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MIRDEC 2019

MIRDEC-11th
International Academic Conference
Social Science, Multidisciplinary and Independent Studies
(Global Meeting of Social Science Community)

CONFERENCE PROCEEDINGS
MADRID 2019

Full Paper Series

Editors
Tamer Budak
Joaquim Ramos Silva
Kemal Cebeci
Antonio Focacci

Holiday Inn Piramides
Madrid, Spain
05-07 February 2019

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JUDIT NAGY[1] AND ZSÓFIA JÁMBOR[2]

COMPETITIVENESS IN FOOD INDUSTRY: THE ROLE OF INDUSTRY 4.0

Abstract

The food and drink industry are the largest manufacturing sectors in Europe in terms of jobs and value added. The industry is rather concentrated and in such circumstances, it would be very important to know what are the competitive advantages of the manufacturers, what can less developed countries learn from the corporate practices of the more advanced countries. Within the food industry, research into the dairy industry has been reduced. The aim of the researchers is to explore the position of Hungary among the major dairy producers and define, what to learn, what technology should be developed - especially with regard to the opportunities offered by digitization - to increase the competitiveness of the Hungarian sector. The study uses two methodologies. On the one hand, it explores the areas and solutions of digitization technology in the dairy industry in detail through literature analysis. On the other hand, interviews has been carried out with Hungarian players in the industry to explore the possibilities of using these modern technology solutions at companies with different corporate backgrounds, and in companies of different size.

Keywords: Industry 4.0, digitalization, human resource, food industry

JEL Codes: L23, L66, O33

1. Introduction

There are 600,000 dairy farms in the European Union and together with the 12,000 milk processing companies they produce 15 percent of the EU's agricultural production value. One quarter of global milk production is also processed in this region, and European milk consumption is three times the world average. 87% of dairy products produced in the EU are also delivered to consumers within the Union (Lemoine, 2016).

In world trade, dairy products represent a low proportion, as typically the milk produced in a country is consumed within the country, but their share of consumption is steadily increasing with the expansion of a healthy lifestyle and their role is expected to continue to grow. The biggest growth is expected in the developing countries, India and China (4-5%), while in the developed world only 0.8-1% growth is expected in the forthcoming decades (European Committee, 2018).

In this study, we analyse the literature and the content available on the Internet, in order to assess the potential of Industry 4.0 for dairy companies. In the first chapter, we review the European situation of the sector and then deal with the role of the Hungarian dairy sector and its changes in recent decades. We analyse the competitiveness of the European and Hungarian dairy industry by analysing the World Bank WITS database. We uncover the shortcomings that cause the competitive disadvantage of the Hungarian dairy industry. In a separate chapter, we are dealing with the issue of Industry 4.0 and the possibilities that the technological achievements could successfully ensure in the dairy industry. In the results section we summarize our findings and in conclusions we make our suggestions on the possibilities of technological development of the sector and outline further directions of research.

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2. Dairy industry in the European Union and in Hungary

2.1. Dairy industry in EU

According to data from WITS (World Bank World Integrated Trade Solutions), Germany, the Netherlands, France and Belgium were the largest European dairy exporting countries between 2012 and 2017. Cheese, butter, cream, liquid milk and fresh dairy products are the most sought products in the European Union, if we regard the product level (AHDB, 2016). A significant part of EU dairy production is realized in Germany and in the Baltic Sea countries, with a production volume of 37.4% and 31.4% of sales in 2012 (Jansik et al., 2014). 42% to 43% of the world's cheese production is also linked to the European Union, which is the market leader in the world, while the share of EU products in the other segments is declining due to the dynamically growing dairy production in the developing countries (Tacken et al., 2009). Achieving competitiveness by EU it has a key role to achieve economies of scale, produce high value-added products and accumulate innovation and knowledge. (Poppe, 2008). The TOP 10 dairy exporting countries in EU cover a very large part of the region's total production (91%, between 2012 and 2017). Between 2012 and 17, Germany, the Netherlands, France and Belgium were the largest European dairy exporting countries, and the top three countries already cover more than 50 percent of total production. Hungary contributes to European performance with a stable 1 percent export value. It is worth highlighting Poland, as the only Central-Eastern European state to be included in the TOP 10 list. Due to the high export concentration value mentioned above, we will focus on the analysis of the EU's TOP 10 dairy exporting country and Hungary (WITS, 2018).

2.2. Hungarian dairy industry

The operation of the Hungarian dairy market has been determined by two events over the past thirty years (Dairy Association, 2013): on the one hand, due to the political an economical system change, actual product prices were set by the actual production costs instead of the regulated prices until then, resulting in a significant price increase and resulting in that in 1995 per capita dairy consumption fell to a historic low (Kürthy et al., 2016). On the other hand, with the accession to the European Union, the market faced another challenge with its strong international competitors through its uninterrupted products. All this resulted in a strong concentration of the industry (Kürthy et al., 2016).

Although numerous major international dairy companies have purchased smaller or larger shares in old Hungarian dairy companies, the dairy industry still has difficulty in catching up with the technological and productivity levels of EU member states with a more advanced dairy industry (Dairy Association, 2013). As raw material costs account for 70-80% of the cost of products in the dairy industry, energy costs account for another 5 to 15% (Kürthy et al., 2016). Until 2012, the Agricultural Rural Development Agency granted investment aid of HUF 78.8 billion to 366 plants. Most of them started in the first half of 2013. Investing companies were typically big employers, with large-scale production and sales volumes that were able to secure self-sufficiency and have a viable vision for market survival (Dairy Association, 2013). Developments are even more necessary because the efficiency and financial indicators of the Hungarian dairy sector reflect poor performance (Kürthy et al., 2016).

Besides the domestic market, the competitiveness of the dairy industry of a country is also influenced by the trade with foreign markets (Bojnec and Fertő, 2014). After joining the EU, the export of Hungarian dairy products increased almost fourfold, but the processing level of these products was quite unfavourable, in 2014 almost two-thirds of exports were raw milk, cheese and fresh cheese (30.9%) and other processed products (9.5%). The main destinations for raw milk are Italy, Romania and Slovakia, while the Italian market was also the main target in cheese exports, but the sector also exported significant quantities to Arab countries (Kürthy et al., 2016).

Hungarian milk production, although able to cover the country's needs, cannot offer wide range of products that can serve the varied needs of the domestic consumer. Due to this, the import significantly exceeds the export value, and the imported, high value added processed dairy products (mainly cheeses, dessert preparations and butter products) cause a negative balance of 33 million euros in 2014 (Dairy Association, 2013; Kürthy et al., 2016).

2.3. Competitiveness in dairy industry

The dairy industry is a significant sector of the manufacturing industry, with a strong competition between players on both national and international markets. The competitiveness of a country's dairy industry is largely determined by the structure of the industry, the number, size and geographical distribution of competitors, the ownership structure and the cost of production resources (Jansik et al., 2014). The competitiveness of the dairy industry can also be measured through market performance, which should be distinguished in two directions: domestic demand and exports (Bojnec and Fertő, 2014). The stability of market positions occupied by companies in the domestic market also predicts the ability to compete with imports in both price and product range. Generally speaking, the larger internal market allows companies to achieve economies of scale and financial stability, which increases the likelihood of foreign market success (Jansik et al., 2014). Smaller dairy companies in smaller countries are constantly struggling to achieve economies of scale, which either intensify competition and lead to high concentration on the market or force operators to export.

Competitiveness, interpreted at national level, is deeply rooted in the theory of international trade, which deals with the question: why the different nations are trading with each other. Among the answers to this question, Ricardo's (1817) theory (the theory of comparative advantages) has been most influential, according to which countries should focus on the production of goods with comparative advantages.

Based on Ricardo's theory of comparative advantages, Balassa (1965) created an index (Balassa index) which was designed to measure the comparative advantage. However, there are different methods to measure competitiveness, just think about competitiveness indices of World Economic Forum or World Bank. As the study focuses on trade-based macro-competitiveness, we have chosen the Balassa index, which is able to capture competitiveness through commercial processes.

The study is based on the manifest comparative advantage index developed by Balassa (1965), which is structured as follows:

$$RCA_{ij} = \left(\frac{X_{ij}}{X_{it}} \right) \Big/ \left(\frac{X_{nj}}{X_{nt}} \right) \quad (1)$$

where we determine the share of a country's exports of a given product (Xij) compared to its total exports (Xit), then compare it with the proportion of exports (Xnj) and total exports (Xnt) of a reference group of countries from that product. If the RCA index is higher than one, the given country has a comparative advantage in the given product compared to the reference countries if it is less than one, it is competitive disadvantage. In the course of our study, the competitiveness of the European Union and Hungary's dairy industry was analysed using the above index, the results are presented in Table 1 below.

Table 1. Balassa index values for EU TOP10 dairy exporter countries and Hungary between 2000-2017

Country	2000-2005	2006-2011	2012-2017	2000-2017
Germany	0.98	0.93	0.88	0.93
The Netherlands	1.21	1.08	1.29	1.19
France	1.48	1.67	1.73	1.62
Belgium	1.39	1.21	1.35	1.32
Italy	0.46	0.52	0.64	0.54
Denmark	2.56	2.13	2.02	2.24
Poland	0.72	1.24	1.03	1.00
Ireland	1.25	1.54	1.43	1.41
United Kingdom	0.56	0.55	0.55	0.55
Austria	1.33	1.15	1.09	1.20
Hungary	0.12	0.36	0.38	0.29

Source: Own calculations, based on WITS (2018) database.

The results show that the ranking of the most competitive countries (Denmark, France, Ireland and Belgium) is not fully aligned with the order of the largest dairy exporters (Germany, the Netherlands, France and Belgium). Looking for the reasons for this, we see a tendency showing that the highest customer value can be achieved by producing high-end products (Poppe, 2008; Dairy Association, 2013) and the countries, good at this (like France in skimmed milk and yogurt, Ireland in skimmed milk and butter, Belgium in cream, sweetened milk and other processed cheeses) (WITS, 2018), specializing in the production of one or a few of these products.

2.4. Industry 4.0 technologies for dairy industry

The fourth industrial revolution is based on digitization and data, the computer is just a tool. The source of the competitive advantage can be not only the coordinated production (eg automation, robotization), but also that company will able to filter out the relevant information from the generated data to support decision-making (Nagy et al., 2018). These technological solutions offer many opportunities to support the processes of milk production, processing and sales (Vervesys, 2016).

To support dairy production, many precision farming or smart farming solutions are available (e.g. drone stock observation, milking robot application) (DMIGB, s.a.), but these are not the subject of this paper. Real time data, sharing on the expected quantity and quality of milk coming from the farm can provide opportunity for more efficient operations and production planning. It is possible to ensure the continuous operation of the plant and to balance the processes.

During the processing - as the raw material and the end product are both perishable - the well-organized, continuous control of the production and logistics processes, and the constant monitoring of quality are critical issues, which can be ensured by sensors and e.g. smart applications on packaging.

Modern digitalization solutions can support sustainability goals and serving consumer trends for example by ensuring that the extensive tracking and tracing of raw materials and auxiliary materials contributes to the growth of food safety, serving the quality and safety needs of the customers towards food products. Modern equipment is energy efficient, which can result in a significant cost advantage for the company due to the low profit rate of dairy products (Peternell, 2016). On the other hand, in the case of products that require a cooling chain, a device must be provided to check that the cooling chain has not been broken for a longer period than is allowed to prevent the product being placed on the shelves in inappropriate quality (Kroll, 2015).

The following chapters compare the characteristics of the market and the technology options, and then deduce the consequences.

3. Results

High-value-added products from the European Union's dairy countries are challenging for Hungarian dairy processors. Market changes clearly point to the direction of further increase in processed dairy products (Dairy Association, 2013), so Hungarian producers have to move towards highly processed products. As Kürthy et al. (2016) point out, there are success products that are competitive on foreign markets (cheese, fresh cheese), but significant technological and capacity investments are needed. At the same time, Kürthy et al. (2016) draw attention to a worrying trend. The processors interviewed during their survey do not understand how the lack of cost-effective production resulting in cost disadvantage and out-of-date machines hinder them on international markets, and some have no need for advanced technology. The results we disclose present the positions in the competitiveness ranking at the country level, and there is also an opportunity at the product level to show which countries have the comparative advantage in which product (s). In this research we revealed that all the countries of the European Union are able to present at least one dairy product with a competitive advantage, including Hungary, for low-fat raw milk. At the same time, the result is that raw milk is sold abroad by producers at low purchase prices - typically to Italy, Slovakia and Romania - and then re-imported in processed form.

At the same time, technological solutions offer the opportunity to develop a broad spectrum of milk production and processing, some of which will become a basic requirement for customers and consumers after a while (full traceability). Not only can production benefit from the data gathered through technological tools, but economic activity becomes more transparent, more controllable, and the sources of inefficiency become apparent.

4. Conclusions

In order to ensure the stable development of milk processing in the coming years and to serve the higher growth in developing countries, milk-producing countries should be prepared to increase their capacities. Increasing customer expectations on the market also mean that products should be highly processed, and our results show that higher-end products are key to competitiveness.

Due to the high concentration of the dairy industry in Hungary, investments in industrial technology can be conceived mainly by large, strong players. However, for both large and SMEs, it is possible to use Industry 4.0 solutions in supportive processes: preventive maintenance, planning and warehouse processes. Because products need to be traceable from a food safety point of view, their supply with identifiers has been incorporated into the production process in most places. The use of these identifiers to track warehouse or transport inventory can also help optimize logistics processes. The cost of this can also be borne by an SME, and automation and robotization can be the next step.

We will continue our research in a practical direction. After processing the reviewed literature and technology descriptions, we are looking for dairy companies to explore whether they have started, either consciously or not, digitalisation. We would like to look for both large and SME sized companies and we would like to prepare a comparative analysis in a case study, which may serve as a benchmark for Hungarian industry players.

References

Agriculture and Horticulture Development Board (AHDB) (2016). Average milk yield. Accessed: 12.10.2018. URL: https://dairy.ahdb.org.uk/market-information/farming-data/milk-yield/average-milk-yield/#.W8BqnmgzaUl.

Balassa, B. (1965). Trade Liberalization and Revealed Comparative Advantage. The Manchester School, 33, 99-123.

Bojnec, Š., & Fertő, I. (2014). Export competitiveness of dairy products on global markets: The case of the European Union countries. *Journal of dairy science*, 97(10), 6151-6163.

Dairy Association (2013): A magyar tejágazat helyzete és fejlődésének lehetséges iránya (The situation and possible direction of development of the Hungarian dairy sector), Hungarian Dairy Association, Budapest.

DMIGB (s.a.): Technology in diary farming: how new gadgets are changing the game. Accessed: 23.07.2018. URL: http://www.drinkmilkinglassbottles.com/technology-in-dairy-farming/.

European Committee (2018). Short-term Outlook for EU agricultural markets in 2018 and 2019. Accessed: 12.10.2018. URL: https://ec.europa.eu/agriculture/markets-and-prices/short-term-outlook_en.

Jansik, C., Irz, X., & Kuosmanen, N. (2014). Competitiveness of Northern European dairy chains. MTT *Agrifood Reseach Finland*, Paper No.116.

Kroll, K.M. (2015). The diary supply chain: from farm to fridge. Accessed: 20.07.2018. URL: https://www.inboundlogistics.com/cms/article/the-dairy-supply-chain-from-farm-to-fridge/.

Kürthy, Gy., Dudás, Gy., Felkai, B.O. (szerk.) (2016). A magyarországi élelmiszeripar helyzete és jövőképe (The situation and vision of the food industry in Hungary). Agrárgazdasági Kutató Intézet.

Lemoine, R. (2016). European dairy sector rising to all challenges, Revue Laitière Française, 767, 1-12. Accessed: 23.07.2018. URL: https://www.rlf.fr/reussir/fichiers/107/JYE21Y0F_1.pdf.

Nagy, J., Oláh, J., Erdei, E., Máté, D., & Popp, J. (2018). The Role and Impact of Industry 4.0 and the Internet of Things on the Business Strategy of the Value Chain—The Case of Hungary. *Sustainability*, 10(10), 3491.

Peternell, C. (2016): Interview mit Herrn Christoph Peternell, COO der Hochdorf-Gruppe. Accessed: 30.07.2018. URL: http://www.acs-ag.com/aktuell-erfahrungsberichte-interview-mit-herrn-christoph-peternell.

Poppe, K. J. (2008.): Regulation and competitiveness in the European diary industry. LEI Wageningen UR. Accessed: 25.07.2018. URL: http://ec.europa.eu/DocsRoom/documents/3363/attachments/1/translations/en/renditions/pdf.

Ricardo, D. (1817). The principles of political economy and taxation, New York: Macmillan, 1909.

Tacken, G. M. L., Banse, M. A. H., Batowska, A., Gardebroek, C. (2009). Competitiveness of the EU dairy industry. LEI Wageningen UR. Accessed: 28.10.2018. URL: http://edepot.wur.nl/10766.

Vervesys, (2016). Trends and technology adaptation in diary industry. Accessed: 30.07.2018. URL: http://blog.vervesys.com/trends-and-technology-adoption-in-dairy-industry/.

World Integrated Trade Solution (WITS) database (2018). World bank. Open databases. Accessed: 20.07.2018. URL: https://wits.worldbank.org/.

GYORGY KOCZISZKY[1] AND MARIANN EVA VERESNE SOMOSI[2]

MODELLING OF THE SUSTAINABILITY OF MAJORITY-STATE-OWNED (NON FINANCIAL) ENTERPRISES

Abstract

The geo and economic political reorientation after 1989 in the central and Eastern European countries radically changed ownership. The reduction of majority state and cooperative ownership began and at the same time, the deployment of dual ownership also commenced. This latter one, even it took place in different ways and at different pace in the countries of the region, brought marked shocks. This was the case also in Hungary.

In the paper, the authors briefly review the Hungarian practice of privatization and reprivatization after 1987 on the one hand. On the other, they review the model that was elaborated to monitor the operational stability of the enterprises that remained owned by the state and the state- and municipality-owned enterprises that became community-owned as a result of reprivatization. Besides, this model could be suitable to define the appropriate ways of intervention.

Keywords: Privatization, reprivatization, sustainability, life cycle, early alert system, consulting

JEL Codes: H11

1. Introduction

Economics have been involved in the question of "division of labor" between the state and the market since Adam Smith in the second half of the 18th century. As is well known, economic policy aimed at applying both extreme models (total state ownership and the "night watchman" state) in practice in the past almost 250 years. In retrospect, however, it is undisputed that both attempts failed. The total private ownership and the centralized state ownership, that excludes private entities, with its legislation was found to be unsustainable and harmful in the longer run from both economic and social view.

When searching for its reasons, without aiming to give an exhausting list, it is worth mentioning that in the case of the processes of privatizing state functions, i.e. in the case of the private sector (Hanka, 1987; Maggison, 2005):

- national and communal interest can be infringed (like justice or spatial equilibrium);
- there is the risk of moral hazard (like the state cannot help rescuing strategically important enterprises from bankruptcy even in the case of irresponsible management because "they are too big to fail").

Contrarily, in the case of total state ownership, there is the risk (Maggison/Jeffry, 2003; Savas, 1987):

- of productivity and efficiency decrease and the lack of sensitivity to costs (like because of the lack of the sense of ownership or because of the monopoly situation of the community);
- that the necessary developments can fail to be realized and products or technologies can become obsolete because of the shortage of the economy.

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The advantage of the proportionately (or almost) optimal dual entrepreneurial structure is that the vulnerability of the given country can be diminished and in the case of economic crisis, the public sector can help maintain employment and the economically inefficient but socially important (like social) activities therefore improve social well-being.

As a result of the ideologic changes after 1989 in the central and Eastern European countries (after more than 40 years), it became again possible to build dual (state and private) ownership form. The change of ownership ratios and the privatization of state property, especially at the beginning, caused a big social storm in the former Eastern bloc countries because of the immaturity of the legislation and methodology of privatization (Bostyn/Baytsun, 2002).

The process of the reduction of state ownership and of the renationalization have had four phases in Hungary (Table 1):

- spontaneous privatization (1987-1993),
- accelerated privatization supervised by the state (1994-1998),
- slower privatization supervised by the state (1999-2012),
- reprivatization of strategic sectors (after 2013).

Table 1. Characteristics of the phrases of domestic privatization

no.	phase	characteristics
1.	spontaneous privatization	• incomplete legislation • lack of property inventories • small circle of enterprises
2.	accelerated privatization supervised by the state	• weak legislation • bulk of the property transferred to foreign owners • liquidation, increasing unemployment
3.	slower privatization supervised by the state	• Hungarian ownership • beginning of private sector investments
4.	reprivatization	• nationalization of strategic enterprises (like water services, energy or bank)

Source: Authors' own compilation.

First phase: spontaneous privatization, which, beyond the effort to reduce government debt, was supported by the neoliberal ideology according to which "the state cannot be a good owner".

Second phase: accelerated privatization supervised by the state (1994-1998), whereby close to 30% of the state property was privatized.

At the end of the first and second phases, the production of several sectors (like the industry of vegetable oils or sugar industry) spectacularly deteriorated, many of their enterprises closed and service companies of key importance (like water services of gas) were privatized.

Third phase: slower privatization supervised by the state (1998-2010), whereby the change of owner was realized in the framework of stronger regulatory conditions and methodology.

Fourth phase: an important element of the change of economic political paradigm after 2010 is the reevaluation of the ownership role of the state, as a result of which the public service sector (like water services, electricity supplier or waste treatment) became again state-owned (2014-2018).

Reprivatization again highlighted the question whether the state is a "good" owner and whether it is able to operate state-owned and majority-state-owned enterprises efficiently and in a sustainable way.

Taking it into consideration, we ask the following questions in our research:

a) What justifies the examination of sustainability of majority-state-owned enterprises?
b) How, with which indices can the sustainability of these enterprises be measured?
c) What kind of methodological support can be provided to insure the sustainability of the majority-state-owned enterprises?

2. Concept and macroeconomic importance of majority-state-owned, non-financial (community) enterprises

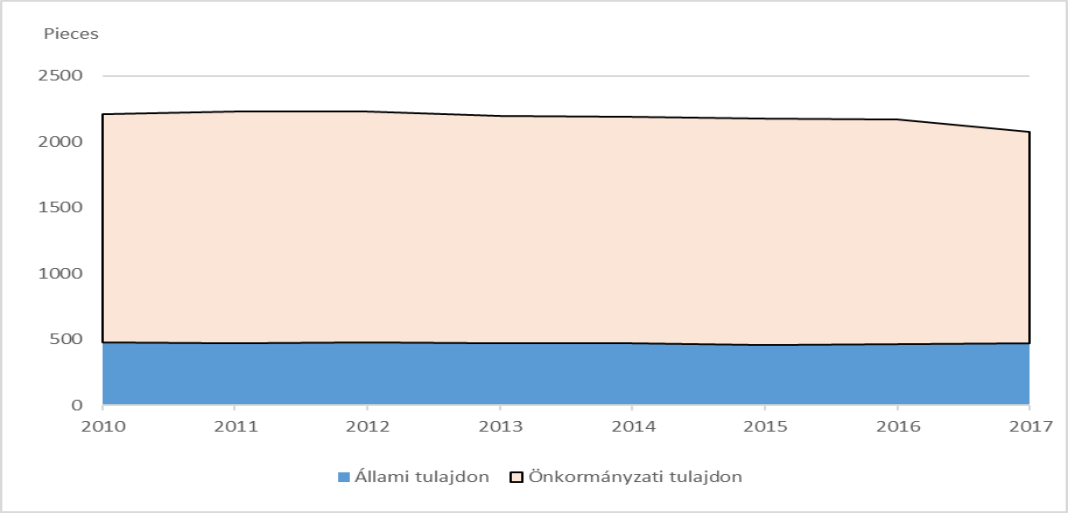
In the Hungarian practice, community enterprises are (municipal) enterprises and subsidies that are under the control of the central government (state) and the local municipalities. The Hungarian statistics have separated these enterprises within the corporate sector and published their financial accounts since 2010.

The direct state-owned and municipality-owned enterprises are identified yearly based on the ownership composition of the subscribed capital from the annual corporate tax return (their subsidies can be examined based on the information provided in the annual report of the enterprises). Financial accounts are prepared based on the corporate tax returns and annual reports but complementary statistical services are also needed so that the components of stock data and of the annual stock changes be available in the appropriate details and accuracy[3].

The Hungarian statistics registered 2125 community enterprises at the end of 2017. In the examined period (2010-2017), there were no significant changes in the number of these enterprises, their number was between 2200 and 2300 (the number of enterprises becoming community enterprise and the number of enterprises excluded from this category were nearly the same). There was a bigger fall in the number of community enterprises in 2017, which was primarily caused by the termination of municipality-owned enterprises to a great extent and the decrease of the number of new enterprises. At the end of 2017, about a quarter of the community enterprises was state-owned. This rate moderately increased in the examined period (Figure 1).

[3] The former methodological handbooks (SNA 93, ESA 95) of the national accounts include the decomposition of the financial (S.12) and non-financial (S.11) corporate sector based on the main owners as a recommendation. Within this category, the newer handbooks (SNA 2008, ESA 2010) focus on community enterprises: on the one hand, they define the corporate sector, which includes public finances and community enterprises, on the other, they regulate the statistical statement of the financial relations between the owners (governmental bodies) and the enterprises owned by them.

Figure 1. Number of community enterprises, 2010-2017

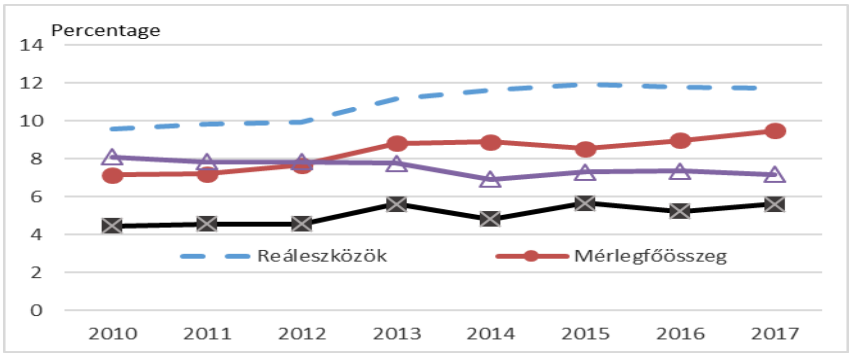


Source: Central Bank, financial accounts, corporate database for statistical purpose.

The number of state-owned and municipality-owned enterprises is slightly more than 10% of the total number of Hungarian enterprises, which is below the average of the European Union (close to 20%).

This type of enterprises has an appropriate added value, a stable revenue level and a total balance sheet level (Figure 2).

Figure 2. Share of community enterprises within the non-financial enterprises regarding some indicators (%)

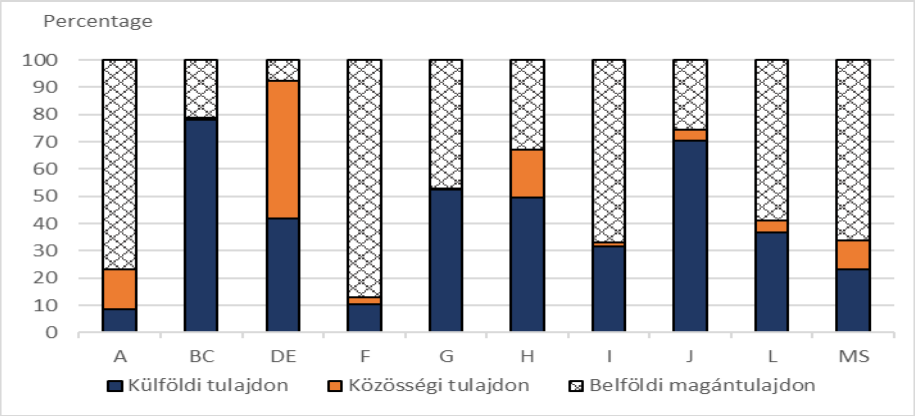


Source: Central Bank, financial accounts, financial accounts of community enterprises.

The reprivatization between 2013 and 2017 had a moderate positive effect on the main economic indicators of the enterprises, whereby the control functions of the government extended.

The added value of the community-owned enterprises are usually much lower in each sector (except for the energy sector) than that of the enterprises with the same profile in the private sector (Figure 3).

Figure 3. Enrolled students in Physical Education professional conversion program



Legend:

A	BC	DE	F	G	H	O	J	É	MS
Agriculture	Industry	Energy	Construction	Trade	Transport	Hotel and restaurant	Information	Real estate	Other

Source: Central Bank, corporate database for statistical purpose. It includes estimation. Data are from 2017.

Surveys verifies that the stable, sustainable and efficient operation of the public sector sets further tasks to the managements of the concerned enterprises.

