (time series) models are used to fit the data and to make price predictions. ARFIMA along with GARCH are the best fitted models for both time series.

Key words: financial markets, indicators, volatility, Bollinger Bands, SMA, EMA, MACD, RSI, SPY, IXIC, ARIFMA, GARCH

Określenie najskuteczniejszego technicznego wskaźnika inwestowania na rynkach finansowych na podstawie trendu, wielkości, tempa i zmienności

Streszczenie

W niniejszym opracowaniu przeprowadzamy badanie najskuteczniejszego wskaźnika technicznego spośród pięciu najlepszych wybranych wskaźników inwestowania na rynkach finansowych. Są one oparte na trendzie na całym rynku, wielkości w każdym okresie, impecie oraz zmienności rynków finansowych, np. odpowiednio wstędze Bollingera, SMA, EMA, VWAP, MACD

i RSI. Nasza uwaga skupia się głównie na rynkach finansowych w USA; jednakże, nasze badania mogą mieć zastosowanie do każdego indeksu na świecie. Niniejsza rozprawa stanowi silne poparcie idei wykorzystania analizy technicznej do zdobycia przewagi na rynkach finansowych. W opracowaniu wykorzystane są dane IXIS (NASDAQ Composite Index) oraz SPY (SPDR S&P 500 ETF Trust) dotyczące lat 2000–2020. Jednakże w celu empirycznego przetestowania przewidywalności tych wskaźników zastosowaliśmy przedziały czasowe 2007–2009 oraz 2019–2020. Ze względu na recesję i pandemię COVID-19 w odpowiednich okresach, są one szczególnie przydatne do przetestowania naszych wskaźników, gdyż rynki cechuje stosunkowo wysoka zmienność w tym czasie.

Modele (szeregi czasowe) zaawansowanej ekonometrii stosowane są by dopasować dane i przewidywać ceny. ARFIMA oraz GARCH są modelami najlepiej dopasowanymi do obu szeregów czasowych.

Słowa kluczowe: rynki finansowe, wskaźniki, zmienność, wstęga Bollingera, SMA, EMA, MACD, RSI, SPY, IXIC, ARIFMA, GARCH

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APPENDICES

Appendix I

The results for the other ARIMA models fitted over the SPY ETF time series, which were rejected due to the relatively higher AIC and BIC values, are as follows.

1. ARIMA (4,1,1)

	AR1	**AR2**	**AR3**	**AR4**	**MA1**
Coefficients	-0.892088	-0.089231	-0.021481	-0.010926	0.824186
SE	0.091413	0.019817	0.019045	0.014559	0.090344

	VALUES
Sigma Squared	0.000251
Log Likelihood	13777.89
AIC	-27543.78
AICc	-27543.77
BIC	-27504.62

2. ARIMA (2,1,0)

	AR1	**AR2**
Coefficients	-0.0690	-0.0325
SE	0.0141	0.0141

	VALUES
Sigma Squared	0.000251
Log Likelihood	13775.82
AIC	-27545.64
AICc	-27545.63
BIC	-27526.06

3. ARIMA (3,1,1)

	AR1	**AR2**	**AR3**	**MA1**
Coefficients	0.1523	-0.017	0.0108	-0.221

	VALUES
Sigma Squared	0.0002511
Log Likelihood	13775.86
AIC	-27541.71
AICc	-27541.7
BIC	-27509.07

4. ARIMA (5,1,0)

	AR1	**AR2**	**AR3**	**AR4**	**AR5**
Coefficients	-0.0688	-0.0321	0.0052	-0.0062	-0.0199
SE	0.0141	0.0141	0.0141	0.0141	0.0141

	VALUES
Sigma Squared	0.0002511
Log Likelihood	13776.96
AIC	-27541.93
AICc	-27541.91
BIC	-27502.76

The results for the other ARIMA models fitted over the IXIC Index time series, which were rejected due to relatively higher AIC and BIC values, are as follows.

1. ARIMA (1,1,1)

	AR1	MA1
Coefficients	0.2881	-0.3583
SE	0.1837	0.1797

	VALUES
Sigma Squared	0.0002511
Log Likelihood	13775.38
AIC	-27544.77
AICc	-27544.76
BIC	-27525.18

2. ARIMA (0,1,0)

	VALUES
Sigma Squared	0.0002523
Log Likelihood	13761.86
AIC	-27521.72
AICc	-27521.72
BIC	-27515.19

3. ARIMA (1,1,0)

	AR1
Coefficients	-0.0668

	VALUES
Sigma Squared	0.0002512
Log Likelihood	13773.15
AIC	-27542.29
AICc	-27542.29
BIC	-27529.24

4. ARIMA (0,1,1)

	MA1
Coefficients	-0.0709
SE	0.0141

	VALUES
Sigma Squared	0.0002512
Log Likelihood	13773.86
AIC	-27543.72
AICc	-27543.72
BIC	-27530.66

Appendix II

Training set error measures:

Apart from Ljung-Box tests and other criteria that measure autocorrelations and normality in errors, there are a few accuracy and precision measures for the forecasts, which are listed as follows. The values for these measures are tabulated and are also tabulated below.

MAPE (Mean Absolute Percentage Error) – it is the average of the percentage errors. The errors are divided by the respective demand and summed over and divided by the total number of observations.

MAE (Mean Absolute Error) – it is the average of the absolute errors. In order to understand the implication of the value, it should be divided by average demand. The only demerit is, hence, the scale of the measure, which can be resolved by dividing the average demand to attain MAE in percentage terms.

MPE (Mean Percentage Error) – The Mean Percentage Error is the computed average of the percentage errors by which a forecast of a model differs from actual values of the quantity being forecasted.

RMSE (Root Mean Squared Error) – the Root Mean Squared Error is a measure of the concentration of the actual datum points around the best fit. It is the standard deviation of the errors. A lower value depicts an overall good fit. The square root of the average of squared errors is computed for this measure.

ME (Margin of Errors) – this measure depicts the difference between the actual data and the forecasts values in percentage terms. A larger value indicates lesser accurate forecasts.

The values for these accuracy measures are given below for the SMA, EMA and VWAP projections for the IXIC and SPY data series.

1. SMA projections for SPY ETF time series

	ME	RMSE	MAE	MPE	MAPE
Training set	0.1803078	3.944103	2.566009	0.0460829	1.704767

2. EMA projections for SPY ETF time series

	ME	RMSE	MAE	MPE	MAPE
Training set	0.2591323	4.684283	2.55217	0.09049056	1.698478

3. VWAP projections for SPY ETF time series

	ME	RMSE	MAE	MPE	MAPE
Training set	36.31693	63.11259	43.72535	14.71358	22.44715

4. SMA Ppojections for IXIC index series

	ME	RMSE	MAE	MPE	MAPE
Training set	6.328891	115.653	73.8213	0.03834196	2.272291

5. EMA projections for IXIC index series

	ME	RMSE	MAE	MPE	MAPE
Training set	8.690561	139.5241	73.72134	0.07838845	2.264921

6. VWAP projections for IXIC index series

	ME	RMSE	MAE	MPE	MAPE
Training set	1039.626	2000.735	1358.959	12.73405	31.62165

Akerke Demeubayeva*

THE IMPACT OF BILATERAL TRADE BETWEEN THE US AND MEXICO ON THE US INDUSTRIAL PRODUCTION BEFORE AND UNDER THE PRESIDENCY OF DONALD TRUMP

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Introduction

Nowadays, the US president Donald Trump's protectionist policy is one of the most controversial topics for discussion in the world. The United States has guided the world into a rules-based system of trade-globalisation for the last 75 years, culminating in the creation of the World Trade Organisation (WTO) in 1995 and subsequent bilateral and multilateral trade agreements (Stiglitz 2018). However, Trump, being highly concerned about the effects of globalisation, entitled suggestions aimed at reversing the long-term trade liberalisation process initiated by his predecessors (Noland et al. 2016). In terms of reasoning, Trump claimed that trading partners, especially members of such regional trade partnerships as the Trans-Pacific Partnership (TPP) and the North American Free Trade Agreement (NAFTA), had been taking economic advantages over the US for decades (Donnan 2019). Donald Trump stated that Americans

> must protect our borders from the ravages of other countries making our products, stealing our companies and destroying our jobs. Protection will lead to great prosperity and strength (The White House 2017).

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Thus, in his electoral campaign, he pledged to abolish some of the existing free trade agreements, renegotiate the NAFTA agreement, and impose tariffs on imports from Mexico and China (Noland et al. 2016). This way, the decline in the volume of imports was expected to cause a rise in employment and wages of the US citizens (Stiglitz 2018: 515–528).

In November 2016, Hilary Clinton obtained 48.2% of the popular vote compared to 46.1% of votes for Donald Trump. However, there were 304 electoral votes for Trump in contrast to 227 electoral votes for Clinton, which resulted in his victory in the fifty eighths US presidential election (Federal Election Commission 2017).

> America is a nation of many economies, but those that produce real, tangible things – food, fiber, energy and manufactured goods – went overwhelmingly for Trump (Kotkin 2016).

The main motivation behind their support was a reasonable loss of manufacturing competitiveness under the process of globalisation. In response, Trump's Administration immediately started to work on implementing his pre-electoral promises. Thus, on the first day of Trump's presidency, the US pulled out of the Trans-Pacific Partnership. Initially, the TPP had a strategic aim of counteracting the economic influence of China (Lobosco 2018). Instead of the proposed deal, on 6 July 2018, the US imposed a 25% tariff on goods imported from China, which amounted for 34 billion in 2017 (Liu and Woo 2018: 319–340). Xi Jinping, the general secretary of the Chinese Communist Party, responded to the US in the form of tit for tat game strategy, by imposing reciprocal tariffs (Liu and Woo 2018). These actions triggered the ongoing trade war between the US and China.

The next major Trump's target was to restrict economic relations with Mexico for the following reasons. First, the American President has repeatedly expressed his hostile attitude towards Mexico and its citizens, claiming they are "rapists, criminals, and 'bad hombres'" (Klingner 2018). Second, he characterised NAFTA as the worst trade agreement that the US had ever signed (Klinger 2018). In 1994, this agreement (launched by President George H.W. Bush) established the trade union between the US, Mexico and Canada (Noland et al. 2016). Supporters of NAFTA stated that imports from Mexico would help US consumers and producers to purchase relatively inexpensive final goods and intermediate goods, respectively (Burfisher et al. 2001: 125–144). However, opponents of NAFTA, including President Trump, claimed that American manufacturers and blue-collar workers would lose their jobs because of both increasing imports from Mexico and capital flows

to Mexico (Burfisher et al. 2001: 125–144). Therefore, in May 2018, the US imposed a 25% on steel and a 10% tariff on aluminium imported from the EU, Canada and Mexico (Edelman 2019). The Mexican President together with the Canadian Prime Minister profoundly regretted this decision and agreed to impose counteractive measures until the US government terminates tariffs on metals (Edelman 2019). A Mexican economist and politician, Ildefonso Guajardo, commented that the US is attempting to manipulate a "fully integrated" industrial sector (Edelman 2019). Hence, undervalued trade relations with Mexico are expected to result in significant retaliation against the US economy.

This paper aims to examine the effect of President Trump's political decisions on foreign trade with Mexico on the US manufacturing sector. The main research question is whether Trump's trade policies towards Mexico have a positive impact on the US industrial production. The main hypothesis of the research is that political factors influencing trade are significantly affecting industrial production. Moreover, it is expected that Trump would fail in his trade policies, bringing the US economy, particularly its industrial sector, irrecoverable losses, in contrast to previous mutually beneficial trade agreements. This article presents empirical findings of numerous researchers proving that there is a significant impact of trade openness on domestic production. However, they were mainly based on the cross section data, which raise doubts about the efficiency of employed models for a particular country. In contrast to the previous studies, the VAR estimation, based on time series data, has been found to be a proper econometric model in the context of current research.

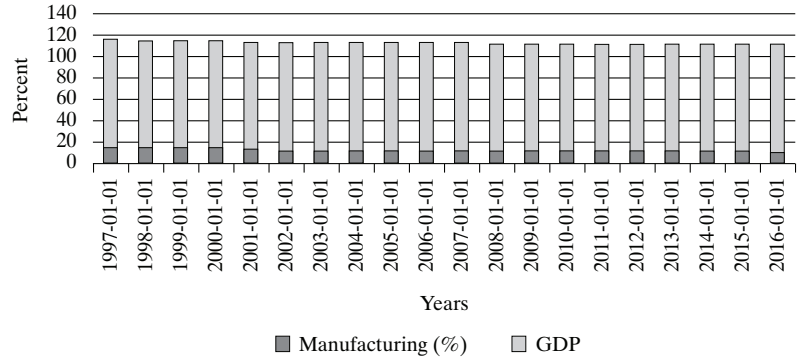
1. Theoretical Approach

Manufacturing sector of secondary production is one of the most significant sectors of the US economy. However, for the last 25 years, the US manufacturing sector has been experiencing two contradicting trends illustrated in Figure 1: a nearly stable manufacturing share of real GDP (measured in value added) and a gradually decreasing number of manufacturing employees (Baily and Bosworth 2014: 3–26).

Accounting for a relatively large proportion of tradable goods and services, the US manufacturing should potentially run a trade surplus (Baily and Bosworth 2014: 3–26). However, since the 2000s, there has been an increase in the US trade deficit, which in 2018 reached a peak of USD 891.3 billion

Figure 1

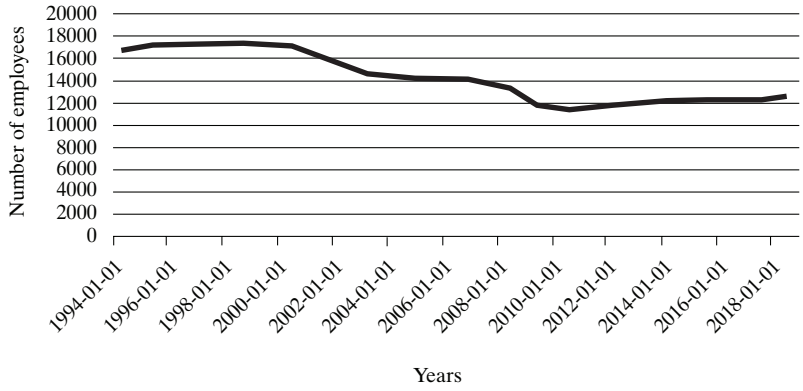
Manufacturing Value Added as a Percentage of GDP (USA, from 1997 to 2016)



Source: The World Bank Open Data 2019.

Figure 2

All employees: Manufacturing (USA, from 1994 to 2018)



Source: FRED Economic Data 2019.

(United States Census Bureau 2019). This tendency of import costs exceeding the value of American exports started from considerable trade imbalances with China, caused by the dramatic growth of Chinese economy in 2000s (Baily and Bosworth 2014). Hence, the majority of economists argue that trade imbalances with foreign countries are the main reason for a decline in the US manufacturing productivity (Baily and Bosworth 2014). On the other hand, some economists suggest that trade deficits are simply macroeconomic phenomena, reflecting the difference between national savings and domestic investments (Baily and Bosworth 2014: 3–26). As a result, the relationship between trade and the US

manufacturing production appears to be more complex, rather than blaming other countries, such as Mexico, for unfair trade practices.

In contrast to his predecessors, President Donald Trump claims that nations should protect their domestic production by selling goods abroad and buying nothing in exchange (Stiglitz 2018: 515–528). This suggestion reflects the concept of absolute advantage, introduced by "The Father of Economics" – Adam Smith back in 1776. According to Smith's theory, a country must produce a greater quantity of goods in which it specialises, against an opponent, using an equal amount of resources; while labour "is the real measure of the exchange value of all commodities" (Smith 1776: 31–44). In other words, Smith suggests that a more efficient division of labour can accelerate economic growth, since specialisation in one task gives rise to innovation (Ades and Glaeser 1999: 1025–1045). However, although the concept of absolute advantage assumes 'the wealth of nations', it does not always imply mutually beneficial trade. Early in 1817, a politician and economist, David Ricardo, introduced the theory of comparative advantage, according to which nations may gain mutual benefits from trading with two commodities they specialise in (Ricardo 1817: 85–104). Neoclassical in nature, the Ricardian model of trade has the following limitations: it is restricted to two countries and two commodities; it assumes constant returns to scale; it is constrained by the labour factor only; it neglects transportation costs; it assumes perfect factor immobility; and it does not take into account sizes of trading countries (Akrani 2011). As a result, economists later moved from the Ricardian theory to more realistic assumptions about trade.

In 1933, Swedish economists Bertil Heckscher and Eli Ohlin initiated the so-called Heckscher-Ohlin model, which assumes two factors of the production function, namely labour and capital (Markusen, Melvin, Maskus, and Kaempfer 1995: 98–126). American economists Wolfgang Stolper and Paul Samuelson further develop the Heckscher-Ohlin model, showing that only the abundant factors gain from free trade (Markusen et al. 1995). Moreover, Stolper and Samuelson claim that tariffs on imports are expected to return a country to autarchy, protecting the real incomes of scarce factors (Markusen et al. 1995). Overall, the Stolper-Samuelson theorem explains why some factors of production require protection from import competition, while others require openness to trade (Markusen et al. 1995).

Unlike the Neoclassical models of trade, the New Trade Theory highlights the importance of increasing returns to scale. First, trade expansion allows firms to access lager markets with the corresponding greater level of competition. Second, trade allows for a diversification of the produced commodities, most

evidently, in the manufacturing industry (Van Marrewijk 2012: 178–198). As a result, the extension of the market would still result in beneficial trade, even in case of two countries with homogeneous preferences and technologies (Krugman 1970). Later integration of markets throughout the world gave incentives for the so-called gravity model of international trade, observed in both trade and factor movements across countries (Anderson 2011: 133–160). Similar to the concept of Newton's law of universal gravitation, the volume of trade between two countries is linearly related to their gross domestic products (GDP) and inversely related to the distance between them (Tinbergen 1962, Beck 2017: 1–20). Moreover, other factors of trade such as the common language, currency, and ethnicity are taken into consideration (Anderson 2011, Beck 2018a: 118–126). Overall, gravity has been referred to as one of the most empirically successful models explaining the distribution of goods and a factor of production across neighbouring countries (Anderson 2011, Beck 2018b and 2020: 68–84).

However, trade is not the one and only source of economic growth. Any of the present growth theories suggests that an increase in the total output of goods and services (within a given period of time) entails growth of a given economy. Early studies of economists such as Roy Harrod and Evsey Domar (1) as well as Charles Cobb and Paul Douglas (2) denoted the following factors impacting the rate of a production (Y): capital (K) and labour (L) (Solow 1956: 65–94).