3. Concept and characteristics of sustainable enterprise

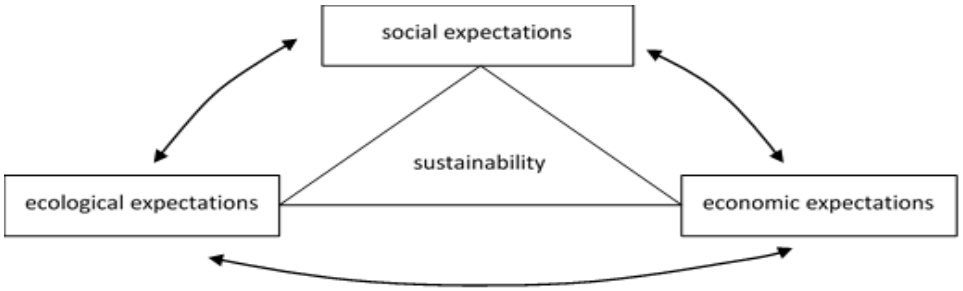
The concept of sustainability dates back almost a half century (Carson, 1962; Meadows et.al., 1972; Brown, 1981). At the beginning, authors described sustainability separately, sometimes as a mutually exclusive (grows vs. sustainability) factor, as a basically ecological problem[4].

At present, the viewpoints have come closer together as it is highlighted in the reports of the UN (United Nations, 2011; 2012; UNEP, 2011) and the member states.

The examination of Corporate Social Responsibility (CSR) dates back a shorter history than that of the macroeconomic sustainability. In our understanding, sustainable enterprise meets the social, ecological and economic expectations at the same time and sustainability expresses the balanced and stable interaction of the three components (Figure 4).

[4] The concept of ecological sustainability was first used by the German Carlowitz in the 18th century in relation with forest use (the extent of logging cannot be as high as the level which threatens the reproduction capacity of the forest).

Figure 4. Magic triangle of the sustainability of state-owned enterprises



Source: Authors' own compilation.

This latter one means that economic expectation that are in accordance with ownership expectations (like the extension of core activities or technological shift) cannot cause negative natural and environmental effects (because natural capital can only partly be substituted with physical capital) and cannot be in contrast with social expectations (like the quality of the service).[5]

The examination of the interdependence among ecological, economic and social expectations is relevant also because the traditional, only economic (partial) viewpoint hampers the application of ecological and social viewpoints.

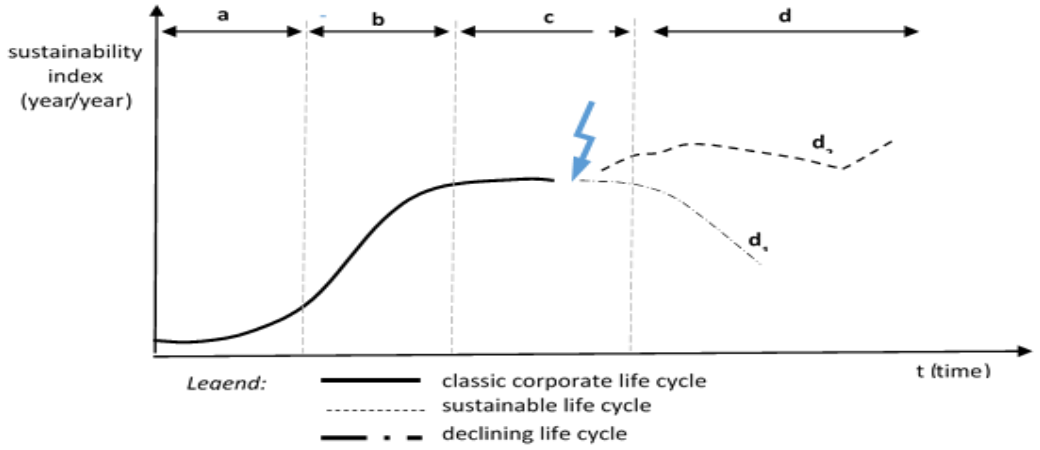
Sustainability is closely linked with the corporate life cycle. Sustainability also means that an early warning system alerts the approach of the critical (inflection) point of the life cycle (where the indicators of the operation collapse).

That is why it is necessary to consistently differentiate sustainability (as a static position) and sustainable development (as a process). We considered the latter one important (from the corporate life cycle point of view) in our research[6].

It applies that a corporate life cycle (Figure 5) meets the criterium of sustainable development (after the launch – a, growth – b, shake-out – c phases, contrary to the maturity, decline – d_1 phase) when the values of the indicators measuring sustainability does not decrease (d_2) monotonously, but they renew (d_1).

[5] We suggest that the price of the product manufactured / service provided is not suitable to insure ecological sustainability.
[6] Literature about corporate sustainability make a distinction between performance and environmental sustainability. The concept of sustainable development used by macroeconomics is different from it. The Brundtland Report says that "it is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Meadows et.al. 1972).

Figure 5. Corporate life cycle



Source: Authors' own compilation based on Adizes, 1990.

The examination of corporate sustainability is also justified by the so-called fourth industrial revolution (digitalization), which poses new challenges on enterprises and their management.

It is not difficult to foresee that digitalization has an important effect on corporate sustainability. Only the enterprises that are able to meet the requirements of the smart enterprises (smart factoring) (high productivity, network cooperation, digitalization, flexibility) can meet this challenge.

4. Interpretation of the sustainability index

Corporate sustainability can be best characterized by the renewal capacity, the operational effectiveness and the environmental consciousness that synthetically can be quantified by the corporate sustainability index (I). This index is made up of six indicators (Figure 6)[7]

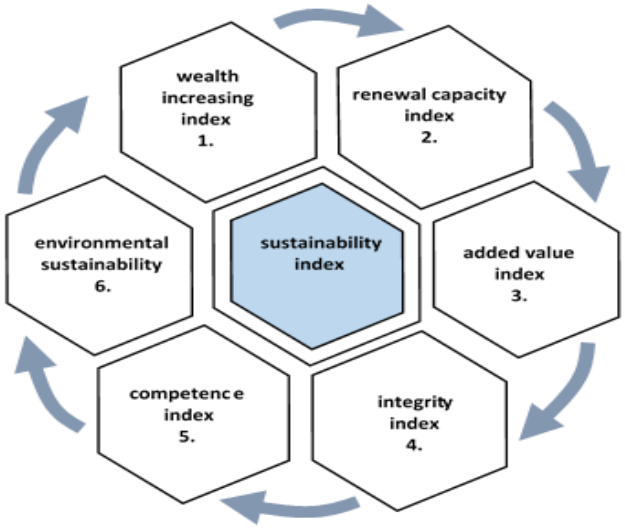
- environmental sustainability index (ESI),
- renewal capacity index (RCI),
- added value index (AI),
- integrity index (II),
- competence index (CI),
- wealth increasing index (WI).

The value of sustainability index that expresses change over time, can be written as follows:

$$I(t_1 - t_0) = [ESI(t_1 - t_0), ESI(t_1 - t_0), RCI\ (t_1 - t_0), AI(t_1 - t_0)\ , II(t_1 - t_0), CI(t_1 - t_0), WI(t_1 - t_0)]$$

[7] It is worth noting that while there are dozen of set of indicators to examine macroeconomic sustainability (see Karcagi-Horváth, 2011 for their comparison), there can hardly be found any for micro level examinations (on the basis of current knowledge) in the literature.

Figure 6. Structure of the sustainability index of public utility enterprises



Source: Authors' own compilation.

When defining the indicators of the subindexes, we tried to ensure that

- they can be defined based on relevant corporate data,
- they are interpretable in business economics and in accounting,
- they are easily quantifiable,
- their determination helps the work of the concerned management,
- they are suitable for comparison over time and in space.

Different values of the indicators can be assigned to the different phases of the corporate life cycle.

The significant change of the index or any of its subindexes indicates operational and sustainable risks. The change, on the other hand, provides information to the owner and to the management about the strengths and weaknesses of the enterprise and it draws attention to the ways of intervention.

The index value expresses a percentage (I) change based on the following formula:

$$\Delta I = \frac{I\,(t1) - I\,(to)}{I\,(to)} \text{x } 100 \;\; (\%),$$

where: t_1 – current date, t_o – reference date.

4.1. Index of environmental sustainability

In the international literature, the first publications issued from the 1960s drew the attention to the connection between economic output and environmental status (Meadows/ Meadows, 1972). The company-level environmental impact assessments carried out mainly to determine the environmental footprint dates back a shorter history (like Cucek et.al, 2012 or Salzmann et.al., 2005).

Without calling into question their aim to be complex, because of the difficulties in their practical use, we apply a more simple approach that also embodies the real issue. To do so, we define two users' indicators and an output indicator:

a) Users' indicator:

- Water consumption per revenue (KFV):

$$KFV(t) = (WATER\ COST(t) + EN\ COST(t)) / NETR(t)$$

where: WATER COST: cost of water consumption (thousand HUF/year); EN COST: cost of energy consumption (thousand HUF/year); NETR: total net revenue (thousand HUF/year).

- Energy consumption per revenue (KFE):

$$KFE(t) = (EL\ COST(t) + HE\ COST(t)) / NETR(t)$$

where: EL COST: electricity cost (thousand HUF/year); HE COST: heat energy cost (thousand HUF/year).

b) Output side indicator:

- Harmful emission per revenue:

$$KFK(t) = [GE\ COST(t) + HAR\ COST(t) + WT\ COST(t)] / NETR(t)$$

where: GE COST: greenhouse effect cost (thousand HUF/year); HAR COST: cost of harmful emission disposal; WT COST: waste treatment cost (thousand HUF/year); NETR: total net revenue (thousand HUF/year).

4.2. Index of renewal capacity

The capacity to permanently renew is a condition of sustainability. Since Schumpeter, it has been known that only the enterprises meet this criteria that are capable of new and novel solutions[8].

Fordist business thinking was followed by diversification and the constraint of constant renewal.

The necessity of renewal is independent of the size, the company form, the owner structure, the number of premises and the profile of the enterprise.

In line with the above the renewal index quantifies the renewal of the profile (range of products and services), processes, technology and marketing activity of the enterprise.

a) Input indicator (MKI)

- Technological renewal

$$MKI(t) = ATE(t) / NETR$$

where ATE: acquired technology (thousand HUF/year).

[8] It is worth referring to the fact that renewing capacity in Schumpeter's definition is a more complex term than innovation. Schumpeter (1980) defines four conditions of innovation:

- production of new goods or of new quality products,
- new production procedure, technology,
- insurance of new purchasing markets,
- creation of new organization.

b) Transformation indicator (MKT)

$$MKT(t) = [TECH\ COST(t) + PROD\ COST(t) + ORG\ COST(t) + RD\ COST(t)] / SUM\ COST(t)$$

where: TECH COST: cost of technological change (thousand HUF/year); PROD COST: cost of product change (thousand HUF/year); ORG COST: cost of organizational change (thousand HUF/year); RD COST: cost of research and development (thousand HUF/year); SUM COST: total cost (thousand HUF/year).

c) *To measure the output side of renewal capacity*, the classical financial and profitability measures (Table 2) and the measure of renewal rate can be used.

Table 2. Measurability of ability on renewal

no.	indicator	way of calculation
	Financial and liquidity position	
1	short cashflow	profit after tax + depreciation
2	liquidity measure	current assets / short term obligations
3	measure of quick ratio	liquid cash/ short term obligations
4	measure of credit coverage	liabilities/short term obligations
5	long term liquidity	operating profit/obligations
6	ratio of buyer – supplier	buyer/supplier
7	ratio of operating capital	current assets – short term obligations/total capital
	Indebtedness	
8	indebtedness	total obligations/ equity
9	indebtedness per revenue	(obligations - liquid assets)/ net revenue

Source: Authors' own compilation.

$$MKA(t) = MTÁ(t) /NR(t),$$

where: MTÁ: net revenue of new/ renewed products (thousand HUF/year), NR: total net revenue (thousand HUF/year).

4.3. Index of added value

Each corporate activity and process that contribute to the satisfaction of consumers' and communities' needs and expectations creates added value.

Added value can be examined based on three measures: financial position, indebtedness and profitability (Table 3).

Table 3. Indicators of added value index

no.	indicator	way of calculation
	Profitability	
1	asset effectiveness	profit after tax/ total asset
2	result per capital	profit after tax/ equity
3	operating result per revenue	operating result/ net revenue
4	cashflow gap	short cashflow/ net revenue

Source: Authors' own compilation.

4.4. Integrity index

It hardly needs to be debated that meeting the legislative and ethical requirements is an important element of the corporate sustainability. (Many international and Hungarian examples can be found about the business risks of the violation of the integrity requirements, of the lack of transparency and of corruption in the last two decades in the automotive industry, in the steel industry or in the pharmaceutical industry, etc.).

Integrity index reflects the qualitative and quantitative aspects that express actions that are in accordance with the moral values, rules and acts accepted by the given organization and society (Kolthoff, 2007).
Indexes of integrity side output:

a) Input side:
   - risk of corruption,
   - legislative risk.

b) User's side:
   - ethical risks.

c) Output side:
   - reputational risks.

4.5. Index of professional competence

Competence index reflects the professionalism and the ability required for appointment to the given job of the workers.

To determinate competence, a questionnaire of 10 questions can be used, based on which human resources and/or the immediate superior evaluates the workers in a scale of values (1 – weak, 5 – perfect) (Table 4).

Table 4. Measuring of professional competence

no.	evaluating aspect	evaluation				
		1	2	3	4	5
1	Conflict resolution ability					
2	Cooperation ability					
3	Ability to comply standards of behavior					
4	Problem solving ability					
5	Professional practical skill					
6	Work experience					
7	Ability to work alone					
8	Responsibility					
9	Discipline at work					
10	Self-starter ability					

Source: Authors' own compilation.

Based on the data derived from the questionnaires, the competence index (CI) can be defined in the following way:

$$CI(t) = \frac{\sum_{i=1}^{n} \sum_{j=1}^{m} k_{ij}(t)}{(5n + 5m)}$$

where: K: competence result of the given worker, i: number of the participant in the survey, j: number of the given competence aspect.

4.6. Index of wealth management

This index refers to the dynamics of the changes in corporate wealth.
Seven indicators can be used to analyze and evaluate the wealth position (Table 5).

Table 5. Indicators of wealth position

no.	indicator	way of calculation
1	equity ratio	equity/total assets
2	increase of equity	equity/ subscribed capital
3	fixed assets coverage	equity/ fixed assets
4	revolution of assets	net revenue/total assets
5	capital efficiency	profit after tax/equity
6	ratio of fixed assets	fixed assets/total assets
7	revolution of equity	net revenue/equity

Source: Authors' own compilation.

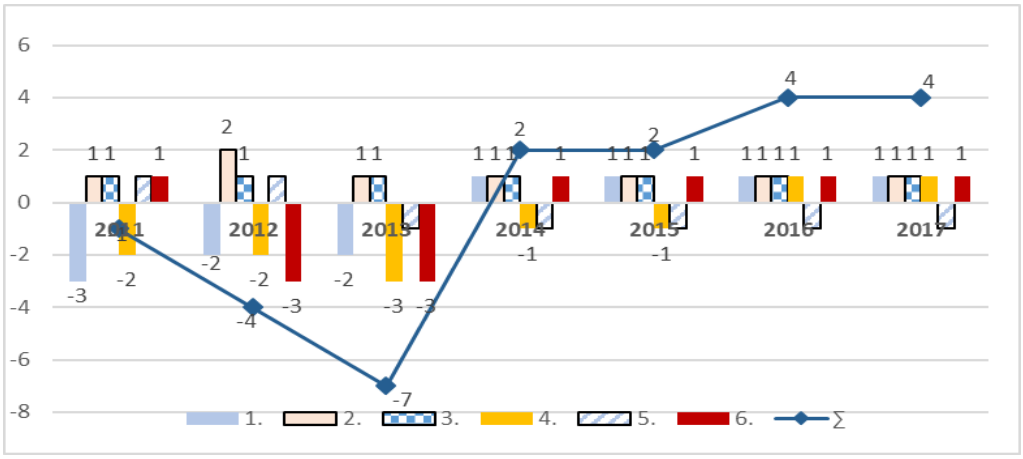
5. Calibration and evaluation of the indicators

The specific subindexes (regarded that they express percentage change) are comparable. Their aggregation in the most simple way is possible by extracting a root from the product of the indexes in the following way:

$$I = \sqrt[6]{I_1 \times I_2 \times I_3 \times I_4 \times I_5 \times I_6}$$

We tested the applicability of the model by examining the operation of a heating service provider enterprise owned by the municipality of a medium-size (population of 158,000) city between 2010-2017, including the management of the concerned enterprises (Figure 7).

Figure 7. Decomposition of the sustainability of the heating service provider owned by the municipality

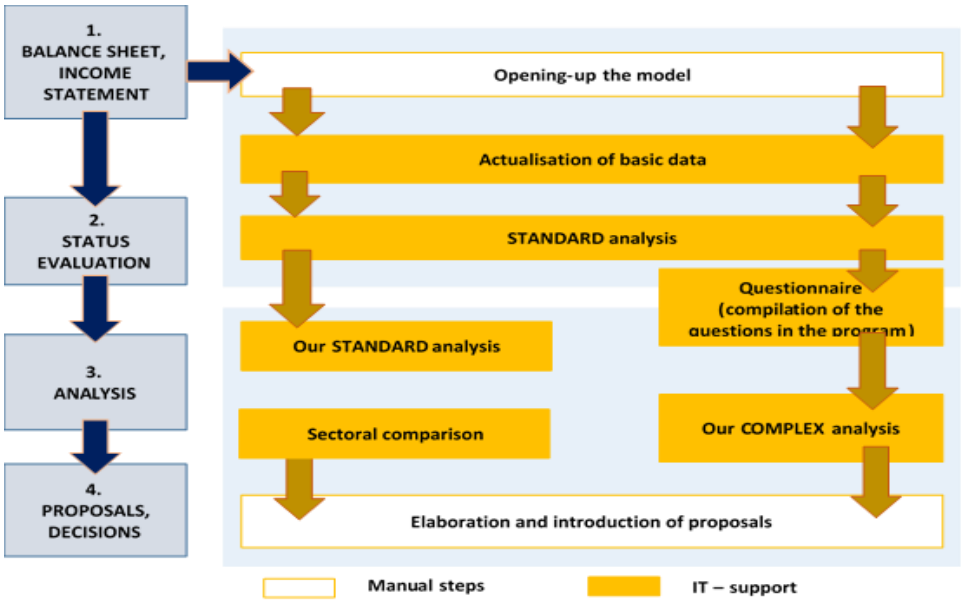


Legend: 1 –environmental sustainability; 2 – renewal ability; 3 – added value; 4 – integrity; 5 – competence; 6 – wealth; ◆- - - -◆ change in the sustainability index (year/year)

Source: Authors' own compilation.

Quantification of the indicators is supported by a software (Figure 8).

Figure 8. Logical structure of the informatic support of the sustainability model



Source: Authors' own compilation.

Based on the database of the enterprise, the value of the subindex and of the sustainability (integrated) index can be found using a drop-down menu.

During the calibration, the need for a questionnaire to help the work of the concerned management and to help the interventions to improve the index was expressed. The questionnaire would help find the weaknesses of the corporate operation.

6. Summary

Based on the literature we can boldly say that the more than two-decade-long debate about the conflicting and mutually exclusive role of the public and private ownership has been calmed down. The presence of public ownership (that changes over time and in space) in the production and in the service sectors is justifiable also in the market economy.

The direct real economic involvement of the state, however, cannot contribute to the fact that the enterprises operating within the framework of communal ownership have an easy time, that they become insensible to cost and productivity and they are constantly being endowed with public money.

The regular analysis of macroeconomic data provides an overall view of the sustainability of the economic processes, but because of aggregating information, these data are not appropriate for the individual examination of the economic operators and the judgement of their operating stability. It is especially true for community-owned enterprises.

That is why it is justifiable to continuously monitor the sustainability of majority-state-owned enterprises and, if needed, to elaborate the necessary interventions. The model and the system of indicators described in our paper are intended to support it (Table 6).

Table 6. Indicators of sustainable enterprise

no.	name of the index	components of the index
1	environmental sustainability index (ESI)	• specific water consumption (KFV) • specific energy consumption (KFE) • specific harmful emission (KFK)
2	renewal capacity index (RCI)	• technological renewal • product/service renewal
3	added value index (AI)	• financial/ liquidity position • indebtedness • profitability
4	integrity index (II)	• risk of corruption • legislative risk • internal ethical risk • reputational risk
5	competence index (CI)	• conflict resolution ability • Cooperation ability • Ability to comply standards of behavior • Problem solving ability • Professional practical skill
6	wealth increasing index (WI)	• equity ratio • increase of equity • fixed assets coverage • revolution of assets • capital efficiency • ratio of fixed assets • revolution of equity

Source: Authors' own compilation.

With the help of the index that includes six elements (renewal capacity, added value, integrity, competence, environment, wealth increase), comparisons within a sector becomes possible on the one hand. On the other, it is also possible to reveal the weaknesses of the enterprises.

The questionnaire of the model makes it possible for the management to focus on the desirable ways of intervention.

References

Adizes, I. (1990): Corporative Lifecycles. Englewood Cliffs, London.

Bostyn F./Boytsun A. Eds. (2002): Ownership and Privatisation in Poland. governance Implications of Poland's Accession to the European Union. Garanc, Antwerpen-Apeldoorn.

Brown L.R. (1981): Building a sustainable society. A Worldwatch Institute book, W.W.Norton, New York. pp. 433.

Carson, R. (1962): Silent Spring. Riverside Press, Boston.

Cucek, L./Klemes, J.J./Ktravanja, Z: (2012): Review of Footprint analysis tools for monitoring impacts on sustainability. Journal of Cleaner Production, Vol. 34, pp.9-20.

Hanke, St. H. (1987): Privatization versus Nationalization, in Prospects for Privatization. Steve H. Hanke, ed. New York: Academy of Political Science, pp. 1–3.

Meadows D. H./Meadows D. L./Randers J./Behrens III W. W. (1972): The limits to growth. A report for the Club of Rome's project on the predicament of mankind. Universe Books. New York.

Meadows D.H./Meadows D.L. (1972): The Limits to Growth. Universe Books, New York.

Megginson, W. L. (2005): The Financial Economics of Privatization. New York: Oxford University Press.

Megginson, W. L./Jeffry M. N. (2003): History and Methods of Privatization, in International Handbook on Privatization. David Parker and David Saal, eds. Cheltenham: Edward Elgar, pp. 25–40.

Salzmann, O./Ionescu-Somers, A/Steger, U. (2005): The business case for corporate sustainability: Literature review and research options. European Management Journal, 23 (I), pp.27-36.

Savas, E. S. (1987): Privatization: The Key to Better Government. Chatham: Chatham House Publishers.

UNEP (2011): Global Environmental Outlook 5, Nairobi.

United Nations (2011): Sustainable development in the 21st century: implementation of Agenda 21 and the Rio principles, detailed report on the implementation of Agenda 21, Department of Economic and Social Affairs, New York, December.

United Nations (2012): United Nations Conference on Sustainable Development Outcome Document: The future we want. A/CONF.216/L.1, 19 June 2012.

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SERVET GURA[1], VJOLLCA HYSI PANAJOTI[2] AND KRISELDA SULÇAJ GURA[3]

TEST OF THE RELATIONSHIP BETWEEN REWARDS DESIGNED ADVERGAMES AND THEIR INCREASED EFFECTIVENESS ON BRAND COMMUNICATION

Abstract

Development of advergames raised two main questions: the first stems from the theory of games design on motives that push players to play games and the second from marketing practitioners on the effectiveness of videogames used as means of brand communication. Rewards recently find broad use on advergame and prompted by this, current paper aims to test the relationship between using reward as a motivation to encourage participation and increased affectivity of such designed advergame on brand communication. Such objective is based on the preposition that selection of communication affords have a special importance mainly when the level of connectivity between the customer and the brand is closer. The work tries to test the relationship mainly based on the theory of game design (reward offering) and as empirical observation has been chosen a Deductive Approach, a Quantitative Method and Survey as research material. The work is based on a sample consisting of 300 participants, all of them "Vodafone" brand customers among which 100 were rewarded. Collected data are processed through SPSS statistical package and all the hypotheses are tested by Chi-Square test. The main hypothesis of the paper is that, there is a positive relationship between rewards offered by advergame and the increased effect it has on each selected advergame and brand element. The main result of the study is that rewards offered have a higher effectiveness when the relationship between brand and customer is tighter. It showed that incentives like advergame rewards encourage more participation and has a higher positive effect when used as a brand communication afford. The work suggests creation of a reward system due to different demographic composition of participants.

Keywords: Advergame, rewards on advergame, brand communication, "Vodafone City"

JEL Codes: M30, M31, L96

1. Introduction

Games offer many advantages because they are attractive, motivating, and addictive. Precisely, for these reasons, there is a critical approach to them, arguing that they influence behaviors and guide people's feelings. But obsessed from the eye of a marketer, who seeks precisely those opportunities that serve to achieve the goal of forming positive attitudes towards the brand, we can say that from being a critique it turns into an extraordinary opportunity for them. In the last decade, electronic games have become an important entertainment activity and are being widely used worldwide.

According to the 2018 Global Gaming Market Report, published by the NEWZOO platform (NEWZOO, 2018), from their invention in 1975 to 2007, it took some 32 years for the game industry to reach 35 billion dollars revenue, the year when the 'Iphone' smartphone was introduced. From that year to the end of 2018, the industry grew by $ 100 billion and reached $ 137.9 billion worldwide. Despite being one of the most influential factors, smartphone involvement has been a key contributor to the rapid growth of the gaming market both in terms of engagement and revenue. Additionally, in total, around 2.3 billion people are playing entertainment games, a figure which, according to this growth trend, is expected to reach 2.6 billion players in 2021. Those are some simple figures that push marketers to

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seriously consider entertainment on their marketing strategies. Achieving a very large customer base is very important for marketing campaigns as this base is subject of filtering process and it is reduced through the path from one level of engagement to the next.

Based on the summary done above the purpose of this paper is to test the relationship between rewards offered for advergame play and the effectiveness it has on the each advergame and brand element. To do such, the work raised 9 hypotheses for each brand and advergame element. To development the hypothesis order and to analyze them is used the "sales funnel" logic followed by Roger (2011) hierarchy. The main result of the study is that the closer is the relationship between brand and customer the greater is the effectiveness of offering reward on the advergame play. It is seen from level to level that sometimes that rewards has not been the main motivation of engagement in advergame play and that why the work suggest creation of rewards system because demographic composition of participants may have different approach to the motivation incentives. This paper is simply organized in those main sections: section one is the introductory part; section two is literature review; section 3 explains the methodology and the empirical approach; section 4 presents empirical part; the last section come up with some concluding remarks and recommendations.

2. Literature review

Research attempts on the field did not have a clear focus only advergames and did not make a clear cut between them and traditional product placement (Winkler and Buckner, 2006), moreover they note just a few studies which point out their real potential and the impact of those tool on communication efforts. On the same line of thought come also Moore (2006) who concludes that most of the studies include only content analysis; Mallinckrodt and Mizerski (2007) analyze the effects of advergame on children; Villafranco and Zeltzer (2006) consider social policies on them. But, despite the beginnings their advantage on advertising started to be noticed, and the main findings belongs to the advantages of interactive advertising of the advergames. Many studies focus on what makes an advergame effective and which are the best ways to integrate ads on them (Dahl, et al., 2009). While Waiguny and Terlutter (2011) compare both the effects of advergame and commercial video games and the result was that advergames are perceived as more attractive and generate more customer positive attitude.

The aim of advergame design was to promote and mainly to be widely used on branding. In this context the main development of the research on the field was identification of their advantage on brand communication. Companies specialized on advergame creation have identified and present different characteristics of them as brand communication instrument: the reach of all users, adding also individuals who do not play them (Hernandez, 2011); immersion and involvement as it receives the player's attention for several minutes without interruption (Herrewijn and Poels, 2013); easily understandable and challenging (Herrewijn and Poels, 2013); competitive and encouraging to replay (Van Reijmersdal, et al., 2012); relevant to the company / product/brand being promoted, viral and encouraging interactive communication (Vanwesenbeeck, et al., 2016).

One other feature with real impact on brand communication is related to what Gross (2010) and Wise et al.,(2008) refer to as harmony effect which in simple terms is explained as perfect fit between brand and advergame content. In this regard advergame uses a more sophisticated method to realize brand communication by using a well-searched field (DiClemente and Hantula, 2003). Miller (2002) list as the main feature of advergame the persuasive communication and refers to the conveying message as shaping, reinforcing and changing the perceptions, emotions, believes or behaves toward the brand. Bogost (2007), Ferrari (2010), and Frasca (2007) analyse the effectiveness of advergame as brand communication instrument and identify advergame characteristics which require special attention to understand the message they convey. According to them advergames do not simply show an image but also offer capacity to apply rules, encourage critical thinking and explain different identities.