(1) Harrod-Domar Model: $Y = F(K,L) = \min\left(\frac{K}{a}, \frac{L}{b}\right)$

(2) Cobb-Douglas Production Function: $Y = K^{\alpha}L^{1-\alpha}$

Nevertheless, there was a question of what determines the volume of output, which can be produced with given quantities of capital and labour. In response, Robert Solow developed the Neoclassical Growth model (3) by emphasising the important role of a technological change in production growth. Thus, the production function was multiplied by an increasing scale of a technology factor A(t) (Solow 1956).

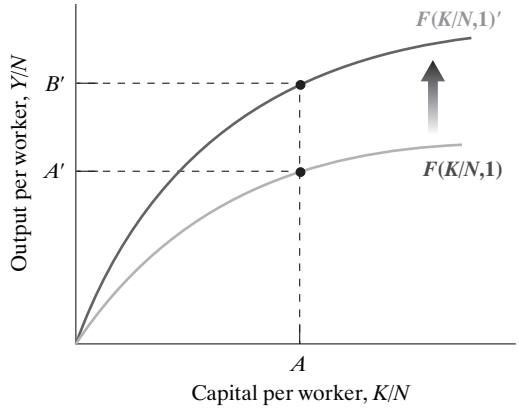
(3) Solow-Growth Model: $Y = A(t)F(K,L)$,

where t defines the continuous time

Figure 3 shows that the only shift in the production function appears due to the improvement in the state of technology (Blanchard 2009: 209–212).

Figure 3

The Effects of an Improvement in the State of Technology

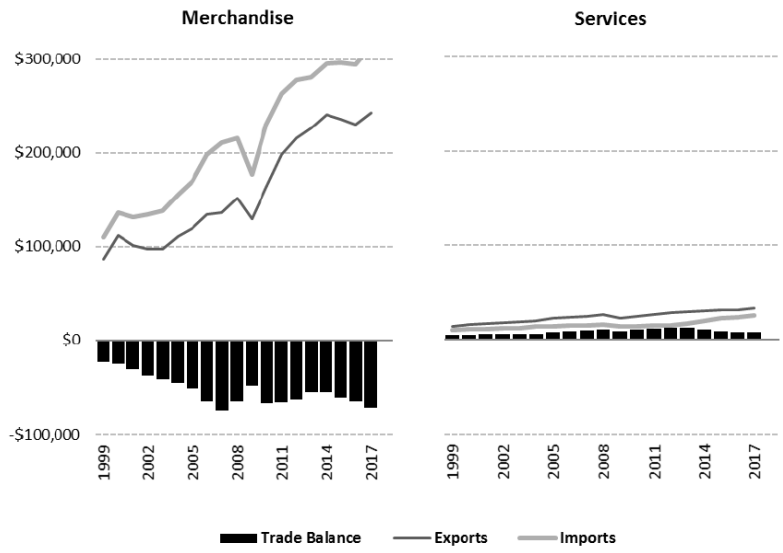


Source: Blanchard 2009.

Relying on the economic theory captured above, this part of the research briefly discusses general patterns of trade between the US and Mexico. According to Figure 4, bilateral trade between the United States and Mexico has tripled during the period from 1999 to 2017 (Villarreal 2019).

Figure 4

The US trade with Mexico between 1999 and 2017



Source: The United States International Trade Commission (USITC) 2019 cited in Villarreal 2019.

Moreover, the expansion of trade since NAFTA prompted the creation of vertical supply relationships along the US–Mexico borders (Villarreal 2019). According to Table 1, the US imports from Mexico increased from USD 295.7 billion in 2014 to USD 346.5 billion in 2018 (Villarreal 2019).

Table 1

The US Merchandise Imports from Mexico: 2014–2018 (nominal USD)

Items (NAIC 4-digit)	2014	2015	2016	2017	2018	% Total Imports from Mexico
Motor vehicles	46.2	50.0	49.3	57.4	64.5	19%
Motor vehicle parts	40.3	43.9	46.0	45.5	49.8	14%
Computer equipment	13.8	17.1	18.2	20.2	26.6	8%
Oil and gas	27.8	12.5	7.6	10.1	14.5	4%
Electrical equipment	10.1	10.5	10.5	11.1	11.9	3%
Other	157.5	162.4	162.3	170.0	179.2	52%
Total	295.7	296.4	293.9	314.3	346.5	100%

Source: the United States International Trade Commission (USITC) 2019 cited in Villarreal 2019.

Table 2, in turn, represents major American merchandise exports to Mexico during the period between 2014 and 2018.

Table 2

The U.S Merchandise Exports to Mexico: 2014–2018 (nominal USD)

Items (NAIC 4-digit)	2014	2015	2016	2017	2018	% Total Imports from Mexico
Petroleum and coal products	19.6	15.4	15.9	21.6	28.8	11%
Motor vehicle parts	18.4	20.8	19.8	19.8	20.2	8%
Computer equipment	15.9	16.2	16.5	15.7	17.4	7%
Semiconductors and other electronic components	10.9	11.4	12.0	12.2	13.1	5%

Table 2 (cont.)

Items (NAIC 4-digit)	2014	2015	2016	2017	2018	% Total Imports from Mexico
Basic chemicals	10.1	8.5	8.1	9.4	10.3	4%
Other	166.1	164.2	157.8	164.6	175.2	66%
Total	241.0	236.5	230.1	243.3	265.0	100%

Source: the United States International Trade Commission (USITC) 2019 cited in Villarreal 2019.

In general, the US exports to Mexico increased from USD 241 billion in 2014 to USD 265 billion in 2018 (Villarreal 2019). It is worth mentioning that the spectacular performance of American computers and electronics sub-sectors sustains a reputation of the entire US manufacturing (Baily and Bosworth 2014: 3–26). Moreover, US manufacturing industries, including motor vehicles, computers and electrical equipment, all rely on the assistance of Mexican manufacturers (Villarreal 2019).

Overall, liberalisation of trade between the US and Mexico suggests economic benefits from both import and export flows between these countries (Beck et al. 2019: 7–25; Villarreal 2019; Gawrońska et al. 2019: 248–261). Figure 5 illustrates the growth rates, in terms of GDP, for the US and Mexico during the period from 1985 to 2017. It can be observed that Mexican growth rate of economy fluctuates substantially from 1985 to 1995, reaching the minimum level of negative 6%in 1995. After joining NAFTA in 1994, there is a sharp increase of real change in Mexican GDP to the record level of 7% in 1997. Lately (1995–2017), GDP growth in Mexico mainly replicates the US positive trends in economy (except the Global Crisis of 2008), with higher fluctuations.

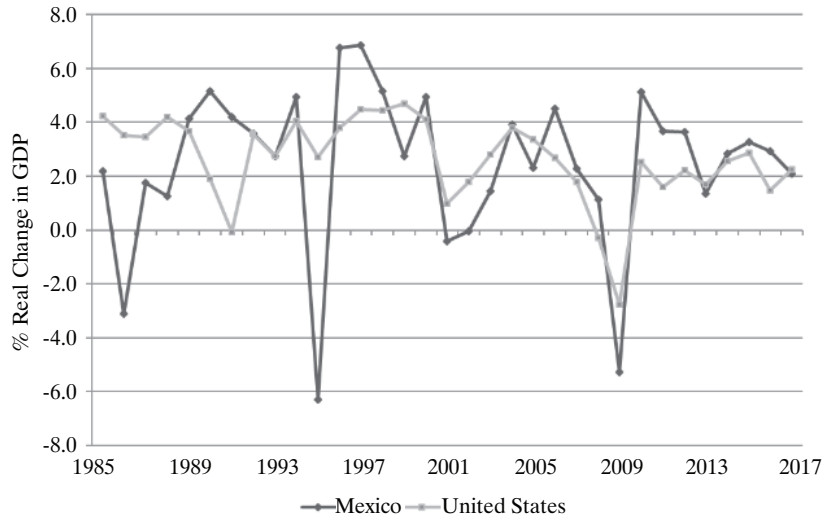
However, the US Congress faces numerous problems related to present trade and investment relations with Mexico (Villarreal 2019). Indeed, it has to assess economic outcomes of the recently adopted US-Mexico-Canada Agreement, the proposed withdrawal from NAFTA, and the potential strategic response of Mexico's "anti-American" President Andrés Manuel López Obrador, who took office on 1 December 2018 (Villarreal 2019).

Finally, Mexicans have a reason to believe that they are being treated unfairly, while, in contrast to Trump and his followers, the majority of the US population understands that NAFTA was generally fair (Stiglitz 2018: 515–528). Thus, Pew Research Center survey showed the following results

for 2017: 56% of Americans think that NAFTA has been good for the American economy (Tyson 2017). A potential withdrawal from NAFTA, in turn, has triggered an intention to strengthen, for instance, the Pacific Alliance (Villarreal 2019). As a result, Mexico will sign more sufficient trade agreements with other countries, relatively diminishing American competitiveness in the context of the global market.

Figure 5

GDP Growth Rates for the US and Mexico: 1985–2017



Source: The Economist Intelligence Unit 2019 cited in Villarreal 2019.

2. Literature Review

Numerous economists have conducted research into the relationship between foreign trade and economic growth. Thus, Bela Balassa investigated the relationship between exports and growth of the economy in eleven developing countries with an established industrial base. The main hypothesis of his research suggested that export-oriented countries are more successful in terms of their growth performance than closed economies (Balassa 1978: 181–189). The results obtained indicated greater statistical significance of estimates in open economies in comparison to countries favouring import-substitution during the period from 1960 to 1973 (Balassa 1978). An American

economist, Alan Krueger, claims that free trade policies of a country result in productivity gains (1980). Moreover, a comparative advantage across countries results in greater profitability of labour-intensive industries (Krueger 1980: 288–292). Relying on the research papers by Balassa (1978: 181–189) and Krueger (1980), the dollar provided two additional arguments in favour of outward policy orientation: external factors, associated with exports, contribute to economic growth in open economy countries; and export activities, along with easily accessible import resources and equipment, accelerate technological progress in developing countries (1992).

However, the above literature exaggerates the influence of exports, when explaining the relation between trade and economic growth. According to the theory of comparative advantage mentioned before, efficiency of the usage of state resources is obtained through both exporting abundant and importing scarce goods and services. For instance, James Anderson and Peter Neary developed an index for trade, which incorporates several forms of domestic policy distortions: tariffs, subsidies, and quota regulations (1992: 57–76). The impact of restrictive trade policies on a given economy was, in turn, measured through the comparison of prices on goods and services in the domestic and international markets (Harrison 1995: 419–447). Nevertheless, there is a problem related to the availability of the information on these relative prices (Harrison 1995). As a result, the most common measure of trade orientation is openness to trade, which is the sum of exports and imports to the ratio of GDP (Harrison 1995).

First of all, it is crucial to address the issue of potential opposite causation of trade openness to productivity. In 1996, Jeffrey Frankel and David Romer employed different instrumental geographic variables, taken from the Gravity model of bilateral trade, in order to avoid the problem of endogeneity between trade openness and economic growth (Frankel and Romer 1996: 379–399). Obtained results indicated no evidence of countries with higher income trading more than the others (Frankel and Romer 1996). Moreover, gained results were further compared with Ordinary Least Squares (OLS) estimates of the same bilateral trade equations (Frankel and Romer 1996). The comparison of the results led to the conclusion that OLS estimation undervalues the effect of trade on income (Frankel and Romer 1996). Later in 1997, Alberto Alesina et al. (1997: 1276–1296) justified that trade openness determines the size of the domestic market, and, therefore, productivity level of a country. In terms of econometrics, seemingly unrelated regressions (SUR) were used in order to resolve the issue of correlated error terms across periods (Alesina, Spolaore and Wacziarg 1997). At the same time,

3 semiparametric least square (SLS) version of estimates was applied in order to control for endogeneity bias between openness and growth. The results obtained from both SUR and 3SLS estimations satisfied hypothetical expectations towards positive coefficients on size and trade openness of a country. As a result, an empirical evidence of a significant causal effect of trade openness on productivity growth was found.

Nevertheless, the research mentioned above was mainly based on the cross section data. In contrast, Endrik van den Berg and James Schmidt emphasised the importance of using time series evidence, while analysing the long-term relationship between trade and economic growth (Van den Berg and Schmidt 1994). The time series method, in turn, demands testing for the stationarity of the variables. Hence, several unit root tests were conducted, which indicated the presence of both stationary and non-stationary variables (Van den Berg and Schmidt 1994). This triggered the need of detecting cointegrated relationships among the variables, which occurred to be present (Van den Berg and Schmidt 1994). Afterwards, an error correction model was applied in order to distinguish between the short-term and long-term characteristics of the regression (Van den Berg and Schmidt 1994). The results obtained indicated a positive long-term relationship between trade growth and economic growth variables (Van den Berg and Schmidt 1994). Moreover, Dani Rodrik argues that trade is not a significant determinant of productivity when geographic variables are included in the empirical analysis (2000). The reason is that geography may determine income through a variety of channels, whereas trade is only one of them (Rodríguez and Rodrik 2001: 261–338). This way, trade becomes a statistically insignificant determinant of productivity in the presence of geographical controls.

On the other hand, researchers extensively used the factors of aggregate production function to determine productivity growth. Thus, Roy Harrod (1939: 14–33) and Evsey Domar (1946: 137–147) developed a growth model where rapid capital accumulation is the fundamental determinant of economic growth. Furthermore, Solow developed the Solow-Growth model, where capital to output ratio changes in response to variations in saving behaviour of a nation (1956: 65–94). Based on the US data over the 1950s and 1960s, Solow found that only a small fraction of the US production growth could be explained by an increase in capital per worker (1957: 312–320). Similarly, Edward Denison (1967) and Angus Maddison (1982) prove that this finding is also applicable to various industrialised European countries. As a result, Solow-Denison-Maddison growth accounting framework suggests that the

growth rate of capital accumulation has an insignificant, but still certain impact on the overall production output.

Furthermore, Adam Smith investigates the relationship between the division of labour and economic growth (1776). According to Smith, a more precise division of labour can accelerate the growth of an economy, since specialisation in a single task of production fosters an innovation sector of a country (1776: 31–44). Thus, Gary Becker and Kevin Murphy found that the division of labour plays an important role in increasing both the level and the growth rate of income over time. This way, an increase in benefits from specialisation stimulates economic development (Becker and Murphy 1994: 299–322). Overall, division of labour theories emphasise the importance of a complex production task's participation in achieving productivity growth.

Finally, productivity growth is assumed to result from the choice of policies. Thus, vid Coe and Elhanan Helpman show that accumulation of expenditures on research and development (R&D) activities helps to foster growth in total productivity between the OECD countries (1995: 859–887). This reflects the endogenous theory of growth, which suggests a range of possible variables explaining productivity growth, where the R&D sector is, inter alia, one of the most important factors. This way, knowledge-based growth theories may predict that access to information spurs economic growth (Romer 1986: 1002–1037). Thus, using the US data, Solow showed that 87.5% of the US productivity relies on technological progress (1957: 312–320). Years later, Baily and Bosworth showed that the 'spectacular performance' of computer and electronics subsector plays an important role in the sustainabíility of US manufacturing over the last 50 years (2014: 3–26). As a result, there is a significant impact of technological developments on productivity growth.

Summarising the review of economic papers on the current research topic, it can be concluded that productivity growth is largely dependent on policies towards the openness of trade and the state of technology, while the impact of labour and capital inputs was found to be insignificant.

3. Methodology

The current research sample is represented by the industrial sector of the US economy. The period of observation covers 34 years (1985–2018 years inclusively) with quarterly frequency, which implies a number of

136 observations. This time frame was chosen based on the data availability for all of the variables involved in the current research. The following variables were included in the regression:

- The Industrial Production Index (INDPRO) – which measures real output of the following facilities located in the US: manufacturing, mining, and electric and gas utilities; where the unit of measurement is Index 2012 = 100;
- Trade Openness ratio (TRADE) – a measure of the US openness to trade with Mexico. It was calculated by taking the sum of the volume of exports (the US–Mexico) and the volume of imports (Mexico-the US) and dividing it by the US nominal GDP. The volume of exports and the volume of imports were, in turn, represented by the US Imports of Goods by Customs Basis from Mexico and US Exports of Goods by F.A.S. Basis to Mexico respectively; denominated in millions of the USD.

In terms of control variables, the following proxies for the factors of the production function were used (relying on the availability of data):

- The US Civilian Labor Force Participation Rate (LFPR) (25 to 54 years) – a measure of the US labour participants (out of total) at the age between 25 and 54; expressed as a percentage;
- Gross Fixed Capital Formation (GFCF) – a measure of the US capital accumulation, denominated in the USD;
- Real Gross Private Domestic Investment: Fixed Investment: Non-residential: Intellectual Property Products: Research and Development (chain-type quantity index) (GPDIRD) – a measure of real gross private domestic (non-residential) investments in such intellectual property products as research and development, where the unit of measurement is Index 2012 = 100.

All of the data were extracted from FRED Economic Data base (2019).

Finally, the main aim of this paper is to examine the US industrial productivity under the presidency of Trump, in particular, under the frame of his restricted trade policies towards Mexico. Thus, the dummy variable TRUMP was introduced to the regression. The US President Trump entered the office on the 20th of January 2017. Hence, the period from the first quarter of 2017 to the last quarter of 2018 (according to the latest available data) is marked as "1", while the remaining quarter periods are marked as "0". As a result, the dummy variable TRUMP was introduced in the regression.

4. Econometric Approach

In contrast to research papers mentioned above, the vector autoregressive (VAR) model was selected for analysis under the current research. The main reason is that it is commonly used for the time series data analysis. Moreover, the VAR model allows for avoidance of a potential issue of endogeneity in the relationship between the variables by treating all of the variables present in model as endogenous (Gujarati 2003: 715–835). Furthermore, the VAR model is primarily used for the purpose of macro-econometric analysis. Thus, it is mainly focused on forecasting the reaction of macroeconomic variables to various policy shocks. This way, it draws expectations towards the future values of estimates on the basis of their (and of the other variables') lagged or past values. At the same time, the VAR allows for an inclusion of exogenous variables into the model. This way, the dummy variable TRUMP was primarily introduced in the equation for the purpose of improving the quality of the proceeding tests and estimations.

The constructed econometric model is presented below:

$$INDPRO_t = \beta_0 + \beta_1 TRADE_t + \beta_2 GFCF_t + \beta_3 LFPR_t + \\ + \beta_4 GPDIRD_t + \beta_5 TRUMP_t + u_t,$$

where u_t stands for the residuals and t stands for the time period

First of all, all the variables involved in the model have to be examined for the presence of a unit root. This way, the Dickey-Fuller (DF) unit root test has been conducted under the current research.

Table 3

Dickey-Fuller Test (Levels): Results

Variable	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
INDPRO	-1.114	-3.498	-2.888	-2.578
TRADE	-1.004	-3.498	-2.888	-2.578
GFCF	2.103	-3.498	-2.888	-2.578
LFPR	-1.531	-3.498	-2.888	-2.578
GPDIRD	1.602	-3.498	-2.888	-2.578
TRUMP	-0.233	-3.498	-2.888	-2.578

Source: author's own elaboration.

According to the results of the DF test for unit root presented above, all the listed variables are non-stationary in levels, which implies the acceptance of a null hypothesis. However, the VAR model demands stationarity of the involved variables. Hence, the first difference of a non-stationary time series was taken, as it is shown in Table 4.

Table 4

Dickey-Fuller Test (1st difference): Results

Variable	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
d(INDPRO)	-4.707	-3.499	-2.888	-2.578
d(TRADE)	-12.336	-3.499	-2.888	-2.578
d(GFCF)	-5.215	-3.499	-2.888	-2.578
d(LFPR)	-11.621	-3.499	-2.888	-2.578
d(GPDIRD)	-10.646	-3.499	-2.888	-2.578
d(TRUMP)	-11.576	-3.499	-2.888	-2.578

Source: author's own elaboration.

The idea behind the Dickey-Fuller test is to include enough difference terms so that the error term is serially uncorrelated (Gujarati 2003: 715–835). However, unit root tests are commonly characterised by their low power, which implies a bias towards rejecting the null hypothesis when it is false. Since the Dickey-Fuller type tests cannot be trusted in the presence of autocorrelation, the Durbin-Watson test statistic is, therefore, used to detect the presence of autocorrelation in the residuals from a regression analysis (Durbin and Watson 1950).

Table 5

Durbin's alternative test for autocorrelation: Results

Variable	d(INDPRO)	d(TRADE)	d(GFCFC)	d(LFPR)	d(GPDIRD)	d(TRUMP)
p-value	0.1363	0.0976	0.1529	0.2864	0.1507	0.9020

Source: author's own elaboration.

According to the data in the table above, p-values of the variables are higher than the critical value at 5% significance level. Therefore, the null hypothesis of the Durbin-Watson test is rejected: there is no autocorrelation.

Furthermore, before the VAR estimation, the maximum lag length criteria must be determined. Thus, including too many lagged terms implies the issue of multicollinearity, while including too few lags may lead to specification errors (Gujarati 2003).

Table 6

Selection-order criteria: Results

• **varsoc d.TRADE d.INDPRO d.LFPR d.GFCF d.GPDIRD, exog (d.TRUMP)**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-677.7				.024969	10.4992	10.58840	10.7187
1	-589.434	176.53	25	0.000	.009509	9.53334	9.84549*	10.3015*
2	-551.595	75.678	25	0.000	.007832	9.33733	9.87244	10.6542
3	-517.544	68.103	25	0.000	.006854	9.19914	9.95721	11.0647
4	-471.458	92.17*	25	0.000	.005011*	8.87723*	9.85826	11.2915

Endogenous: D.TRADE D.INDPRO D.LFPR D.GFCF D.GPDIRD
Exogenous: D.TRUMP_cons,
where * indicates lag order selected by the criterion.

Source: author's own elaboration.

According to the data output presented above, Likelihood Ratio (LR), Final Prediction Error (FPE) and Akaike (AIC) lag length criteria indicate that 4 lags are the best option for the proceeding VAR estimation. Thus, the VAR system of simultaneous equations is modified in terms of lag length criteria:

- $d(INDPRO)_t = \beta_0 + a_{11} * d(INDPRO_{t-1}) + b_{11} * d(INDPRO_{t-2}) + g_{11} * d(INDPRO_{t-3}) + h_{11} + * d(INDPRO_{t-4}) + a_{12} * d(TRADE_{t-1}) + b_{12} * d(TRADE_{t-2}) + g_{12} * d(TRADE_{t-3}) + h_{12} * d(TRADE_{t-4}) + a_{13} * d(GFCF_{t-1}) + b_{13} * d(GFCF_{t-2}) + g_{13} * d(GFCF_{t-3}) + h_{13} * d(GFCF_{t-4}) + a_{14} * d(LFPR_{t-1}) + b_{14} * d(LFPR_{t-2}) + g_{14} * d(LFPR_{t-3}) + h_{14} * d(LFPR_{t-4}) + a_{15} * d(GPDIRD_{t-1}) + b_{15} * d(GPDIRD_{t-2}) + g_{15} * d(GPDIRD_{t-3}) + h_{15} * d(GPDIRD_{t-4}) + m_1 * d(TRUMP_t) + u_{1t}$
- $d(TRADE)_t = \beta_1 + a_{21} * d(TRADE_{t-1}) + b_{21} * d(TRADE_{t-2}) + g_{21} * d(TRADE_{t-3}) + h_{21} + * d(TRADE_{t-4}) + a_{22} * d(INDPRO_{t-1}) + b_{22} * d(INDPRO_{t-2}) + g_{22} * d(INDPRO_{t-3}) + h_{22} * d(INDPRO_{t-4}) + a_{23} * d(GFCF_{t-1}) + b_{23} * d(GFCF_{t-2}) + g_{23} * d(GFCF_{t-3}) + h_{23} * d(GFCF_{t-4}) + a_{24} * d(LFPR_{t-1}) + b_{24} * d(LFPR_{t-2}) + g_{24} * d(LFPR_{t-3})$

$+ h_{24} * d(LFPR_{t-4}) + a_{25} * d(GPDIRD_{t-1}) + b_{25} * d(GPDIRD_{t-2}) + g_{25} * d(GPDIRD_{t-3}) + h_{25} * d(GPDIRD_{t-4}) + m_2 * d(TRUMP_t) + u_{2t}$

- $d(GFCF)_t = \beta_2 + a_{31} * d(GFCF_{t-1}) + b_{31} * d(GFCF_{t-2}) + g_{31} * d(GFCF_{t-3}) + h_{31} + * d(GFCF_{t-4}) + a_{32} * d(INDPRO_{t-1}) + b_{32} * d(INDPRO_{t-2}) + g_{32} * d(INDPRO_{t-3}) + h_{32} * d(INDPRO_{t-4}) + a_{33} * d(TRADE_{t-1}) + b_{33} * d(TRADE_{t-2}) + g_{33} * d(TRADE_{t-3}) + h_{33} * d(TRADE_{t-4}) + a_{34} * d(LFPR_{t-1}) + b_{34} * d(LFPR_{t-2}) + g_{34} * d(LFPR_{t-3}) + h_{34} * d(LFPR_{t-4}) + a_{35} * d(GPDIRD_{t-1}) + b_{35} * d(GPDIRD_{t-2}) + g_{35} * d(GPDIRD_{t-3}) + h_{35} * d(GPDIRD_{t-4}) + m_3 * d(TRUMP_t) + u_{3t}$
- $d(LFPR)_t = \beta_3 + a_{41} * d(LFPR_{t-1}) + b_{41} * d(LFPR_{t-2}) + g_{41} * d(LFPR_{t-3}) + h_{41} + * d(LFPR_{t-4}) + a_{42} * d(INDPRO_{t-1}) + b_{42} * d(INDPRO_{t-2}) + g_{42} * d(INDPRO_{t-3}) + h_{42} * d(INDPRO_{t-4}) + a_{43} * d(TRADE_{t-1}) + b_{43} * d(TRADE_{t-2}) + g_{43} * d(TRADE_{t-3}) + h_{43} * d(TRADE_{t-4}) + a_{44} * d(GFCF_{t-1}) + b_{44} * d(GFCF_{t-2}) + g_{44} * d(GFCF_{t-3}) + h_{44} * d(GFCF_{t-4}) + a_{45} * d(GPDIRD_{t-1}) + b_{45} * d(GPDIRD_{t-2}) + g_{45} * d(GPDIRD_{t-3}) + h_{45} * d(GPDIRD_{t-4}) + m_4 * d(TRUMP_t) + u_{4t}$
- $d(GPDIRD)_t = \beta_4 + a_{51} * d(GPDIRD_{t-1}) + b_{51} * d(GPDIRD_{t-2}) + g_{51} * d(GPDIRD_{t-3}) + h_{51} + * d(GPDIRD_{t-4}) + a_{52} * d(INDPRO_{t-1}) + b_{52} * d(INDPRO_{t-2}) + g_{52} * d(INDPRO_{t-3}) + h_{52} * d(INDPRO_{t-4}) + a_{53} * d(TRADE_{t-1}) + b_{53} * d(TRADE_{t-2}) + g_{53} * d(TRADE_{t-3}) + h_{53} * d(TRADE_{t-4}) + a_{54} * d(GFCF_{t-1}) + b_{54} * d(GFCF_{t-2}) + g_{54} * d(GFCF_{t-3}) + h_{54} * d(GFCF_{t-4}) + a_{55} * d(LFPR_{t-1}) + b_{55} * d(LFPR_{t-2}) + g_{55} * d(LFPR_{t-3}) + h_{55} * d(LFPR_{t-4}) + m_5 * d(TRUMP_t) + u_{5t}$

where d is the difference operation needed to transform the series into stationary; β-s are the intercepts; a, b, g, h, m are the coefficients to be estimated; u-s are the error terms that are uncorrelated with own lagged values and right-hand side variables.

After setting the number of lags, which is 4, the VAR model is regressed, keeping the dummy variable TRUMP as exogenous.

Table 7

Vector Autoregression: Results

• **varsoc d.TRADE d.INDPRO d.LFPR d.GFCF d.GPDIRD, dfk exog (d.TRUMP) lags (1/4)**

Vector autoregression

Sample: 1986q2-2018q4		No. of obs	= 131
Log likelihood	= –471.4584	AIC	= 8.877228
FPE	= .0050111	HQIC	= 9.858261
Det (Sigma_m1)	= .0009196	SBIC	= 11.29152

Equation	Parms	RMSE	R-sq	chi2	P > chi2
D_TRADE	22	.064629	0.4838	102.1562	0.0000
D_INDPRO	22	.700448	0.6474	200.1457	0.0000
D_LFPR	22	.168824	0.3301	53.70132	0.0001
D_GFCF	22	6.711590	0.6471	199.8649	0.0000
D_GPDIRD	22	1.302630	0.3397	56.08101	0.0000

Where dfk option indicates small-sample corrections to the large-sample statistics.

Source: author's own elaboration.

According to the above figures, the values of R-sq show that the model has a relatively strong explanatory power (64%) of both D_INDPRO and D_GFCF variables. The rest of the variables have weaker explanatory power, but still describe 30–50% of the model.

However, before interpreting the empirical results, post-estimation tests have to be used in order to assess the reliability of the VAR's output.

This way, the normality test was conducted, where the most important values for the analysis are Jarque-Bera test estimates shown below.

Table 8

Jarque-Bera normality test: Results

• **varnorm**

D_TRADE	6.261	2	0.04369
D_INDPRO	3.992	2	0.13586
D_LFPR	8.084	2	0.01756
D_GFCF	4.222	2	0.12113
D_GPDIRD	0.571	2	0.75159
ALL	23.131	10	0.01027

Source: own elaboration.

Joint probability of all equations, namely ALL equation, is 0.01027, which is lower than the critical value of 0.05. Hence, the null hypothesis of normal distribution is rejected, or, in other words, the residuals have no normal distribution. Separately, only D_INDPRO (0.13586 > 0.05), D_GFCF (0.12113 > 0.05), D_GDIRD (0.75159 > 0.05) equation residuals passed the normality test, while the residuals in D_TRADE (0.04369 < 0.05) and D_LFPR (0.01756 < 0.05) equations did not.

One of the possible reasons for non-normal distribution of the residuals in D_LFPR equation is that there are too many extreme values in its data set. It can be observed in the graphical representation (Figure 6) of D_LFPR time series. In terms of D_Trade (Figure 7), the possible reason for the non-normal distribution of its residuals is the presence of outliers in 2008, as it is shown below. It may be explained by the Global Financial Crisis of 2007–2008, when the U.S international trade experienced various difficulties. As a result, the VAR model may not follow a normal distribution for particular equations: D_LFPR, D_TRADE.

The next post-estimation test is the Lagrange-multiplier test, which states the null hypothesis of no autocorrelation at lag order.

Table 9

Lagrange-multiplier test: Results

• varlmar

lag	chi2	df	Prob > chi2
1	31.9142	25	0.16051
2	43.2009	25	0.01330

Source: author's own elaboration.

The results of the Lagrange-multiplier test presented above show there is an autocorrelation at lag order 2 (0.01330 < 5%). Nevertheless, there is no autocorrelation at lag order 1 (0.16051 > 5%), which is good.

According to the data in Table 9, which shows the results of Eigenvalue stability condition, all the eigenvalues lie inside the unit circle. Therefore, the VAR model satisfies the stability condition.

Table 10

Eigenvalue stability condition: Results

• varstable

Eigenvalue	Modulus
-.9404402	.94044
.06802441 + .8786028*i*	.881232
.06802441 - .8786028*i*	.881232
.8572397 + .1255651*i*	.866387
.8572397 - .1255651*i*	.866387
.6804469 + .367376*i*	.773287
.6804469 - .367376*i*	.773287
.4635535 + .5624719*i*	.728873
.4635535 - .5624719*i*	.728873
-.6272761 + .1372232*i*	.64211
-.6272761 – .1372232*i*	.64211
.07983887 + .6302238*i*	.635261
.07983887 - .6302238*i*	.635261
-.250721 + .5750767*i*	.627355
-.250721 - .5750767*i*	.627355
-.5818435 + .211819*i*	.6192
-.5818435 - .211819*i*	.6192
-.0169474 + .5990737*i*	.599313
-.0169474 - .5990737*i*	.599313
.5808304	.58083

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

Source: author's own elaboration.

At last, the post-estimation test determining the significance of the dummy variable TRUMP is conducted since it is crucial under the research of this thesis.

Figure 6

Test parameter (d. TRUMP)

(1) [D_TRADE]D.TRUMP = 0
(2) [D_INDPRO]D.TRUMP = 0
(3) [D_LFPR]D.TRUMP = 0
(4) [D_GFCF]D.TRUMP = 0
(5) [D_GPDIRD]D.TRUMP = 0
chi2(5) = 10.75
Prob > chi2 = 0.0566

Source: author's own elaboration.

According to the test parameter illustrated above, the dummy variable d. TRUMP is statistically significant for the model, and thus, has incentives to be included in the model.

5. Empirical Results

The output of VAR organises its results in an equation, which is identified with its dependent variable: INDPRO, TRADE, GFCF, LFPR, GPDIRD. Table 11, containing all of the relevant coefficients, standard errors, *t* statistics, and *p*-values, is rather extensive. Only the significant results are going to be briefly discussed below.

Table 11

VAR Results: Extensive

Variable	Coef.	Std. Err.	z	P > |z|	[95% Conf. Interval]	
D_TRADE						
TRADE						
LD.	–.1436896	.1006922	–1.43	0.154	–.3410427	.0536634
L2D.	–.0936709	.0972418	–0.96	0.335	–.2842614	.0969195
L3D.	–.2654425	.0980020	–2.71	0.007	–.4575229	–.0733621
L4D.	.3651202	.0978416	3.73	0.000	.1733541	.5568863
INDPRO						
LD.	.0413969	.0101623	4.07	0.000	.0214791	.0613147
L2D.	.0089503	.0125717	0.71	0.477	–.0156899	.0335904
L3D.	.0058008	.0125389	0.46	0.644	–.0187750	.0303766
L4D.	–.0199675	.0098138	–2.03	0.042	–.0392022	–.0007328

Table 11 (cont.)

Variable	Coef.	Std. Err.	z	P > |z|	[95% Conf. Interval]	
LFPR						
LD.	.0226386	.0341362	0.66	0.507	–.0442670	.0895443
L2D.	–.0416292	.0342326	–1.22	0.224	–.1087239	.0254655
L3D.	.0260042	.0346338	0.75	0.453	–.0418768	.0938852
L4D.	–.0604184	.0365660	–1.65	0.098	–.1320865	.0112496
GFCF						
LD.	–.0002815	.0011242	–0.25	0.802	–.0024849	.0019219
L2D.	–.0013449	.0011317	–1.19	0.235	–.0035630	.0008731
L3D.	–.0016467	.0011133	–1.48	0.139	–.0038286	.0005353
L4D.	.0011431	.0010636	1.07	0.283	–.0009416	.0032278
GPDIRD						
LD.	–.0037363	.0045520	–0.82	0.412	–.0126580	.0051854
L2D.	.0034463	.0042077	0.82	0.413	–.0048007	.0116932
L3D.	.0011880	.0045507	0.26	0.794	–.0077312	.0101072
L4D.	–.0035945	.0049912	–0.72	0.471	–.0133770	.0061881
TRUMP						
D1.	.0473432	.0720496	0.66	0.511	–.0938715	.1885579
_CONS	.0167118	.0085959	1.94	0.052	–.0001360	.0335595
D_INDPRO						
TRADE						
LD.	–1.189062	1.091299	–1.09	0.276	–3.327969	.9498443
L2D.	–1.959390	1.053904	–1.86	0.063	–4.025004	.1062244
L3D.	–1.000350	1.062143	–0.94	0.346	–3.082111	1.0814120
L4D.	–.2912572	1.060405	–0.27	0.784	–2.369613	1.7870980
INDPRO						
LD.	.8153315	.1101390	7.40	0.000	.5994630	1.0312000
L2D.	.0092453	.1362523	0.07	0.946	–.2578042	.2762949
L3D.	.0236571	.1358963	0.17	0.862	–.2426946	.2900089
L4D.	–.1400893	.1063617	–1.32	0.188	–.3485544	.0683757
LFPR						
LD.	.9831849	.3699668	2.66	0.008	.2580633	1.7083070
L2D.	–.7918030	.3710121	–2.13	0.033	–1.5189730	–.0646326
L3D.	.1901850	.3753603	0.51	0.612	–.5455076	.9258776
L4D.	–.0809348	.3963014	–0.20	0.838	–.8576714	.6958017

Table 11 (cont.)