Promotional campaign conducted through advergames are characterized by an immediate inclusiveness ascertained, presented by Subramani and Rajagopalan (2003) work, according to whom advergame players create relationships with other players; players inform each other about the achievements in the game; players may want to recruit new players; their involvement makes them play the game in any environment they are in. ***If we refer to the results of this work logically it can be created an overlap between the theory of games design and motives that push players to play games.*** In fact, players' motivations have been explored since the early 1990's, when computer games began to develop gradually from secondary activity to the main mode of entertainment and within the scope of game design theories, the motives for playing the game are some aspects with very high interest. Bartle (1990) observes a wide variety of player mode among them and based on this, he categories types of players and links them to their motivations according to their interest, if they are interested in acting or interacting. Meanwhile, Yee (2006) reduces the motives of the game studied by Bartle using factor analysis in three main components. With the electronic integration videogames advertisers have been focusing on using different tactics in online game advertising (Emling, 2001; Neff, 2001). Evidences suggest that advertising campaigns have a growing tendency to use interactive entertainment to convey the advertising message. At the same time, though online advertisers recognize advergames as a powerful tool, there are questions raised again about their effective communication (Neff, 2001). For this reason, different games aim to create a pleasing sense of the gaming environment, so that participation is more enjoyable and the purpose of the game is more effective (Thom, Millen and DiMicco, 2012). Studies suggest that reward and motivation are important elements in every respect, but lately it also finds special integration in online gaming and, moreover, in advergames. Motivation is normally viewed as a subject of social psychology and similar fields, but its different aspects and the associated theories are also observed during gaming applications. Different theories from the social sciences are incorporated on different aspects of games: we see that the theory of basic needs of Maslow, (Siang et al., 2003) are incorporated on different games, where low-level needs require fulfillment before high-level needs; Medler (2011) shows how the games represent an achievement system that aims to encourage gaming and performance monitoring. According to Montola et al. (2009), the system of achievements and reward structure provides additional objectives by promoting friendly competition and comparison among them. The games represent many aspects of Bandura (1977), theory regarding personal efficacy. Kraiger et al. (1993) claim that self-efficacy can be positively stimulated by dividing high fibrillation tasks into smaller and less difficult tasks. They believe that if players believes are higher they will fulfill the tasks better to achieve the final goal. Moreover, games with rewards represent aspects of the social comparison theory. The comparison between players on a quantitative basis provokes competition (Medler and Magerko, 2011). McNamara et al. (2010) show that ranking among players on various grounds promote participation and activation in the game.

The most important part of this issue and the purpose mentioned so far is that it comes to the result: the rewards theory incorporated in games. In this context, there are two main theories that appear to be present in the games: the theory of expected values and Skinner's theory of reinforcement. The theory of expected values shows that goal-oriented behaviors are a function of the belief that constant effort leads to the performance necessary to get the reward (Shepperd, 2001). McNamara et al. (2010) shows that games provide a sense of control that has process personalization features to attain the purpose of the reward. Von Ahn and Dabbish (2008) find that score usage increases motivation, thus enabling a clear link between effort in play, performance, and outcomes. While Skinner argues that behavior is the output of reinforcements or distribution (Lilienfeld et al., 2014). Hacker and Von Ahn (2009) have studied different versions of holding scores in games and it turns out that different functions lead to different behaviors during the game.

Any theory or a combination of them can explain the effect of rewards or motivations on advergames. Players enjoy exploring the data and they are encouraged to collect more achievements and consequently to finish the game (Medler, 2011; Medler and Magerko, 2011). Moreover, the achievement accompanied

with reward allows to measure progress and encourage to set other objectives beside the primary objectives (Medler and Magerko, 2011; Montola, et al., 2009).

3. Study methodology

In this study it is used *deductive approach* under which, it is developed a theoretical and conceptual framework and then goes on with the empirical part in order to test the hypothesis raised. The empirical part consists on *primary data* collected through the use of *quantitative method.* The procedure followed is gathering information from different customer of the service offered by the company taken as a case study through the *survey research material*. *Questionnaire was self-designed* and after the conduction of the appropriate structure and form of the survey (appropriate questions that gather information for the raised hypothesis, listing the questions in accordance with the importance and appropriate order, formulation of question understandable, easy enough, and so forth) it is decided for the sample of the research to consist on 300 participants. It is taken care that all participant of the survey to be client of "Vodafone Albania" company, which are contacted randomly after they have done any transaction near the service shops of the company. The direct research focus is the case of Mobile Advergame called "Vodafone City" which is applied by "Vodafone Albania" company within the Albanian territory. Surveys are filled on 10 different (Tirana, Durrsi, Fier, Vlora, Elbasan, Shkodra, Korca, Berat, Gjirokastra, Kuksi) cities where the above mentioned advergame has been applied. The main aim of the study is to test the relationship between rewards offered by the advergame and the effect it has on brand elements. To make e clear comparison and to evidently see the effect it is taken care to interview custmers that have resulted winner and the ones that did not among which, 100 are winners and 200 non-winners. Surveys have been conducted during the period May 1- June 30, 2018. Those are unique data gathered of such a kind from which may be extracted different results and can lead to considerable conclusions. Despite the subjective nature of the customer level data and the reliability of self-reported answers, they are advantageous for allowing benchmarks and specifications and since they are the first can be taken as references for other similar applications.

4. Empirical part

4.1. Descriptive analysis

Vodafone Albania Sh.A., part of 'Vodafone Group Plc', is the first company to undertake the realization of an advergame in Albania, which was implemented as mobile advergame version via the application named "Vodafone City ". This project has so far been developed in two phases, and this study takes into analysis second phase of case in question.

"Vodafone City" just like the version applied in the first phase, it is a mobile advergame project, a mobile application created by this company to offer a different experience to its customers. Since the first advergame "Vodafone City" was a new experience, it was limited and applied only in the city of Tirana, but in the second phase, Vodafone City expanded the geographic territory and was applied on 15 cities: Tirana, Durrës, Elbasan, Fier, Berat, Korça, Gjirokastra, Vlora, Shkodra, Kukës, Sarandë, Krujë, Pogradec, Lunshnje and Lezhë where it managed to attract 100,000 players: 50,000 downloads to the Android platform and about 40,000+ downloads IOS platform.

The design idea of "Vodafone City" advergame came as a result of efforts to create a fun application in the category of games. Taking into account the fact that games today are very popular, the company was persuaded about the idea of interplay of games and the use of mobile phones applications. Just like the first phase, different places in the city were set up with mysterious elements with different names, depicted through a combination of fantasy and real-world historical characters that players had to find and scan via the "Vodafone City" application and in this way they were also fulfilling the game phases.

At this stage, specifically, the concept was elaborated in the form of the discovery of a superior intelligence source called 'Red Power' in the cities where the game was applied. And so it launches the adventure of the game towards a parallel universe where the source of superior intelligence, 'Red Power', is hidden, whose mastery opens up a window of new knowledge, yet a mystery to mankind. To possess it, each of the players must find the 10th elements that make it possible to form it. So this advergame consisted in completing a virtual map or inventory by discovering 10 objects in each of the 15 cities. Players must find and scan these objects via the 'Vodafone City' application and to add them to the Game Inventory category. Participants can only play in the pre-selected city of them. As in the first stage where *"The Wise"* was the leader of the players and challenge for each city were the characters of the other dimension who constantly communicated with the players for every necessary guidance. So, the game involved a mysterious mission that followed an interesting and intriguing itinerary as users reached the points that complemented the map and inventory of the game.

This advergame was closely linked to the Facebook social network by creating intense interactivity with client players. The game guides were in constant communication with the players and provided them with detailed information. Players should communicate with him via Company's Facebook page to get further instructions, thus creating an interactivity with the official company account on the social network.

Among other things, as in the first phase, this advergame project included stimulation by award of prizes to winning players, thus promoting engagement for participation in the game. To this end, the company had booked a number of different gifts, among which, smartphones for players who complete the first game and the Internet packages in different quantities. The winners were rated at the speed calculated by the application itself.

This advergame project targeted mostly young people aged 18-30 who belonged to the Vodafone Club tariff plan. The project lasted a month running on the 28 June 2017 to July 30, 2017 and could be played by all Vodafone Albania customers using smartphones and technology devices using Android and IOS operating systems (Vodafonecity.al). To play the game, the players had to follow some rules. To be included for the first time in the game, a registration form was needed, which included: name, surname, birthdates and phone number. After completing this data, the city where the player wanted to play and then the data to the central system was chosen. Also, inside the app was integrated a mini-game, which could be played at any free time the player wanted and did not require any specific engagement. It aimed to increase the commitment of players to spend as much time in the app and to have fun through it, as advergame was endowed with multiple elements of Vodafone brand identity. So the mini-game was not part of the main game and rewards that was offered for the winning players.

Table 1. Distribution of participants according to demographic data

1.1. Age Group		
	N	%
14-24	170	56.7
25-34	100	33.3
35-54	30	10.0
Total	300	100.0

1.2. Gender		
	N	%
Female	142	47.3
Male	158	52.7
Total	300	100.0

1.4. Education Level		
	N	%
Secondary School	4	1.3
High School	186	62.0
Bachelor	110	36.7
Total	300	100.0

1.3. Resident City		
	n	%
Tirana	130	43.3
Durrsi	34	11.3
Fier	26	8.7
Vlora	22	7.3
Elbasan	20	6.7
Shkoder	20	6.7
Korça	16	5.3
Berat	12	4.0
Gjirokaster	10	3.3
Kukes	10	3.3
Total	300	100.0

1.5. Employment		
	n	%
Yes	64	21.3
No	236	78.7
Total	300	100.0

Source: Authors.

According to the data presented in Table 1.1, where is given the distribution of participants in this study by the respective age groups, it results that 56.7% of them belong to the age group 14-24, 33.3% are 25-34 year olds , 10% of the adult age 35+ and over. The main result extracted from here is that, as it is stated on literature also the main users of the mobile company and its aplications (which automatically means that at the same time are the main users or reqestors of the services those companies offer) are teenagers, adult and young people till the age of 35 years-old.

According to the data presented in Table 1.2, where is shown the distribution of participants in this study by gender, 47.3% of them belong to the female gender and 52.7% belong to the male gender. As it is seen there is not any considerable diference in usage of the offered services by the company according to the gender (both genders use it apprximatelly on the same level).

Table 1.3, shows the distribution of the participants according to the residential towns where the "Vodafone City" game was played, it turns out that most of the participants in the study have become part of the game in the city of Tirana, to be followed by the city of Durres. Specifically, 43.3% of the participants are in Tirana, 11.3% in Durrës, 8.7% in Fier, 7.3% in Vlora, 6.7% in Elbasan, 6.7 % in

Shkodra, 5.3% in Korça, 4.0% in Berat, 3.3% in Gjirokastra and 3.3% in Kukes. As it is expected most of the participants come from metropol of the country, which in general can be considered as country representative since the consentration of population is high. But, the result is related with one other fact also, it was the second time this game was played in Tirana, and they were more informed about the game and maybe more familiar also.

The distribution of participants according to the "level of education that are enrolled or have completed" prsented on Table 1.4 points out that, 1.3% of them follow or have completed secondary education, 62% are attending or have completed higher education, and 36.7% are attending or have completed university (bachelor).

Employment status reported on Table 1.5 showed that 21.3% of participants are employed, while 78.7% of them are not employed. As stated on literature participation on different online games (among them advergame) is linked among others with leisure and the manner how people decide to pass free time. Since there is no any huge difference between two groups, it means that it is effective for both employed and unemployed people.

Table 2. Distribution of participants according to the rewards taken

Did you result winner in any phase of the game?		
	n	%
Yes	100	33.3
No	200	66.7
Total	300	100.0

Source: Authors.

As mentioned at the methodological part, it was taken care to have a composion of the sample with participants who have resulted winner and who did not win any of the phases of advergame. Since the number of winner is considerably low compared to the total number of participant, it was taken care so that the interview to have a ratio 1:3, so that to better see the effects of rewards offer on advergames.

4.2. Results from hypothesis testing

The aim of the study is to see the relationship between the rewards on advergames and the effect it has on different aspects of the advergame which in a direct way show the effect is has on the brand itself. To come up to some concrete results there have been raised 9 hypotheses which try to test the relationship between rewards offered for playing and resulting winner of the corresponding phase and the effects it has on “Vodafone City” advergame and on “Vodafone” brand. The first hypothesis raised was:

H_1: *There is a positive relationship between offering rewards on advergames and effectiveness on positive attitude creation on it.*

Table 3. The relationship between rewards offered and positive attitude creation towards advergames

			Have you resulted winner in any of the phases of "Vodafone City" advergame?		
			Yes	No	Total
What is your attitude toward the "Vodafone City" advergame	Negative	n	0	58	58
		%	0.0%	29.0%	19.3%
	Neutral	n	0	70	70
		%	0.0%	35.0%	23.3%
	Positive	n	100	72	172
		%	100.0%	36.0%	57.3%
Total		n	100	200	300
		%	100.0%	100.0%	100.0%

Source: Authors.

The hypothesis was tested by Chi-Square Test and 0 cells (0.0%) have expected count less than 5. The minimum expected count is 19.33. To determine the statistical significance of the relationship it is used Asymptotic Significance, which in this case has e p-value = 0.000. Since this $p<0.05$ it is proofed that there is a statistically significant relationship between the two variables. This propositional aspect of the content was based on the advertising research from which we know that the liked advertisement can positively influence brand-related measures (Brown and Stayman 1992).

H_2: *There is a positive relationship between offering rewards on advergame and effectiveness on its positive image creation.*

Table 4. The relationship between rewards offered and positive image on advergame

		Have you resulted winner in any of the phases of "Vodafone City" advergame?					
		Yes		No		Total	
		n	%	N	%	n	%
Positive attributes of "Vodafone City" advergame	Interesting Game	100	100.0%	100	50.0%	200	66.7%
	Game for young group ages	74	74.0%	82	41.0%	156	52.0%
	Offer very good rewards	82	82.0%	56	28.0%	138	46.0%
	Innovative Game	82	82.0%	54	27.0%	136	45.3%
	Special Game	54	54.0%	40	20.0%	94	31.3%
	Credible/Unbiased	66	66.0%	20	10.0%	86	28.7%
	Encourages Community Engagement	34	34.0%	22	11.0%	56	18.7%
	Encourages Interactivity	76	76.0%	141	70.5%	217	72.3%

Source: Authors.

The hypothesis was tested by Chi-Square Test again. To determine the statistical significance of the relationship it is used Asymptotic Significance, which in this case has e p-value = 0.000. Since this $p<0.05$ it is proofed that there is a statistically significant relationship between the two variables. This relationship preposition is based on the fact that among the main benefits of advergaming it that it raises brand awareness through the display of positive attributes.

H_3: *There is a positive relationship between offering rewards on advergame and effectiveness on its preference creation.*

Table 5. The relationship between rewards offered and advergame preference

			Have you resulted winner in any of the phases of "Vodafone City" advergame?		
			Yes	No	Total
Would you prefer to replay "Vodafone City" advergame?	Yes	n	88	143	231
		%	88.0%	71.5%	77.0%
	No	n	12	37	49
		%	12.0%	18.5%	16.3%
	Maybe	n	0	20	20
		%	0.0%	10.0%	6.7%
Total		n	100	200	300
		%	100.0%	100.0%	100.0%

Source: Authors.

The hypothesis was tested by Chi-Square Test and 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.67. To determine the statistical significance of the relationship it is used Asymptotic Significance, which in this case has e p-value = 0.001. Since this $p<0.05$ it is proofed that there is a statistically significant relationship between the two variables. Robertson and Rossiter (1974) state that repeated exposure may result in an increased desire for the product advertised. In this case the increased preference can be considered preference directly toward the advergame. While they go on that it will result in increased preferences for the brand which is considered by the following hypothesis.

H_4: *There is a positive relationship between offering rewards and having an increased loyalty towards it.*

Table 6. The relationship between rewards offered and advergame loyalty

			Have you resulted winner in any of the phases of "Vodafone City" advergame?		
			Yes	No	Total
Would you recommend the advergame to your family, friends and colleague?	Yes	n	72	106	178
		%	72.0%	53.0%	59.3%
	No	n	10	46	56
		%	10.0%	23.0%	18.7%
	Maybe	n	18	48	66
		%	18.0%	24.0%	22.0%
Total		n	100	200	300
		%	100.0%	100.0%	100.0%

Source: Authors.

The hypothesis was tested by Chi-Square Test and 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.67. To determine the statistical significance of the relationship is used Asymptotic Significance, which in this case has e p-value = 0.004. Since this $p<0.05$ it is proofed that there is a statistically significant relationship between the two variables. Teng (2010) disclose that loyalty is increased directly and indirectly through enhanced immersion satisfaction from the gameplay.

H_5: *There is a positive relationship between offering rewards on advergame and forming a positive attitude towards brand.*

Table 7. The relationship between rewards offered on advergame and positive attitude creation towards brand

			Have you resulted winner in any of the phases of "Vodafone City" advergame?		
			Yes	No	Total
What is your attitude towards "Vodafone" brand?	Positive	n	100	177	277
		%	100.0%	88.5%	92.3%
	Negative	n	0	23	23
		%	0.0%	11.5%	7.7%
Total		n	100	200	300
		%	100.0%	100.0%	100.0%

Source: Authors.

The hypothesis was tested by Chi-Square Test and 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.67. To determine the statistical significance of the relationship is used

Asymptotic Significance, which in this case has e p-value = 0.000. Since this p<0.05 it is proofed that there is a statistically significant relationship between the two variables. Brown and Stayman (1992) and Homer (1990) explain these attitudes toward advergame influence brand attitude through the affect transfer between advertisement and the brand. In the same way, Waiguny, Terlutter, and Zaglia (2011) and Wise et al. (2008) observe this relationship and explain that the stimuli of the advertisement create an attitude for it and subsequently it influence the brand attitude.

H_6: *There is a positive relationship between offering rewardson advergames and creating a positive image towards brand.*

Table 8. The relationship between rewards offered on advergame and brand image

		Have you resulted winner in any of the phases of "Vodafone City" advergame?					
		Yes		No		Total	
		N	%	n	%	n	%
Positive attirubtes of "Vodafone" brand	"Vodafone" is the leading company for organizing innovative initiatives	90	90.0%	132	66.0%	222	74.0%
	"Vodafone" thinks about the entertainment of clients	88	88.0%	170	85.0%	258	86.0%
	As a customer I feel appreciated by "Vodafone" company	76	76.0%	142	71.0%	218	72.7%
	"Vodafone" is a credible company	92	92.0%	138	69.0%	230	76.7%
	"Vodafone" often rewards its clients	92	92.0%	144	72.0%	236	78.7%
	"Vodafone" interact/collaborates with the clients	84	84.0%	144	72.0%	228	76.0%
	"Vodafone" undertakes innovative initiatives	76	76.0%	132	66.0%	208	69.3%
	"Vodafone" is aware of social responsibility	80	80.0%	140	70.0%	220	73.3%

Multiple answer question. Number of the answers can overpass the number of participants.

Source: Authors.

The hypothesis was tested by Chi-Square Test and the statistical significance of the relationship is done using Asymptotic Significance, which in this case has e p-value = 0.000. Since this p<0.05 it is proofed that there is a statistically significant relationship between the two variables.

H_7: *There is a positive relationship between offering rewards on advergame and effective increase of brand consideration.*

Table 9. The relationship between rewards offered on advergame and brand consideration

			Have you resulted winner in any of the phases of "Vodafone City" advergame?		
			Yes	No	Total
What is your consideration towards "Vodafone" brand?	Positive	n	100	174	274
		%	100.0%	87.0%	91.3%
	Negative	n	0	26	26
		%	0.0%	13.0%	8.7%
Total		n	100	200	300
		%	100.0%	100.0%	100.0%

Source: Authors.

The hypothesis was tested by Chi-Square Test and 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.67. The statistical significance of the relationship is done using Asymptotic Significance, which in this case has e p-value = 0.000. Since this $p<0.05$ it is proofed that there is a statistically significant relationship between the two variables.

H_8: *There is a positive relationship between offering rewards on advergame and effective increase of brand preference.*

Table 10. The relationship between rewards offered on advergame and brand preference

			Have you resulted winner in any of the phases of "Vodafone City" advergame?		
			Yes	No	Total
Would Vodafone be one of your preferences if in the future you would have to buy a mobile phone product / service?	Yes	n	88	136	224
		%	88.0%	68.0%	74.7%
	No	n	12	64	76
		%	12.0%	32.0%	25.3%
Total		n	100	200	300
		%	100.0%	100.0%	100.0%

Source: Authors.

The hypothesis was tested by Chi-Square Test and 0 cells (0.0%) have expected count less than 5. The minimum expected count is 25.33. The statistical significance of the relationship is done using Asymptotic Significance, which in this case has e p-value = 0.000. Since this $p<0.05$ it is proofed that there is a statistically significant relationship between the two variables. Based on the Redondo (2012)

work which suggests that the brand preference can be changed through the use of appropriate entertainment vehicles, in this case the best vehicle used is the reward on advergame.

H_9: *There is a positive relationship between offering rewards on advergame and increase of brand loyalty.*

Table 11. The relationship between rewards offered on advergame and brand loyalty

			Have you resulted winner in any of the phases of "Vodafone City" advergame?		
			Yes	No	Total
Would you recommend the Vodafone brand to your family, friends, and colleagues?	Yes	n	78	112	190
		%	78.0%	56.0%	63.3%
	No	n	22	88	110
		%	22.0%	44.0%	36.7%
Total		n	100	200	300
		%	100.0%	100.0%	100.0%

Source: Authors.

The hypothesis was tested by Chi-Square Test and 0 cells (0.0%) have expected count less than 5. The minimum expected count is 36.67. The statistical significance of the relationship is done using Asymptotic Significance, which in this case has e p-value = 0.000. Since this $p<0.05$ it is proofed that there is a statistically significant relationship between the two variables. In this case it is used the willingness to recommend the brand as e measure based on Gorn and Florsham (1985) which define it as the intention to consume the brand in the future. The added element to their definition is the advergame which serve as a powerful asset for building brand loyalty (Youn and Lee 2005; Steel 2013).

4.3. Discussion of results

In this part of the study, relationship analysis takes place in the context of the relationship between the rewards offered and it will be translated into direct result firstly for the advergame itself and then consequently for the brand. Concretely: the relation will be analyzed by taking into consideration the effect of the rewards offered on the positive attitudes toward advergame and positive attitude towards the brand; on the image created toward advergame and image created toward the brand; preference toward advergame and brand preference; and the loyalty toward the advergame and the loyalty toward the brand.

To analyze all those component it is followed the "sales funnel" the same method used by Gura and Gura (2018) which makes an analysis of brand elements based on Roger (2011) hierarchy. Based on that the first element to analyze is the relationship between rewards offered by advergames and the effect it has on the creation of positive attitude toward it. To test this hypothesis there are taken two combined results from the survey: either the player resulted winner in any of the advergame phase and the attitude hold toward it. Based on the results of this hypothesis the ones resulting winner of any phase hold a positive attitude toward advergame at 100% level, while among those that have did not win any of the phases hold a negative attitude toward the advergame at a level of 58%. Positive attitude toward

advergame from those that did not win goes till 36%, which shows a huge difference on the postitive attitude formation between the winner and non-winner.

The second hypothesis tests the relationship between rewards offered and the effect it has on the positive image created toward the advergame. To achieve concrete results in this case is tested the relation by using data of two questions: if they resulted winner in any phase and their opinion regarding the positive attributes of the advergame. All of them which have resulted winner think that it is an interesting game, 74% think that it is a game for new group ages, 82% think that the rewards offered were very good, 82% think that it is an innovative game, 54% think that it is e special game, 66% see it as a credible/unbiased game, 34 % state that it encourage community engagement and 76% says that it encourages interactivity among young group age. Interesting in this step is that also those that did not result winner in any of the phases on very high percentage state that it is a very special game and it encourages interactivity among young group age.

Regarding the relationship between rewards offered and advergame preference creation are used the results as winner or not and the willingness of them to replay the game. 88% of the winners are willing to replay the game which means that advergame preference at this sample goes to 88% level. Interesting result is the fact that in the preference level for advergame goes up to 71.2% also in non-winner sample, which means that the evaluation of advergame goes beyond the rewards.

The outmost important purpose of all brand communication affords is to achieve brand loyalty since at the end loyal customers are net result of the company. For this reason the next hypothesis tries to test the relationship between rewards offered and the loyalty toward the advergame. The loyalty in this case is measured through the willingness of participant to recommend the advergame to other family members, to friends and to colleges. 72% of the winners are willing to recommend the advergame to others while only 53% of non-winners are going to recommend it, which in fact is not e bad result but to increase the loyalty by 20% is very important and in this case the effect of rewards in brand loyalty creation is crucial.

After this analysis as mentioned previously there has been raised hypothesis for the same elements but this time to measure the effect of rewards offered by advergame on brand itself. Just like the result with advergame, 100% of the winners hold a positive attitude toward the brand and 88.5% of non-winners hold a positive effect toward the brand. Only a very small portion of the sample of non-winners holds a negative attitude toward the brand. In this regard we can conclude that despite the rewards offered the effect of advergame on positive attitude formation toward the brand is very high and we strongly recommend it.

Brand consideration is very important for the long run operation of the company, because despite the fact that consideration is not always translated to loyalty, persons belonging to this sample are a very high potential for the brand. Again all winners of the rewards hold positive consideration for "Vodafone" brand and only 13% of non-winners have a negative consideration toward the brand. When it comes to brand preference, the filtering process starts. In this case 88% of winners prefer "Vodafone" brand as their choice in the future and the level of non-winners that do not prefer it goes to 32%. By this we can understand that despite the fact that effect of the rewards offered was not considerable on the creation of brand elements which are initiator of connection with the brand and the relationship between customer and brand is not very strong. Further we can conclude that the stronger the relationship between the customer and the brand the grater is the effect of the rewards used on the advergames. The diminishing result of such statement is reinforced also when we go on analyzing the effect on brand loyalty. In this case 78% of winners are willing to recommend the brand which means that only this portion of the sample is loyal toward the brand. Moreover 44% of non-winners do not recommend the brand which is almost half of the sample. In this level of connection the use of rewards as a strategy to have higher

effects on brand elements is import especially on those level which require strong connection between customer and brand.

5. Conclusions and recommendations

This research paper combines mainly two elements: firstly the aspects of advergame design including motivations as an alternative to promote better effects for the promotion campaign and secondly all those tentative are done for the purpose of having better brand communication affords. The main objective of the paper is to test the relationship between rewards offered and the affectivity it has as a brand communication afford with the main preposition that: *the closer the connectivity between the brand and customer the greater is the effect of this relationship*. Choice of such a topic is encouraged by the growing importance practitioners are giving to this brand communication tool and based on the latest trend of the gaming industry. There has been used primary quantitative data collected through e self-designed survey. The data are processed through SPPS package and the hypothesis are tested using Chi-Square test. Moreover it is a cased based study because it conducts the research on a real case from telecommunication industry in Albania. The mentioned advergame was called "Vodafone City" and was lunched by "Vodafone" brand. It is the first if its kind in Albania and can be considered as a very successful one. The advantage of it was that it included the reward element on some of its phases, so we can better analyze this aspect of it. The work raises in total 9 hypothesis and tries to test the relationship on advergame and on brand by analyzing different elements of it based on the "sales funnel" hierarchy. It resulted that the relationship is very strong for all elements and for both of them, the advergame and the brand. The main result of the study is that the effect of rewards offered is higher on those elements which are characterized by close connectivity between customer and the brand. Based on this we recommend to marketing practitioners to take care of this when they attempt to design any of such brand communication afford. Additionally we recommend to them to create e reward system when they design such advergames, because of different demographic composition of participants. Different participant have different perception of values and due to this subjective nature, what's motivational for someone may not be for someone else.

References

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. Psychological review, 84(2), 191.

Bartle, R. (1990). Interactive multi-user computer games. MUSE Ltd for British Telecom plc, Colchester, UK, Report.

Bogost, I. (2007). Persuasive Games: The Expressive Power of Videogames. Cambridge, MA: MIT.

Brown, S. P., & Stayman, D. M. (1992). Antecedents and consequences of attitude toward the ad: A meta-analysis. Journal of consumer research, 19(1), 34-51.

Dahl, S., Eagle, L. and Carlos, B. (2009) 'Analyzing Advergames: Active Diversions or Actually Deceptions: An Exploratory Study of Online Advergames Content', Young Consumers, 10(1), pp.46-59.

DiClemente, D. F., & Hantula, D. A. (2003). Applied behavioral economics and consumer choice. Journal of Economic Psychology, 24(5), 589-602.