Variable	Coef.	Std. Err.	z	P > |z|	[95% Conf.	Interval]
GFCF						
LD.	.0171750	.0121840	1.41	0.159	–.0067052	.0410552
L2D.	–.0047153	.0122651	–0.38	0.701	–.0287545	.0193239
L3D.	–.0135866	.0120655	–1.13	0.260	–.0372345	.0100614
L4D.	.0076778	.0115278	0.67	0.505	–.0149162	.0302719
GPDIRD						
LD.	–.0357775	.0493342	–0.75	0.456	–.1334707	.0599157
L2D.	–.0567656	.0456030	–1.24	0.213	–.1461459	.0326147
L3D.	.0605328	.0493204	1.23	0.220	–.0361334	.1571989
L4D.	–.0825467	.0540943	–1.53	0.127	–.1885696	.0234762
TRUMP						
D1.	–.1233099	.7808719	–0.16	0.875	–1.6537910	1.407171
_CONS	.2212998	.0931626	2.38	0.018	.0387045	.4038951
L_LFPR						
TRADE						
LD.	–.3908937	.2630283	–1.49	0.137	–.9064198	.1246323
L2D.	–.0043619	.2540153	–0.02	0.986	–.5022228	.4934990
L3D.	.3953955	.2560010	1.54	0.122	–.1063572	.8971483
L4D.	–.8123812	.2555822	–3.18	0.001	–1.3133130	–.3114494
INDPRO						
LD.	.0374064	.0265460	1.41	0.159	–.0146229	.0894357
L2D.	–.0207422	.0328400	–0.63	0.528	–.0851073	.0436229
L3D.	–.0005477	.0327541	–0.02	0.987	–.0647446	.0636493
L4D.	.0214606	.0256356	0.84	0.403	–.0287843	.0717056
LFPR						
LD.	–.0016385	.0891706	–0.02	0.985	–.1764097	.1731326
L2D.	–.1273971	.0894225	–1.42	0.154	–.3026620	.0478678
L3D.	.0701375	.0904705	0.78	0.438	–.1071815	.2474565
L4D.	.2338080	.0955178	2.45	0.014	.0465965	.4210195
GFCF						
LD.	–.0018050	.0029366	–0.61	0.539	–.0075607	.0039507
L2D.	–.0013949	.0029562	–0.47	0.637	–.0071889	.0043991
L3D.	.0000569	.0029081	0.02	0.984	–.0056428	.0057566
L4D.	.0034048	.0027785	1.23	0.220	–.0020408	.0088505

Table 11 (cont.)

Variable	Coef.	Std. Err.	z	P > |z|	[95% Conf. Interval]	
GPDIRD						
LD.	.0081883	.0118907	0.69	0.491	–.0151170	.0314936
L2D.	.0351416	.0109914	3.20	0.001	.0135989	.0566843
L3D.	–.0093495	.0118874	–0.79	0.432	–.0326483	.0139492
L4D.	.0116267	.0130380	0.89	0.373	–.0139273	.0371807
TRUMP						
D1.	–.0760764	.1882082	–0.40	0.686	–.4449578	.2928049
_CONS	–.0317432	.0224543	–1.41	0.157	–.0757529	.0122665
D_GFCF						
TRADE						
LD.	–6.441382	10.45667	–0.62	0.538	–26.936080	14.053320
L2D.	–33.96488	10.09836	–3.36	0.001	–53.757300	–14.172460
L3D.	–12.13939	10.17730	–1.19	0.233	–32.086530	7.807753
L4D.	11.61691	10.16065	1.14	0.253	–8.297594	31.531420
INDPRO						
LD.	3.317469	1.055336	3.14	0.002	1.2490480	5.3858900
L2D.	2.509560	1.305550	1.92	0.055	–.0492704	5.0683900
L3D.	.0368425	1.302139	0.03	0.977	–2.5153020	2.5889870
L4D.	–2.162340	1.019143	–2.12	0.034	–4.1598230	–.1648573
LFPR						
LD.	3.816542	3.544969	1.08	0.282	–3.13147	10.764550
L2D.	–9.495947	3.554985	–2.67	0.008	–16.46359	–2.528304
L3D.	–8.586467	3.596649	–2.39	0.017	–15.63577	–1.537165
L4D.	–5.439045	3.797304	–1.43	0.152	–12.88162	2.003634
GFCF						
LD.	.2871384	.1167453	2.46	0.014	.0583219	.5159549
L2D.	.1354612	.1175227	1.15	0.249	–.0948791	.3658014
L3D.	.0139042	.1156098	0.12	0.904	–.2126869	.2404953
L4D.	.1679464	.1104574	1.52	0.128	–.0485462	.3833390
GPDIRD						
LD.	–.3426352	.4727130	–0.72	0.469	–1.2691360	.5838652
L2D.	.6178031	.4369616	1.41	0.157	–.2386260	1.4742320
L3D.	–.0134092	.4725807	–0.03	0.977	–.9396503	.9128320
L4D.	.0117098	.5183242	0.02	0.982	–1.0041870	1.0276070

Variable	Coef.	Std. Err.	z	P > |z|	[95% Conf. Interval]	
TRUMP						
D1.	16.29434	7.482204	2.18	0.029	1.629487	30.959190
_CONS	1.4333707	.8926706	1.61	0.108	–.315895	3.183309
D_GPDIRD						
TRADE						
LD.	3.6905060	2.029505	1.82	0.069	–.28872501	7.668263
L2D.	2.4126820	1.959961	1.23	0.218	–1.428771	6.254136
L3D.	.4733809	1.975283	0.24	0.811	–3.398102	4.344864
L4D.	1.6555020	1.972051	0.84	0.401	–2.209646	5.520651
INDPRO						
LD.	.2682343	.2048271	1.31	0.190	–.1332194	.6696881
L2D.	.0106668	.2533903	0.04	0.966	–.4859691	.5073028
L3D.	–.1262270	.2527283	–0.50	0.617	–.6215654	.3691114
L4D.	–.1955338	.1978024	–0.99	0.323	–.5832194	.1921518
LFPR						
LD.	.4298195	.6880328	0.62	0.532	–.9187000	1.7783390
L2D.	–.5261531	.6899767	–0.76	0.446	–1.8784830	.8261765
L3D.	.8582398	.6980631	1.23	0.219	–.5099387	2.2264180
L4D.	–1.224959	.7370077	–1.66	0.096	–2.6694680	.2195405
GFCF						
LD.	–.0189953	.0226587	–0.84	0.402	–.6340560	.0254150
L2D.	–.0340881	.0228096	–1.49	0.135	–.0787942	.0106180
L3D.	.0058870	.0224384	0.26	0.793	–.0380914	.0498654
L4D.	.1018784	.0214384	4.75	0.000	.0598600	.1438969
GPDIRD						
LD.	.0278791	.0917475	0.30	0.761	–.1519427	.2077008
L2D.	.1153421	.0848086	1.36	0.174	–.0508797	.2815639
L3D.	–.2941678	.0917218	–3.21	0.001	–.4739393	–.1143964
L4D.	–.0188293	.1006000	–0.19	0.852	–.2160018	.1783431
TRUMP						
D1.	2.579107	1.452199	1.78	0.076	–.267151	5.425365
_CONS	.4266929	.1732558	2.46	0.014	.081177	.7662681

Source: author's own elaboration.

In the first equation, three-period TRADE lag, four-period lag TRADE and one-period lag INDPRO are the only significant variables at 5% level. Three-period TRADE lag has a negative coefficient, while the four-period TRADE lag has a positive coefficient. Thus, a change in three-period TRADE inflow will give a negative change of trade openness. At the same time, change in four-period TRADE inflow will increase openness to trade. As a result, the impact of changes in trade openness on itself worsens with time. In terms of one-period INDPRO lag, it has a positive impact on TRADE. It, therefore, means that positive changes in the industrial productivity lead to the greater willingness of a country to trade.

The second equation shows how chosen variables affect INDPRO changes. One-period INDPRO lag, one-period and two-period LFPR lag are significant variables. According to the results, changes in the industrial production imply a meaningful positive change in the industrial production. Thus, policies towards the development of the industrial productivity foster industrial productivity itself. In terms of labour force participation, it can be observed that the significance of LFPR increases from the second lag period to the lag period one. Moreover, changes in LFPR have a negative and meaningful positive impact on changes in the industrial productivity at lag period 2 and at lag period 1 respectively. It can be explained by the fact that labour inputs require time to influence the productivity.

In the third equation, three-period TRADE lag, four-period lag TRADE, four-period lag LFPR and two-period lag GPDIRD are the only significant variables. The change in three-period TRADE lag has a strong negative impact on the labour force participation rate. It can be explained by the fact that trade openness under the process of globalisation allows for a free movement of labour across countries. Thus, a country may lose a decent portion of its labour force. The change in four-period LFPR lag has a minor positive impact on the labour force participation rate itself. In real life, a higher rate of labour force participation initially accelerates its growth. However, with time it has no impact on labour force at all. From the perspective of greater investments in research in development at lag 2, they have an incremental positive impact on the labour force participation. Thus, a technological change has almost no impact on the US labour force participation rate.

In the fourth equation for the independent variable GFCF, only one- and two-period lag TRADE, two- and three-period lag LFPR, one-period lag GFCF and exogenous dummy variable TRUMP are significant among the others. According to the coefficients, greater openness to trade implies

moderate negative growth in capital formation. It can be explained by the fact that globalisation is characterised by the free movement of capital across countries. A positive change in labour force participation, in turn, has an incremental negative impact on the US capital formation. Thus, more workers in the labour force imply a slowdown in the capital accumulation, which becomes more significant from lag period 3 to lag period 2. The change in the capital formation, in turn, implies a slight positive change in the capital formation itself. At last, in terms of the exogenous variable, Trump has a significant positive impact on the US capital formation, which suits the aims of his political campaign.

Finally, only four-period lag GFCF and three-period lag GPDIRD are significant variables among the others. According to the results, a change in the capital formation implies an initial positive change in research and development investments. At the same time, a change in GPDIRD has a minor negative impact on GPDIRD itself. However, a change in both GPDIRD and GFCF does not cause a change in GPDIRD. The remaining coefficients are found to be insignificant at 5% significance level.

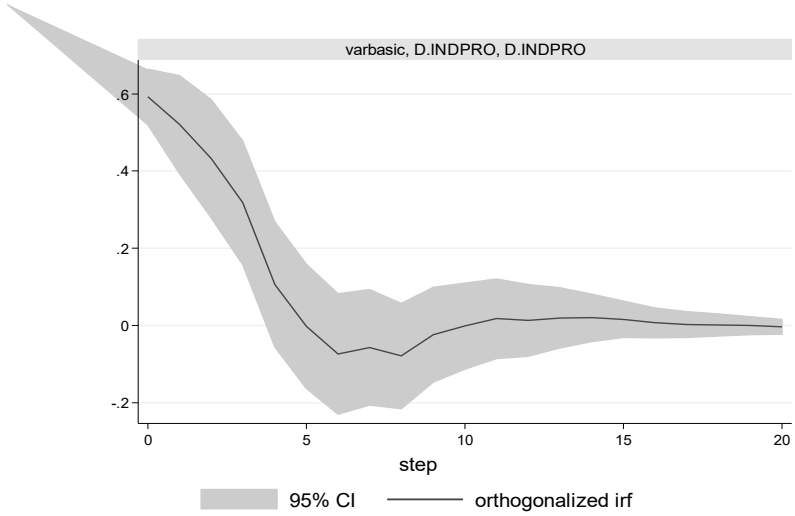
Furthermore, it is typical to evaluate the VAR coefficients using the impulse response function. Impulse responses, in turn, describe how an unexpected change, or shock, in one variable impacts another variable over time. The most important impulse responses for this research are described below.

Figure 7 illustrates the forecast-error variance decompositions with a time period of 20 quarters. Precisely, it shows the response of D_INDPRO toward shocks in D_INDPRO. The blue line represents the impulse response function (IRF) and the grey area is the 95% confidence interval for the IRF. It can be observed that the response line is decreasing dramatically during the first 5 quarters. Then, starting from period 6, it slightly increases and remains stable at zero level until the last quarter. Thus, an increase in D_INDPRO by one standard deviation leads to the negative reaction of D_INDPRO along the first 5 periods, and stabilises after the shock from the period 6 to the period 20.

The response of D_INDPRO to D_GFCF (Figure 8) looks quite stable. In the beginning, one standard deviation increase in the capital formation causes a positive response of the industrial production. Then, it fluctuates between 1 and 0 during the next 9 periods. Starting from period 10, the line goes closer to zero and transforms into a straight line. Thus, the insignificant relationship between the parameters is proved: an increase in GFCF generally leads to no change in the industrial productivity, which, in turn, meets the expectations towards the insignificant impact of capital input on the aggregate productivity.

Figure 7

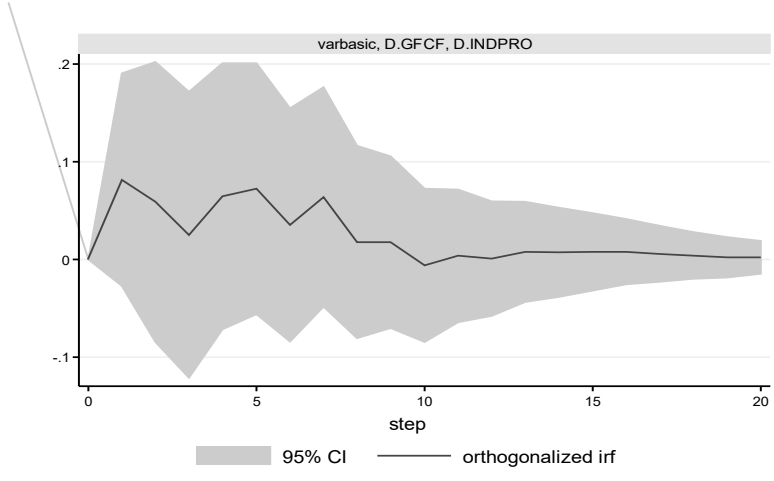
Impulse-Response Function (D.INDPRO, D.INDPRO)



Source: author's own elaboration.

Figure 8

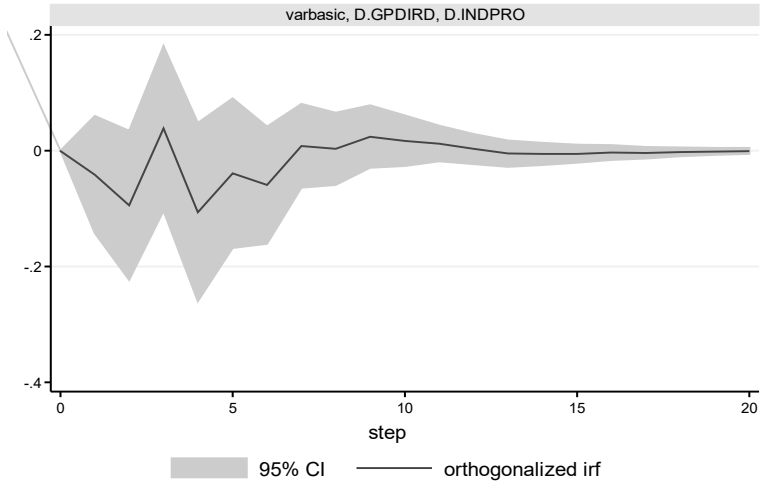
Impulse-Response Function (D.GFCF, D.INDPRO)



Source: author's own elaboration.

Figure 9

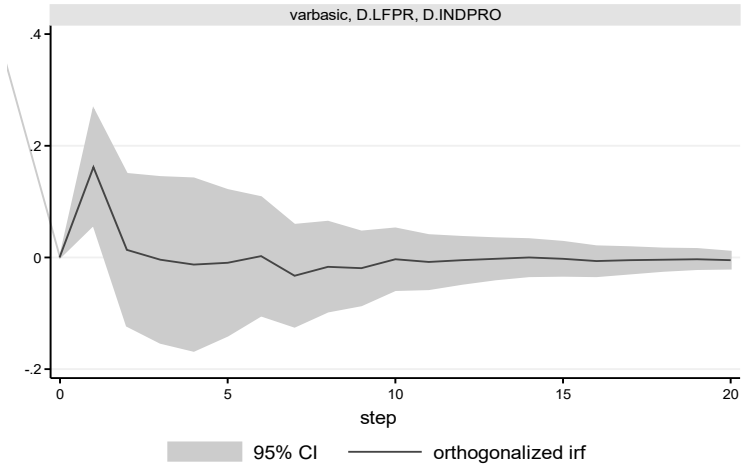
Impulse-Response Function (D.GPDIRD, D.INDPRO)



Source: author's own elaboration.

Figure 10

Impulse-Response Function (D.LFPR, D.INDPRO)



Source: author's own elaboration.

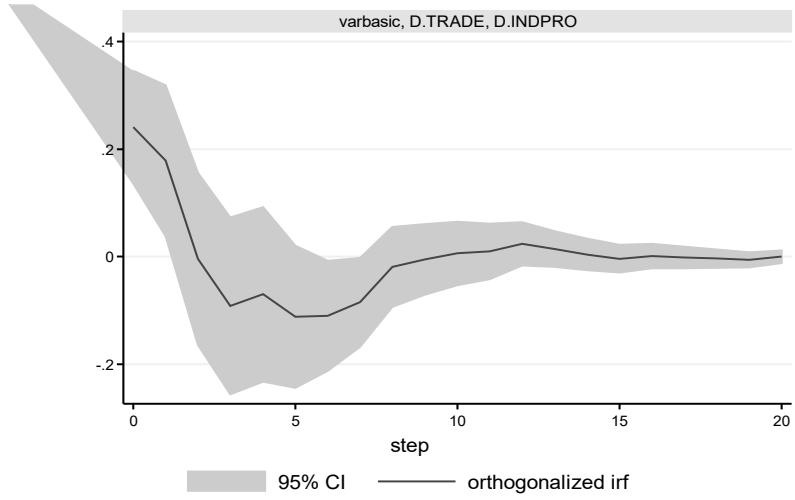
Figure 9 illustrates how changes in D_GPDIRD impact D_INDPRO expectations. Within the first 7 quarter-periods, the response line of the expectations fluctuates around zero. However, then it goes slightly above zero and becomes rather stable. Therefore, technological changes bring incremental positive effects to the industrial output expectations, which does not meet expectations towards the outstanding effect of technological development on productivity growth.

Figure 10 shows how D_INDPRO reacts to changes in D_LFPR. The response line of the expectations increases during the first two periods. However, it decreases during period 3 and remains stable around zero until period 20. As a result, changes in labour force participation bring almost no effects on industrial productivity, which meets the expectations towards the insignificant impact of labour input on productivity.