Emling, Shelley (2001), "Marketers Advertise with Online Games," Star Tribune, 6 September, E8 (4).

Ferrari, S. (2010). The Judgment of Procedural Rhetoric.Georgia Institute of Technology, Georgia.

Frasca, G. (2007). Play the message. Play, Game and Videogame Rhetoric. IT University Copenhagen, Copenhagen.

Gorn, G. J., & Florsheim, R. (1985). The effects of commercials for adult products on children. Journal of consumer research, 11(4), 962-967.

Gross, M. L. (2010). Advergames and the eects of game-product congruity", Computers in Human Behavior, Vol.26, No.6, pp.1259-1265.

Gura, S. and Gura, S., K. (2018). Advergame Charachteristics as Brand Communication Tool and Its Relationship With Brand Consideration and Brand Preference. Proceedings of the 32nd International Business Information Management Association Conference (IBIMA), 15-16 November 2018, Seville, Spain. ISBN: 978-0-9998551-1-9, 2018, page 6669-6683.

Hacker, S., and von Ahn, L. 2009. Matchin: Eliciting user preferences with an online game. In CHI, 1207–1216.

Hernandez, M. D. (2011). A model of ow experience as determinant of positive attitudes toward online advergames. Journal of Promotion Management, Vol.17, No.3, pp.315-326.

Herrewijn, L., and K. Poels. 2013. Putting brands into play: How game difficulty and player experiences influence the effectiveness of in-game advertising.International Journal of Advertising32, no. 1: 1744.

Homer, P. M. (1990). The mediating role of attitude toward the ad: Some additional evidence. Journal of Marketing research, 27(1), 78-86.

Kraiger, K., Ford, J. K., & Salas, E. (1993). Integration of cognitive skill-based, and affective theories of learning outcomes to new methods of training evaluation. Journal of Applied Psychology, 78, 311-328.

Lilienfeld, S., Lynn, S. J., Namy, L., Woolf, N., Jamieson, G., Marks, A., & Slaughter, V. (2014). Psychology: From inquiry to understanding (Vol. 2). Pearson Higher Education AU.

Mallinckrodt V and Mizerski D (2007). The effects of paying an advergame on young children's perceptions, preferences, and requests. Journal of Advertising 36(2): 87–100.

McNamara, D.S., Jackson, G.T., and Graesser, A.C. 2010. Intelligent tutoring and games (ITaG). In Y.K. Baek (Ed.), Gaming for classroom-based learning: Digital role-playing as a motivator of study, 44-65. Hershey, PA: IGI Global.

Medler, B. (2011). Player dossiers: analyzing gameplay data as a reward. Game Studies Journal.11(1).

Medler, G., &Magerko, B, (2011), Analytics of play: Using information visualization and game-play practice for visualizing video game data. Parsons Journal for Information Mapping, 3(1), 1-12.

Miller, G. R. (2002). On Being Persuaded: Some Basic Distinctions. In J. P. Dillard & M. Pfau (Eds.), The Persuasion Handbook: Developments in Theory and Practice. London: SAGE Publications.

Montola, M., Nummenmaa, T., Lucero, A., Boberg, M., & Korhonen, H. (2009, September). Applying game achievement systems to enhance user experience in a photo sharing service. In Proceedings of the 13th International MindTrek Conference: Everyday Life in the Ubiquitous Era (pp. 94-97). ACM.

Neff, Jack (2001), "Seeking Click with Consumers Online," Advertising Age, 23 April, 30.

Redondo, I. (2012). The effectiveness of casual advergames on adolescents' brand attitudes. European Journal of Marketing, 46(11/12), 1671-1688.

Robertson, T. S., & Rossiter, J. R. (1974). Children and commercial persuasion: An attribution theory analysis. Journal of Consumer research, 1(1), 13-20.

Shepperd, J. A. (2001). Social loafing and expectancy-value theory. In Multiple perspectives on the effects of evaluation on performance (pp. 1-24). Springer, Boston, MA.

Siang, A. C., & Rao, R. K. (2003). Theories of learning: a computer game perspective. In Multimedia software engineering, 2003. proceedings. fifth international symposium on (pp. 239-245). IEEE.

Subramani, M. R., & Rajagopalan, B. (2003). Knowledge-sharing and influence in online social networks via viral marketing. Communications of the ACM, 46(12), 300-307.

Teng, C. I. (2010). Customization, immersion satisfaction, and online gamer loyalty. Computers in Human Behavior, 26(6), 1547-1554.

Thom, J., Millen, D., &D iMicco, J. (2012). Removing gamification from an enterprise sns. In Proceedings of the acm 2012 conference on computer supported cooperative work, 1067 -1070.

Van Reijmersdal, E.A., E. Rozendaal, and M. Buijzen. (2012). Effects of prominence, involvement, and persuasion knowledge on children's cognitive and affective responses to advergames. Journal of Interactive Marketing 26, no. 1: 3342.

Vanwesenbeeck, I., Ponnet, K., &Walrave, M. (2016). Go with the flow: How children's persuasion knowledge is associated with their state of flow and emotions during advergame play. Journal of Consumer Behaviour, 15(1), 38-47.

Villafranco, J. E. and A. N. Zeltzer (2006). Product Placement and Brand Integration Strategies: Managing the Risks of Regulatory Uncertainty. Consumer Protection Update, 13 (1) http://www.colliershannon.com/documents/CPU_JEV2.pdf (accessed on 10/05/2007).

Von Ahn, L. and Dabbish, L. (2008). Designing games with a purpose. Communications of the ACM 51, 8, 58–67.

Waiguny, M. K., & Terlutter, R. (2011). Differences in children's processing of advergames and TV commercials. In Advances in Advertising Research (Vol. 2) (pp. 35-51). Gabler.

Waiguny, M. K., Terlutter, R., & Zaglia, M. E. (2011). The influence of advergames on consumers' attitudes and behaviour: an empirical study among young consumers. International Journal of Entrepreneurial Venturing, 3(3), 231-247.

Winkler, T. & Buckner, K. 2006. Receptiveness of gamers to embedded brand messages in advergames: Attitudes towards product placement. Journal of Interactive Advertising, 7(1).

Wise, K., Bolls, P. D., Kim, H., Venkataraman, A., & Meyer, R. (2008). Enjoyment of advergames and brand attitudes: The impact of thematic relevance. Journal of Interactive Advertising, 9(1), 27-36.

Yee, N. (2006). Motivations for play in online games. CyberPsychology & behavior, 9(6), 772-775.

Youn, Seounmi, and M. Lee. 2005. Advergame playing motivations and effectiveness. In Advertising, promotion, and new media, ed. M.R. Stafford and Ronald J. Faber, 32047. Armonk, NY: ME Sharpe.

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RUHUI GAO[1]

AN EMPIRICAL INVESTIGATION INTO THE DETERMINATIONS OF PARTICIPATION IN ILLEGITIMATE ACTIVITIES USING U.S. CRIME STATISTICS IN 1960s

Abstract

This paper investigates the factors potentially affecting the incentives on participation in illegitimate activities including regions, presidential election, punishment, wealth, inequality, race, unemployment, labour force and age based on the U.S. crime statistics back to 1960s. The background of this study is conducted on the basis of Isaac Ehrlich's study published in 1973 with attention to Supply-of-Offense function. The study employs quantitative research method including between-group factorial ANOVA and regression analysis by decomposing the changes in crime rates onto a series of variables. The findings of this study suggest that regional effect, punishment, wealth, inequality and race are significant factors, whereas presidential election, unemployment, labour force and age components are insignificant in explainning the variations of crime rates when using OLS estimation method in regression analysis based on the 1960s crime statistics. The implication of this study shows that the result of presidential election, reducing unemployment, increasing labour force participation rate and changing age group would exert little influence on decreasing incentives on participation illegitimate activities.

Keywords: Regression analysis, ANOVA, participation in illegitimate activities.

JEL Codes: C12, C13, I00

1. Introduction

This study examines the factors that potentially affecting incentives of participation in illegal activities in the context of data in 1960's in U.S across states by running a series of statistical analysis. Crime rate control has been a major issue faced by government nowadays. Developed countries or regions tend to have lower crime index, which indicates that the society is more stable, whereas undeveloped countries or regions tend to be more violated (Beattie, 1960). It's necessary for governments to identify the potential factors affecting crime rates and control it to a satisfactory level in order to stabilize the community. Both criminologists and research bodies have been analysing and trying to find out how to reduce incentives of participation in criminal activities and what the factors may influence the crime rates (Buonanno and Leonida, 2009). Back to 1960, criminologists and economists analysed the effects of variables such as wealth, inequality, unemployment on crime rates. In Isaac Ehrlich's research published in 1973, he examined the effects of inequality, age composition, race composition, wealth, inequality on participation in illegal activities by running a series of regression analysis. Apart from these factors addressed above, other potential factors that may influence people's decisions on participating in criminal activities are regional effect and presidential election, which will be introduced in turn.

According to Sperlings' (2002) study, there is a regional difference in crime index existing across 50 states in U.S 2002, which reflects that the number of criminal activities in northeast region of U.S. was 2889 per 100,000 people, which ranked the lowest compared with other regions. Midwest region ranked the second least with 3883 offenses per 100,000 populations. Next was the western region with 4418 offenses per 100,000 populations and southern region had largest number of offenses in U.S. (Sparlings 2002) In this study, it will first examine whether the rates of participation in criminal activities differ among those four regions, which are South, West, Midwest and Northeast as Sparlings stated in the

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study. If there is a significant difference, it would help researchers, other research bodies and other disciplines to analyze further on these regional effects. It will also help government to determine how to spend their budget on controlling crime rates based on regional effects and allocate limited expenditure to those regions which have higher criminal activities participation rates.

Except regional effect, Presidential Election has also become an emerging problem, which researchers haven't done much so far (Sudehna and Shruti Datt, 2017). Social Media released a new report in November 2016, showing *that '2016 presidential election insinuating that areas with a high population of democratic voters also had higher rates of crime'* (Subject Politics). This report will investigate if the Presidential Election has played an important role in crime rates in 1960. Since this will give historical evidence to people to know which party, either Democratic or Republican, has lower criminal rates based on empirical evidence and this will recap voter's preference when they determine their choice of voting. It also gives the Party which holds the power some implications on how to improve their policies on lowering the crime rates compared with their opponent and this may improve the chance of winning the election as well. Is there an interaction effect between regions and presidential election? This problem will be examined in the report based on empirical evidence in 1960s.

The other aspect of this study is to analyze the regression models developed by Isaac Ehrlich in 1973 and test whether the factors stated in his research are significant or not and whether the model is a good representation. The effect of southern and northern states on crime rates will also be examined in the study. This will give some hints to analyse which factors are significant on crime rates based on his models. Since Isaac's regression models contain multiple independent variables, it's valuable to test the significance of the model to identify how significant the endogenous variables are. This will help governments redesign the policy to stabilize the social system. Such as if the racial composition plays an important role in crime rate. Government should balance the racial composition between communities in the city.

Structure of the report and the Hypotheses to be tested:

The overall structure of the study is:

In the first part, whether the crime rates are different between different regions will be examined.

1) The regional effect on crime rates
   Are crime rates different among different regions?
   H0: the crime rates are the same among different regions.
   Ha: the crime rates are different among different regions.

After this, the factor of presidential election will be taken into consideration,

2) The effect of presidential election on crime rates
   Is there a difference between the regions where people voting for Democratic Party and the regions where people voting for Republican Party?
   The correlated Hypotheses are:
   H0: the crime rates are the same between regions voting for Democratic Party and regions voting for Republican Party.
   Ha: the crime rates are different between regions voting for Democratic Party and regions voting for Republican Party.

And the interaction effect of presidential election and the regions needs to be considered.

3) The effect of interaction between regions and presidential election
   Does there is an interaction between regions and presidential election? In other words, do these two factors affect each other?
   H0: there is no interaction effect between regions and presidential election.
   Ha: there is an interaction effect between regions and presidential election.

Then, it analyses the factors proposed by Isaac Ehrlich in the regression models. In the regression models developed by Isaac, the aim is to test whether the regression models and their estimators are significant.

4) The analysis of regression models
   Do the regression models significantly make sense in reality?
   H0: the models Isaac proposed have no difference compared with mean only model.
   Ha: the models Isaac proposed are significantly different from mean only model.

2. Methodology

2.1. Design of the study

2.1.1. Comparing means between regional effect and presidential election

This study focuses mainly on solving the questions which have developed in the introduction. It investigates the following issues: 1) Is there a regional effect on crime rates in 1960? 2) Is presidential election a factor affecting crime rates? 3) Is there an interaction effect between these two? 4) Are the models predicting crime rates developed by Isaac make sense based on empirical data in the context of 1960?

In order to solve the first three research questions, first it needs to be clear which are the independent variables and dependent variables. Since to find 'The difference in crime rates' between different conditions is the aim of the study, it's reasonable to choose the variable related to crime rates as our dependent variable and the measurement level needs to be metric as the research is interested in the difference between conditions. Comparing difference between ordinal or nominal variables would not make sense in this case. As for the independent variables, there are two conditions assigned to this study, which are regions and Presidential election. The research design focuses on how crime rates are different under these two conditions. In this case, independent variables become to regions and presidential election. There are two regions as stated in the data set provided, north and south, but if the research is expected to be precise it needs to extend the regions to more levels. Regions are nominal variables since the number of the regions doesn't have meaning for computing means or other numerical statistics as metric or ordinal variables. Presidential election refers to when U.S election coming up, voters need to select their preference from Democratic Party or Republican Party. Presidential election has two levels since you can either choose Democratic or Republican Party and it should be nominal as well, as numbers in this case do not have actual meanings in comparing means and calculating numeric statistics. To summarize, for the first three questions, the dependent variable is metric and it needs to relate to crime rates and independent variables, regions and presidential election, are categorical.

The research questions focus on comparing means in different conditions and how are these conditions distributed and what's the relationship between these conditions determines the research design. In order to answer the research question or test the hypotheses, the research design should be easy to conduct and easy to analyse. Since the research is designed to answer the question 'are the crime rates different between regions? And what happens to crime rates when consider the presidential election? And lastly is there an interaction effect between these two variables? Since it is expected to examine whether the means are different between two conditions, and the scores are metric variables where two conditions

are independent variables and each one has more than two levels. T-test can be applied to examine the difference between regions voting for Democratic and regions voting for Republican since this presidential election only has two levels. One-way ANOVA can be implemented to analyse the effect of regions, since regions has more than 3 levels where the criterion is to divide the U.S into 4 regions, namely, Northeast, Midwest, South and West as what Sperlings (2002) did in the study. But if it applies Factorial ANOVA analysis, all of the three research questions and related Hypotheses can be tested and analysed in one analysis. Each independent variable has more than two levels and dependent variable is metric. Whether the means are different in regions or whether the means are different under Presidential condition or the interaction effect, all of these can be incorporated in factorial ANOVA and T-test or One-Way ANOVA doesn't need to be implemented any more.

Next, how conditions are distributed in sample also need to be considered. Within-Group design refers to the situation where each independent variable, in this case 47 states, receives two conditions in sequence, Whereas Between-Groups design refers to the situation when two or more conditions applied simultaneously. In this study, each state has two attributes which are regions and presidential election, and these two conditions are endogenous to the states. In other words, each state can only have one combination of regions and presidential election and each condition cannot be distributed in a time sequence since they are the properties of the states. For example, Arizona in 1956 voted for Republican and it's in the regions of West these two properties cannot change and Arizona cannot be changed to vote for Democratic or changed in a time sequence between these conditions. In this case, Between Groups Factorial ANOVA is selected to the research design for solving the first three questions.

2.1.2. Test crime rates regression models based on empirical data

As for solving the rest of the research questions, it's clear that the aim of the research is to test whether the models developed by Isaac Ehrlich make sense or not based on empirical data set. One of the assumptions that regression analysis can be performed is that there is a causal relationship between the variables. This is equal to state that the purpose of the research is to test whether data fits the regression models developed by Isaac Ehrlich. Statistically. If the regression model makes sense, the data should fit better in regression model compared with mean only model. So, for solving the rest of the research problems, a series of regression analysis will be performed. Lastly, the regional effect based on data set containing south and north will also be considered in the regression model which Isaac didn't mentioned much in his study by running a dummy regression to compare the regional effects.

To summarize, Between -Groups Factorial ANOVA analysis will be performed to solve the first three research questions and relevant hypotheses. Linear Regression analysis will be performed to analyse if the models developed by Isaac Ehrlich make sense based on the data set in 1960.

2.2. Data collection

2.2.1. Data collection for regional and presidential effects

After the research design, it needs to consider how to collect the relevant data to perform or match the correlated research questions or hypotheses. In order to perform a Between- Groups Factorial ANOVA analysis, the dependent variable should be relevant to crime rates and independent variables are regions and people's preference for their election. For independent variables, it's obvious that regions are categorical variables and it has four levels as the geographical division criterion of the all states based on Springls'(2002) criterion. And also there are numerous criterions on how to divide U.S into regions. The reason why choosing to divide U.S. into 4 big regions, which are Northeast, Midwest, South, West, rather than 6, 7, or 8 is to analyse the regional effect in the context of large-scale pattern. However, if it breaks down the whole country into too many sections. For instance, dividing northeast area further into

3 regions is not based on the geographical criterion rather it's on the basis of other factors such as development of economy in a region and that is not the aim of the research question. Finally, categorical variable of regions with 4 levels selected to analyse the regional effect. But categorical variable of regions is not provided in the original data set. The corresponding data set is provided from U.S. Census Bureau's survey with state name and its corresponding regions. As for presidential effect, 1956's presidential election results were imported to this research, because 1956's election result was the one which had substantial effect on 1960's data. In 1956, Dwight D. Eisenhower was Republican and his opponent was Democrat Adlai Stevenson, whom Eisenhower defeated four years earlier. (McCarty Hearings, Hungary, Suez Canal) States voting for Democratic Party are recorded as 1 in our dataset whereas states voting for Republican Party are recorded as 0. As a result, nominal variable, presidential election, in this case has two levels.

In the dataset provided, the crime rate is measured by how many offenses per 100,000 populations in 1960. But it's difficult to implement crime rate into the analysis since the regional effects and presidential election cannot be incorporated into the data set, it's known that the number of offenses per 100,000 population but not sure which state it is. A new data set was introduced which describing 48 states crime index with corresponding states' names. In this case, regional and presidential effects are able to be conducted based on its state name. Crime index is calculated by the total number of offenses by two and crime rates provided in the data set is calculated by the total number of offenses per 100,000 populations. In essence, the two measures, crime rate and crime index, they are measuring the same thing. The relationship between crime index and crime rate is crime index= (crime rate)/2. So, crime index is a reliable measure and it has same effect with crime rates. All the 48 states' crime indexes with sates names were collected in 1960 from U.S. Bureau Statistics. Then, it can be applied with its corresponding region's name and presidential election preference.

2.2.2. Data collection for regression analysis

Next part of the research design is to analyse the regression models developed by Isaac Ehrlich in 1973. In the regression model developed by Issac (1973), he investigated the effect of wealth, inequality, racial composition, age composition, average time served in prison and unemployment on crime rates. The regression analysis is expected to be conducted based on the data set used by Isaac's previous study.

2.3. Method design

2.3.1. Method design for between-groups factorial ANOVA

The detailed procedures for Between-Groups Factorial ANOVA for testing the effects of regions and presidential election are 1) Estimating the Factorial Model 2) Check for assumptions 3) Determine significance of model 4) Interpretation of model. It first starts from estimating the model, as discussed above, dependent variable, crime index, is metric Independent variables, regions and presidential election, are categorical with 4 and 2 levels respectively. Research design is between-groups and it has three H0 and Ha respectively as shown below.

H0: The means of crime index are equal among 4 different regions.
Ha: The means of crime index are not equal among 4 different regions.
H0: The means of crime index are equal between two presidential election preferences.
Ha: The means of crime index are equal between two presidential election preferences.
H0: There is no interaction effect between regions and presidential election.
Ha: There is an interaction effect between regions and presidential election.

And as illustrated in the section above, it's a between-group research design. Secondly, a series of assumptions for Factorial ANOVA needs to be checked. 1) Normality of dependent variable, which is crime index. 2) Equal variances between conditions need also be satisfied. Then, all the relevant data will be imported in SPSS to get test statistics to analyse the significance of the model. Finally, based on those statistics, results of the research questions and hypotheses will be interpreted.

2.3.2. Method design for regression analysis

In order to perform a regression analysis, both dependent variable and independent variables are metric. Crime rates given in the data set and a series of independent variables including wealth, inequality, racial composition, age composition and so on, all of the variables listed above are metric, but crime rates which is the dependent variable needs to be normally distributed. The corresponding procedures for conducting a regression analysis as the following 1) estimating the models. The three regression models developed by Isaac Ehrlich are illustrated below.

Supply-of-offense Function:

$$Crime = AP^{b1}F^{b2}Y^{c1}Y^{c2}U^{d1}U^{d2}V^{e1}V^{e2}\exp(u)$$

a) Supply-of-offense equation: The effect of probability of imprisonment, averaged time served in prisons, wealth, inequality and racial composition on crime rates

$$\ln\text{Cri} = a + b_1 lnProb + b_2 lnTime + c_1 lnWealth + c_2 lnIneq + e_1 lnNW + u$$

b) Supply-of-offense equation: The effect of unemployment, labour force participation, and age composition on crime rates

$$\ln\text{Cri} = a + b_1 lnProb + b_2 lnTime + c_1 lnWealth + c_2 lnIneq + d_1 lnU1 + d_2 lnLF + e_1 lnNW + e_2 lnM.F + u$$

c) *Supply-of-offense equation*: The effect of regions: Southern states and Northern States on crime rates

$$\ln\text{Cri} = a + fD_{0+} b_1 lnProb + b_2 lnTime + c_1 lnWealth + c_2 lnIneq + e_1 lnNW + u$$

$$D_0 = \begin{cases} 0, & Northern\ states \\ 1, & Southern\ states \end{cases}$$

The first two regression models developed by Isaac were multiple linear regression models whereas the last one was the dummy regression model to test the effect of regions from the data provided, however it simplifies the regression model by analysing two regions given in the original considering only south and north.2) Conduct SPSS analysis 3) Determine significance of model, this refers to set the value of alpha, which is the probability of type 1 error (5% level applied in this report for all analysis) and compare the statistics to the value to determine whether the null hypothesis is correct. 4) Interpret the model, interpretation of the values of statistics in the context of 1960, and relevant explanations will be discussed in Results and Discussion section.

Additionally, a few problems also need to pay attention. First, the approximation method in this study uses Ordinary Least Squares (OLS) method, whereas Issac (1973) used Generalized Least Squares (GLS) method. The Gauss-Markov theorem indicates that errors with zero expectation and they need to uncorrelated to each other with equal variances (Homoscedastic), if all those assumptions satisfied, the estimators derived from regression using OLS are BLUE. Secondly, multicollinearity states that independent variables are not correlated to each other. If they are correlated, the regression model is not a good fit. Thirdly, Outliers in some circumstances have effect on the accuracy of the results but in this case, it is ignored since if crime rate in a region is relatively larger than others, it should be taken into

analysis rather than delete it. Finally, there should be linearity existing between dependent variable and independent variables. To sum up, 1) the variance of the errors should be constant 2) linearity relationship between dependent variable and independent variables 3) errors are independent distributed 4) independent variables are not correlated to each other.

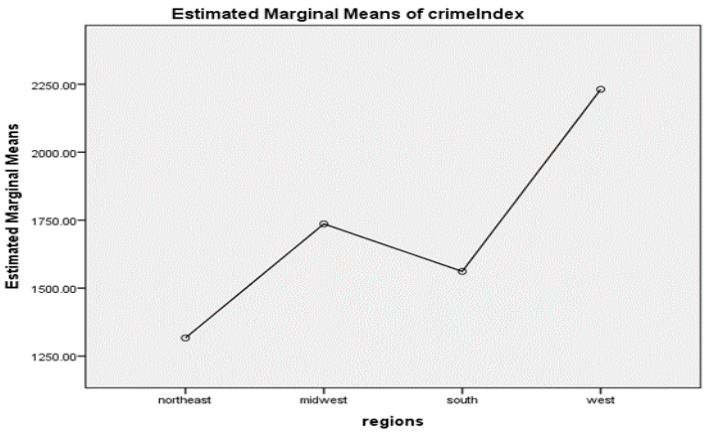
To solve the issues mentioned above, several tests will be conducted. 1) Residuals vs. Fitted value graph to detect if the points on the plot are randomly scattered around zero. If the residuals increase or decrease with the fitted values in a pattern, the errors may not have constant variance(Matti, 2014) . 2) Durbin-Watson test applied to detect if the residuals are corrected to each other, if the statistic is around zero, it is suspected residuals have some patterns correlating to each other. 3) Use Step-wise method to detect multicollinearity, if the correlation of any combination of two independent variables above 0.7, then multicollinearity detected (Grande, 2017).

3. Results

3.1. Results for regional and presidential effect (Between-Groups Factorial ANOVA)

Crime rates across 47 states are transformed to crime indexes with corresponding regions and presidential election. Averages of crime index between regions and presidential election were calculated. No missing values (0%) found in SPSS which indicates that all observations all included in the dataset. Regional effect and presidential effect were tested through Between-Groups Factorial ANOVA and regions and presidential election are all between-subjects variables. Kolmogorov-Smirnov test shows the crime index is normally distributed as sig. > 0.05, the H0, which states the normality assumption, is not rejected. [Kolmogorov-Smirnov=0.123, p=0.065]. Main effect of regions and presidential election and their interaction effect were tested in a Between-Groups Factorial ANOVA analysis. If the main effects are significant, pairwise comparisons will be applied to find which two pairs of regions are significant. Levene's Test indicates that the variances of the dependent variables are equal across groups, which satisfied the assumption of equal variances. [F (6, 41) =0.532, p=0.781]. The regional effect [F (3, 41) =2.916, p=0.046] yields a significant main effect for crime index but both presidential election [F (1, 41) =0.014, p=0.905] and their interaction effect [F (2, 41) =0.448, p= 0.642] were not significant. Differences between regions were investigated by pairwise comparison with Bonferroni adjustment. However, with pairwise comparison analysis, all the possible combinations turned out to be not significant. The possible answer from Jose Zubcoff (2017) could be due to the sensitivity of ANOVA. One of the solutions is to choose another a different pairwise test to further compare the effects or just look at the marginal mean plots. From pairwise comparison with LSD adjustment, Northeast and West regions are significantly different this time with [p = 0.018, SD. = 370.73, mean difference = 914.171]. From the Marginal means of crime index, it shows the same result that West and Northeast are significantly different with the largest distance of the marginal means on the plot. See the figure 1 below. From the results above, it can be inferred that we can reject H0: The means of crime index are equal among 4 different regions since the main effect of regions is significant and with a significantly different LSD pairwise comparison of Northeast and West regions. However, H0: The means of crime index are equal between two presidential election preferences and H0: There is no interaction effect between regions and presidential election cannot be rejected since their p-values reported insignificant values.

Figure 1. Marginal means of Crime Index



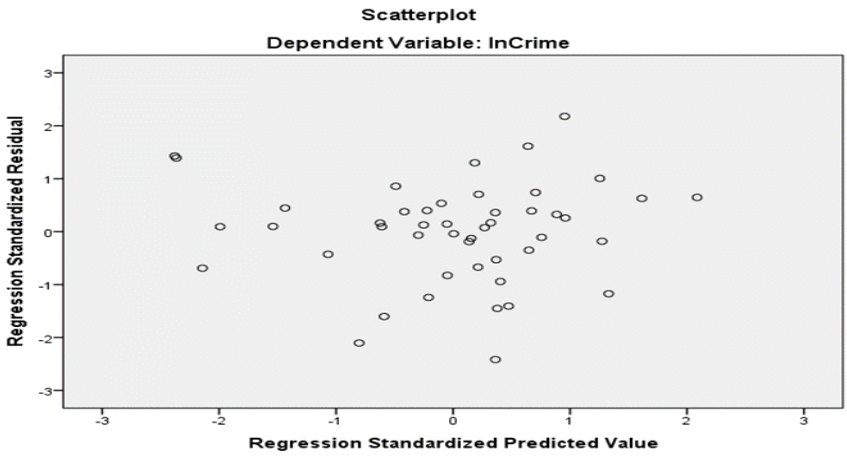
Source: Author.

3.2. Results for regression analysis

3.2.1. Results for the effects of the effects of probability of imprisonment, wealth, inequality and racial composition on crime rates

Regression analysis was used to test the effect of the different factors on the evaluation of the crime rates. (Bouten, Hultink and Snelders, 2006) Normality assumption of independent variable, crime rates, is satisfied with a Kolmogorov-Smirnov test [Kolmogorov-Smirnov=0.987, p=0.20]. The scatterplot of residuals on y-axis and predicted values of crime index on x-axis shows a rectangular pattern of the dots in the plot which indicates that homoscedasticity not violated and same for linearity. See the figure 2 below. But sometimes making judgement based on graphical approach is not accurate, so Breusch-Pagan and Koenker tests were introduced to test homoscedasticity assumption. Both two tests showed that homoscedasticity assumption not violated as the test statistics for Breusch-Pagan [BP=8.845, p=0.165] and [Koenker=7.838, p=0.165]. For detecting multicollinearity, there are two possible approaches, Variance Inflation Factor (VIF) is computed, and all of the values are below threshold 3except ln (Wealth) [VIF =4.628] and ln(Ineq) [VIF=5.275]. Another approach used to detect multicollinearity is to use bivariate correlation scores between predictors to decide if there is a multicollinearity issue and the threshold in this case is 0.7. Wealth and Inequality with correlation of -0.862 indicates that they are highly correlated to each other and this value is beyond 0.7. One possible explanation from Kuznets (1955) is that developing countries are more unequal than developed countries. Apart from this, Durbin-Watson test statistics [Durbin-Watson= 2.036] states that there is not severe correlation between residuals, since Durbin-Watson test statistics is always between 0-4, and a value close 0 means positive autocorrelation and a value approaching 4 means negative autocorrelation, whereas a value close to 2 means no autocorrelation in the sample (Datt and Shruti, 2017). All the assumptions are satisfied except the correlation between wealth and inequality, possible solutions will be discussed in the discussion.

Figure 2. Scatterplot for Residuals and Predicted Values



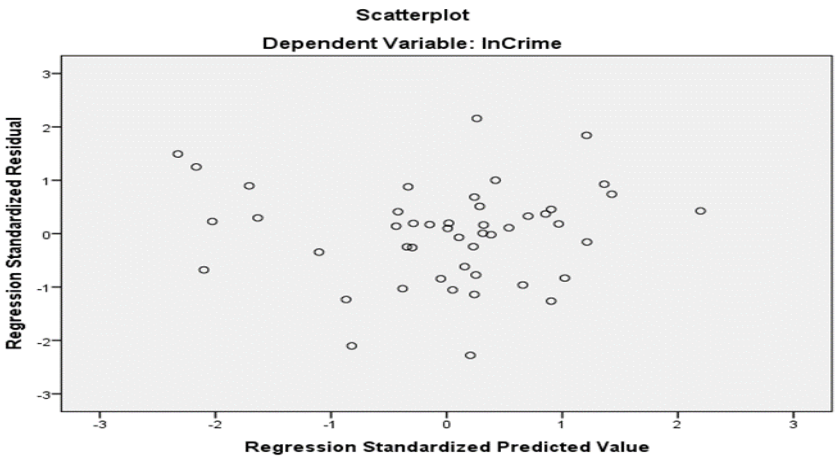
Source: Author.

The analysis of the regression showed that all predictors including Time (average time served in prison) [β= -0.55, t= -2.763, p= 0.09], Non-White (racial composition) [β=0.197, t= 4.797, p=0.00], Wealth [β= 1.561, t=3.827, p=0.00], Prob (Probability of imprisonment) [β= -0.452, t= -3.816, p=0.00] and Ineq (Inequality) [β=1.077, t=0.423, p= 0.015], all of the predictors provided a significant effects on explaining crime rates. A 1 per cent increase in Time will result in a 0.55 per cent decrease in crime rate, a 1 per cent increase in non-white racial composition will incur a 0.20 per cent increase in crime rates, and one per cent increase in wealth will attract more criminals to participate in illegal activities by 1.561 per cent. Also, one per cent increase in probability of imprisonment will decrease the crime rates by 0.45 per cent. One per cent increase in inequality increases crime rates by 1.08 per cent. All results interpreted using per cent rather than unit since the regression function following a natural log form. The overall fit of the model is also significant with a [F (5, 41) = 15.781, p=0.00] and the R square value of 0.658 which indicates that the model explained 65.8% of the variance in crime rates, which is a fairly good model. So, we can reject H0: The model stating the effects of probability of imprisonment, average time served in prison, wealth, inequality and racial composition developed by Isaac has no difference compared with mean only model and in favour of Ha.

3.2.2. Results for the effects of unemployment, labour force participation, and age composition on crime rates

This model has more predictors compared with the last one, unemployment; labour force participation and age composition were incorporated to test if these predictors are significant and if the model is a good fit. In this model, multicollinearity assumptions, homoscedasticity and linearity need to be rechecked. From the scatterplot for residuals and predicted values, see the figure 3 below, it can infer that homoscedasticity and linearity assumed. To further test the homoscedasticity without using graphical method, we use Breusch-Pagan and Koenker again to detect homoscedasticity. Both test statistics and p-values are significant showing that homoscedasticity is not violated. [Breusch-pagan=8.004, p-value=0.433, Koenker= 6.870, p-value = 0.551]. Durbin-Watson test is around 2.035, which means no auto correlation discovered in residuals. For multicollinearity assumption, except the one which has been discovered in the last model the rest of the predictors' VIF are all below the threshold, which is 3. The same result applied for correlation analysis, except wealth and inequality, all the Pearson Correlation values are below 0.7.

Figure 3. Scatterplot for Residuals and Predicted Values



Source: Author.

The analysis of the regression showed that predictor unemployment [β= 0.091, t=0.408, p= 0.608], labour force participation [[β= 0.614, t=1.045, p= 0.302] and percentages of Males [β= 1.168, t=2.006, p= 0.052]. All of the predictors added by Isaac to the new model in his 1973's paper were not significant. But the R square improved by approximately 5% [R^2=0.7] showing that 70% of the variance can be explained by regression model. The regression model also gives a significant result by [F (8, 38) = 11.072, p-value = 0.00]. Since the effects of unemployment, labour force participation and age composition are all not significant due to their above 0.05 significance value, we cannot say the model is significant even though the p value of F is smaller than 0.05. In this case, to answer the research question "Are the effects of unemployment, labour force participation and age composition significant on crime rates based on existing model?", based on the results of P value of F and t-test statistics of the predictors, H0 can not be rejected. In conclusion, this model doesn't really make sense.

3.2.3. Results for the effects of Southern and Northern States

This model has the same predictors compared to the first one but considering the effect of dummy variable, indicator of southern state. The dummy variable in the data set is coded as if it's 1 indicating southern state, otherwise representing a northern state. If dummy variable equals 1, the regression is a model analysing only the effect of southern states and as well other predictors in the regression and if dummy variable equals 0, the regression gives a model measuring the northern states and relevant predictors. The difference between these two regression models shows intercept difference between southern state and northern state and it is represented by the coefficient of the estimator of D_0, which is f as the equation stated. After running the regression, the estimator of D_0 is 0.035 which gives a 0.035 unit increase of crime rates if the state is southern. But this 0.035 unit increase is not significant compared to its 0.145 SD, so the p-value is not significant [β= 0.035, t=0.244, p-value =0.809]. According to the latest report from Erin (2013), which states that Southern regions are more violent than the rest of U.S. There is a tiny effect of the difference of crime rates between northern and southern states but this 0.035 effect is not significant based on its p-value, so we can't reject the H0.

4. Discussion

4.1. Discussion of the effects of regions and presidential election (Between-Groups Factorial ANOVA)

4.1.1. Findings

The study of the effects of regions and presidential election examined influences of categorical variables on crime index. The results showed only regions have main effect on crime rate with a significant difference between Northeast and West regions on the basis of LSD adjustment rather than Bonferroni. Presidential election shows that there is no significant effect and the same applies for their interaction effect. So, we can conclude that there is a regional main effect on crime rate but no presidential effect and interaction effect. This finding is different from the situation in 2000s, where south region has the highest crime rates with 3370.8 per 100,000 population based on FBI's annual report (2017). In 1960s, according to Pinker (2017) who proposed that U.S. experienced a U-shaped curve of crime rates reaching the lowest point in 1960s and highest in 1990s. Other possible explanations could be the development of the Western regions in U.S. With the development of IT industry, western regions in U.S. especially in California has developed compared with the circumstance in 1960 which has gained more civilization to decrease the crime rate.

As for the presidential effect, the result shows an insignificant effect of the predictor and this result also against the expectation. In 2016, the regions with democratic voters experienced higher rates of crime, but in the context of 1960, this difference hasn't been discovered. In 2016, regions voting for Trump and Clinton are clustered across the country but in 1960 there were only 8 states voting for Stevenson and all states voting for Stevenson clustered in the southeast. This geographical phenomenon was part of the reason leading the result insignificant. Eisenhower won the election in 1956 with absolute advantages and this trend continued for two terms. Generally, the presidency needs to be served for two terms and he was also a five-star general at that time. 1956 was his second term of the presidency it's believed that he could win the election among the voters in U.S. at that time also due to his identity as a general. Those factors reshaped the dispersion of the results of the election, which also contributed to an insignificant result. Trump and Clinton's election was different from that, after the retirement of Obama, two new candidates were running for the new president and voters couldn't predict who would win the election as they could predicted when Eisenhower was running the election.

4.1.2. Methodological limits

The limitation of this research design was the effect of the historical event which has been discussed above. To analysis the effect of the presidential election, it needs to consider whether the president would continue as his second term. If it's believed the president would continue his/her presidency, he/she would gain more voters compared with his/her opponent, which will lead the dispersion of the election results uneven. In our dataset in the context of 1960, there were only 8 states out of 50 voted for Stevenson, which seems biased.

When conducting the pairwise comparison of regions to find which combination is significant, it showed all pairs were not significantly different under Bonferroni adjustment, but the overall regional effect was significant. And as explained in the Result section, this is mainly due to the sensitivity of ANOVA (Greater than the pairwise test sensitivity). The ANOVA detect lower variability around mean when pairwise test hardly distinguishes between the pair's mean. As a result, it shifted to LSD pairwise adjustment and looked at the marginal means plot. The sensitivity of ANOVA compared to pairwise test sometimes would need to adjust the comparison method.

The presidential effect is not generalizable as what has found in 1956 is significantly inconsistent from the result in 2016. It can be generalized to predict the year in future given the changes of each year's result.

4.1.3. Recommendations

For future research, one needs to identify the context of the research construct. What year of the research construct is needed to investigate? Is there a historical issue affecting the variables that we want to investigate? Those factors will have substantial effect on the results and may incur a different expectation. Regions differential of crime rates discovered in 1960 and until now there is still a significant difference between regions and crime rates. This indicates the under-development of some regions and lack of administration in term of crime control. Broadly speaking, underdeveloped regions in the world tend to be more violent and developed regions tend to be less participation in crime activities. If a regional effect discovered in a country, government needs to consider and balance the budget to underdeveloped regions and enforce the law to the crime events. Less crime rates' regions also tend to have more GDP growth, since there would be less economic losses which would stimulate the economic growth. It's necessary for government to eliminate the unequal crime rates dispersion across states to gain economic growth.

4.2. Discussion of the regression analysis

4.2.1. Findings

Regression models developed by Isaac were analysed using OLS method in this study. The effects of probability of punishment (average time served in prison, probability of imprisonment), wealth, inequality and racial composition were analysed in the first model. Increases in punishment of criminal events will decrease the crime rates and increases in wealth, inequality and racial composition of non-white will increase the crime rates. For the second model, when adding the factors of unemployment, labour force participation and age composition, all of these factors were insignificant in explaining crime rates. Since the models developed by Isaac were analysed in this study, he used *weighted* OLS to estimate the first model, and 2SLS and SUR to estimate the second model. In our analysis method, we applied OLS to all the models. That's the reason why we got different results compared with Isaac. But based on results derived from this study, it found several factors including punishment of illegal activities; wealth, inequality and racial composition were significant. For the hypothesis developed in the introduction, except the first model, the rest of them were insignificant, as the t-statistics of the estimators of unemployment, labour force, age composition and estimate of dummy variable as well. Increasing the severity of punishment of participating illegal activities will decrease the crime rates. This indicates that criminals value the pay-off of participating criminal activities. Participating illegal activities will make criminals get wealth (transferable assets) from robbery, burglary or larceny. But it's also risky for offenders to be caught, and get punishment for violating the laws. The punishment less the wealth is the net pay-off of participating illegal activities. Increase in punishment will make the net pay-off less compared with before. So, offenders have less incentive to do criminal activities. But if there is an increase in wealth, the net pay-off of participating illegal activities will increase which will attract more criminals. The definition of wealth defined by Isaac is the transferable assets, such as auto, jewellery or cash. If valuable transferrable assets are easily to be stolen, the criminals will be attracted and go to the street and starting their illegal activities. Inequality is a measure of distribution of wealth; inequality represents economic development of a region. If a region with high inequality, that shows rich people have the majority of the total wealth but poor people have little. This will also give poor people incentives to steal things from others. In the context of 1960, the result also shows non-white composition typically means more offenses.

4.2.2. Limitation of the models

Several assumptions have been tested and multicollinearity has been found between wealth and inequality. This gave an inaccurate regression model. But for simplicity, it is ignored. In reality, if a precise expression of the model is expected to present. Alternatives should be considered as follows: 1) Remove highly correlated predictors from the model. 2) Use Partial Least Squares Regression (PLS) or Principal Components Analysis, regression methods that cut the number of predictors to a smaller set of uncorrelated components.

Isaac also used a different method to estimate the coefficient. But for simplicity, we only applied OLS for all the models rather than using 2SLS, SUR as what he did in the paper. Sometimes OLS is not BLUE especially when residuals are not independent or residuals are correlated to predictors (Endogeneity). Other possible estimation method needs to apply, such as GLS when the assumptions violated.

The data set used to compute in regression analysis was not a perfect representative as discussed previously stating that the dataset was in the context of 1960. The structural changes of the world economy and changes of development of regions reshaped the people's incentives to participate in illegal activities. The estimates of coefficients are changing over time as the development of economies so we need to consider those factors. The severity and incentives of illegal activities in the context of 1960's is different from today.

4.2.3. Recommendations

For future research, it is worth to investigate the effect of the significant factors which have been analysed in this report using data set of the past 10 years rather than 1960's and see how significant the factors are and what's the difference of the β's compared with 1960's. Governments should aware the significant predictors of regression to control criminal activities. Increasing punishment and extend the time served in prison or incurring financial penalty have been proved to be effective methods to reduce crime rates. Government should also consider balance inequality in the society; inequality also plays an important role in both the development of economy and crime rate control. In 1960, non-white society tends to be more violent and this is questionable in the context of 2017. Relevant hypotheses need to be tested as well since the development of the economy and society during the past 50 years reshaped the social identity of racial composition. Transferable asset protection could also decrease the criminal activities, both individuals and government can consider placing their valuable assets in a safe condition to reduce the probability getting stolen so that offenders cannot get chances to participating in illegal activities.

References

Beattie, R.H. (1960). Criminal Statistics in The United States 1960, *The Journal of Criminal Law, Criminology, and Police Science*, 51(1), pp. 49.

Bestplaces.net. (2019). *"America's Best and Worst Cities for Crime",* Available at: http://www.bestplaces.net.

Bouten, L. Dirk. S. and Erik. J.H. (2011). The Impact of Fit Measures on The Consumer Evaluation of New Co-Branded Products. *Journal of Product Innovation Management*, 28(4), pp. 455-469.

Buonanno, P. and Leonida, L. (2009). Non-market effects of education on crime: Evidence from Italian regions. *Economics of Education Review*, 28(1), pp. 11-17.

Datt, S. (2017). Limitations and Weakness of Quantitative Research Method. *Knowledge Tank*.

Ehrlich, I. (1973). Participation in Illegitimate Activities: A Theoretical and Empirical Investigation. *Journal of Political Economy*, 81(3), pp. 521-565

Fabrycy, M.Z. (1975). Multicollinearity Caused By Specification Errors. *Applied Statistics*. 24(2), pp. 250.

MATEI, A. (2014). Developing ECEC in Romania: between Perceptions and Social Realities, *Revista Romaneasca pentru Educatie Multidimensionala*, 06(02), pp.111-118.

Pinker, S. (2017). *"Decivilization in the 1960s".* Available at: http://www.quodlib.umich.edu.

Sudehna, S.D. (2017). *"False: Maps Show High Crime Rates Where Democrats Vote*", Available at: http://www.snopes.com.

Tew, B. and Simmon, K. (1956). Income and Wealth. *Economica*, 23(90), pp. 196.

Wadvcki, W.J. and Steven. B. (1979). "Participation In Illegitimate Activities: Forst's Model Revisited". *Journal of Behavioral Economics*, 8(2), pp. 151-163.

Zubcoff, J. (2017). *"Cross Validated*". Available at: http://www.statsstackexchange.com.

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ALESSANDRO CARDINALI[1] AND ELISABETTA MENSALI[2]

THE LONG-RUN EQUILIBRIUM OF FOREIGN EXCHANGE MARKETS AFTER THE SUBPRIME CRISIS

Abstract

Cointegration is a statistical concept that has always been associated with the economic concept of equilibrium. This is a static relationship commonly called long-run equilibrium between two or more financial time series. When this dependency exists, the mean-reversion logic holds: cointegrated time series, as stated in 'Granger's representation theorem', cannot drift too far apart from equilibrium, because an error correction term, represented in practice by various economic mechanisms, will act to restore such equilibrium. Thus, a long-term relationship implies the that an error correction term in the model automatically exists and this error correction term captures every short-run dynamics of the system, by quantifying deviations from the long-run, therefore it contains information regarding the future movement of one variable based on past prices. According to this fundamental property and since Granger's work and recommendation, cointegration has been widely used in the foreign exchange market to test for market efficiency. This linkage is of particular interest for investors and traders looking at any possible arbitrage opportunity. However, relatively recent studies suggested that cointegration is not suitable for testing market efficiency and consequently market predictability at any period. Our study uses the multivariate Johansen's approach to investigate the presence of co-movements among some of the most important exchange rates after the subprime crisis. Our main purpose is not to provide investors with advice on trading or portfolio diversification but to look at whether the recent subprime financial crisis has modified the long-run equilibrium in Foreign Exchange markets.

Keywords: Cointegration, exchange rates, long-run equilibrium

JEL Codes: C50, C51, C58

1. Introduction

Since Granger (1981) seminal work, cointegration has been widely used in the economic literature to investigate the long-run dynamics of foreign exchange rate markets. Many studies used cointegration as a (weak) test for market efficiency in the sense of Fama (1970), who suggested that in an efficient market prices fully reflect all available information and excess profits are not available to market participants. In terms of cointegration, this means that an efficient market does not reject the hypothesis of no cointegrated time series.

MacDonald and Talyor (1989) rejected the existence of cointegration for the currency pairs French Franc/US-Dollar and Deutsche Bank/US-Dollar, while Hakkio and Rush (1989) in investigating seven daily exchange rates during the first half of the 1980s did not, by applying a multivariate Johansen's procedure.

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Haug, Mackinnon, Michelis (2000) and Rangvid and Sorensen (2002) found that exchange rates were cointegrated over an extended time period before the inception of the European Union in 1999, and they interpreted this result as evidence of stability and credibility of the EU exchange rate policy, giving rise to the debate on whether or not cointegration in the FX market implies inefficiency. Aroskar, Sarkar, and Swanson (2004) concluded about a weak form of inefficiency analyzing the daily spot exchange rates of the EU currencies during the crisis in years 1992-1993. Cointegration was found among Asian daily spot exchange rates by Araksar and Swanson (2002), and Jeon and Seo (2003) during the Asian crisis of 1997 and 1998. The last two results were re-examined in Phengpis (2006), who applied Johansen's method and showed that the european and asian currencies were cointegrated during their crisis in 1992-1993 and 1997-1998, respectively. Kühl (2007) applied multivariate cointegration analysis to investigate whether "the introduction of the Euro has resulted in inefficient markets". This study considered the exchange rate between US Dollar and Australian Dollar, Canadian Dollar, Swiss Franc, British Sterling Pound, Euro, and the Swedish Krona. Their results showed that a long-run equilibrium relationship linked the EUR/USD and the GBP/USD exchange rates, and emphasized that the FX market was "just broadly consistent with the market efficiency hypothesis".

Phengpis (2006) suggested that cointegration might be not suitable for testing market efficiency and consequently market predictability at any period. This paper investigates the existence of co-movements among six currency pairs after the 2008 subprime crisis by conducting a multivariate cointegration analysis. Section 2 presents the methods that will be used in our analysis, whereas Section 3 ilustrates the results of the empirical analysis. Section 4 concludes.

2. Cointegration and error correction

Several important economic and financial time series such as Gross National Product, asset prices and unemployment rates typically do not have a clear tendency to return to a constant value or a linear trend, and in statistical terms would be termed as Integrated, or Unit Root, processes. Integrated processes of (integer) order d are often referred as $I(d)$ processes and are characterized by an unconditional variance increasing at the polynomial rate t^d, for t = 1,2,.. and $d \geq 1$. Classical regression analysis of these data leads to inconsistent parameter estimation (the spurious regression problem). Granger (1981, 1983) provided the necessary framework to analyze these data. Since then, cointegration analysis has been very used in the literature to test for market efficiency as recommended in Granger (1986). The cointegration framework deals with regression on unit root time series. A variety of tests (such as the Augmented Dickey-Fuller test) are available to identify Integrated processes of a given integer order $d > 0$. Then a vector $\boldsymbol{x_t} = (\boldsymbol{x_{1t}}, \boldsymbol{x_{2t}}, \dots, \boldsymbol{x_{mt}})$ of $I(1)$ time series is cointegrated, if there is a vector $\boldsymbol{\beta}$ of deterministic parameters**,** (the cointegrating vector**)**, such that the series $\boldsymbol{z_t} = \boldsymbol{\beta^T x_t}$ is $I(0)$. Consequently $\boldsymbol{x_t}$ is referred to as the vector of cointegrated series and the linear combination z_t represents its long-run equilibrium relationship. Therefore, one of the greatest merits of cointegration is that of providing a statistically rigorous framework with an economic meaningful interpretation.

The paper by Engle-Granger (1987) established that if two unit root time series are cointegrated then at any time a relation exists between the expected variation of these series and the long-run equilibrium z_t. This relation is formalized by the Error Correction Model (ECM), which is a regression model linking the long and short run behavior of cointegrated series. This approach has been generalized in a series of papers which have been summarized in Johansen (1995), to a multivariate model of arbitrary dimension, the so called Vector Error Correction Model (VECM). In this framework, a vector error correction model of order *p*, is defined as

$$\boldsymbol{\Delta x_t} = \boldsymbol{\Phi D_t} + \boldsymbol{\Pi x_{t-1}} + \boldsymbol{\Gamma_1 \Delta x_{t-1}} + \boldsymbol{\Gamma_2 \Delta x_{t-2}} + \ldots + \boldsymbol{\Gamma_p \Delta x_{t-p}} + \boldsymbol{\varepsilon_t},\ t = 1, \ldots, T \qquad (1)$$

where $\boldsymbol{\varepsilon_t}$ is an *m*-dimensional vector of i.i.d. Gaussian random variables with zero mean and constant variance, $\boldsymbol{\Phi D_t}$ represents the deterministic system components, $\boldsymbol{\Pi}$ is a square matrix containing the relation between $\boldsymbol{x_{t-1}}$ and the adjustments $\boldsymbol{\Delta x_t}$, whereas the matrices $\boldsymbol{\Gamma_i}$, for $i = 1, 2, \ldots, p$, contain the short-run coefficients concerning the *p* lagged differences of the vector process. A VECM(*p*) system admits the presence of multiple cointegrating vectors, whose number corresponds to the rank of the matrix $\boldsymbol{\Pi}$. In the representation (1) the term $\boldsymbol{\Pi x_{t-1}}$ represents the error correction term acting to restore the long-run equilibrium. A cointegrated system implies the existence of the factorization

$$\boldsymbol{\Pi} = \boldsymbol{\alpha \beta^T} \qquad (2)$$

where the matrices $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ have both dimension (*m x r*) and *r* is the number of cointegrating vectors (and also the rank of $\boldsymbol{\Pi}$). Note that each column in $\boldsymbol{\beta^T}$ contains a distinct cointegrating vector, whereas the matrix $\boldsymbol{\alpha}$ contains the coefficients linking the *r* cointegrated series $\boldsymbol{z_{t-1}} = \boldsymbol{\beta^T x_{t-1}}$ to the successive adjustment for each indidual series, that is $\boldsymbol{\Delta x_t}$. In this framework two different likelihood ratio tests can be used to determine the cointegrating rank *r*: the Johansen's trace test and the Johansen's maximum eigenvalue test (Johansen, 1995). The deterministic component $\boldsymbol{\Phi D_t}$ can be specified as an intercept or linear trend for either $\boldsymbol{\Delta x_t}$ or $\boldsymbol{\Pi x_{t-1}}$. A large part of literature concurred that when analysing cointegrated exchange rates an intercept term for the cointegrated series $\boldsymbol{z_{t-1}}$ should be considered. In this case we will set $\boldsymbol{\Phi D_t} = \boldsymbol{\alpha \rho_0}$, where $\boldsymbol{\rho_0}$ is a vector of intercepts for the $\boldsymbol{z_{t-1}}$ series and $\boldsymbol{\alpha}$ has been defined in (2). We will therefore fit the following VECM(p) specification to our data:

$$\boldsymbol{\Delta x_t} = \boldsymbol{\alpha}\left(\boldsymbol{\beta^T x_{t-1}} + \boldsymbol{\rho_0}\right) + \boldsymbol{\Gamma_1 \Delta x_{t-1}} + \boldsymbol{\Gamma_2 \Delta x_{t-2}} + \ldots + \boldsymbol{\Gamma_p \Delta x_{t-p}} + \boldsymbol{\varepsilon_t}, \qquad (3)$$

Where the relevant quantities are analogous those in (1).

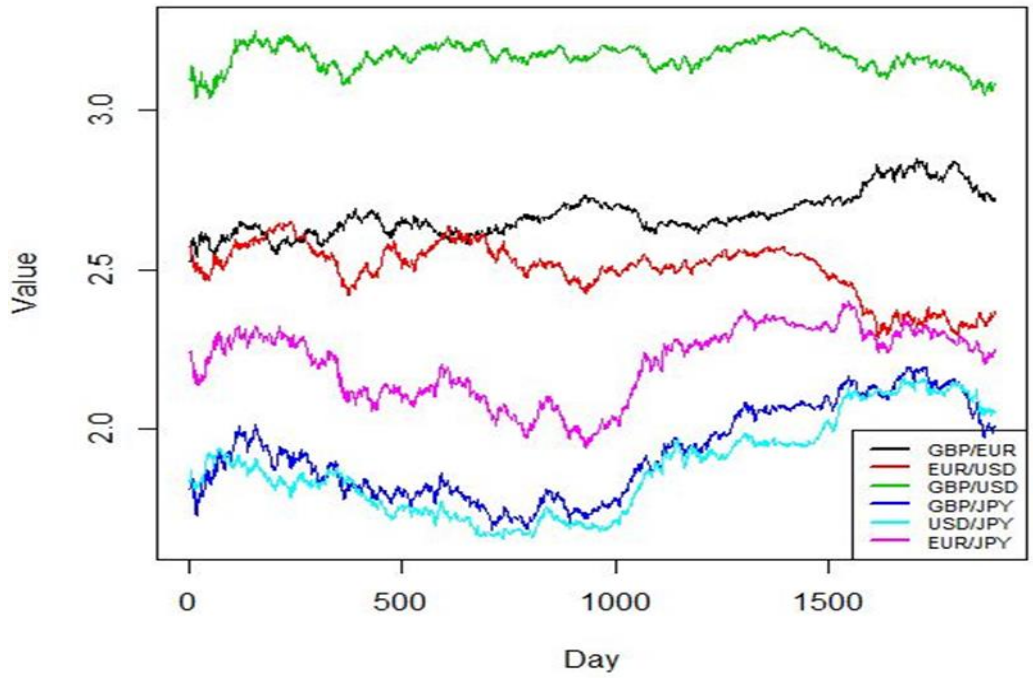
3. Empirical results

A cointegration analysis of closing daily exchange rates obtained from Yahoo finance has been carried out by using the statistical software R (R Core Team, 2018) and the R package urca (Pfaff, 2008). Our analysis considers the most traded currencies, namely: the United States Dollar (USD), the Euro (EUR), the British Sterling Pound (GBP) and the Japanese Yen (JPY). We therefore use daily quotes for the following exchange rates: GBP/EUR, EUR/USD, GBP/USD, GBP/JPY, USD/JPY and EUR/JPY. In the following we will refer to the corresponding vector of log-data at time *t* as

$$\boldsymbol{x_t} = (\boldsymbol{x_t^{GE}}, \boldsymbol{x_t^{EU}}, \boldsymbol{x_t^{GU}}, \boldsymbol{x_t^{GJ}}, \boldsymbol{x_t^{UJ}}, \boldsymbol{x_t^{EJ}}) \quad (4)$$

In particular, our dataset spans a seven year time period running from January 01, 2009 to March 31, 2016 for a total of 1891 observations in each series. We did not include further data to avoid the bias due to a significant shock brought by the Brexit referendum in the United Kingdom. Figure 1 illustrates the series of log-exchange rates, rescaled by their standard deviations.