Finally, the most important relation of this study is represented by Figure 11: how changes in G_TRADE impact D_INDPRO expectations. During the first 5 quarter-periods, the response line of the expectations goes below zero. However, then this line gradually increases and becomes rather stable slightly above zero from period 6 to period 20. As a result, changes in trade openness bring initially negative outcomes to the productivity growth, which, in turn, accepts the main hypothesis of this research paper.

Figure 11

Impulse-Response Function (D.TRADE, D.INDPRO)



Source: author's own elaboration.

Overall, impulse response functions show how changes in the industrial production, labour force participation, gross fixed capital formation and gross domestic investments in research and development influence US industrial production during the next 20 quarters. According to the results, changes in the industrial productivity bring negative outcomes on the industrial productivity itself. In terms of labour and capital inputs, obtained results prove that they do not affect productivity growth. Technological developments (GPDIRD), in turn, violate expectation towards their positive impact on productivity, indicating vulnerable negative response. At last, shock in US trade openness with Mexico caused by policies of Trump implies negative outcomes for the US industrial production within the next 20 quarters' period.

Conclusion

The relationship between international trade and industrial production is always attractive to economists. Trump's protectionist policies towards Mexico are of special interest, since the economic relationship between the two neighbouring countries is crucial for both of them, and the world as well. The exploration of this relationship lies in the following theories: Neoclassical Theories of Trade, New Trade Theory, Gravity Model of International Trade, and Solow-Growth Model. Trade openness is found to be an efficient way of increasing productivity growth. However, when the government intervenes in the relation between trade and productivity of a country by establishing trade barriers, an inverse relationship between the parameters emerges. These situations imply numerous empirical studies, where productivity growth is estimated with the use of various methods and numerous econometric models. The majority of researchers point out that trade openness is crucial for the expansion of domestic production; however, control factors, such as labour, capital and state of technologies, are found to be essential as well. Moreover, the previous studies were mainly based on cross-section data. Thus, they may have obtained biased results, struggling with the selection of proper instruments for their multi-stage least square models. This study, in turn, is based on time series data, which demands VAR estimation. Numerous pre-estimation and post-estimation tests proved the efficiency of the constructed model, except for the normality test and the Lagrange multiplier test at the second lag, which may be explained by outliers present in some of the data. The results derived from the impulse-response functions indicate a significant positive relation between trade openness and

industrial production. Inversely, barriers to trade have a negative impact on the industrial productivity growth. Furthermore, the results obtained indicate an insignificant effect of both capital input and technological development on productivity growth. It, therefore, violates the expectations that capital input and technological development have a strong impact on productivity. Insignificant results for labour force participation rate, in turn, meet expectations towards the insignificant impact of labour input on the aggregate productivity. Most importantly, the presidency of Trump expressed in the form of exogenous dummy variable is found to be a significant negative factor for the constructed model. Thus, the main hypothesis of the paper has been proved: political decisions of President Trump towards foreign trade with Mexico have a substantial negative effect on the US manufacturing sector.

At last, it is worth mentioning that this research discusses the problem in less detail, relying on the availability of data, especially in the quarterly frequency. Thus, the most appropriate variables were taken into consideration. As far as suggestions for the future economic papers are concerned, the best option for investigations of similar macroeconomic issues is to use the VAR model, elaborating on different effects, the number of lags and specification tests, since this model brings the most accurate results.

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The Impact of Bilateral Trade Between the US and Mexico on the US Industrial Production Before and Under the Presidency of Donald Trump

Abstarct

The main goal of this research is to discover the relation between the US–Mexico bilateral trade and the US industrial production, where the presidency of Donald Trump is treated as an exogenous factor. The paper is going to uncover some of the empirical studies, where economists estimate the productivity growth under different barriers to trade. With the use of the VAR model based on time series data, the impact of trade openness on productivity growth was assessed. The US industrial output during the period from 1985 to 2018 was taken as a sample for the purpose of analysis. Control variables, such as proxies of the aggregate production function, were also taken into consideration. Numerous pre-estimation and post-estimation tests were conducted in order to assess the reliability of the constructed model. In accordance with the results, the VAR estimations proved that there is a significant impact of Trump's trade policies towards Mexico on the US industrial production.

Key words: the US, Mexico, Donald Trump, bilateral trade, industrial production, econometrics

Wpływ dwustronnej wymiany handlowej między USA i Meksykiem na amerykańską produkcją przemysłową przed i w trakcie prezydentury Donalda Trumpa

Streszczenie

Głównym celem przeprowadzonego badania jest wykrycie związku pomiędzy dwustronną wymianą handlową USA z Meksykiem a amerykańską produkcją przemysłową przy założeniu, że prezydentura Donalda Trumpa miała charakter egzogeniczny. Praca przedstawi wyniki badań empirycznych, w których ekonomiści szacują wzrost produkcyjności w obliczu różnych barier handlowych. Wpływ otwartości handlowej na wzrost produktywności został oceniony przy zastosowaniu modelu wektorowej autoregresji (VAR) opartym na danych szeregu czasowego. Na potrzeby tej analizy jako próbkę przyjęto amerykańską produkcję przemysłową w okresie 1985–2018. Uwzględniono również zmienne kontrolne takie jak zmienne proxy funkcji produkcji. W celu oceny wiarygodności skonstruowanego modelu przeprowadzone zostały testy wstępnego szacunku i oszacowania końcowego. Zgodnie z wynikami, szacunki wektorowej autoregresji wykazały, że polityka handlowa Trumpa wobec Meksyku miała znaczący wpływ na amerykańską produkcję przemysłową.

Słowa kluczowe: USA, Meksyk, Donald Trump, dwustronna wymiana handlowa, produkcja przemysłowa, ekonometria

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Marcin Madziała*

ATTITUDES OF MEDICAL STUDENTS TOWARDS THE COVID-19 PANDEMIC IN THE SOCIOLOGY OF MEDICINE

DOI: 10.26399/meip.3(70).2020.19/m.madziala

Introduction

The impact of socio-cultural factors on the health of societies is not questioned by anyone today, and the sociology of health, disease and medicine is one of the most dynamically developing fields of sociology in Poland. It is proved by facts indicating a growing group of sociologists of medicine, as well as a growing number of publications and academic textbooks devoted to health issues: Barański, and Piątkowski (2002); Ostrowska (2009); Piątkowski (2009); Tobiasz-Adamczyk (2010).

In terms of the historical aspect, Magdalena Sokołowska is considered the mother of the Polish sociology of medicine (Klingemann, and Sokołowska 2011). The impact of contemporary health problems on the sociology of medicine is no longer just a selective issue, but due to the COVID-19 pandemic, sociological issues are already being studied and observed almost everywhere in the world.

The emergence of a previously unknown form of severe pneumonia in November 2019 at first surprised health care units of the city of Wuhan with nearly 9 million-population in the Chinese province of Hubei, and soon the entire province, which has 58.4 million inhabitants. This event received the highest epidemiological priority, and started a race of scientists, busily searching for the causative agent of this mysterious disease and ways to

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combat it. The disease was named COVID-19 and the causative pathogen was named SARS-CoV-2 virus (Duszyński et al. 2020). According to the data of the Ministry of Health (Raport zakażeń koronawirusem 2021), from the identification of the first case in Poland, i.e. from 4 March 2020 to 21 March 2021, a total of 2 058 550 people were infected, 352 423 became ill, 1 656 827 recovered and 49,300 died.

The above statistical data clearly indicate problems which the sociology of medicine examines in a multifaceted manner, bearing in mind, among other things, the role, tasks, and efficiency of health care in fighting the pandemic, the social situation resulting from contracting the disease, the course of disease and further care resulting from complications, as well as the fact relating to the health situation after the end of the pandemic. Therefore, research into the attitudes of future physicians towards the current situation seems fully justified because, as students, they experience the beginning of their medical destinies related to the further treatment of patients who have and will have long-term complications following infection with the SARS-CoV-2 virus, as well as its pathogenic form COVID-19, which currently has one of the most severe courses.

1. Materials and Methods of Study

The study involved 150 medical students in their first, third and sixth year, who successfully completed the medical sociology course. There were 50 respondents in each year of study. In terms of gender, the majority were men (86), who constituted 57.33% of the respondents. The study was voluntary. For the research purposes, a questionnaire was used consisting of 7 questions, 2 of which required self-assessment concerning the occurrence of the pandemic and the level of knowledge about it, and 5 other aspects surveyed related to the sociology of medicine and diseases caused by the SARS-CoV-2 virus. Questions 4 and 6 were multiple-choice ones. The survey results were compiled with the use of Microsoft Excel for Office 365.

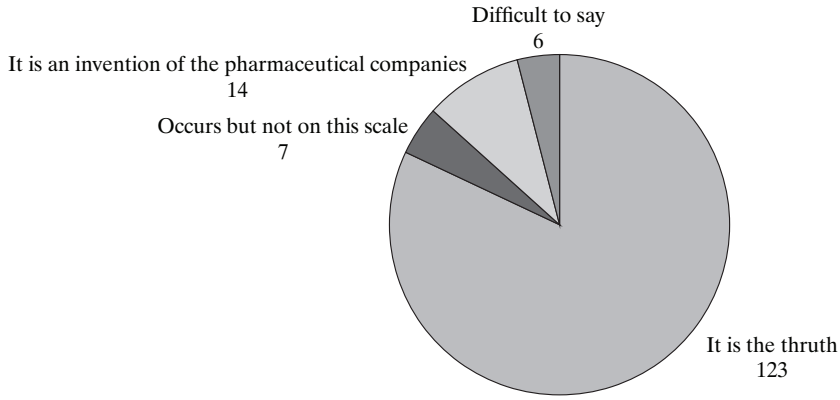
2. Results of the Survey

Question 1 asked for self-assessment of the students' awareness of the problem of the pandemic caused by the SARS-CoV-2 virus. The vast majority, 82% of the respondents, acknowledged the actual existence of the pandemic,

14% did not recognise its existence, while only 6 persons did not express their opinion.

Figure 1

Question 1. In your opinion, how would you rate the phenomenon of the pandemic problem caused by the SARS-CoV-2 virus?

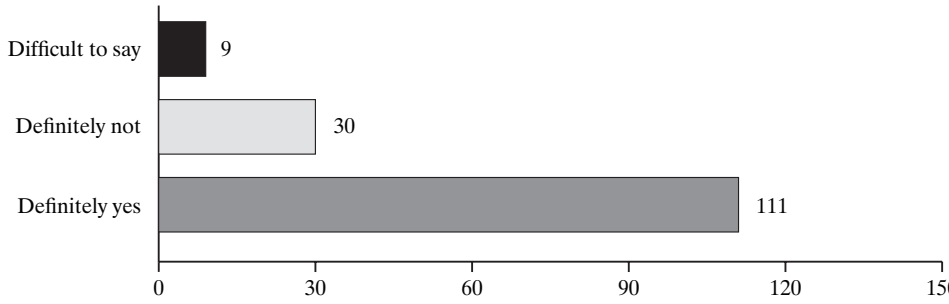


Source: author's own elaboration based on the survey.

In question 2, the respondents were asked whether the end of the epidemic would have any significance for their professional work. The majority (111) acknowledged the fact that the current pandemic will have an impact on the nature of their professional work. 30 students surveyed denied this and only 9 students could not decide.

Figure 2

Question 2. Will the end of the epidemic make any difference to your career?

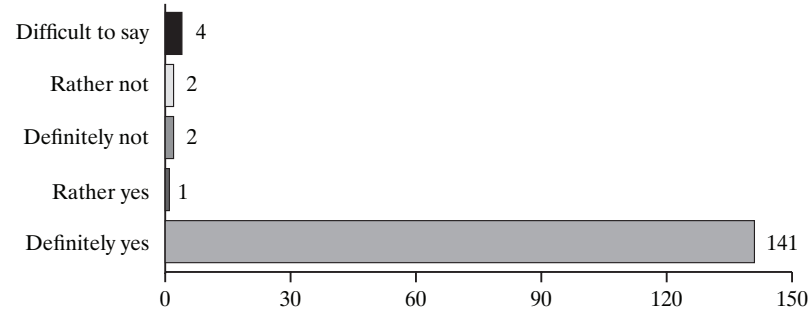


Source: author's own elaboration based on the survey.

Question 3 was intended for revealing whether sociological research into the occurrence of SARS-CoV-2 virus would be helpful in further treatment of patients. 94% of the students considered that sociological research would definitely be helpful in the further treatment of people who fell ill. Only 1 person considered it to be rather a fact, while the rest of the respondents denied it or could not decide.

Figure 3

Question 3. Will sociological studies in the aspect of SARS-CoV-2 virus be helpful for further treatment of patients?

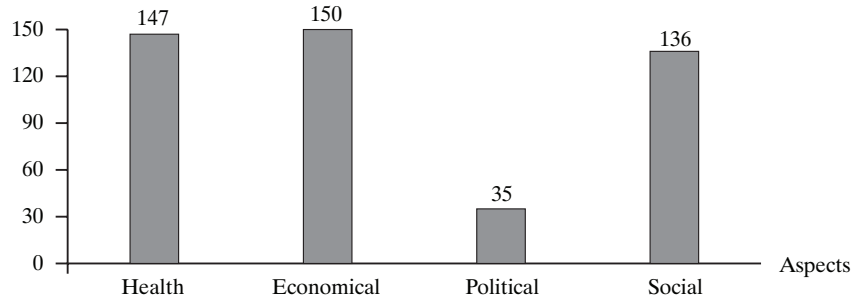


Source: author's own elaboration based on the survey.

In question 4, it was necessary to provide information about the impact of the pandemic on the Polish population. The vast majority (an average of 144) of the future physicians answered that it has a multifaceted dimension, which includes health, economic and social aspects. 35 of them also considered the political aspect.

Figure 4

Question 4. What is the impact of the pandemic on the population of Poland?*



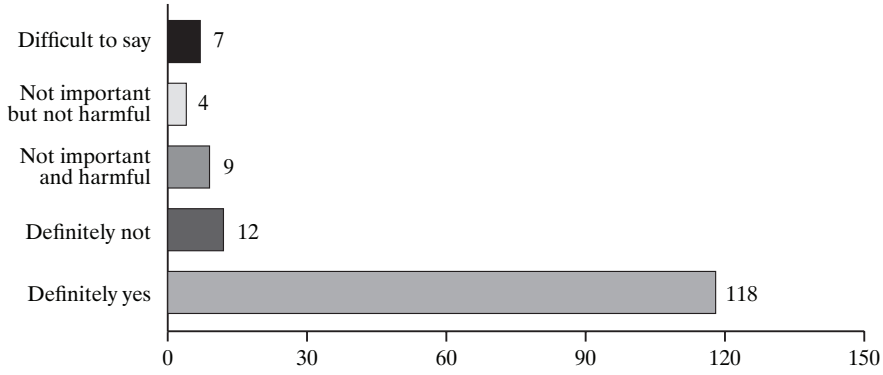
* Multiple-choice.

Source: author's own elaboration based on the survey.

Question 5 asked about the validity of vaccination in terms of the health of the world population. 118 respondents considered that preventive vaccinations have an impact on the development of the pandemic, which was the vast majority. 9 students specified harmfulness and lack of importance, while the rest could not specify their opinion.

Figure 5

Question 5. Does the current SARS-CoV-2 vaccination affect the future of the pandemic?

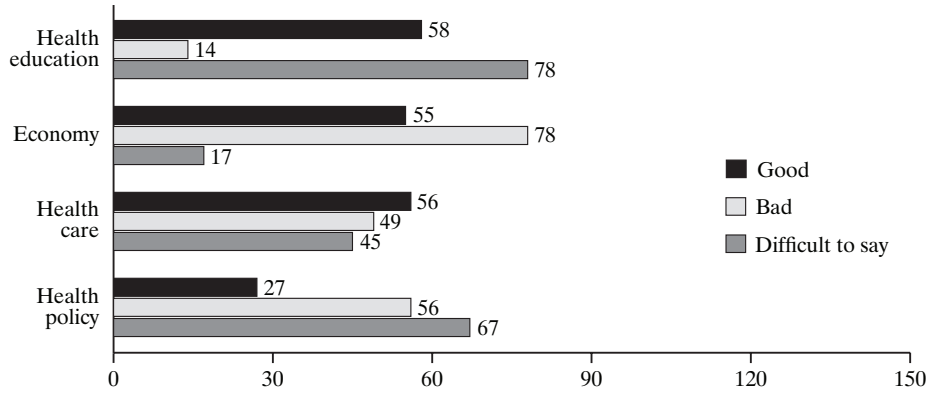


Source: author's own elaboration based on the survey.

Question 6 concerned all activities within the aspect of the fight against the coronavirus and the state's preparedness. Health education, within the framework of which Poles have the opportunity to raise awareness of the pandemic, received the most positive opinions (78 respondents). The same number of the respondents assessed the state of finance allocated for the fight against coronavirus negatively. It should be noted that the small number of the answer "good" was received by actions related to health care units and those related to the health policy implemented by the state.

Figure 6

Question 6. How do you assess the different areas in terms of the fight against coronavirus in Poland?*



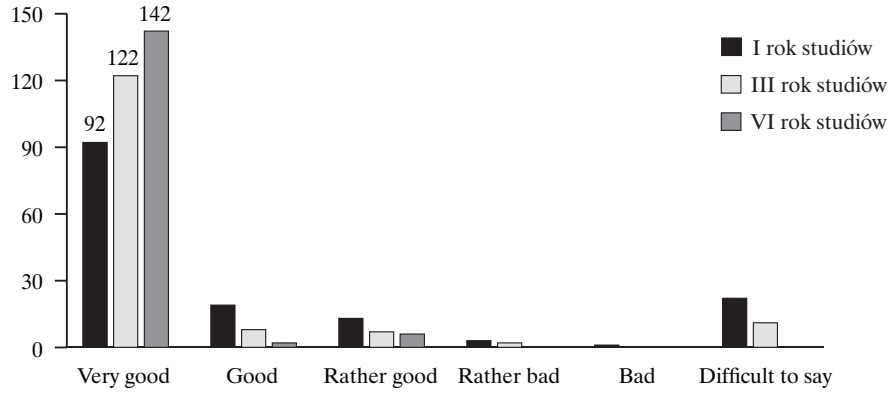
* Multiple-choice.

Source: author's own elaboration based on the survey.

Question 7 concerned the determination of one's own level of knowledge in each year of education, which links the fact of the pandemic and the role of the sociology of medicine. The vast majority of the students in their respective years of study (I – 92, III – 122, VI – 142) described their level as very good. It was also noted that 33 of them did not have a precise opinion.