Figure 1. Rescaled daily exchange rate quotes



Source: Own calculation using R on Yahoo Finance Data.

The presence of unit roots in these series would be the necessary condition for a meaningful cointegration analysis. We checked this assumption using the Augmented Dickey-Fuller test and the null hypothesis of non-stationarity was not rejected at the 5% significant level in all the series. To determine the integration order, the test was also applied to the differenced series, but then the null hypothesis was always rejected. This further evidence confirmed the exchange rates data to be integrated processes of order one, or $I(1)$**.** Model selection based on the AIC indicated that a VECM(2) was the most appropriate model for our data.

Both Johansen's Trace and Maximum Eigenvalue tests indicate the presence of three cointegrating relationships at 5% significance level. Each rows of the matrix $\boldsymbol{\beta^T}$ contains one of the three cointegrating vectors determined imposing a standard normalization (Johansen, 1995). In order to obtain a sparse representation of the cointegrating vectors we test linear restrictions implying the coefficients to be rounded to their nearest integer. Note that we do not impose restrictions on the restricted constants which are estimated as

$$\widehat{\boldsymbol{\rho}}_{\boldsymbol{0}}^{\boldsymbol{T}} = (-0.00005, -0.0015, -0.0023),$$

whereas the sparse estimation for the cointegrating vectors leads to $\widehat{\boldsymbol{\beta}} = (\widehat{\boldsymbol{\beta}_1}, \widehat{\boldsymbol{\beta}_2}, \widehat{\boldsymbol{\beta}_3})$**,** where

$$\widehat{\boldsymbol{\beta}_1} = (\mathbf{1}, \mathbf{0}, \mathbf{0}, -\mathbf{1}, \mathbf{0}, \mathbf{1})^T$$
$$\widehat{\boldsymbol{\beta}_2} = (\mathbf{0}, \mathbf{1}, \mathbf{0}, \mathbf{0}, \mathbf{1}, -\mathbf{1})^{\boldsymbol{T}}$$
$$\widehat{\boldsymbol{\beta}_3} = (\mathbf{0}, \mathbf{0}, \mathbf{1}, -\mathbf{1}, \mathbf{1}, \mathbf{0})^{\boldsymbol{T}}$$

are the estimated cointegrating vectors. The coefficients of $\widehat{\boldsymbol{\beta}_1}$ show that in the long-run an *x%* increase in the GBP/JPY would be accompanied by an *x%* increase in the GBP/EUR and an *x%* increase in the EUR/JPY would be paired by an *x%* decrease in the GBP/EUR. Similarly for $\widehat{\boldsymbol{\beta}_2}$: an *x*% increase in the USD/JPY would be accompanied by an *x*% decrease in the EUR/USD and by an *x*% increase in the EUR/JPY along with an *x*% increase in the EUR/USD. Finally for $\widehat{\boldsymbol{\beta}_3}$: an *x*% increase in the GBP/JPY leads to an *x*% increase in the GBP/USD and an *x*% increase in the USD/JPY leads to an *x*% decrease in the GBP/USD. Although constant terms are quite small, they are kept within the cointegrating space because this is now common practice in the literature of cointegrated exchange rates. Further insights on the error correction relations characterizing these data can be obtained by looking at the matrix $\boldsymbol{\alpha}$ containing the adjustment coeffients. Looking at the significance tests for the corresponding estimated coefficients we can derive the (possibly sparse) estimated matrix $\widehat{\boldsymbol{\alpha}}$, whose transpose is given by

$$\widehat{\boldsymbol{\alpha}}^{\boldsymbol{T}} = \begin{pmatrix} 0, & 0, & 0,0, & 0, & 0 \\ 0, & -1, & 0,0,0, & 0, & 0 \\ 0, & .55, & 0,0, & -.75, & 0 \end{pmatrix}$$

These estimated coefficients provide evidence about the presence of significant error correction for both the EUR/USD and USD/JPY exchange rate log-differences. When considering the EUR/USD exchange rate as a dependent variable, two significant error correction terms describe the short-term adjustment to the long-run equilibrium; the adjustment speeds with respect the cointegrated series driven by $\widehat{\boldsymbol{\beta}_2}$ and $\widehat{\boldsymbol{\beta}_3}$ are equal to -1 and 0.55, respectively. This implies that in the first case the entire disequilibrium is recovered in one day, whereas in the second case the positive sign of the adjustment coefficient indicates that the system is also subjected to forces that (mildly) perturbate its stability. The adjustment speed for the first term is faster than the adjustment for the second one since both the Euro and the US Dollar are in the corrisponding cointegrated series. Moreover, looking at the coefficients for the lagged differences reveal that the log-difference of EUR/USD rate also depends on its own first lagged differences and on the first two lagged differences fot the GBP/USD and the USD/JPY exchange rates.

When considering the USD/JPY exchange rate log-differences as dependent variable, about 75% of the disequilibrium is corrected over one day. Note that this adjustment is with respect the cointegrated series driven by the $\widehat{\boldsymbol{\beta}_3}$ coefficients. The first lagged difference for the logs of EUR/USD, GBP/USD and USD/JPY exchange rates have also a significant effect as well as the second lagged difference for the log GBP/USD and the log USD/JPY exchange rates.

4. Conclusions

The empirical results of our analysis show that all exchange rates are integrated processes of the first order. Moreover, Johansesn's trace and maximum eigenvalue tests both indicated the presence of three distinct cointegrating relationships. Specifically, long-run co-movements in the Forex market for the period 01 January 2009 – 31 March 2016, characterize the EUR/USD and the USD/JPY exchange rates. In terms of market efficiency, since the null hypothesis of no cointegrated time series has been rejected, we have evidence that the foreign exchange market is only partially efficient due to the presence of three cointegrating relations involving the currency pairs EUR/USD and USD/JPY. Consequently, if relying on Granger's recommendation, there is some evidence that investors could gain excess profits by exploiting the adjustment coefficients to the long-run equilibrium.

References

Aroskar, R., S. K. Sarkar and P. E. Swanson (2004). European Foreign Exchange Market Efficiency: Evidence based on Crisis and Noncrisis Periods. *International Reviews of Financial Analysis*, 13, 333–347.

Baffes, J. (1994). Does Comovement among Exchange Rates imply Market Efficiency? E*conomics Letters*, 44, 273–280.

Baillie, R. T. and T. Bollerslev (1989). Common Stochastic Trends in a System of Exchange Rates. *The Journal of Finance*, 44, 167–181.

Dwyer, Jr., G. P. and M. S. Wallace (1992). Cointegration and Market Efficency. *Journal of International Money and Finance*, 11, 318–327.

Engle, R. F. and C.W.J. Granger (1987). Co-Integration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55, 251–276.

Engel, C. (1996). A Note on Cointegration and International Capital Market Efficiency.*Journal of International Money and Finance*, 15, 657–660.

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, 25, 383–417.

Granger, C.W.J. (1981). Some Properties of Time Series Data and their Use in Econometric Model Specification. *Journal of Econometrics*, 16, 121–130.

Granger, C.W.J. (1983). Co-Integrated Variables and Error-Correcting Models. *UCSD Discussion Paper*, No. 83-13.

Granger, C.W.J. (1986). Developments in the Study of Cointegrated Economic Variables. *Oxford Bulletin of Economics and Statistics*, 48, 213–228.

Hakkio, C. S. and M. Rush (1989). Market Efficiency and Cointegration: An Application to the Sterling and Deutschmark Exchange Markets. *Journal of International Money and Finance*, 8, 75–88.

Haug, A. A., J. G. MacKinnon and L. Michelis (2000). European Monetary Union: A Cointegration Analysis. *Journal of International Money and Finance*, 19, 419–432.

Jeon, B. N. and B. Seo (2003). The Impact of Asian Financial Crisis on Foreign Exchange Market Efficiency: The Case of East Asian Countries. *Pacific-Basin Finance Journal*, 11, 509–525.

Johansen, S. (1995). Likelihood-Based Inference in Cointegrated Vector Autoregressive Models. Oxford University Press, Oxford (UK).

Kühl, Michael (2007). Cointegration in the foreign exchange market and market efficiency since the introduction of the Euro: Evidence based on bivariate cointegration analyses. *CEGE Discussion Papers*, No. 68, University of Göttingen, Center for European, Governance and Economic Development Research (CEGE), Göttingen.

MacDonald, R. and M. P. Taylor (1989). Foreign Exchange Market Efficiency and Cointegration – Some Evidence from the Recent Float. *Economics Letters*, 29, 63–68.

Pfaff, B. (2008) Analysis of Integrated and Cointegrated Time Series with R. Second Edition. Springer, New York.

Phengpis, C. (2006). Market Efficiency and Cointegration of Spot Exchange Rates during Periods of Economic Turmoil: Another Look at European and Asian Currency Crises. *Journal of Economics and Business*, 58, 323–342.

Rangvid, J. and C. Sorensen (2002). Convergence in the ERM and Declining Numbers of Common Stochastic Trend. *Journal of Emerging Market Finance*, 1, 183–213.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL: http://www.R-project.org.

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ALESSANDRO CARDINALI[1] AND THOMAS MORAN[2]

ON EMPIRICAL EVIDENCE OF LONG-MEMORY IN FINANCIAL VOLATILITY

Abstract

In order to improve risk management and portfolio allocations, it is of wide interest to estimate and predict the volatility of financial assets. It is commonly believed that financial volatility is characterized by the presence of slowly decaying autocorrelations of squared returns, i.e. by the presence of long-memory for squared returns. This evidence has numerous consequences in terms of modelling and prediction strategies, therefore it is important to assess carefully its derivation. In this study we propose an analysis of the volatility for SP500 log-returns with the aim of investigating the nature of its long-memory features. We use a modelling strategy based on the long-memory GARCH model for the log-returns, and compare this model with its time-varying generalization. We conclude that when considering long-memory GARCH processes with time-varying parameters the evidence of long-memory often disappears and only concerns limited periods. This suggests that long-memory in financial volatility might appear as a spurious effect of fitting stationary models to non-stationary returns.

Keywords: Financial volatility, GARCH models, long-memory

JEL Codes: C10, C14, C18

1. Introduction

The statistical analysis of financial volatility is fundamental in modern finance since it allows better assessment of the risk associated with financial assets. It is widely known that heteroscedasticity and other empirical features, such as heavy tails and absence of autocorrelation, characterize daily returns. This latter seems a feature characterizing assets traded in financial markets with certain degrees of efficiency, in the sense of Fama (1970). Financial volatility is considered a variable that is not directly observed, and squared or absolute returns are two proxy measures commonly considered in empirical work. The family of GARCH processes represents the most popular modelling strategy for financial returns exhibiting volatility. The classical version of these models successfully reproduces the absence of autocorrelation for returns, as well as the presence of autocorrelation for squared returns. For squared returns, classical GARCH processes are able to reproduce fast decaying autocorrelations that decays at exponential rate. However, another commonly observed empirical feature is that squared returns have slowly decaying autocorrelations, see Ding et al. (1993), Bollerslev and Mikkelsen (1996), Breidt et al. (1998) for more details. Usually slow autocorrelation decay is represented mathematically by hyperbolic decay (Ding et al., 1993) and is associated with long-memory. Therefore, GARCH models have been extended in order to also reproduce these features, leading to FIGARCH models (Fractionally Integrated GARCH). This class of models was introduced in 1996 (Baillie et al., 1996), and in spite of many studies and analyses of these models, some aspects remain to be clarified. Often is convenient to represent FIGARCH model for returns as an ARFIMA model for squared returns, in both cases the returns are assumed to be stationary, i.e. the model parameters are constant over time.

More recently locally stationary (LS) models have been proposed as an alternative for volatility modelling which allows for time-varying parameters. In principle, LS processes are stationary when considered over short time intervals, and eventually become non-stationary over longer intervals. LS

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volatility models therefore imply that the unconditional variance of returns can change with time. When considering the LS extension of FIGARCH models for returns, or for their ARFIMA representation of squared returns, it will be possible to assess whether the underlying statistical properties (summarized by the estimated model parameters) change with time, and how these values compare with the estimates from the corresponding stationary models. The first purpose of this paper is to compare the evidence of long-memory arising from fitting stationary and locally stationary FIGARCH models. The second purpose is to assess the relation between long-memory and local stationarity. The paper is structured as follows. Section 2 reviews the historical context of long-memory in time series, whereas Section 3 illustrates the main stationary and locally stationary models accounting for long-memory in volatility. Section 4 presents the results of our analysis whereas Section 5 concludes.

2. Long-memory and volatility

In order to estimate accurately the capacity of water reservoirs, long-term storage needs have to be taken into account to ensure a stable water supply in spite of seasonal riverflow variations. This problem led Hurst (1951) to the formulation of the rescaled range (R/S) statistic. Hurst's R/S statistic is represented by the range of partial sums of deviations of a time series from its mean, rescaled by its standard deviation. The R/S statistics provided the first formal statistical measurement of long-memory. Hosking (1981) and Granger and Joyeux (1980) made important contributions to the study of long-memory in time series, which eventually led to the development of ARIMA models with a fractional order of integration (ARFIMA). The maximum likelihood estimation of ARFIMA models was investigated in Granger, and Joyeux (1980) and Sowell (1992), whilst other widely used long-memory estimation methods are the log-periodogram regression (Geweke and Porter-Hudak, 1983) and the local Whittle estimation (see Künsch, 1987 and Lobato, 1999). Long-memory in financial time series is still subject of intensive research. In particular, a topic that has attracted wide interest is the study of long-memory in financial volatility, expressed either by absolute or squared returns, see e.g. Baillie (1996), Bollerslev and Mikkelsen (1996) and Ding et al., (1993). A stochastic process is said to possess a long-memory if there exists a persistent dependence between observations which are distant in time. A more precise definition of long-memory can be formulated in terms of both the autocorrelation and the spectral density functions. A covariance stationary stochastic process exhibits long-memory with Hurst coefficient $H \in (0; 1)$ when, given a bounded constant c, the ACF with lags τ decreases at a hyperbolic rate, i.e.

$$\rho_\tau \sim c\tau^{-2H}, \qquad \text{when} \quad \tau \to \infty.$$

On the other hand, the alternative definition states that the spectral density function $f(\omega)$ in case of long-memory must satisfy the condition

$$f(\omega) \sim c\omega^{-2H+1}, \qquad \text{when} \quad \omega \to 0^+,$$

where c is a finite constant and the symbol "~" means that the ratio of the left and right hand sides tends to 1. As we have already mentioned, the parameter H quantifies the memory of the process. In particular, when $H > 1/2$ the spectral density function is unbounded in the neighborhood of zero and such a stochastic process is called a long-memory process (Granger and Joyeux, 1980).

3. Long-memory volatility modelling

In order to construct a FIGARCH model for the conditional variance, first consider a theoretical model for the returns r_t, that is

$$r_t = \varepsilon_t \sqrt{h_t},$$

where $\varepsilon_t \sim i.i.d.(0,1)$ and $h_t = E_{t-1}(r_t^2)$ is the returns conditional variance for time *t.* If data are assumed to be stationary, i.e. the unconditional variance and the other moments do not depend on time, then a FIGARCH(*1,d,1*) model implies that the squared log-returns satisfy the following equation

$$(1-B)^d(1-\varphi B)r_t^2 = \alpha + (1-\beta B)\eta_t,$$

where B is the backshift operator, $\theta = \{\alpha, \beta, \varphi\}$ represents the three nuisance parameters, η_t, is a martingale difference sequence and $d = H - 1/2$ is known as the fractional difference order and is the parameter of interest in this problem. In the following we will approximate the FIGARCH models with ARFIMA models of the same order. The likelihood approximation is provided by considering η_t as an i.i.d. rather than a martingale difference sequence (see e.g. Beran, et al. 2013). In this scenario, the parameter *d* can be estimated by means of Maximum Likelihood and then the Hurst coefficient can be derived accordingly. Beran et al. (2013) review various approximations to the exact Gaussian likelihood. In particular, we can express the Whittle Likelihood as:

$$\mathcal{L}_T^W(d, \theta;\, r_t^2) = \frac{1}{4\pi}\int_{-\pi}^{\pi}\left\{\log f(\omega; d, \theta) + \frac{I_T(\omega)}{f(\omega; d, \theta)}\right\}d\omega,$$

where $f(\omega; d, \theta)$ is the ARFIMA(1,*d*,1) spectra at frequency ω, and $I_T(\omega)$ is the smoothed periodogram for r_t^2, see Brockwell and Davis (2002) for details. Therefore, our strategy is to estimate

$$\hat{d} = \underset{d}{\operatorname{argmin}}\, \mathcal{L}_T^W(d, \theta;\, r_t^2),$$

and then obtain $\widehat{H} = \hat{d} - 1/2$. In recent studies (see e.g. Dahlhaus and Subba Rao, 2006), locally stationary generalizations of volatility modelling have been proposed. This included locally stationary long-memory modelling, that is an extension of traditional FIGARCH(1,d,1) to allow for time-varying parameters, and in particular a time-varying fractional difference parameter. When considering locally stationary processes, model parameters are typically time-varying as functions of $z \in (0, 1)$. If *[x]* is the integer part of *x*, and *t = [zT]*, then *z* is defined as the limit of *t/T* for $T \to \infty$. For these reasons, usually *z* is referred to as the *rescaled time*. Locally stationary ARFIMA(*1,d,1*) processes imply that, for $T \to \infty$, the squared returns satisfy the equation

$$(1-B)^{d(z)}(1-\varphi(z)B)r_t^2 = \alpha(z) + (1-\beta(z)B)\eta_t,$$

where B is the backshift operator, $\theta(z) = \{\alpha(z), \beta(z), \varphi(z)\}$ represents the three nuisance parameter (bounded) functions, η_t, is a martingale difference sequence and $d(z) = H(z) - 1/2$ is the (possibly time-varying) fractional difference order and is the parameter function of interest in this study. An example of a time-varying AR process is given in Dahlhaus (1997), whereas Beran et al. (2013) discuss inference for locally stationary long-memory processes. In the locally stationary case, a generalization of the Whittle Likelihood is derived as in Dahlhaus (1997), i.e.

$$\mathcal{L}_T^{LW}[d(t/T), \theta(t/T);\, r_t^2] = \frac{1}{4\pi T}\sum_{t=1}^{T}\int_{-\pi}^{\pi}\left\{\log f(t/T, \omega; d, \theta) + \frac{I_T(t, \omega)}{f(t/T, \omega; d, \theta)}\right\}d\omega,$$

where $f(t/T, \omega; d, \theta)$ is the locally stationary ARFIMA(1,*d*,1) spectra at frequency ω and (approximated) rescaled time *t/T*, and $I_T(t, \omega)$ is the smoothed time-varying periodogram (for r_t^2), see

Dahlhaus (1997) and Beran et al. (2013) for details and for alternative likelihood approximations. As previously, it is possible to estimate

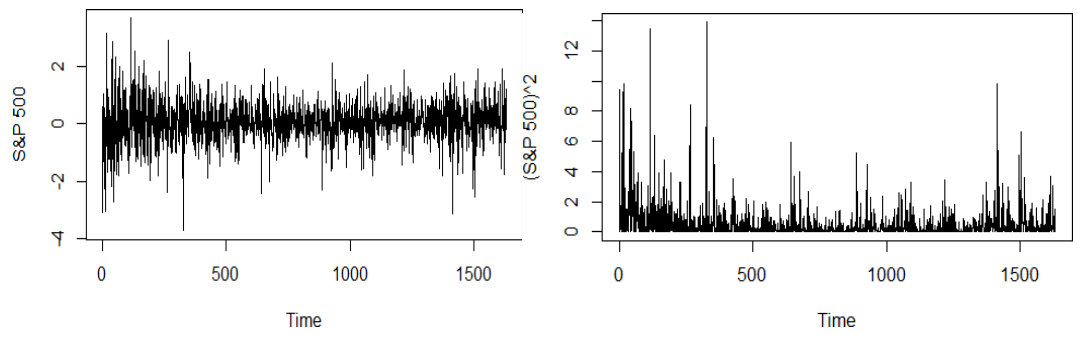
$$\hat{d}(t/T) = \underset{d(t/T)}{\operatorname{argmin}} \mathcal{L}_T^W [d(t/T), \theta(t/T);\ r_t^2],$$

then obtain $\widehat{H}(t/T) = \hat{d}(t/T) - 1/2$. Then, with large probability $\widehat{H}\left(\frac{t}{T}\right) \to H(z)$ for all *t*, as $T \to \infty$. The approximation is usually very good for sample sizes of normal use.

4. Local stationarity and long-memory for S&P 500 returns volatility

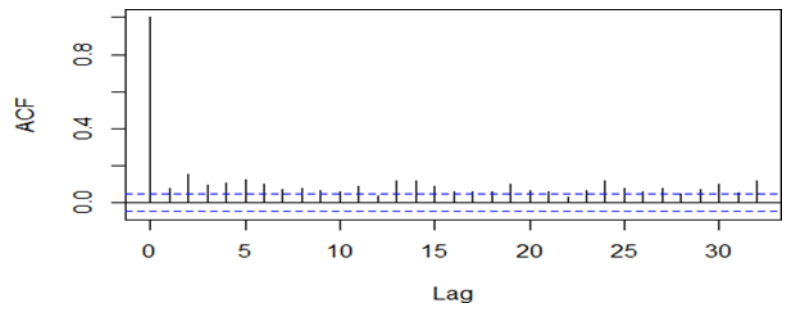
We conduct our computations using *R* (R Core Team, 2018) and the *R* package *longmemo* (Beran et al, 2018). Our analysis is based on a series of S&P 500 log-returns spanning a period of 6.5 years (July 1990 - January 1997). The data are available as part of the R library *MASS* (Ripley and Venables, 2002). Log-returns and squared log-returns for this period are shown in Figure 1, where both plots provide evidence of heteroscedasticity. In addition, the plot of the squared log-returns display higher volatility at the beginning and the end of the period. When looking at the plot of the ACF of the squared log-returns in Figure 2, it is clear that there are significant lags further than we would expect from short memory processes. The slowly decaying ACF provides evidence of long-memory characterizing the S&P 500 volatility. We can therefore consider a long-memory GARCH model for the log-returns, as this is approximately equivalent of fitting a long-memory ARMA model (ARFIMA) to the squared log-returns.

Figure 1. Plots of the S&P 500 log-returns (left) and the squared log-returns (right)



Source: Own calculation using SP500 dataset (from R library MASS).

Figure 2. Plot of ACF for the S&P 500 squared log-returns

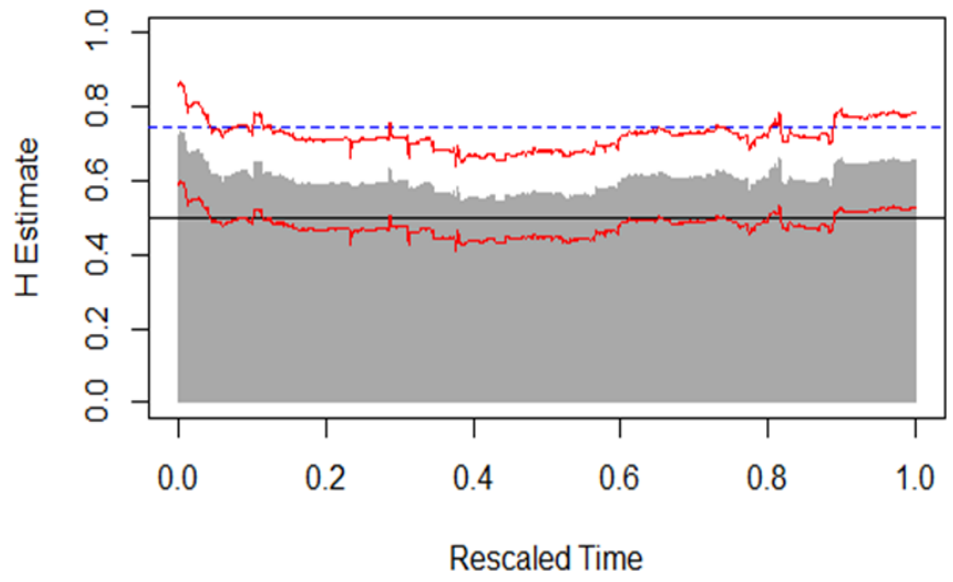


Source: Own calculation using SP500 dataset (from R library MASS).

We optimized the stationary Whittle Likelihood to estimate the Hurst exponent, obtaining a fitted value $\widehat{H} = 0.76$. This evidence would lead us to believe that the dataset exhibits persistent long-memory. But is this really what is happening with the underlying data? To try answering this question, we repeat our analysis by maximizing the LS Whittle Likelihood to estimate the time-varying Hurst exponent $\widehat{H}(\mathrm{t/T})$, for all $t = 1,2, \dots, T$. In order to obtain a consistent estimation of the time-varying spectral density, we smooth the time-varying periodogram using a smoothing kernel, which corresponds to considering a rolling window of approximately 500 observations. Figure 3 displays the stationary estimate of the Hurst exponent, along with its locally stationary estimate. For the latter, we also illustrate the (95%) asymptotic confidence intervals. Looking at these results we have evidence that the LS confidence intervals contain very often the value $H = 0.5$ which usually characterizes short-memory processes.

On the other hand, the intervals very rarely contain the stationary estimate given by $\widehat{H} = 0.76$, which indicates that the scenario of stationary log-returns with long-memory is much less likely than the scenario of locally stationary log-returns with short memory. Whilst the locally stationary Whittle Likelihood allows to fit time-varying Hurst coefficients, by adopting this framework it is found that in a time-varying scenario often there is no need to consider long-memory. We therefore contend that the evidence of long-memory in financial volatility appears as a spurious effect mainly due to fitting stationary models to locally stationary log-returns. When we do not restrict our analysis to stationary models, this evidence most often disappears. We also note that the (locally stationary) confidence intervals of $\widehat{H}(\mathrm{t/T})$ include the stationary estimate (0.76) at the beginning and at the end of the sample, where data exhibit larger volatility and more evidence of locally stationary behavior. This latter evidence further supports our conjecture that long-memory in volatility could arise as a spurious evidence of model miss-specification.

Figure 3. Plot of H estimates for the S&P 500 log-returns. Dashed line: stationary estimate; Solid line: short memory value (0.5); Grey bars: estimated time-varying Hurst exponent; Red dotted lines: 95% confidence intervals for time-varying Hurst exponent estimates



Source: Own calculation using SP500 dataset (from R library MASS).

Figure 3: Plot of H estimates for the S&P 500 log-returns. Dashed line: stationary estimate; Solid line: short memory value (0.5); Grey bars: estimated time-varying Hurst exponent; Red dotted lines: 95% confidence intervals for time-varying Hurst exponent estimates.

5. Conclusions

Is long-memory what we really see in financial volatility? Through our analysis of the S&P log-returns, we found the data set to show signs of long-memory when estimating the Hurst exponent H for the whole series. The result of H = 0.76 can induce analysts to think that the S&P 500 volatility is always characterized by long-range dependence. However, when considering a locally stationary long-memory volatility model, the evidence of long-memory disappears for a very large part of the sample. Since the alternative evidence corresponds to periods of high volatility, this suggests that raising values for the estimated Hurst coefficient are typically linked to growing uncertainty in the corresponding financial markets, and possibly to the occurrence of local non-stationarities.

References

Baillie, R. T. (1996), Long-memory processes and fractional integration in econometrics, *Journal of Econometrics*, 73, 5–59.

Baillie, R.T., Bolloerslev, T., Mikkelsen, H.O. (1996). Fractionally integrated generalized autoregressive conditional heteroskedasticity, *Journal of Econometrics*, 74, 3–30.

Beran, J., Feng, Y., Ghosh, S. and Kulik, R. (2013). Long-Memory Processes: Probabilistic Properties and Statistical Methods. Springer, New York. DOI: 10.1007/978-3-642-35512-7.

Beran, J, Maechler, M and Whitcher, B. (2018). longmemo: statistics for long-memory processes. R package Version 1.1-1, URL: https://CRAN.R-project.org/package=longmemo.

Blume L., Easley D., O'Hara M., (1994). *Market statistics and technical analysis: The role of volume*, Journal of Finance, 1994, Vol. 49, 153–181.

Bollerslev, T. and Mikkelsen H.O. (1996). *Modeling and pricing long-memory in stock market volatility*, Journal of Econometrics, 1996, Vol. 73, 151-–184.

Breidt F.J, Crato N., De Lima P. (1998). *On the detection and estimation of long-memory in stochastic volatility*, Journal of Econometrics, 1998, Vol. 83, 325-–348.

Brockwell, P.J. and Davis, R.A. (2002) *Introduction to time series and forecasting*, Springer, New York.

Dahlhaus, R. (1997). *Fitting time series models to nonstationary processes*, Ann. Statist., 25, 1-–37.

Dahlhaus, R., Subba Rao, S. (2006) Statistical inference for time-varying ARCH processes. Ann. Statist. 34, 3, 1075--1114.

Ding Z., Granger C.W.J., Engle R.F. (1993). *A long-memory property of stock market returns and a new model*, Journal of Empirical Finance, 1993, Vol. 1, 83–106.

Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance, 25*(2), 383-417.

Geweke, J., Porter-Hudak, P. P. (1983). The estimation and application of long-memory time series models, *Journal of Time Series Analysis*, 4, 221–238.

Granger C.W.J. and Joyeux R. (1980). *An introduction to long-memory time series models and fractional differencing*, Journal of Time Series Analysis, 1980, Vol. 1, 15–29.

Hosking, J. R. M. (1981). Fractional differencing, *Biometrika*, 68, 165–176.

Hurst H. R. (1951). Long-term storage capacity of reservoirs, *Transactions of the American Society of Civil Engineers*, 1, 519–543.

Kunsch, H. R. (1987). Statistical aspects of self-similar processes, *Proceedings of the First World Congress of the Bernoulli Society*, Prokhorov Y., Sazanov V.V. (eds.), VNU Science Press, 67–74.

Lobato, I. N. (1999). A semiparametric two-step estimator in a multivariate long-memory model, *Journal of Econometrics*, 90, 129–153.

Qian, B. and Rasheed, K. (2004). Hurst exponent and financial market predictability, *Proceedings of The 2nd IASTED international conference on financial engineering and applications*, 203–209.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL: http://www.R-project.org.

Sowell, F. B. (1992). Maximum likelihood estimation of stationary univariate fractionally integrated time series models, *Journal of Econometrics*, 53, 165–188.

Venables, W.N. and Ripley, B.D. (2002). *Modern Applied Statistics with S*, Springer, New York.

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ALESSANDRO CARDINALI[1] AND EDWARD MELLEN[2]

THE QUANTIFICATION OF PRECISION IN MARKET RISK REGULATION

Abstract

Expected Shortfall (ES) has been proposed to replace Value at Risk (VaR) as the new regulatory market risk measures ES is theoretically superior to VaR, however its estimates entail more estimation error. Impetus of critical policy analysis regarding the quantification of relative estimation error in risk measures and robust estimation methods needs to be developed in attempt to alleviate the practical weakness of ES. In order to facilitate this objective, this research proposes a Bootstrap method that is computationally efficient in constructing prediction intervals and provides a robust variant of Filter Historical Simulations.

Keywords: Value at Risk, expected shortfall, Bootstrap, Garch

JEL Codes: C50, C53, C54

Literature review

The existential failure of market risk regulation was the predominant cause of the subprime financial crisis. The BCBS later acknowledged the implications of employing an incoherent risk measure that neglected tail risk (BIS, 2011). Consequently ES, with a 97.5% confidence level, was proposed to replace VaR as the standardised approach to determine regulatory capital requirements (BIS, 2012). ES is defined as the "expected loss conditional on VaR being violated" and is expressed by the "negative expected value of [returns] over the tail density" (Danielsson, 2011). Even though ES may give a more accurate representation of risk, it is measured with greater uncertainty than VaR due to higher model and estimation risk. These forms of risk present uncertainty upon the underlying model to capture risk correctly (Green & Figlewski, 1999; Cont, 2006) and when this is the case, estimation error is present in model estimates (Hendricks, 1996; Boucher *et al*., 2014).

The research presented in this paper proposes a new variant of FHS (denoted R-FHS hereafter) in attempt to increases the robustness of ES estimation, and a simulation study is conducted to assess its finite sample performance. The method also employs a GARCH(1,1) Quasi-Maximum Likelihood Estimation (QMLE) methodology, however it has two main distinctive features; the use of the Median Absolute Deviation (MAD) to predict returns volatility and the use of nonparametric bootstrap for tail risk estimation. In the context of risk measures, MAD of returns has been already used (Benati, 2014; Chernobai & Rachev, 2006) and evidence illustrates that it produces "better estimates for the probability in question" (Grechuk et al., 2010) than the standard deviation. Consequently, the proposed variant of FHS, denoted R-FHS hereafter, will use MAD to derive the volatility forecasts, in attempt to increase the robustness of risk measure estimates. The Rao-Blackwell theorem (Lehmann, 1983) states that ancillary statistics can be integrated out of the bootstrap sample scheme, as they do not bring additional information to the probability distribution of interest (Casella & Robert, 1996). Therefore, because the QMLE estimator is asymptotically Gaussian regardless of the distribution of returns, the proposed bootstrap procedure is inspired by the Rao-Blackwell theorem and only consists of performing random draws with replacement from the distribution of standardized GARCH residuals, thus increasing the computational efficiency of the method. In our approach, the model uncertainty is incorporated in the robust volatility (MAD) estimation.

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R-FHS methodology

ES is defined as a one-step ahead tail risk forecast, however it estimates the expected loss beyond the VaR measure. The ES is commonly measured at either 97.5% or 99% confidence level. In this paper, the confidence level will be set at 99% to compare model performance with that of Christoffsen and Goncalves (2005) (referred as C&G, hereafter). The ES is defined as a one-step-ahead forecast of the expected loss, based on the information available at time T (represented here by the set $\mathcal{F}_T$) and a tail probability of 0.01, that is:

$$ES_{T+1}^{(0.01)} = E(R_{T+1} \mid R_{T+1} > VaR_{T+1}^{(0.01)}, \mathcal{F}_T), \quad (1)$$

where we assume that log-returns are distributed as a GARCH(1,1) process, i.e.

$$R_t = \varepsilon_t \sigma_t, \quad (2)$$

$$\sigma_t{}^2 = \omega + \alpha R_{t-1}^2 + \beta \sigma_{t-1}^2, \quad (3)$$

and, for $t = 2, \dots, T$, R_t denotes the log-return series. The error term ε_t is a standardized i.i.d. sequence (i.e. $\varepsilon_t \backsim D(0,1)$ for all t, and for some CDF denoted as D), and $\sigma_1{}^2 = \omega/(1-\alpha-\beta)$ is the unconditional variance. The GARCH parameters (ω, α, β) must adhere to positivity and stationarity restrictions. Since returns are determined by (2), a one-step ahead forecast for ES can also be defined as:

$$ES_{T+1}^{(0.01)} = \sigma_{T+1} E(\varepsilon_t | \varepsilon_t > Q_{0.01}) \equiv \sigma_{T+1} I_{ES}, \quad (4)$$

where the conditional standard deviation at time T+1 is denoted as σ_{T+1}. In this formulation, $Q_{0.01}$ is a quantile for the unknown distribution of the sequence $\varepsilon_t = R_t/\sigma_t$ and will be estimated by nonparametric bootstrap based on the standardized GARCH residuals. The Quasi Maximum Likelihood estimator will be used to estimate the GARCH(1,1) parameters (by means of $\hat{\omega}, \hat{\alpha}, \hat{\beta}$), and therefore from (3) we obtain a plug-in estimate $\hat{\sigma}_t$. This will allow the computation of standardised residuals $\hat{\varepsilon}_t = R_t/\hat{\sigma}_t$ which are used to estimate the unknown distribution function D by means of $\widehat{D}$, the empirical CDF of the residuals $\hat{\varepsilon}_t$. If we define as $\boldsymbol{\varepsilon}_*$ a (whole) random sample drawn with replacement from $\widehat{D}$, the tail risk measure I_{ES} can be estimated by

$$\hat{I}_{ES} = m[\boldsymbol{\varepsilon}_* \, I(\boldsymbol{\varepsilon}_* > Q_{0.01})], \quad (5)$$

where $m[\boldsymbol{x}]$ indicates the average of a sample $\boldsymbol{x}$, and $I(.)$ is the indicator function. If we use B independent bootstrap replications, the expected shortfall will therefore be estimated as

$$\widehat{ES}_{T+1}^{(0.01)} = \frac{1}{B} \sum_{b=1}^{B} \widehat{es}_{T+1,b}^{(0.01)}, \quad (6)$$

where $\widehat{es}_{T+1,b}^{(0.01)} = \hat{\sigma}_{T+1} \hat{I}_{ES}$, and the tail risk empirical measure was defined in (5). A new aspect of our method is that we use a robust approach to obtain the volatility forecast. This estimation is based on the MAD of returns, and is defined as:

$$\hat{\sigma}_{T+1} = \frac{c}{T} \sum_{t=1}^{T} \left| R_t - \tilde{R} \right|, \quad (7)$$

where $\tilde{R}$ represents the median of returns and the constant *c* is evaluated by a data-driven approach. In fact, we consider *c* to be a continuously differentiable increasing function of the returns sample variance and we approximate this function using a Taylor expansion. Since in (6) we used bootstrap to obtain a point estimate of the expected shortfall, we can also use a bootstrap approach to estimate the ES standard error, and therefore obtain a bootstrap estimation of the ES prediction intervals. Therefore, the ES standard error is estimated as

$$\widehat{\sigma_E} = \sqrt{\frac{1}{B}} \sum_b \left(\widehat{es}_{T+1,b}^{(0.01)} - \widehat{ES}_{T+1}^{(0.01)} \right)^2, \quad (8)$$

Moreover, denoting as Q_α [x] the 100α% bootstrap quantile for the (simulated) random variables x, our estimated ES prediction intervals with 90% confidence level are defined as

$$\widehat{ES}_{int}^{(0.01)} = \left(Q_{0.05}[\widehat{ES}_{T+1}^{(0.01)}], Q_{0.95}[\widehat{ES}_{T+1}^{(0.01)}] \right). \quad (9)$$

To summarize, the first step in our procedure is to fit a GARCH(1,1) to the log-return series, then the GARCH residuals $\hat{\varepsilon}_t = R_t/\hat{\sigma}_t$ are standardized. Therefore, we estimate the Empirical Cumulative Distribution Function (ECDF) from these standardized residuals by applying local polynomial smoothing (Cleveland et al., 1988). We then resample with replacement from the ECDF of standardized residuals to obtain *B* random samples $\boldsymbol{\varepsilon}_*$ from which we estimate the tail risk measure as in (5). We use this measure along with a robust volatility (MAD) estimate to produce both point and interval ES bootstrap estimations as shown in (6) and (9), respectively.

Simulation study

In our simulations we consider both Gaussian and Student-t (with 8 d.o.f.) distributions to generate our pseudo data from several GARCH specifications. In particular, to compare model performance with respect to literature, we consider two main GARCH(1,1) specifications, used also in C&G:

- **Gaussian**: $\omega = \left(\frac{20^2}{252}\right) * (1 - 0.1 - 0.8)$, $\alpha = 0.1$, $\beta = 0.8$, $v = 500$,
- **Low Persistence**: $\omega = \left(\frac{20^2}{252}\right) * (1 - 0.1 - 0.4)$, $\alpha = 0.1$, $\beta = 0.4$, $v = 8$.

These specifications have been used to simulate GARCH series of size 500. The Low Persistence specification results in the most volatile process in the simulation studies of C&G. For each scenario, the true volatility σ_{T+1} is calculated by Montecarlo, using 5000 independently generated series of size 500. In order to obtain the true ES value, the 'true' GARCH volatility is multiplied by the appropriate tail risk measures, which are distribution dependent. For the Gaussian distribution, the risk measure has the following expression

$$I^G{}_{ES} = \frac{\phi(\Phi_{0.01}^{-1})}{0.01}, \quad (10)$$

where Φ is the Gaussian CDF and ϕ is the Gaussian density. Moreover, C&G proposed the following expressions to calculate Student-*t* tail risk measure

$$I^{t}{}_{ES} = \left(1 + \left(\sqrt{\frac{v}{v-2}}\sqrt{\frac{v-2}{v}}\,t_{0.01}^{-1}\right)^{2} / v\right) \frac{v}{v-1}\frac{f\left(\sqrt{\frac{v}{v-2}}\sqrt{\frac{v-2}{v}}\,t_{0.01}^{-1}\right)}{0.01}\sqrt{\frac{v-2}{v}}, \tag{11}$$

where $t_{0.01}^{-1}$ is the Student-t quantile, v is the corresponding degrees of freedom parameter and f is the corresponding Student-t density function. Each experiment we conduct is based on B =1000 bootstrap samples $\boldsymbol{\varepsilon}_{*}$ of GARCH residuals**.**

Simulation results

We used the statistical software R (R Core Team, 2018) to conduct our simulations. For the Gaussian specification, the simulation results show comparable performance to FHS in the paper of C&G. However, R-FHS in the Low Persistence specification has improved statistics, both in accuracy (RMSE) and precision (Coverage). The RMSE decreases by 21% and the Coverage Probability increases by 10%. The RMSE results are as follows:

Specification	Mean	Bias	Variance	RMSE
Gaussian	3.379	0.053	0.100	0.321
Low Persistence	4.070	0.159	0.148	0.416

As one can see, the variance of estimates for the Low Persistence specification reduces by 44% compared with that of C&G. This increase in performance can be attributed to the robust MAD volatility estimate. The Prediction Interval results are as follows;

Specification	Coverage	Lower	Upper	Width %
Gaussian	76.80	2.89	3.82	27.68
Low Persistence	84.30	3.41	4.60	29.15

In terms of the Low Persistence specification, R-FHS has to highest Coverage Probability compared to all methods analysed by C&G.

Conclusions

This paper introduces a new method, based on nonparametric bootstrap, to derive a robust estimation of ES and its prediction intervals. We defined this method Robust Filtered Historical Simulation (R-FHS) since it combines a nonparametric bootstrap resampling scheme and a robust estimator for the volatility of returns. Results show that R-FHS has comparable performance to FHS methods from the literature, when returns are approximately Gaussian. However, R-FHS is shown to have significantly better performance with respect to a returns process that is highly mean-reverting and volatile. Compared to literature (C&G), R-FHS has lower RMSE (decreases by 21%) and higher Coverage Probability (increases by 10%).

Appendix

Results of Christoffersen & Goncalves (2005):

90% Prediction Intervals - 1% ES: Gaussian

Risk Measure Properties

	T	Method	Mean	Bias	Variance	RMSE
ES	500	HS	3.447	0.129	0.402	0.647
99%		Normal	3.309	-0.009	0.038	0.196
		Hill	3.302	-0.016	0.101	0.318
		GC	3.416	0.098	0.230	0.489
		FHS	3.347	-0.070	0.090	0.308

Bootstrap Prediction Interval Properties

	T	Method	Coverage	Lower	Upper	Width %
ES	500	HS	54.48	2.92	3.83	27.26
99%		Normal	88.82	2.99	3.59	17.98
		Hill	85.56	2.79	3.74	28.82
		GC	87.92	2.79	4.31	45.91
		FHS	80.00	2.76	3.62	26.25

90% Prediction Intervals - 1% ES: Low Persistence

Risk Measure Properties

	T	Method	Mean	Bias	Variance	RMSE
ES	500	HS	3.867	-0.036	0.406	0.638
99%		Normal	3.333	-0.570	0.062	0.622
		Hill	3.857	-0.047	0.302	0.552
		GC	2.648	-1.255	0.456	1.425
		FHS	3.778	-0.125	0.268	0.533

Bootstrap Prediction Interval Properties

	T	Method	Coverage	Lower	Upper	Width %
ES	500	HS	73.14	3.11	4.50	35.77%
99%		Normal	12.70	3.01	3.66	16.70%
		Hill	81.70	3.08	4.67	40.97%
		GC	40.54	2.01	3.83	46.85%
		FHS	73.52	3.03	4.41	35.33%

References

Bank for International Settlements, (2011). Messages from the Academic Literature on Risk Measurement for the Trading Book. Switzerland: Basel Committee on Banking Supervision. URL: http://www.bis.org/publ/bcbs_wp19.pdf.

Bank for International Settlements, (2012). Consultative Document: Fundamental Review of the Trading Book. Switzerland: Basel Committee on Banking Supervision. URL: http://www.bis.org/publ/bcbs219.pdf.

Boucher, C. et al., (2014). Risk models-at-risk. *Journal of Banking & Finance*, 44, 72–92.

Casella, G. & Robert, C., (1996). Rao-Blackwellization of Sampling Schemes. *Biometrika*, 93, 81-94.

Chernobai, A. & Rachev, S., (2006). Applying Robust Methods to Operational Risk Modelling. *Journal of Operational Risk*, 1(2), 27–41.

Christoffersen, P. & Goncalves, S., (2005). Estimation Risk in Financial Risk Management. *Journal of Risk*, 7(3), 1–28.

Cont, R., (2006). Model uncertainty and its impact on the pricing of derivative instruments. *Mathematical Finance*, 16(3), 519–547.

Cont, R., Deguest, R. & Scandolo, G., (2010). Robustness and sensitivity analysis of risk measurement procedures. *Quantitative Finance*, 10(6), 593–606.

Danielsson, J., Embrechts, P., Goodhart, C., Keating, C., Muennich, F., Renault, O., Sing, H., (2001). *An academic response to Basel II*. Financial Markets Group: FMG Special Paper no. 130.

Giannopoulos, K. & Tunaru, R., (2004). Coherent risk measures under filtered historical simulation. *Journal of Banking & Finance*, 29(4), 979–996.

Goldstein, D. & Taleb, N., (2007). We Don't Quite Know What We are Talking About When We Talk About Volatility. *Journal of Portfolio Management*, 33(4), 84–86.

Gouriéroux, C., Laurent, J.P. & Scaillet, O., (2000). Sensitivity analysis of values at risk. *Journal of empirical finance*, 7(3), 225–245.

Green, T.C. & Figlewski, S., (1999). Market Risk and Model Risk for a Financial Institution Writing Options. *Journal of Finance*, 54(4), 1465–1499.

Hendricks, D., (1996). Evaluation of Value-at-Risk Models Using Historical Data, *Economic Policy Review*, 2, 39-69.

Nieto, M. & Ruiz, E., (2010). *Bootstrap Prediction Intervals for VAR and ES in the context of GARCH Models,* Statistics and Econometrics Working Papers ws102814, Universidad Carlos III, Departamento de Estadística y Econometría.

Pascual, L., Romo, J. & Ruiz, E., (2006). Bootstrap prediction for returns and volatilities in GARCH models. *Computational statistics and Data Analysis*, 50, 2293–2312.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL: http://www.R-project.org.

Yamai, Y. & Yoshiba, T., (2005). Value-at-risk versus expected shortfall: A practical perspective. *Journal of Banking & Finance*, 29(4), 997–1015.

GULNAR KARIMOVA[1]

HISTORICAL STAGES OF SCRIPT CHANGES IN THE WRITTEN KAZAKH LANGUAGE

Abstract

This paper examines the changes of the script used to represent the written Kazakh language, which belongs to the Kipchak branch of Turkic language group from Transeurasian language family. Taking into account that from 1917 to 2017 the script in Kazakhstan was changed four times, the author decided to investigate this phenomena since ancient times to our days. Thus, the main objective of this research is to find the answers to the questions When/ How/ Why various script changes occur in the history of the Kazakh language development. This small-scale study is based on the descriptive qualitative method. Data collection was done through document analysis of secondary sources divided into four periods and by conducting the interviews with local experts in the field of linguistics. The findings are systemized in the chronological summary tables, with brief description and historical background on each script used for the Kazakh language. Potential readers of this research paper are specialists in the history of Turkic people, Kazakh language teachers and specialists in historical linguistics.

Keywords: Kazakhstan, Turkic languages, script, language policy

JEL Codes: D01, P26

1. Introduction

Before the Russian Revolution of 1917, the people of the Kazakh land read and wrote using the Arabic alphabet. All books were written in the Arabic script and my great-grandfather wrote in Arabic as well. From late 1920s to early 1950, Kazakh people wrote in the Latin alphabet. My mother remembers that in primary school they learned to write using Latin letters, even though officially after 1940s the script was supposed to be already in adapted version of Cyrillic. From 1957, following the order of Khrushchev, who came to power after the death of Stalin, nearly all Kazakh-speaking schools were closed. Moreover, school graduate students of Kazakh-speaking schools were forbidden to have their entry exams to the higher education institutes in their native language, in Kazakh. As a result of such discriminating political decision one generation of native Kazakh speakers didn't get the access to the Institutes or Universities. I received the secondary and high education provided only in Russian and we didn't have any lessons of the Kazakh language or Kazakh literature in the school curriculum. Thus, my great-grandparents spoke only Kazakh. My grandparents both spoke Kazakh fluently as their first language and spoke Kazakh at home. They have good Russian as an acquired second language, while my parents were bilinguals, but they spoke Russian at home. In spite of the fact that my mother tongue is Kazakh, I am considered to be a native speaker of Russian. My knowledge of Kazakh is on the elementary level, while I have a fluent English. It is also unfortunate that my children don't speak and don't understand Kazakh because they speak Russian and Italian. Thus, just through the example of my family we could see how five generations of Kazakh native speakers witnessed the language change and passed through tragic code-switching processes during the Soviet period mostly for the political reasons. After living abroad for a long time and completing my 50s, I have become more sensitive to the history of my nation and realized that the knowledge of one's mother tongue is essential for his/her identity. It is the main reason why I decided to conduct this research.

The main purpose of this study was to prepare a chronological summary of the historical stages of change in the written Kazakh language using the qualitative data collection method through documents

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analysis of secondary sources divided into four historical periods and conducting the interviews with Kazakhstani scholars. Another objective of this small-scale research is to review and summarize possible reasons for such changes. Thus, the aim of this research paper is to find the answers to the questions when, *how and why* did the Kazakhs have changes of the script to represent the Kazakh language. Potential readers of this research paper are specialists in the history of Turkic people, Kazakh language teachers, specialists in historical linguistics and other people who are fond of the history of the Kazakh people.

2. Historical background

Since ancient times on the territory of modern-day Kazakhstan, people tried to leave at least some written messages about themselves. But there is still a wide spread opinion among some scientists that the Kazakh people has only the oral language. For example, Amanzholov, S (1940) and Rakhmanaliyev (2009) both wrote in their works that the Kazakh people didn't have their own writing system, though they have done their statements in different way. Rakhmanalieyev in his research work "The Empire of Turks. History of Great Civilization." (2009) notes that since the times of Attila the Tùrkic people had only the spoken form of the language and "didn't know the art of writing" (p98) and as a result they had a strongly trained memory to transfer the knowledge from one generation to another. On the contrary, S. Amanzholov recognizes that the ruling high class of the medieval times was able to write while the common people had very limited access to this privilege. As a result, he makes the conclusion that the factor of availability of the writing system to the majority of the population is dominating argument for the negative answer to the question whether the Kazakh people had or didn't have their own writing system. Thus, there is an opinion among some linguists that having only the spoken language, the Kazakhs, as well as other Turkic people, had to apply the various types of scripts such as Arabic graphic, Latin or Cyrillic, which are associated in our minds with other languages rather than with Turkic ones. Suleimenov (2002) in his book "Turks in prehistory: the origin of ancient Turkic languages and scripts" discusses this approach as the wrong one and identifies some other problematic issues and gaps in the investigations referring the origin of ancient Turkic languages in general and of the writing system in particular.

Turkic people have a rich history and recently there were found a lot of new documents confirming that they had their own writing system from the ancient times. Some Kazakh linguists suggest that written symbols were already used by ancient proto-Tùrkic people more than 2500 years ago. This assumption is based on some archeological findings done recently on the territory of Kazakhstan, which are mentioned by B. Sarsekeev (2007) in his textbook "The World of the Nomad". Among the buried treasures in Issyk Kurgan, in the Sacae tomb of the famous Kazakh Golden Man (V century B.C), one of the symbols of Kazakhstan, they found an extraordinary artifact, a vase, which has some writing on it that hasn't yet been deciphered. At the same time there are still some doubts among specialists regarding the 2500- age-period of writing system being used by proto-Turkic people. Some researchers consider that the reconstruction of the history of ancient Turkic languages better to investigate from the IV-V century A.D. Kan (2004) writes that the second wave of migration, which occurred from II to V centuries A.D., known among historians as the Great Migration, influenced a lot on the ethnic content and distribution of the people lived in the Great Steppe, which covered the territory of the modern-day Kazakhstan and Central Asia. When in the 4th century the Huns tribes leaded by Attila moved from the Central Asia (probably from the area of current day Mongolia) to Europe, the Turkic people became the dominating ethnic population of the Great Steppe and began to play very important role in the world history, having the interactions with the neighbouring Empires as China, Persia, India and Byzantine. Kan (2004) states that the first written reference to the term "Tùrk" was applied in 542 A.D. in Chinese manuscripts describing the attacks of Turkic tribes to China from the North-West. He writes that "In VI century the term Turk was widely spread, it meant the union of tribes, established at Altay" (p9).

Shakarim Kudaiberdy–uly (1990) notes that Chinese sources used the term "Tu-kyu" (which means "helmet") to define Turks.

In spite of the fact that Runes are not used anymore, most specialists of Turkic studies accept that the Turkic languages had their own writing system in the form of script known as Turkic Runes, which is dated VI-VIII centuries A.D. Therefore, this paper will include only the scripts which are recognised by the majority of specialists. Other scripts, which are supposed (but based on controversial hypotheses) to represent the ancient Turkic languages on the territory of modern-day Kazakhstan, would be investigated in some future research papers.

3. Research methods

- document-based analysis of research papers done in this field
- interviews with specialists of the National Institute of Linguistics.

4. Document-based analysis and findings

In this section it will be provided theoretical frame of concepts and ideas expressed in the previous studies done in this field. This paper examines the changes of the script used to represent the written Kazakh language, which belongs to the Kipchak branch of Turkic language group from Transeurasian language family. Taking into account the certain lack of reliable resources on the open public access, I should declare that I didn't have all data to provide in this paper the complete analysis, but I did best possible in order to make my contribution to explore this issue.

Anttila (1989) states that "Writing and its changes are presented as a microcosm of linguistic change and as support for reconstruction". However, in the process of searching the previous studies focused on this issue, it was found out that there is an obvious lack of reliable document sources in the open access. In December 1935 Lev Gumilev (1993), a Soviet leading specialist in the history of Turkic people, began to write his research on "Ancient Turks". Lev Nikolaevich Gumilev, states that "Historical writing notes of Turks were lost, maybe didn't exist anymore, and the burial stone monuments could not replace them. That's why my study has to be based on some indirect narrative sources, using some translations, which were introduced to academic environment" (p87). Gumilev (1993) notes that not all of the ancient sources could be considered as reliable. For example, an ancient could not be very informed about the event or it could be the conflict of interests when the witness provides the subjective interpretation of the original message or makes the wrong conclusion based on the hypothesis spread that period. It happens even in our days when some authors who write taking the wide spread opinion without a proper investigation of the real situation documented by the scientists of that period. For example, Artykbayev Zh., Prmanov A (2013) in their textbook "History of Kazakhstan" wrote that "up to the mid of the 20th century the written literature didn't play the serious role in the life of nomads " (p17), while on the contrary, the scholar of XIXth century Gedin Swen in his book "In the Heart of Asia" mentioned that in 1871 the children of Turkestani region (the part of modern – day Kazakhstan) went to schools "medrese" and read books in Arabic. It is proved by some photos retrieved from photo album called "Turkestan Album", which was published as per order of K.P. fon Kaufman, a General Gubernator. Therefore, taking into account that I had a limited access to the manuscripts from the ancient times to early XVIII century (before the period, when Kazakh people and their territory were included into the Russian Empire) it was taken a decision to provide the secondary- source-review divided to the following periods:

1. From medieval times to early XVIII century. It was the period of Tùrkic and Kazakh Khaganates.

2. From 1731 to 1917 - the period of tsarism. Russian expansion to Central Asia. It was the period when the Kazakh Khaganate entered to the Russian empire.
3. From 1917 to 1987- the Soviet period. "Russification" period.
4. From 1991 to present- the Independence period. The Republic of Kazakhstan.

From V to early XVIII century

1.1. Most of written monuments in Turkic languages regarding the ancient period since IV century are presented in the forms of grave stones. However, recently the researchers discovered some ancient Turkic manuscripts, found in the Eastern Turkestan and known as Turfan texts. All texts, most of them are one-page-texts or just some pieces remained, are written by ink on parchments. The originals are held in Germany, UK, France, Russia, and Japan. The British Library (Stein Collection) and Digital archives of Berlin Academy of Science provide the access to the e-copies of these rare manuscripts. The only manuscript book in Turkic runes written by ink on the parchment is called "Yrk Bytik". It is known also as a Book of Omen, a book of interpreting the dreams. It has more than 60 pages and is written in the folk genre. Images of other Turkic runes of IX-X century found in Kazakhstan, China, Mongolia, with brief descriptions could be found on site http://bitig.org. This site with e-library was created thanks to the idea of the Kazakhstani Institute of Oriental Culture named after Suleimenov.