Figure 7

Question 7. How would you rate your level of knowledge about the pandemic and the role of medical sociology in it?



Source: author's own elaboration based on the survey.

3. Sociology of Medicine

The sociology of medicine is one of the few sub-disciplines that, having evolved out of general sociology but being based on its theoretical foundations and methodological assumptions applicable in increasingly developing empirical research, have achieved so much in a relatively short period of time. It has established itself not only in contemporary sociological thought, but also equally importantly in medical science, or health sciences in general (Tobiasz-Adamczyk 2015). Sociological research nowadays directly translates into these fields of medical science, and thus its beginning has important implications for the attitudes of future medical personnel. The sociology of medicine is taught at many key medical faculties as early as the first year of study. Although it seems incomprehensible to young medical students, experience shows that every experienced medical professional often becomes a sociologist, without even being aware of it.

The study of medical students examining the aspect of the sociology of medicine, after its interpretation, allows the lecturers of this subject to adopt appropriate attitudes, thus contributes to the constant correction of the content and methods in order to convey the idea of this field of science in the most understandable way. While analysing the sociological aspect of modern times, when we face a great epidemiological problem, it should also be remembered that the present day allows future medics unlimited access to all sources of information, especially so since the modern form of studying is closely related to access to computer solutions. The study by Łódzki (2017: 121–136) clearly indicates that traditional and social media not only reflect reality, but also create it. Interest in COVID-19 (measured by the intensity of the topic coverage on the Internet) is unrelated to the officially reported pressure of the virus (measured by frequency) and probably the physical risk of infection in Poland. As traditional media overtake social media, we recommend choosing traditional news media for rapid dissemination of information, but using social media for greater impact. Otherwise, public information campaigns may have less impact on the public than expected (Jarynowski et al. 2020).

The current epidemiological situation almost forces us to take sociological patronage over its aspects, due to the fact that further complications of the disease are unknown, and thus preparing future medics for analysis and observation is fully justified. The seemingly narrow field of sociology allows for adapting all methods in such a way that every medical professional that deals with patients will understand the socio-cultural dimension of the

sociology of medicine. Nowadays, sociologists collaborate with physicians in a multidisciplinary way, studying and analysing human health problems, improving the well-being and the quality of life of the population (Balarezo-López 2018). Linking the sociology of medicine to the actions and awareness of physicians, among others, allows for the creation of appropriate rules, attitudes, and responses, especially when the current pandemic has consequences for social relations at the level of mental and somatic health, which is not resolved in any way by any restrictions imposed by the governments of various countries (Gloster et al. 2020). A study by Wang et al. shows that the COVID-19 pandemic has a significant impact on the attitudes adopted by older people, manifested by a double increase in anxiety among this age group. Based on such analyses, it is concluded that more attention should be paid to the mental state of the elderly in rural areas and people kept in quarantine or persons close to the quarantined for the purpose of medical observation (Wang et al. 2020). The study of the attitudes and needs of students in terms of the sociology of medicine in the era of the SARS-CoV-2 pandemic is not only a need for analysis related to the future physician-patient relationship; in this case also a future physician aims to make sociologists of medicine aware of the needs in understanding the contemporary thoughts and attitudes adopted by students, as well as shaping their own scientific trends, since the further consequences of the pandemic are not yet known.

Conclusion

The survey aimed to analyse the knowledge of and attitudes towards the occurrence of the prevailing pandemic. The group was divided in a way that allows for an objective assessment of the state of knowledge at levels pertinent to the stage of education at the medical faculty. As a result, it was noticed that the level of knowledge directly translates into the stages of education, which is related to the amount of education resulting from seminars, practical classes, as well as experience resulting from clinical classes and internship. The significance of the students' gender has not been demonstrated with respect to issues of social sensitivity.

When analysing the questions, it should be noted that 123 respondents considered the pandemic to be real, which suggests that their answers to further questions will indeed be conscious. Considering the sociological aspect of this study, it is pleasing that 111 students considered that the current pandemic

would have an impact on their professional career. The answers "no" or "don't know" may be dictated by the lack of any experience or awareness of a specialisation, which will not translate directly into taking care of patients with postponed complications after their exposure to SARS-CoV-2. Another important value for sociological research was the question that sought to answer whether sociological research into the aspect of the occurrence of SARS-CoV-2 would be helpful in the further treatment of patients. The vast majority of students who were familiar with the concept of this field answered: "yes"; it was confirmed by 94% out of 150 respondents. Answering the question concerning the consequences of the pandemic for the Polish population, the respondents stated that most people bear health, economic and social consequences. According to the respondents, political issues concerned only a small part of the population. The observed increase in the number of infections and their consequences allows for such interpretation, which also directly affects the respondents themselves. Such a low ranking of the political aspect may be due to the fact that young people are not interested in it, and the amount of current political information forces them to consciously avoid this kind of topic. In the study, this aspect was raised most frequently among the sixth-year students, which may be considered the necessity for political observation from the perspective of graduation and pursuing a medical profession. What is very important for the sociology of medicine is the necessity for analysing currently performed vaccinations. In this question, the students were asked to indicate whether preventive vaccination has an impact on the development of the pandemic. 118 respondents answered that it is essential to its dimension. Others considered it irrelevant for various reasons or had no opinion. This was especially true for the first-year students, who do not yet have epidemiological knowledge and thus may be sensitive to any reporting on social websites, in magazines, and mass media. Analysing the answers concerning the aspect of the state's actions in combating the pandemic, one can notice the positively evaluated influence of education on the awareness of the inhabitants of Poland. The evaluation of health care actions, health policy and economic actions were rated low. The impact of the reports on the increase in the number of cases, the number of ventilator beds or even the frustration of medical staff and their shortages were reflected in the respondents' answers. Also the economic dimension of the introduction of restrictions, the recognition of a country as a red zone, implies restrictions on civil liberties, which does not necessarily translate into the awareness of citizens in terms of the fight against the pandemic. The last question concerned the students' self-assessment in relation to the link

between the sociology of medicine and the fact of the pandemic. It should be noted that all the students had successfully completed this subject while studying medicine, and 6 of them had previous experience studying other medical subjects. The analysis of the data evidently indicates an upward trend in the legitimacy of the link between these disciplines, which is characterised by successive stages of their studies. This is justified by the achievement of emotional maturity, resulting also from the subject matter, the type of classes conducted, as well as their own sociological observations while dealing with real patients, their needs and suffering.

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Attitudes of Medical Students Towards the COVID-19 Pandemic in the Sociology of Medicine

Abstract

The sociology of medicine is essential for shaping social attitudes in the future physician-patient relationship. The contemporary pandemic SARS-CoV-2 coronavirus and the COVID-19 disease it causes compel research into the aspect of analysing the attitudes of future physicians who will have to treat the subsequent complications of this disease. 150 medical students from years I, III and VI participated in the survey. The results show that the awareness and attitudes adopted by the students are closely related to the increase in knowledge and are adequate for the subsequent years of study.

Key words: sociology of medicine, SARS-CoV-2, COVID-19, medical student, medical faculty

Postawy studentów medycyny wobec pandemii COVID-19 w socjologii medycyny

Streszczenie

Socjologia medycyny ma kluczowe znaczenie dla kształtowania postaw społecznych w przyszłej relacji lekarza z pacjentem. Współczesna pandemia koronawirusa SARS-CoV-2 i wywołana przez niego choroba COVID-19 zmusza do prowadzenia badań w aspekcie analizy postaw przyszłych lekarzy, którzy będą zmuszeni leczyć późniejsze powikłania tej choroby. W badaniu ankietowym wzięło udział 150 studentów kierunku lekarskiego z I, III i VI roku. Wyniki wykazały, że świadomość i postawy przyjmowane przez studentów mają ścisły związek ze wzrostem wiedzy i są adekwatne dla kolejnych lat studiowania.

Słowa kluczowe: socjologia medycyny, SARS-CoV-2, COVID-19, student medycyny, kierunek lekarski

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DISCOURSE ON ORGANISATIONAL MEMORY IN EVIDENCE-BASED MANAGEMENT

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INTRODUCTION

At the turn of the nineteenth century in the United States, Frederick W. Taylor (1856–1915) initiated a pragmatic movement aimed at increasing efficiency in the organisation by measuring employees' performance. He proposed that entrepreneurs, who wished to increase their efficiency in the organisation, take detailed measurements of employees' activities. On this ground, Taylor outlined a scientific approach to management based on direct evidence. A fitting reference by James Hoopes says that 'mechanical engineering specialists' (Hoopens 2011: 87) wished forever greater work results for their employees, as they were urged by the investment in specialised equipment which they had made. The resulting evidence-based and performance management was designed to accurately measure employees' performance from the scientific perspective. The answer is the essence of the so-called *evidence-based management*. Therefore, the question arises what the premises in the area of management are so that efficiency is the highest in the intensity of decision making. Answering this question, Andrew A. Bennet, Sven Kepes, Michael A. McDaniel come to the conclusion that an entrepreneur should carry out tasks in accordance with the following levels: Level I: Concentration on a given problem; Level II: Obtaining data from a problem analysis; Level III: Reliable analysis of the evidence provided; Level

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IV: Detailed solutions based on data analysis; Level V: Analysis of the effects and modification of solutions (Kepes, Bennet and McDaniel 2014: 446–466).

This concept slowly breaks the paths in evidence-based management, although intuitive errors are visible. Hence, unable to disagree, Prokokowicz writes:

> There is something unsettling about people, who would probably never board an airplane built on the basis of intuitive physics, but often have no problem deciding about the fate of others only thanks to intuitive knowledge about recruitment and selection (Prokopowicz 2016: 18).

It is surprising that there is certain resentment towards evidence-based management, the source of which lies in the medical community as evidence-based medicine. In his book *Fundamentals of EBM, i.e. medicine based on scientific evidence for doctors and medical students*, Andrzej Szczeklik states that this approach becomes the basis for medical procedures and the British Medical Journal, analysing over 150 years, presents it as a novelty and the main principle of our times (Szczeklik 2008: 11–12). Therefore, it can be presumed that management is close to medicine, and a manager's duties, although varied, have a common denominator in making rational decisions. An analysis of the factors that are derived from the historical turn of organisational memory in a discursive interpretation provides even more evidence to support this thesis.

Tomasz Ochinowski (following Booth and Rowlinson) considers the dilemma of 'historicizing subjectivity' among research topics in the context of the history of organisational remembering. That means analysing subjective feelings in the area of management (Ochinowski 2013: 117).

The use of the historical approach by giving the example of Europeanistic issues based on evidence-based management and organisational remembering interpreted in a controversial way is a new space for discursive initiation of questions, originating in a broadly understood analysis of traditional organisations. These are questions about not only evidence-based management but also values by means of remembering organizational competencies.

Historical thinking within the management of its processes in a changing reality has stimulated the environment of managers or entrepreneurs to analyse the factors and to reflect on this topic. The present considerations are a theoretical suggestion on the cognitive use of the future. It is important to note what happened at the beginning of this century, namely, the relationship of organisational past through the present with the future. The new dimension was given a special intellectual approach in Western countries through the

media expert Craig E. Carroll. The organisational history initiated in the environment of management scientists and practitioners, who reflected on new interdisciplinary areas of interest, emphasises and extends it by rich histographic reflection. Tomasz Ochinowski believes that

> broadly understood histographic reflection is a rational reflection on the study, writing and teaching (also taking into account popularising activities) of history in the theoretical (theory of histography) and historical (history of histography) aspects (Ochinowski 2013: 170).

The interest in the past in the organisational space expressed by means of historiographic analyses goes back to the nineteen nineties in the so-called managerial thought of Mills, Suddaby, Foster, and Durepos, where a radical cognitive organisational reorientation can be pointed at, aiming to 'historicize' this field (Mills, Suddaby, Foster, and Durepos 2016: 67–76). The ongoing theoretical and partly methodological evolution in the course of the humanistic approach to management has its supporters and promoters in Polish science, headed by Tomasz Ochinowski from the University of Warsaw, through the managerial ideas of Tadeusz Oleksyn from the Warsaw University of Finance and Management or Jan Jążak from the University of Łódź.

The opening of the organisational studies to the humanities is particularly developed with great research consistency by Monika Kostera. It distinguishes an archetypal approach to managerial reality through qualitative analysis of an organisation in the panorama of building metaphors from Jungian cultural archetypes (Kostera 2012). Kostera's western approach corresponds with Zygmunt Kubiak's, who, by seeing archetypes grounded in ancient culture, encourages an essayistic approach to evidence-based management (Kubiak 2003).

1. Organisational Memory in a Discursive Approach

Organisational Memory Studies create a remarkable problem when one wants to include it within the humanities of the historicization process. Therefore, Michael Rowlinson and Charles Booth, Peter Clark et al., created an opportunity to enter the management and development of this field (Rowlinson, Booth, Clark, Delahaye and Procter 2010: 69–87).

The historical and sociological fusion with the issue of an organisational and social memory, suggested by the authors, is based on the concept of Barbara A. Misztal, who explains

> the social aspects of remembering and the results of this social experience, that is, the representation of the past in a whole set of ideas, various types of knowledge, cultural practices, rituals and monuments through which people express their attitudes towards the past and which construct their relationship with the past (Rowlinson, Booth, Clark, Delahaye, and Procter 2010: 71).

A discursive view of social remembering, through narratives and discussions, can be a source of new evidence in the making of history. Epistemological reflection, which developed in the nineties in Great Britain and the United States among economists (Deirdre McCloskey), sociologists (Michael Billig) and psychologists, led to the conclusion that both society and the human psyche get to be known not only through experimental and mathematical models, but also thanks to analyses using rhetoric (Billig 2006: 26–47). It can be noticed that the reality in social science research is not only stochastic in nature but also more and more attention is paid to the rhetorical approach. The conviction about social and psychological processes, as well as metaphorical discussions conducted verbally or non-verbally, unconsciously and consciously, can be considered to be manifestations of persuasion of a person's 'internal' conversations (Waldenfels 2014). Subjecting the scientific analysis of the process of remembering, even before examining the data, through the created verification mechanism, one should look at these relations as a certain product understandable in rhetorical terms, meeting the persuasive and pragmatic goals of groups and individuals relating to the organisation within their functioning. The phenomenon of remembering, bringing back or forgetting is changeable and dynamic, therefore one cannot speak about one version of an individual's memorization, and it is even more difficult to capture it in a group that changes in space and time. The evolution of images from the past, as well as a certain negotiation of an individual with himself, others, and with non-personal entities in the context of organisational reality, causes a continuous cycle of changes understood by Derek Edwards and Jonathan Potter as *discursive remembering* (Edwards and Potter 1992: 187–215).

Derek Middleton and his namesake, Edwards, in their collaborative work *Collective Remembering* published in 1990 that became a classic study of discursive pre-orientation, citing the term 'discursive remembering', sought to precisely define the understanding of social memorization as acts of *here and now* communication (Middleton and Edwards 1990).

Jeremy Gingers and Robert Cairns write that 'social representations contain both knowledge and emotional evaluation of this knowledge' (Ginges and Cairns 2000: 1345–1370) treated as a mechanism instead of a result

of remembering, not understanding it as a cognitive message. Therefore, discursive remembering, or, in other words, recalling the past, creates its own separate identity along with a certain amount of information. The line of the horizon outlined in such a discussion defines the present and is oriented towards the future. Bogdan David writes:

> Landscapes of history and social memory are the main forces in the construction and human preference (David 2012: 66–71),

which may be the basis for the social idea. An instrument of social remembering, which is discursive in nature, thus creating ideologies, the resulting discussion of worldviews, makes the formation of views on the future possible.

This approach makes it possible to assume that a statement is a constitutive element as a basic narrative premise, coming from ethnomethodology and the theory of Michael Foucault (Taylor, and Wetherell 1999: 39–58). The social idea is constructed, modified and maintained throughout the narrative as permanent property. Such an approach to narrative memory highlights the discursive approach as a process occurring in dialogue at the interpersonal, organisational and institutional levels. That results in a performative understanding of identities: constructed and found in statements (Jackie, Stokoe, and Billig 2004: 180–192). According to Rowlinson's guidelines, through broadly understood organisations, the consideration of social memory is subject to constant and dynamic changes, where particular attention is paid to places of remembrance, which are: events, which mean all celebrated jubilees of the century; artifacts, including souvenirs as well as rooms and their arrangement; an organisation's documents, which are all official forms in the company, announcements, customer stories, communications, reports and correspondence (Rowlinson 2010: 79–80). At the same time, work on examples of memorial sites is a reference to the identity of the organisation, which is an ongoing project involving the construction of a biography. Social identities derive their source from broad interpretations that function in the cultural context of the storyteller. Interest in social memorial sites focuses on what the implications are and how people structure explanations from past experiences as well as present and future courses of organisational life (Mishler 2004).

The discursive approach to memory evokes incentives to recreate the past through museums or memory rooms; hence the activity with social remembering is much richer than the organisation and everyday life. Discussions that recall reality from memory have a discursive point of view, as the past, necessary for communicating the identity of the organisation and its biography in a personal and social dimension, becomes evident.

> It is not exactly that whoever controls the past controls the future. But whoever controls the past controls who we are (Middleton, and Edwards 1990: 10).

This position corresponds to the concept of expression, which is shaped by interactions, that identities are complex. On the basis of this, postmodern theorists, reducing people to the category of identity in a single approach, marginalised the interpenetration of individuals within an organisation (Rattanasi 1995: 250–286)[1].

Charles Anatki and Sue Widdicombe as discourse analysts and psychologists found that identities are occasioned with a particular emphasis on how people are positioned in speech (Anaki, and Widdicombe 1998). Other researchers, when considering the narratives of organisational memory, focus their goals on the extended interactions of participants during their story, combining the discursive approach into threads, treating it as work on the identity of an individual. Margaret Wetherell, presenting a synthetic approach, assumes that everyone is *positioned*, possessing distinctiveness and exposing distinctiveness, but also positions himself against the background of others in the organisation (Wetherell 1998: 387–412). This approach, admittedly, places a *person in a situation*, but not a personal biography in the sense of the connections between a series of *temporally related situations* that constitute an individual's unique experience. The *positions* of the subject are made available and adopted in subsequent conversational exchanges (*turn-by-turn*) into direct interaction. That is why the broadly understood discursive narrative, which is necessary for getting to know the identity and thus positioned by who they already are, is necessary and indispensable. In this approach, we look not only for narration in the *stretch of talk*, but we focus on *sequential* and *consequential* structuring of a personal version of a biography created in a specific situation. Thus, the narrative reveals itself in the details of the utterance, for example in short references to the past and the future, memories and the *unfolding* of the analysis of life history. As a result, discursive resources are investigated,

[1] It is noteworthy that some of the research by Wetherell and Potter (1992) highlighted common customary meanings and ongoing narratives as part of discourse analysis, including political disagreements. That represented both the broader context of speech and the resources available for use in any particular interaction. In this kind of work, the term 'discourse' is used in strong connection with Foucault's approach (Foucault 2014; Foucault 2018). Other works in discursive psychology directed towards Edwards and Potter's ethnomethodology and conversational analysis and emphasized the context constituted by the turn-by-turn exchange, prompting a sociolinguistic understanding of the term 'discourse' in the sense of a speech or conversation, hence Wetherell (1998) combines both variants, proposing a sort of 'synthetic' approach.

which establish possibilities, but also limitations for work on the identity of an individual in the organisational structure (Taylor 2005: 45–50).

Charlotte Linde points out that personal narratives are shaped by organizational, collective narratives. She writes:

> the story of life (...) consists of the most significant narratives about the storyteller's life, which are retold many times, reinterpreted and re-shaped in various situations (Linde 1997: 283).

Interests focus on narratives *of a bounded collective*, such as those discussed by Linde in relation to institutional memory; then, we also notice the emphasised *re-telling* (Linde 1997: 281–289). By examining this through a specific organisational interaction, we find in the interlocutor's life story how interpretations function in a broader social context.

The interesting social aspect in the context of organisational memory in Rowlinson's works builds a bridge between the archetypal and histographic approach in the cognitive area, along with maintaining distinctiveness. The memory area perceived rhetorically can be an ezample. Therefore, the discursive approach in contemporary humanities shows a certain manifestation of a postmodern atmosphere. The result of deconstructionism is the use of rhetorical analysis as a method in social sciences;, hence the epistemological emphasis of rhetoric in a discursive connotation causes a return to the roots, constituting a tool of analysis in management (Rowlinson 2010: 69–87). In such an approach, historical memory constructs a certain mechanism in its cognitive efforts, recalling the past. This is indicated by Thomas Gannon and George Trabu's research belonging to the areas of the sociology of culture and the history of ideas (Gannon, and Traub 1999). Showing such an approach among professional researchers of the past shows the novelty of the relational perspective

> regardless of the subjective perception of the reality in which we live and which surrounds us; the reality itself does not change (Waldenfels 2014: 76).

Referring to the traditional thinking about the memory of an individual in *The New School for Social Research*, Ross Poole also analyses social memory, which aims to 'claim to truth' as a perspective of aspirations. By presenting Friedrich Nietzsche as an exemple of collective memory, it implies responsibility in the heritage of the past (Poole 2008: 149–166).

A particularly interesting aspect of the representation of the past in collective memory is a narrative, but also a discursive presentation by scientists-historians in a dimension that is not only cognitive. Hence, the main

motive of historical analyses in collective remembering is the construction of certain rules that the past applies to the present (claim of the past). The role of the normative character in social memory shows the efforts of researchers in their responsibility towards the past. Polle, allowing such a relationship, concludes that in some situations collective memory sees and formulates the historical truth in a scientific way (Poole 2008: 155).

Referring to Charlotte Linde and agreeing with Ross Poole that personal narratives are shaped by collective memory, focusing on the collective memory that she discusses in relation to institutional memory,

> the history of life consists of the most significant narratives about the storyteller's life, which are retold, interpreted and re-shaped in different situations (Linde 1997: 283).

This enormous cognitive, as well as axiological, venture is spanned between two horizons focusing on the organisational history based on the analysis of remembering. Apart from the challenges of the present, the horizon of truth can be noticed, depending on various ideological conditions and experiences of historians of historiography; it shows a reference to the mystery, which also teaches cognitive humility in historical reality. According to Rubie Watson, such situations, based on ones' experiences, create a kind of sanctuary of memory through collective remembering on the basis of some environmental resistance and contestation of the past (Watson 1994).

Another special area of organisational memory is worth considering as an area of extensive cooperation between management and organisational history, with emphasis on the archetypal view. Orientation to the discursive approach sheds new light on the past and at the same time becomes rooted in the present. Histographic analyses in discursive orientation come up with a new proposition of a number of interpretations in practical organisational management. The contemporary initiator of the renewal of the historical perspective in organisational research, Roy Jacques claims in *Manufacturing the Employee* that without history reference we do not find ourselves in the changing present. Therefore, in order to have a vision of the overall reality, one should follow the past:

> following the construction of systems in time, researching how relations [...] were fabricated as responses to the past problems that are now forgotten. Considering the conflicts at the root of these problems and what other possibilities have been ruled out through their implementation, one can find fresh insight into the present-day problems (Roy 1996: 11).

Bill Cooke, a British historiographer of management, shows in historical research a significant value that puts the future straight because science was

subject to ideological influence at all times. Analysing this thought, Tomasz Ochinowski emphasises the constructive and creative value of an organisation in the past as a contextual one. Playing an organisational and inspiring role – the open awareness of managers to a new relationship with the past,

> while these discussions are not about recreating history, but about understanding it, so that it can be used as a tool to analyse the current situation and inspire good practices to help overcome crises (Roy 1996: 7).

Therefore, formulating the main thesis that understanding the organisation as a historical phenomenon can be owed to historical narratives,

> the reconstruction of good business practices and organisational values contained in selected traditions of Polish entrepreneurship provides intellectual tools to optimise the activities of contemporary organisations (Roy 1996: 12).

So defined histographic sensitivity in the organisation of management harmonises with the humanistic approach, where there

> is interest in all phenomena from the point of view of a person and his place in organisations (Kociatkiewicz and Kostera 2013: 9–19).

For this reason, it is important to define the

> organisational [history] as a relatively autonomous segment (...) of the science of management, saturated with histographic reflection, examining what the past does to organisations and its environment, and what organisations do to the past (Kociatkiewicz, and Kostera 2013: 117).

2. The Concept of Evidence-Based Management

Ignaz Philipp Semmelweis (1818–1865), a doctor of Hungarian origin, is considered a pioneer of the evidence-based management approach in medicine (Żurawski, Strya, and Szczepański 2010: 173–177). In the 1940s, he associated the high epidemic mortality of children and women with the work of doctors performing autopsies, and thus he presented evidence that there is a cause of higher mortality among doctors. As a preventive measure, he initiated hand disinfection for all people entering and leaving the disease unit, which resulted in a more than six-fold reduction in mortality in the ward led by Semmelweis. In order to find the source of these infections, he analysed factors inside the hospital, such as the type of bedding, diet, ventilation, as

well as external factors, e.g. atmospheric ones. Likewise, observation of the women who had no symptoms resulted in the conclusion that they were from wealthy families who gave birth at home, and their mortality rate was lower than in the hospital. Some preferred to give birth on the street rather than in the hospital, and their mortality was also lower. He wrote: 'it made me so unhappy that life seemed worthless' (Starczewska-Wojnar 2016: 218). The turning point was the death of his closest associate Jacob Kolletschka, who was stabbed accidentally by one of his colleagues during an autopsy in the dissecting room and died of infection. Semmelweis noted directly as evidence that doctors who performed an autopsy and then, without disinfecting their hands, examined patients in gynaecological departments, transmitted the infection to healthy women who died of puerperal fever (Smith 1976). That led to the mandatory hand disinfection for doctors and students with the use calcium hypochlorite prior to other medical procedures and examinations. The Semmelweis' evidence met with substantial scepticism in the medical organisational environment. The professors and their superiors ignored the obligation to wash their hands, becoming a source of infection and death for many women and children, so Semmelweis cited the evidence in his 1861 publication *Etiology, definition and prevention of puerperal fever.* The book, based on evidence, was left out in the medical community, which made him mentally devastated, and in 1865 he was placed in an insane asylum where he died (Żurawski, Strya and Szczepański 2010: 173–177).

At the end of the last century, the notion of evidence-based medicine appeared at the McMaster University in Hamilton, Canada. Gordon H. Guyatt, assuming the post of director of the Specialist Training Program in Internal Medicine, describes in book, *Basics of EBM*, the factors behind making decisions based on the understanding of the history of medical literature. The development of an appropriate basis for diagnosis based on knowledge from scientific data required that Guyatt change the medical staff education programme:

> I proposed the term scientific medicine for this new approach. Previously hostile people were outraged and disturbed by the suggestion that their practice so far was unscientific. My second attempt to name our philosophy of practicing medicine – evidence-based medicine – turned out to be catchy (Guyatt 2008: 19).

Piotr Prokopowicz in his publication *Recruitment and selection based on evidence. 33 principles of efficient employee recruitment* writes:

> The practice and philosophy of management results from the recognition that the scientific method offers unique tools for understanding and predicting reality, including

organizational reality, compared to other cognitive perspectives. This approach is based on three foundations, which are: critical thinking, scientific knowledge, and experimental practice (Prokopowicz 2016: 43–44).

In critical thinking, verifiability, validity, and usability are compelling, which requires knowledge of concepts and the aptitude to apply methods based on intuitive solutions. That requires defining the subject of the study in a specific task-oriented, counter-productive or contextual effectiveness. Critical thinking in this way allows you to properly assess the effectiveness of individuals and organisations (Prokopowicz 2016: 44). When we base managerial decisions on scientific knowledge, the question arises to what research attention should be paid and about its reliability and credibility. When trying to answer, a hierarchy of evidence should be indicated, where meta-analyses are at the top – as statistical analyses of research conducted defined in a specific topic, and at the bottom of the hierarchy of evidence, there are opinions of people with experience in the field.

While defining the experimental practice in the evidence-based management approach, we notice that each organisation is considered to be a prototype in the specificity of the company. That is due to the difference and distinctiveness as well as the complexity of the tasks. Therefore, there is no 'average' organisation and no 'average' patient. That results in a critical benchmarking analysis where the best solutions are open to criticism when they do not fit the canon of the organisation. Therefore, before implementing such activities, ask yourself the questions whether there are any logical premises that show the success of the organisation; whether the strategy, organizational structure, and people employed in it are similar to the nature of the organisation; whether a given idea, a particular practice may influence the results of the outcomes; and finally what the disadvantages of the conducted evidence-based management analysis may be (Pfeffer and Sutton: 2008: 79–94). A thorough analysis of these issues is a spectrum of answers and expected benefits.

In 1999, Dominic Fitzgerald and David Isaacs published the article *Seven alternatives to evidence-based medicine*, in which they present the organisational foundations of doctors who reject evidence-based management (Isaacs, and Fitzgerald 1999: 18–25). In relation to the belief that leadership actions are important for success or failure, the result is an analysis of the impact of management on physicians and their effectiveness. For a manager in an executive position, the following functions brought into the organisation are important: knowledge and skills, high competencies, and strong motivation (Żukowski 2008: 25–40). Sometimes there are differences

in nomenclature resulting from the penetration of the English language into Polish nomenclature due to the development of the market economy (Listwan 1993). Therefore, the word management covers both direction and leadership (Sułkowski 2001: 189–209). Using the terminology of Fitzgerald, and Isaac, the following attempt was made to evaluate management:

- Eminence-based management – accomplishment-based management. The higher the manager is in the hierarchy, the more meritorious in his organisational achievements, and the less scientifically based. Having the experience he is convinced of, the more he 'repeats the same mistakes for many years with more and more conviction' (Isaacs, and Fitzgerald 1999: 18–25).
- Vehemence-based management – management based on the violence and impetuosity of speech. A method based on the manager's conviction of his impeccable skills, thus not allowing people who are more delicate and subtle to speak.
- Eloquence-based management – oratorical management. The eloquence of the statement is accompanied by the lack of scientific premises. Instead, there is the orator's external elegance and the exclusivity of the appearance.
- Providence-based management – provident management. Managers using this style of leadership rely on providence through the determination of higher forces.
- Diffidence-based management – management based on the lack of self-confidence. Self-confidence is inseparably linked with self-esteem, as well as with a belief in the strength of one's abilities. It is crucial in public speaking, as well as when conducting sales processes. A characteristic feature of such management is the inability to make decisions by the manager in the organisation.
- Nervousness-based management – management based on the fear of organisational failure. Actions are taken to insure and protect the manager's position. It is noteworthy that this is not the same as a social engineering propaganda strategy based on the use of fear emotions in order to control and manipulate the organisation.
- Confidence-based management – management based on self-confidence. Fitzgerald and Isaacs note that this approach in medicine characterises surgeons. Thanks to this trait, managers feel comfortable in their own skin, accept themselves with a whole set of imperfections, and support and appreciate who they are and whatever decisions they make without looking at other evidence.

Evidence-based management can be expanded with new elements, thus showing the practice of managing persons and pointing to other organisational alternatives. There is a conviction that each year of work of a manager in a position in the organisation his management competencies increase. Observations indicate that 'some people make the same mistakes for twenty years and call it work experience' even when the consequences are catastrophic for the company. Such activities lead to a clichéd approach to people, manifested in routine and professional burnout. Managers sometimes make a mistake of transferring behaviour patterns from one organisation to another, leading to the absurd situation described below. Robert Sutton and Jeffrey Pfeffer referred to it as an example. An IT company that produces computer software hired a compensation manager who introduced the same compensation scheme as was used in the previous organisation. He disregarded differences in companies such as size, type of software assigned to age groups, market, distribution, and the like. As the chief manager and chairman of the remuneration committee, he did not bother other members. Therefore, one should agree with the view of the cited authors that prestige and power are weakened by evidence-based management. That is a problem for managers who in turn reject this style of management. That is reflected in the words of James Barksdale, the president of Netscape:

> If a decision is to be based on facts, all the facts presented – as far as they relate to the merits of the case – count equally. If a decision is to be based on opinions, my opinion counts much more than others.

To paraphrase these words,

> the facts and the evidence are great *levelers* of the hierarchy. Relying on checked and proven practices changes the balance of power; data counts more than authority, reputation and intuition. That means that leaders in high positions (…) may, to some extent, lose their status as their intuition will have to give way to, at least from time to time, judgments referring to data available to every educated employee. The lesson here is: leaders need to make a fundamental choice whether they want to be right at all times or prefer to lead organisations that actually perform well (Pfeffer, and Sutton 2008: 79–94).

3. Discourse on Organisational Memory based on Management

A manager who treats sources professionally can be an effective cognitive vaccine in managing with scientifically formulated, substantiated inputs (such categories are typically applied to understand the historiography of organisational memory). A researcher dealing with management, like

a representative of social sciences cognitively grasping a source, is forced to criticise first the method with which they conducted the research, and only then the content contained therein. The theory of historiography, as a discipline particularly sensitive to sources, can effectively improve the management effects of executives who are mindful of the income context and focus on pragmatic outcomes (Ochinowski 2013: 160).

Some authors of historical sciences implied principles for management, writing that

> from Marxist historical laws and regularities one can derive knowledge about events that are not confirmed in the source, and it will have an equal status to that obtained with the traditional source method. This type of work with the past was postulated by an ideologically encapsulated and ideologically justified imperative that a researcher should always choose such an era, an assurance, a topic that has clearly still vivid connections with the struggle that is taking place today (Wierzbicki 2010: 131–140).

Postulating with certain proportions, it is worth replacing historical laws and regularities with the principles of modern organisational management and current managerial practice. There is a remedy for getting to know historical reality in the creation of social remembering from evidence-based management. There must be a decision link in the mind of the researcher, which will become a source of analysis and scientific discourse. The concept of Robert Java Lifton can be a methodological help in practice (Grzywacz, and Ochinowski 2003: 233–246).

The discursive approach to evidence-based management also distinguishes the analysis of managerial knowledge in the language convention. It is characteristic not only of what is said but also of how it is said, introducing creative and repressive functions. The development of the described evaluation in a situation of managerial action based on evidence is a special phenomenon of forgetting, based on the research into the anthropology of organisation of the methods of ethnographic interviews conducted by Monika Kostera (Kostera 2010). Referring to the archetype of the Late River (flowing through Hades, whose waters cause memory loss), she outlined the cognitive perspective of forgetting as the archetypal antinomy of organisational learning. In this way, she distinguishes two levels of obliteration of memory: a single loop of forgetting based on the loss of memory ofgood organisational practices and a double loop of forgetting concerning the loss of memory of the organisation and the fundamental principles and values that make it up (Kostera 2012).

The double forgetting loop applies not only to the members of the organization but also appears in evidence-based management, adopting

the formula of the ahistoric programme. The starting point is a certain focus in management based on history and on formulating questions that arise in past experiences and confronting them with new challenges. The cognitive reference of historical management gives a novel approach within the organisation, by minimising the single forgetfulness loop, and with the second value loop through evidence-based management. Questions that arise in the course of environmental and interdisciplinary discussions, also understood metaphorically, as well as theories with management practice and the past and present, play a fundamental role in the discursive process. The development of intentional and dynamic initiating and questioning in the context of evidence-based management is called organisational memory. The course of such action, among the wide spectrum of manifestations of the past in organisations, constitutes a set of organisational reminders by creating images from the past and gives the possibility of direct application to managerial practice (Ochinowski 2013: 119-122).

Tadeusz Oleksyn, defining the term managerial competencies and showing the functional and contextual side, presents the process of remembering as knowledge, experience, dispositions, and skills useful for the functioning of members and organisations. He warns against an excessive bureaucratic approach in the description of managerial competencies, causing the expansion of documents and paying attention to the flexibility of the organisation, assuming a discursive nature. By focusing the attention of managers on the reliability of knowledge, that points at social competencies related to shaping the company's relationship with the external and internal environment and ethics (Oleksyn 2014).

It is not difficult to notice that organisational memory understood discursively in evidence-based management is not only an independent component of the organisation but also corresponds closely to the management strategy.

Conclusions

This article is a proposal for further discussion of evidence-based management in the context of organisational memory. From this perspective, evidence-based management is a procedure of organisational memory, through the cognitive historical discourse of managers and the reflectiveness of practitioners. When postulating the implementation of the proposed approach, it is worth referring to other disciplines, especially historical ones.

The story of Ignaz Semmelweis, described in the article, and his drive to introduce evidence-based anti-infectious precautions, aroused resentment in the environment. Medicine teaches not only evidence-based practice but also an ethical approach and humility. Louis-Ferdinand Celine aptly captured this approach when he wrote:

> There is a hateful wave around his name. The words used to describe his attitude no longer fully reveal the hatred he evokes. These official scholars were not just stupid. They were both hypocritical and noisy and above all beastly and evil. Bad for Semmelweis, whose health collapsed amid unbelievable suffering. Never before has human conscience been more ruthlessly disgraced, nor has it fallen lower than during those months of hatred of Semmelweis in 1846 (Bela 2016: 234).

The current COVID-19 epidemic caused by the SARS-CoV-2 coronavirus raises the question

> whether in the 21st century, in which the risk of iatrogenic infections is still very high, unambiguous logical and statistical arguments would prove sufficient to change medical procedures if the biological factor remained unknown (Żurawski, Strya and Szczepański 2010: 173–177).

In this situation, an important cognitive function of evidence-based management is the return of historical remembering and the improvement of the breath of history in management science. The discursive analysis aimed at the synthesis of the described process concerning specific organisational research can be very interesting also for contemporary management practitioners. The comparison of management models in terms of organisational memory and the identification of today's actions against the aforementioned archetypes might be an inspiration for innovative solutions.

The aforementioned proposals in the discursive approach could create a certain platform for experienced managers and researchers so that through historical, systematic, and critical analysis focused on organisational needs in order to increase the level of ones' own competencies through evidence-based management.

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Discourse on Organisational Memory in Evidence-Based Management

Abstract

The article focuses on highlighting the approach of historical evidence-based management on the plane of organisational memory. The author treats the subject as a discursive interpretation. Based on the analysis of the literature on the subject, he presents an analogy between evidence-based management and management in the context of turning the past into the present. He describes his proposals as historical remembering, open to the reflections of practitioners and questions originating in medicine. The figure of the Hungarian doctor Ignaz Philipp Semmelweis, a forefather of evidence-based medicine, shows that ignoring scientific evidence in everyday practice can lead to a double loop of forgetting about values.

Key words: evidence-based management, organisational memory, managerial competences

Dyskurs o pamięci organizacyjnej w zarządzaniu opartym na dowodach

Streszczenie

Artykuł skupia się na wyeksponowaniu podejścia historycznego zarządzania opartego na dowodach w płaszczyźnie pamięci organizacyjnej. Autor ujmuje temat jako interpretację dyskursywną. Na podstawie analizy literatury przedmiotu przedstawia analogię między evidence-based management a zarządzaniem w kontekście zwrotu przeszłości do teraźniejszości. Swoją propozycję określa jako pamiętanie historyczne w otwarciu na refleksje praktyków i pytań mających swoje źródło w medycynie. Ukazana postać prekursora evidence-based medicine, węgierskiego lekarza Ignaca Philippa Semmelwaisa pokazuje, że ignorowanie dowodów naukowych w praktyce codziennego działania, może prowadzić do podwójnej pętli zapominania w zakresie wartości.

Słowa kluczowe: zarządzanie oparte na dowodach, pamięć organizacyjna, kompetencje menadżera

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REVIEWS

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V.L. Smith, B.J. Wilson, *Humanomics. Moral Sentiments and the Wealth of Nations in the Twenty-First Century [Humanomics. Nastroje moralne a bogactwo narodów w XXI wieku]*, Cambridge University Press, 2019, 234 pp.

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Social sentiments and pro-social behaviour are the undeniable features of human nature. We seek justice, we need to interact with others, and in most cases, we are eager to cooperate, give, and share. Therefore, economics' inability is to account for the fact that human sociability sounds like a paradox – all in all, economics originated as the science of social exchange, attempting to address the problem of rational human behaviour in the social context. And eliminating a social context from the equation only leads to misconceptions and misinterpretations.

One can view *Humanomics* (2019) as a successful attempt to erase the artificial borderline between economics and the world of social sentiments, returning to the origins of economic science. *The Wealth of Nations* by Adam Smith (1776) is commonly referred to as the first formal attempt to formalise and incorporate the separated pieces of knowledge and evidence into the solid principles of exchange, production, and rational behaviour. And if the reader wonders whether it makes sense to address the work written more than two years ago, it definitely does. Anyone unfamiliar with *The Wealth of Nations* makes judgments on Adam Smith's contribution through the prism of the mainstream economic science. In turn, the mainstream economics tends to view Adam Smith's contribution through the lens of the modern orthodox framework, neglecting his ideas about moral sentiments and the role of social norms as (presumably) irrelevant. Nevertheless, as Vernon L. Smith

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and Bart J. Wilson demonstrate, the core of Smith's ideas about properly organised society and markets lies in social sentiments. And as they prove, social sentiments might serve as the final element of the economics puzzle, bringing explanatory power to the world of abstract theoretical models.

The first chapter, titled *Humanomics Spans the Two Worlds of Adam Smith: Sociality and Economy*, formulates the general idea about Adam Smith's views on society and markets, uncovering the most crucial relevant misconceptions. *The Wealth of Nations* does not contain any single explicit statement that self-interest is the main governor of human action; consequentialism is not the best basis for value judgements, since intentions and context also matter; no commerce is possible without a well-designed social order with explicit and implicit functional rules of conduct. Perhaps, what is mentioned above is sufficient to realise how far modern orthodox economics is from *The Wealth of Nations.* Bringing the facts, quotes, and historical context in a well-structured and unbiased manner, Vernon Smith and Bart Wilson manage to re-create a comprehensive picture of economics' social foundations. Similarly, the second chapter provides an insight into Adam Smith's vocabulary (which might be pretty obsolete for a modern reader). Although such analysis might seem secondary, it tells a lot about Adam Smith's perception of human action motives: we commonly design interaction intuitively and constrained to the social context, without any explicit cognitive process. Interestingly, this idea was later reflected in Vernon Smith's (2003; 2010) and Gerd Gigerenzer's (2000; 2007; 2008; 2015) works on ecological rationality, and the aforementioned approach is still relatively novel.

In the third chapter (*Conduct in the Social Universe*), Smith and Wilson juxtapose the conventional view on a human behaviour mechanism to Adam Smith's views on rational behaviour, criticizing the very notion of social preferences (and preferences in general). Altruism is possible even under the orthodox Max-U framework, but only as long as some utility is derived from altruistic behaviour. Not to mention that economists never wonder how social preferences are formed (Amartya Sen expressed his concern about i this problem); the very idea that human beings have stable preferences independent of the social context does not seem realistic. The fourth and fifth chapters follow the same path, pointing out the limitations of the behaviourist approach in economics. It is not enough to observe the choices made: one should also understand the mechanisms leading individuals to their decisions. Therefore, Adam Smith's scientific method based on understanding human motivation (Fleischacker 2005) might serve as a valid alternative to the orthodox positivist methods.

The rest of the book is devoted to the formal analysis of the social norms in the game-theoretical setting. Perhaps, this part constitutes the main added value of the entire study, utilizing novel analytical instruments to test, illustrate, and prove assertions originally made by Adam Smith. It should be noted that applying different forms of cooperative and non-cooperative games in economic experiments is a well-known and frequently exploited approach in behavioural economics. Nevertheless, one can easily notice what Nathan Berg and Gerd Gigerenzer call the consistency approach. Usually, the actual behaviour of the agents is juxtaposed to the behaviour of rational economic human beings; in other words, it is all about figuring out whether human choices are consistent with the predictions of the orthodox substantive rationality models. Although some inter-disciplinary studies attempt to draw some common patterns of the presumably irrational behaviour (for instance, analysing the role of cultural factors on the probability of unfair offer rejection in the ultimatum game), mainstream economics does not offer any formalised framework of experimental analysis and interpretation except the aforementioned consistency approach. We are used to treating social sentiments in line with the bounded rationality approach, i.e., as a result of human mind imperfections preventing us from acting rationally. In contrast, Vernon Smith and Bart Wilson demonstrate that seemingly irrational choices might facilitate the occurrence of the stable and superior equilibrium in the long run. In other words, they provide conclusive proof that social norms serve as a mechanism allowing for more efficient exchange mechanisms, thus benefiting all the participants of the exchange. Moreover, the authors discuss the evolutionary nature of social norms, providing an explicit framework for analysing how «spontaneous social structures» are designed and reinforced.

To summarize the above discussion, *Humanomics* will provide numerous valuable insights for anyone interested in the history of economic thought, behavioural economics, game theory, or economics in general.

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Adrian Chojan*

J.M. Fiszer, T. Stępniewski, K. Świder,
Polska – Ukraina – Białoruś – Rosja.
Obraz politycznej dynamiki regionu
[Poland – Ukraine – Belarus – Russia:
Picture of the Region's Political Dynamics]
Wydawnictwo ISP PAN, Warszawa 2019, 251 pp.

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There have been a lot of changes in the states of Central and Eastern Europe over more than the last 30 years. Some of them managed to leave the sphere of Russian influence and join the Euro-Atlantic integration structures, and some of them not only remained in it but also ‚strengthened' the link. In an attempt to analyse the geopolitical and geo-economic situation of the states of the former Union of Soviet Socialist Republics, we can draw absolutely diverse conclusions. Thus, there are states such as Poland, which in spite of some problems in the period of transformation managed to climb the heights of their political and economic possibilities and join the biggest and the most influential international organisations. There are also states that have been drifting between the eastern and western models of politics for nearly 30 years now: these include Ukraine. Belarus and Russia constitute another category of states. The former cannot and the latter does not want to integrate with Western Europe or into the Euro-Atlantic area. However, the fact that the Central and Eastern European region has undergone massive changes over the last tree decades cannot be hidden.

That is why the book by Professor Józef M. Fiszer of the Institute of Political Studies of the Polish Academy of Sciences, Tomasz Stępniewski, PhD, of John Paul II Catholic University of Lublin, and Konrad Świder,

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PhD, of the Institute of Political Studies of the Polish Academy of Sciences is undoubtedly interesting and significant. The monograph that is subject of this review is titled *Polska – Ukraina – Białoruś – Rosja. Obraz politycznej dynamiki regionu* [Poland – Ukraine – Belarus – Russia: Picture of the region's political dynamics] and was published by Wydawnictwo Instytutu Studiów Politycznych PAN in 2019. The publisher's reviewers of the book are Krzysztof Fedorowicz, PhD, and Yuri Shapoval, PhD. As the authors write in the preface, the monograph is aimed at

> 'familiarising readers with the complex issues of the region where the influence of the West and the East compete' (p. 12).

Indeed, it is not possible to conceal that analysing the region is as difficult as interesting, in particular due to the changes occurring there and the entities that function in it.

The work is properly structured, adequately to its title and the research objective. The monograph is designed clearly following a problem-based pattern. It is composed of a synthetic introduction, six chapters, final conclusions, an abundant bibliography and an index of people.

The first chapter is devoted to Poland's experience in the process of accession to the European Union as a model proposal of solutions for Ukraine. It presents internal and international conditions for Poland's route to the EU, as well as opportunities, threats and prospects for Ukraine. Referring to Poland as an example, the authors make an accurate diagnosis and state that

> 'Poland's accession to the EU has become a real breakthrough in the post-war history of Poland, in particular as far as its domestic and foreign policy is concerned' (p. 15).

It is an obvious fact that thanks to the accession to the European Union Poland has experienced enormous civilizational development. However, unlike Ukraine, Poland was in very friendly international surroundings in the process of its accession to the EU, including support of the biggest and the most important Member State of the EU, i.e. the Federal Republic of Germany. It cannot be said about Ukraine and its external surroundings. In the second part of the first chapter, the authors draw attention to a very important issue of losing sovereignty (p. 25) and introduce a thesis that part of Poland's sovereignty has been moved to a supranational level. Engaging in a discourse with the authors, it is necessary to ask a question whether the independent decision to join the EU has also resulted in the loss of part of sovereignty.

But coming back to the issue of Ukraine, it is important to indicate possible solutions and consequences of this country's potential membership of the European Union. However, Ukrainian society's hopes should not be raised too much as it happened during the famous Euromaidan. In my opinion, it is necessary to treat Ukrainians fairly and show them realistic prospects for their accession to the EU, which is also presented in the first chapter.

The second part of the monograph analyses the political relations between Poland and Russia in the period 2000–2014. The authors conclude in this chapter that in the period discussed

> 'Russia quite skilfully applied the strategy of developing a negative image of the Polish state on the international arena (...). On the other hand, the Polish party was not able to resist this practice and its policy towards Russia was limited to current responses to Russia's accusations and activities' (p. 81).

This assessment is, in my opinion, properly made. It is so because it should be noticed that from the point of view of Polish foreign policy, this period was usually very reactive towards Russia. The only exception was the period of the first government formed by Law and Justice in 2005–2007. However, it did not result only from the willingness to change the policy towards Russia but in general from the change in the approach to Poland's eastern policy in that period[1].

The next, i.e. third chapter of the monograph focuses on an important issue, i.e. Poland's policy towards Ukraine. There are numerous publications on this topic[2]; however, the content of the monograph constitutes a very good and clear unscrambling of Polish-Ukrainian relations. The authors analyse particular stages of those relations, emphasising 2004 and calling that year a breakthrough (p. 96). It is due to the fact that it was the year when two important events took place: for Poland because of its accession to the European Union, and for Ukraine as it was the time of the so-called Orange Revolution. The authors state that Poland should support Ukraine *in the implementation of the Euro-Atlantic direction* (p. 113). The opinion seems

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1 For more see: Chojan, A. (2016) 'Polityka wschodnia Polski w myśli politycznej partii Prawo i Sprawiedliwość (lata 2005–2007)' ['Eastern policy of Poland in the political thought of the Law and Justice party (2005–2007)']. *Rocznik Instytutu Europy Środkowo-Wschodniej* vol. 5, no. 14, 301–314. See also: Chojan, A. (2018) 'From strategy to improvisation – Poland's Eastern Policy in 2016–2018'. *Rocznik Instytutu Europy Środkowo-Wschodniej* vol. 16, no. 4, 107–123.

2 See: Dahl, M., Chojan, A. (2019) *Poland and Ukraine: Common Neighborhood and Relations*. Warszawa: Oficyna Wydawnicza Uczelni Łazarskiego.

to be right, however, first of all it is the Ukrainian nation and its political class that should decide which direction they want to go to develop their country. I get a deep impression supported by many examples that Poland cared about Ukraine's accession to the EU and NATO more than Ukraine and the Ukrainians themselves.

The fourth part of the monograph is titled *Ukrainian policy in the environment of (in)security*. The authors rightly analyse the influence of the remains of the Soviet Union on the political situation in Ukraine. Nevertheless, in this chapter's conclusions, the authors make a key and very accurate diagnosis when writing about the European dreams and Euro-Atlantic realities in Ukraine's policy, which in any case the history of this country after the collapse of the Soviet Union demonstrates.

The fifth chapter presents an analysis of the relations between Russia and Ukraine. The authors draw attention to a series of important issues such as the problem of denuclearisation of Ukraine, the status of Crimea or eventually the issue of Russian minority in Ukraine. The presentation of the so-called period of Euro-revolution in Ukraine is also an extremely important topic. According to the authors of the monograph,

> 'integration of the post-soviet space in the form of strengthening multilateral regional cooperation has become Russia's ambition' (p. 186).

From the perspective of 2020 it seems that Ukraine 'unsubscribed' from this regional cooperation in which the Russian Federation plays the main role. However, there is a question that remains unanswered: Is it a temporary state in the Ukrainian policy (as it often used to happen) or the beginning of Kyiv's general turn towards the Euro-Atlantic alternative?

The final, sixth chapter covers the issues concerning Belarus in the context of its place and role in the policy of the Russian Federation. Presenting the conditions of Belarusian policy, the authors propose an interesting thesis that

> 'Belarusian society is a 'hostage' of geopolitical relations between the West and Russia because their nature determines the stability of president Alexander Lukashenka's government' (p. 207).

On the one hand, Belarusian society, especially the younger one, is clearly for integration with Western European structures, and as one Belarusian student told me, *only the West can give us a chance of normal and secure life*; and on the other hand, for the government and president Lukashenka's

regime, attempts to integrate with the West and, thus, the break of the links with Russia would result in the loss of power.

From the methodological point of view the work has been properly developed and does not raise objections. However, it seems that the authors could have tried to devote much more space to the policy of Belarus. I have no doubts that the authors should continue their research and deepen it in a publication broader than the one that is subject to this review. The issues concerning the four states are so complex and so extensive that, in my opinion, there are reasonable grounds for developing a second volume of the publication, of course covering other issues that have not been discussed in this first and single monograph so far.

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W 2006 r. Uczelnia uzyskała uprawnienia do nadawania stopnia naukowego doktora nauk prawnych, w 2016 uprawnienia do nadawania stopnia doktora habilitowanego nauk prawnych, a obecnie czyni starania o uzyskanie uprawnień do nadawania stopnia naukowego doktora nauk ekonomicznych i w dziedzinie nauk społecznych w zakresie nauk o polityce. Od 2012 roku na kierunku stosunków międzynarodowych działa Centrum Naukowe Uczelni Łazarskiego i Instytutu Studiów Politycznych PAN. Kierunek ten w 2016 roku uzyskał ocenę wyróżniającą Polskiej Komisji Akredytacyjnej.

Uczelnię Łazarskiego wyróżnia wysoki stopień umiędzynarodowienia; prowadzi w języku angielskim studia I i II stopnia w trybie stacjonarnym na trzech kierunkach: ekonomia, stosunki międzynarodowe i zarządzanie. Cztery programy studiów otrzymały akredytację Coventry University z Wielkiej Brytanii – ich absolwenci otrzymują dwa dyplomy: polski i angielski. Uczelnia prowadzi też współpracę z prestiżowymi uniwersytetami amerykańskimi: Georgetown University w Waszyngtonie, University of Kentucky w Lexington i University of Wisconsin w La Crosse.

Nasza Uczelnia zajmuje trzecie miejsce w rankingach uczelni niepublicznych, a Wydział Prawa i Administracji od wielu lat jest liderem w rankingach wydziałów prawa uczelni niepublicznych. Realizowane u nas programy nauczania są współtworzone z wybitnymi praktykami i odpowiadają oczekiwaniom pracodawców. Dzięki temu 96% naszych absolwentów znajduje pracę w trakcie lub zaraz po studiach.

W ramach Uczelni działa również Centrum Kształcenia Podyplomowego, oferujące wysokiej jakości usługi z zakresu kształcenia podyplomowego, szkoleń i doradztwa dla firm, instytucji oraz jednostek administracji państwowej i samorządowej. Absolwentom studiów prawniczych oferujemy anglojęzyczne studia LLM (odpowiednik MBA), umożliwiające zdobycie międzynarodowego dyplomu prawniczego.

Wykładowcy Uczelni to znani w kraju i za granicą dydaktycy, którzy łączą pracę naukową z doświadczeniem zdobytym w renomowanych i cenionych na rynku firmach i instytucjach. To również znakomici profesorowie z Wielkiej Brytanii, Niemiec i Stanów Zjednoczonych.

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