1.2. The most famous manuscript regarding the Turkic language history of the medieval period is "Codex Cumanicus", a Latin-Persian-Cumanic dictionary, written by an Italian priest at the beginning of XIV century. As it is stated in the e-book "History of Humanity: From the seventh to the sixteen centuries" (1996), this ancient dictionary was used mostly for communication of Genoa merchants with representatives of the Golden Horda and Cremian Tatars and later with Ottoman Turkic people in the Crimea. Cumanic, the variety of old Kipchak language was the language of the Cumans, the nomadic Turkic people. Thus, Codex Cumanicus could be considered as evidence of the historical development of the modern Kazakh language and might become the topic of next research work.

1.3. Another very rare manuscript "The General book of turkic-persian and mongolo-persian languages", was investigated by Kuryshzhanov A (2010). This manuscript is held in Lenden library in Holland "under the catalogue number Leiden, n 517, Warner. "(p12). The scholar says that this writing monument of XIII century is known among specialists as Turkic-Arabic Dictionary of Teodor Houtsma according to the name of his research paper "Ein tùrkish-arabisches Glossar: nach der Leidener Handsschrift", published for the first time in 1894 in German. As the researcher describes, the manuscript contains 62 pages of turkic-arabic dictionary out of total 76 pages, others are mongolo-persian and arab-mongolian words. Kuryshzhanov (2010) considers most interesting thing that it was the old Kipchak language, the ancestor of modern Kazakh language, taken as Turkic language for this dictionary.

From 1731 to 1917- Secondary sources of Russian tsarism

The scientists of that period, mostly the members of the Russian Imperial Academy of the Science, such as B.Bertold, V,Radlov, N. Bichurin, B.Potanin, Ch.Valikhanov, H. Yadrintzev, V.Grigoriev, M.Tynyshpaev A.Levshin, N.Konshin and others paid much attention to the study of history, ethnography and language of nomad people who lived in the Russian Empire and of Tùrkic people in particular. Most of their studies were written in the form of the descriptive travel diaries or dictionaries. However, in the field of writing system of the Turkic languages we should consider V. Radlov as the key person. Radlov (Friedrich Wilhelm Radloff) is a German-born Russian scientist, a founder of Turkology, the study of culture and languages of Turkic people. The stone monuments were always protected by local people and sometimes used as places for prays. However, for the academic purposes they were discovered in the XVII century by Russian officials while traveling in Siberia. The site

https://secrethistory.su informs that the Russian Imperator Peter the Great gave the order to send the academic expeditions to Siberia and Mongolia in order to design the maps and collect the stone monuments with writing signs for his Kunzkamera. Some foreign specialists (Tabbert-Stralenberg, Messershmidt, Shulmann and others) were also included into Siberian expeditions. The results of those expeditions were very interesting for the scientists. As Sarsekeev (2007) writes, W. Thomsen was the first to present on the assembly of Dutch Royal Academy of Science in 1893 the results of his work declaring that the stone monuments discovered in Mongolia contain the ancient Turkic texts and that he managed to decipher the words "TENGRI" and "TURKS". Sarsekeev notes that nearly the same time, Radlov prepared already the interpretation of ancient Turkic texts written in Turkic- runes-script. Radlov (2007) is the author of a number of other researches about the Turkic people of Siberia and he created some Turkic dictionaries. He died in 1918 but after nearly 20 years after his death, during the period of Stalin repressions, he was accused in Pan Turkism. Moreover, other linguists and orientalists who knew him or followed his ideas were prosecuted and sentenced to death. As a result, most of the research works in this field were withdrawn from libraries and studies of Turkic culture and languages were frozen for a long time. Some his works are kept in the archives. They are available only for authorized use, though one work "Turkic nomads of the Steppe" was recently published in the encyclopedia "Library of Kazakh ethnography" in 2007.

From 1917 to 1987 - Secondary sources of Soviet period

The first five years of the Soviet period is characterized by interest in the culture and languages of other ethnic groups of imperial Russia as the means to find the support from the common people of the multiethnic population of newly born Soviet Republic. After the Russian Revolution of 1917 Lenin believed that latinization of the alphabet of all muslims of the former Russian Empire will make easier the process of implementing the new Soviet system to the Central Asia. From 1923 to 1927, inspired by the idea of national self-determination and being supported initially by the Soviet authorities, Kazakh linguist A. Baitursynov created a new alphabet modifying Arabic script to match the Kazakh sounds. However, the Soviet authorities took the decision to get the Unified Turkic Alphabet in 1927 designed on the basis of Latin script to be used by the Turkic people who lived on the territory of the multiethnic Soviet Union. All Arabic-script languages were converted to Latin script from 1927 to 1929. Further, from 1937 having the idea of creating the new Soviet culture, Stalin ignored and discriminated the history and languages of other ethnic groups except the Russian culture and language and that's why it is known as "Russification" period. Moreover, some Kazakh linguists and writers such as Akhmet Baitursynov, Alikhan Bukeikhanov, Shakarim Kudaiberdy-uly, Saken Sefullin, Magzhan Zhumabayev and others who wanted to study the national history, wanted to keep the linguistic independence of the Kazakh people were persecuted and sentenced to death in 1937 as nationalists. As a result, this period is characterized by arrival to power of the new generation of linguists who followed the language policy of Stalin. We could see the growth of number of research works devoted to the creation of new alphabets and textbooks adapting Cyrillic script to the native languages of the ethnic groups lived in the Soviet Union. Among Kazakhstani linguists of the "Russification period" the leading role was played by S. Amanzholov (1940), who modified Cyrillic alphabet, increasing it from original 32 to 43 letters to represent the Kazakh language. S. Amanzholov criticized other linguists who argued that Latin or Arab scripts are easier to implement in Kazakhstan due to the historical background. Therefore, S, Amanzholov took the active participation in promoting and applying his modified version of Cyrillic alphabet. After two decades of replacing the Arab script by Cyrillic, S. Amanzholov realized that the applied use of the Kazakh language became dramatically low both at academic institutions and on the state level. In 1954, some years before his death, S. Amanzholov (2002) wrote the letter to the Supreme Committee of the Soviet Union informing about the discriminating policy towards the Kazakh language and requesting to recover the Kazakh language on the state level but his appeal was ignored. From 1957, the Kazakh language and literature were completely removed from the academic curriculum at secondary and high schools.

From 1989 to present - Secondary sources of the Independence period

The post-Soviet period is characterized by the publication of a lot of books regarding the history and culture of the Tùrkic people. It could be explained by the fact that recently the topic of the history and language of Tùrkic people became very popular after the collapse of the Soviet Union in 1989 when former Soviet Republics of the Central Asia received their Independence. Here we should underline the significant contribution of Lev Gumilev on reviving the Turkology as the science in the Soviet Union after Stalin's repressions and promoting the idea of the ancient Great Turkic civilization. The historical researches of Gumilev become the main reference in all recent research studies done in the former Soviet Republics regarding Turkic history. The Indepedence period is characterized by the growth of the interest in the proper history including the history of the native language. The topic of historical stages of script change in the written Kazakh language is rather specific and there are very limited number of papers done by the international linguists. Though there are some books, sold in the bookshops, written by academic researchers exploring the topic of historical development of the Tùrkic people. Among such works there are "Ancient Turks" of Lev Gumilev (1993), "Empire of Tùrks" of" Rakhmanaliyev (2009), "In the Heart of Asia" of Gedin (2017), "Silk Road" of Phrankopan (2018). All these scholarly done researches are presented in the form of historical popular nonfiction books for non-prepared public rather than for academic audience.

Among the researches reviewed regarding the issue of language change, there is a book of Suleimenov (2002), who assumes that the Kipchak language is the ancestor of the Kazakh language and the reconstruction of the Kazakh writing system should be taken from documented evidence of the Kipchak language. He provides his own classification of Turk pro-languages, which is still under consideration by other linguists. Among the recent research papers most of scientific publications are devoted to the history of Tùrkic Runes. G. Aidarov (2000), Kazakhstani linguist, a leading specialist in Turkic Runes in his work «Тоникук ескерткішінін"(VIII гасыр) тілі» describes the Runic alphabet and provides the comparative analysis of original Runes (so-called Orkhon-Enisei alphabet) with the modified Cyrillic script currently used for the written Kazakh language. Another widely spread focus of research works it is the issue of applying the Latin alphabet, especially after the decision of the Kazakhstani government in 1992 to transfer from Cyrillic to Latin script before 2025. One of the most reliable and fundamental research works done in the field of investigating the Latin script's application to Tùrkic languages is the collective work of the specialists of the National Institute of Linguistics, published in 2007. It is titled "Latin Graphics Negizindegi Qazaq àlipbii". All these issues, presented above, will be partly covered in this research but the main goal is to classify all types of scripts used in the Kazakh language into one chronological summary without investigating each of them too deeply. One of the findings of my work is that, following the request of the Kazakhstani Government, some publishing houses reprinted the research works of scientists of XVIII-XX centuries as a series of books "Library of Kazakh Ethnography" (2007) in 50 volumes. It was really very useful source for the literature review.

5. Participants

Three scientists participated in this study. All three of them are the specialists in the field of linguistics and language policy. They work at the National Institute of Linguistics named after A. Baytursinov, the main goal of which is the development of the Kazakhstani linguistics as the science through strategic researches. This institute is the part of the Academy of the Science and works under the supervision of the Ministry of Education and Science of the Republic of Kazakhstan. All three experts were interviewed by me in the same day, one by one, answering the prepared questions. The first interviewee is *Erden Kazhibek*, the Doctor of the Science, a Research Professor, a leading local expert in the field of Tùrkic language and culture studies. He is the current Director of Kazakhstan Institute of Linguistics. The second expert is Gulzhikhan *Kabdenova*, the Candidate of the Sciences in Philological Sciences. She works in the department of the History of the Kazakh language and she is the author of several articles

about the history of language including changes of various scripts used in the Kazakh language. The third expert is *Zhanar Abitzhanova*, she is specialized on the history of ancient Tùrkic writing system such as Tùrkic Runi. I would like to express my thanks for their availability and cooperation during the interview, especially for the recommendations given on document.

6. Data collection: Treatment and procedure

Document-source data for literature review was collected during 5 months, while all three interviews were taken the same day. During the meeting with two specialists from the division on History of the Kazakh language, with their verbal pre-approval, I got my interviews voice-recorded. The interview was conducted in Russian following the list of prepared questions. The answers were given by ladies with switching from Russian to Kazakh. Later I took the interview with the Director of the National Institute of Linguistics. This interview was not recorded because it was connected mostly with Language and Policy issues, which is not the direct subject of this research. Before the meeting I provided the letter from KIMEP University in Kazak with the purpose of my visit and my contact information.

7. Research results

Could we consider Turkic Runes as the Kazakh proto-writing system? As mentioned Anttila (1989) "Writing is a system of signs that represents language". The alphabet is a kind of very complicated cultural code. The change of the alphabet means the code switching. That's why very often the change of writing script occurred after the conquest of the country or lands, when a new political system was implemented. The history shows that the main reasons of changing the writing script were of political and economic nature rather than just some linguistic factors. For example, the Latin alphabet was spread all over the world with the religion of Christianity, while Arabic was spread with Islam. Does it mean that it is not so necessary to have the script for knowledge of the language? In past centuries, scientists used writing as one of the "markers" of civilization. Though the most modern linguists are not so critical to the existence or absence of the proper writing system of the language for its learning and development, some Kazakhstani linguists argue that the Kazakh language has its own writing script in the form of Runes in spite of the fact that the definition "Tùrkic people" includes nearly 40 nationalities and it is supposed that all of them have the same proto-language.

What are the historical stages in changes of the script in the Kazakh written language?

One of my interviewees, Gulzhikhan Kobdenova (2018), the Candidate of the Science, the specialist of the National Institute of Linguistics, prepared and published recently the table where she presented her summary of changes of scripts which were used to represent the Kazakh language. It was translated by me for the purposes of the current research paper:

Table 1. The summary of script changes prepared by Kobdenova (2018)

Original text in Kazakh	Translation
Қазақ жазуын жаңғырту	stages of the Kazakh writing system
I) Көне түркі жазуы V – X ғасырлар.	1) V-X century_ Turkic Runes
II) Араб жазуы X – XX ғ. 20 жылдары (1929 ж.)._Arabic	II) Arabic script from X to 20s of the XXth century A.D. (1929 ж.).
III) Төте жазу XX ғ. Басы _	III) "Clear writing". The begining of XX century
IV) Латын жазуы XX ғ. 1929–1940 жж.	IV) Latin alphabet used in XX century, 1929-1940 years.
V) Кирилл жазуы XX ғ. 1940 жылдан – бүгінгі күнге дейін	V) Cyrillic script used in the XX century, since 1940s up to present
VI) Латын жазуы XXI ғ. 2018–2025 жж. басталады._ Latin	VI) Latin alphabet XXI century, supposed period of use 2018–2025

Source: from Kobdenova (2018).

Though the question whether Turkic Runes belong originally to the Kazakh people seems for me rather controversial, there are no doubts that the ancient Turkic peoples had their own writing system in the form of Runes. One of my interviewee, the specialist of the Kazakstani National Institute of Linguistics Abitzhanova (2008), also conducted her own research work where she presented her interpretations of the Tùrkic Runic writing system. Thus, I agree in general with the summary table designed by Kobdenova (Dec 2018), but its main drawback is that it was prepared for a non-academic audience and it contains only general information without any characteristic features on each script. The arguments of her reasons to put them into her table are also missing.

During my research I collected the data, which I would like to present here in the form of the table 2 "Summary on script changes in written Kazakh language. V-XXI centuries." The supporting arguments to accompany each script will be presented in the next section as data analysis and findings of the research.

Table 2. Summary on script changes in written Kazakh language. V-XXI cc A.D

Switched from	Characteristics	Period	Reasons/ key person
Turkic Runes	Orkhon-Enisey inscriptions. 38 signs. from right to left.	V-VIII	Natural process
Arabic alphabet	29 letters +1 sign. From right to left. In Kazakstan was used Persian writing style	From VIII century to 1917	Religious/ Islam
Missionary Cyrillic, version of Old- style	used during tsarism, 35 letters. From left to right.	From the end of XVII to 1917	Political / Russian Empire. Tsar.
New-styled Cyrillic	32 letters. From left to right	1918-1924	Political / Lenin
Latin script	33 letters. From left to right.	1918-1924	Political / Lenin' s Latinization policy
Baitursynov's alphabet. Төте жазу (Clear letter),	known also as Жаңа Емле. From right to left. 24 letters (19 classical signs + 5 new)	1924-1927	Kazakh linguist A.Baitursynov modified Arab script to match the Kazakh sounds
the Unified Turkic Alphabet	(known also as *Yanalif*), it was designed on Latin script. It contained 33 letters. From left to right.	1929-1937	Political / Stalin.
Modified Cyrillic alphabet	(from original Cyrillic with 33 letters was modified to 41 letters in order to match the Kazakh pronunciation). From left to right.	1940 up to present	Political / Stalin. Designed by Kazakh linguist S.Amanzholov
Nazarbayev's Latin alphabet	Kazakh language will be represented by Latin script using 32 letters (26 Latin letters plus some combinations)	From Feb 2018, expected to replace Cyrillic before 2025	Political. Approved by President of Kazakhstan N.Nazarbayev.

Source: Author's own compilation.

8. Findings and data analysis

Turkic Runes

Tùrkic Runes, V-X A.D. Turkic Runes script is known also as Orkhono-Yenisei letter. Written from right to left but also from Top to Bottom. It is the earliest recorded Tùrkic language. The strongest evidence of this fact is the existence of Tùrk Runic writing monuments, dated at around the 8th century A.D., which were recently found in Altai. The term Altay, used in this research paper, covers the geographical territory of the Southern Siberia which includes the part of modern-day Russia (The Republic of Altay, The Gornii Altay region, the Republic of Tuva), the part of Kazakhstan (the Eastern Kazakhstan), the part of Mongolia and Xinjian uygur Autonomous Region of China (Chinese Turkestan). These geographic places at that historical period were inhabited by the Tùrk people. The language of the inscriptions was the Old Turkic, the language of the Turkic Khaganate (VI-VII). S. Amanzholov (1946) mentions that some ancient monuments with Turkic Runes were found in the

neighboring area of the town Aulie-Ata (Аулие-Ата, present-day Dzhambul). Recently there were found some more monuments and artefacts with Turkic Runes inscriptions.

Arabic script

Arabic script (X century - 1928), the language of Koran. The Arabic alphabet came with Islam and was used also for recording the Turkic texts on the lands of Karakhanids (the modern-day Southern Kazakhstan). It is important to underline that from the very beginning the Arabic alphabet was not used to represent the Kazakh language. The Kazakh people had to learn the Arabic language in order to understand Coran, very often the Kazakh religious people just memorized some parts of Coran without the deep knowledge of the its language. Thus, since VIII century the Runic script started to be replaced by Arabic script of Coran. Zhetpysbaeva (2001) wrote about the Turkic literature of X-XII written in Arabic script. Despite the Mongolian invasion, the period of XIII to XIV is not characterized by any significant change of script in writing system of the Turkic people. It could be explained by devastating consequences of invasions of Chingyzkhan military forces to the territory of present-day Kazakhstan. According to Arab and Persian historical sources, only 20 cities remained in the Great Steppe out of 200, others were destroyed. The library of Otrar, the largest one in the Central Asia, was burned by Mongolians. Moreover, the Black Death (bubonic plague) arrived to the Steppe in the XIII century. A lot of Turkic people, including the tribe of future Turkish Ottoman dynasty, immigrated to safer places to keep far from both Mongolians and the dangerous disease. Furthermore, from XV century on its historical development as the dominant language of the Great Steppe in the part of modern-day Kazakhstan, the Arabic script was modified to match the Turkic and Persian languages. Thus, the most progressive scientists and philosophers of the Orient such as Al-Farabi, Ibn-Sina Avicenna, Ahmad Yasawi, Omar-al Hayami and others created their masterpieces in Arabic script. However, the access to the writing was limited only to the ruling class and religious representatives. The Arabic alphabet was dominantly used in Kazakh Steppe up to the XVIII century when Kazakh Khaganate entered to the Russian Empire. Radlov (2007) writes that from the middle of XIX, it was very common among the rich Kazakhs of the north part of the Steppe to open public schools for children from poor families from the nearest “auls”(villages) and invite the educated Tatars as educational instructors from Tobol city to teach them reading and writing and explain children the basic principles of islam”(p102). In comparison with the early period of “islamization”, the beginning of XIX century was the time when the Arabic script was already used to represent the Kazakh language. For example, the famous Kazakh poets and writers Abay Kunanbay-uli, Chokan Valikhanov, Shakirim Kudaiberdy-uly wrote wrote in Kazakh using Arabic alphabet. Different varieties of the Arabic script used in the Great Steppe could be the subject of future research work.

Missionary version of Cyrillic script (old style)

Since XVII century the Imperial Russia became interested in the lands of Siberia and Central Asia. In order to explore this “terra incognita” there were sent the expeditions with the mission to collect the data and design the maps of the territory for the further expansion. One of the aims of such expeditions was to collect the data regarding the natural recourses and to conduct the ethnographical studies about the culture and languages of the indigenous people. The knowledge of the native languages was used after to create the dictionaries and textbooks to learn the native languages and prepare the translators for various purposes including future trade interaction and colonization plans. Missionary Cyrillic alphabet was used during tsarism, has 35 letters, is written from left to right. It was used in Kazakh Steppe among Russian migrants, Kazakh khans for correspondence with Russian authorities. The Russian imperial authorities used the native Kazakhs to expand their power in the Kazakh Steppe. Ibrahim Altynsarin was a Kazakh educational instructor in the XIX century of Kazakh Khaganate. He was known for introducing the Cyrillic in the Kazakh-Russian schools. Altynsarin was the author of the first Kazakh grammar book and opened the first newspaper in Russian. For his outstanding work, Altynsarin was

awarded the title of the Russian State Counseller. However, the Arabic script was widely spread in Kazakh Steppe up to 1917.

New Kazakh alphabet of A. Baitursynov - Төте жазу- Modified Arabic script

The Soviet period is the nearest period for analyzing the language change processes in the development of the Kazakh writing system and that's why it is well documented in comparison with the ancient times. Since the end of XVIII the Russian language started to be used as the language of ruling class, but the Arabic script was still widely used both by high class and at schools medrese. The most important issue of the period after the Russian Revolution of 1917 is the creation of the Kazakh alphabet Төте жазу (Clear letter), designed by A. Baitursynov. Before the Kazakh people just read Arab words written in Arab alphabet and had to learn the Arab language to understand the text, while with Baitursynov's alphabet they were able to write the Kazakh words using the Arab script. There were published textbooks on this modified Arab script. As my interviewee Dr. Erden Kazhybek mentioned, the alphabet of Baityrsynov was one of the best to represent the Kazakh specific sounds. Later A. Baitursynov participated in designing the Unified Turkic Alphabet for the Turkic people of the Soviet Union. But in 1937 Baitursynov was declared to be a "nationalist" and he was killed in 1937 during the repressions of Stalin. This alphabet, known also as Жаңа Емле (New orthography), is still used by ethnic Kazakhs who migrated away in 1920s-1930s to China, Afghanistan, Iran, Mongolia, while in Kazakhstan it was replaced by Cyrillic script in 1940s.

New Unified Turkic Alphabet of Stalin – Yanalif- Latin script –

After the death of Lenin in 1924, when Stalin came to power, the Soviet authorities took the decision to create the Unified Turkic Alphabet. In 1926 the Congress of the specialists of Turkic languages in Baku recommended to apply the Latin script. They remember that Lenin considered the Latin script application as one of the symbols of revolution because this script was associated for him with the Great French Revolution. It contained 33 letters. It was written left to right. Yanalif was designed on the basis of Latin script to be used by all Turkic people who lived on the territory of the multiethnic Soviet Union. It was initially planned to apply Latin to the Russian language as well, but it was finally declined in 1930s.

New Kazakh Alphabet of S. Amanzholov – modified Cyrillic

In 1930s Soviet authorities decided to implement Cyrillic script in all Soviet republics and this process took nearly ten years. Kazakh linguist S.Amanzholov in 1940 adopted it for the Kazakh language. His supporting arguments were presented in the draft in his research paper "Новый Алфавит и орфография казахского литературного языка" (1946). S. Amanzholov took the original Cyrillic alphabet with 33 letters and modified it adding some new letters in order to match the Kazakh pronunciation). This final version has 41 letters and written from right to left. His alphabet is still used since the times of Stalin.

New Kazakh Alphabet of N. Nazarbayev– modified Latin script

At present the Kazakh language is represented by the adopted version of Cyrillic, which was designed by C. Amanzholov in 1940. However since 1992, after the collapse of the USSR and getting the Independence, the Kazakhstan government took several regulations regarding the reforms in the national language policy. In spite of the declaration done by Kazakhstan president in 2012 of future transfer from Cyrillic to Latin, the Kazakhstan linguists discussed a lot whether to leave Cyrillic script, choose Arabic or Latin alphabet. Some linguists insisted to recover and apply the Turkic Runes for designing the new Kazakh alphabet. In April 2017 the President Nazarbayev made a speech "Look at the future: modernization of the social consciousness", where he put the deadline for the Kazakh linguists for the

transition period from Cyrillic to Latin script. In some months after the President's speech the scholars of the Institute of Linguistics named after Baitursynov proposed to the government two versions of how the Kazakh language could be represented using the classic Latin alphabet. Both versions were presented to the public, but they got rather negative feedback in the social networks from the Kazakhstan people, in spite of the fact that they were not yet tested well because of the lack of appropriate keyboards. Finally, on February 2018 the third version was approved by the President of the Republic of Kazakhstan. During the interview, Dr. Erden Kazhybek, the Director of the Institute of Linguistics, mentioned that the linguists of his Institute didn't participate in the design of the latest version, but he knew that it was tested rather successfully at one of the Kazakhstani summer schools in the form of a probation exam. He stated that in the final version, the Kazakh language will be represented by Latin script using 32 letters (26 Latin letters plus some combinations) in comparison with 42 which were used in Cyrillic. Up to 2025 the new alphabet on the base of Latin script should be implemented all over Kazakhstan.

9. Conclusion

To sum up the findings of this paper, it is necessary to tell that various changes of the script used to represent the Kazakh language occurred mostly because of religious and political reasons. Since ancient times to XXI century, the Kazakh language as the part of the Turkic language group was represented by various scripts. First of all, it is already proved that from the VI to VIII century nearly all Turkic languages were represented by the script in the form of Turkic Runes and it occurred during the period of the first Turkic Khaganate. Later with Islam it was Arabic script was implemented. But from 1917 to 2017 the script representing the Kazakh language was changed four times, making modifications first to Arab script, later to Latin one. Finally, it was completely replaced by modified version of Cyrillic alphabet in 1940, which is still used in Kazakhstan.

After getting the Independence in 1992, Kazakhstan decided to create a new alphabet using again Latin script to represent the modern Kazakh language.

Thus, if the script change in the 10^{th} century was done on religious and economic reasons, the transfers from one script to another during the Soviet period was the part of the aggressive state language policy of the Soviet government, which led to gradual discrimination of the political and educational status of the Kazakh language. At the same time, the recent changes of the script in 2017 and 2018, from Cyrillic to Latin, done by the Kazakhstan government seemed to be done on political reasons as well though, having the Kazakhstan population consisting of more than 130 ethnic groups, being implemented in the less aggressive way in comparison with the Soviet period, but certainly ignoring the natural process of the language development.

Taking into account that spoken Kazakh language remain nearly the same for centuries, I have a question open whether the Kazakh people and its native language really needed all these changes? And I would like to find out in my further research work some script changes in Turkic language family occurred as a result of economic or natural language process rather than the pressure of religious or political reasons.

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References

Amanzholov, S (1940). "New alphabet and orphografia of the Kazakh literary language" (Novii alfavit i orfographia kazaxskogo pismennogo yazika"). Draft. Almaty.

Amanzholov, S. (2002). A collection of articles. "The basic principles of the theory of the Kazakh language". Galym. Almaty.

Artykbayev Zh., Prmanov A (p 17. 2013). History of Kazakhstan" Atamura, Almaty.

Aidarov G. (2000). «Тоникук ескерткішінін "(VIII гасыр) тілі».

Abitzhanova, Zh (2008). Орхон-Енисей ескерткіштері тіліндегі метафоралардың уәжділігі мен семантикасы. Almaty.

Encyclopedia "Library of Kazakh Ethnography" (2007) in 50 volumes. Altyn Kitap. Astana.

Gedin, S.A. (2017, p76). В Сердце Азии. Памир-Тибет-Восточный Туркестан. (In the Heart of Asia. Pamir-Tibet-Eastern Turkestan). Moscow, Russia.

Gumilev L. (1993), "Ancient Turks" (Drevnie tùrki). Tovareshestvo "Kalyshnikov – Komarov & K". Moscow.

Kan (2004). History of Kazakhstan. Textbook for students. Kazintergraph. Almaty.

Kuryshzhanov A (2010) "Research on lexica of Turkic-Arab dictionary -writing monument of XIII century on ancient Kipchak language". Pavlodar State University.

Kazakhstan National Institute of Linguistics, named after A. Baitursyniv (2007). "Latin Graphics Negizindegi Qazaq àlipbii", 410 p. Publishing house "Arys". Almaty. KZ.

Phrankopan (2018) "The Silk Roads: a new history of the world". Publishing house "E". Moscow.

Radlov, V. (2007) (= W. Radloff). Turkic Nomads of the Steppe (in Russian). Encyclopedia of Kazakh Etnography. Volume 3. Altyn Kitap. Astana.

Rakhmanaliyev (2009) "The Empire of Tùrks". p702. n.d.

Sarsekeev, B.C. (2007, p 34). The World of the Nomad. Editing House Atamura. Almaty.

Suleimenov, O. (2002, p 96). Turks in pre-history. About the origin of ancient Turk languages and their Writing systems. Editing House Atamura. Almaty. KZ.

Zhetpysbaeva B. (2001), Turkic literature X-XII century. Litera. Almaty.

Internet sources

Anttila, Raimo. 1989. *Historical and Comparative Linguistics*, John Benjamins Publishing Company, ProQuest Ebook Central, Created from kimep on 2019-01-24 04:55:37. http://ebookcentral.proquest.com/lib/kimep/detail.action?docID=673087.

"History of Humanity: From the seventh to the sixteen century" (1996), edited by Sigfried J.de Laet. ISBN 978-92-3-102813-7. Retrieved 03-03-2019 from https://books.google.kz . e-book.

Kazakhstan National Digital History portal site (2013). *"Ancient arts on the rocks of Kazakhstan"*.

Kobdenova, G.B. (Dec, 5. 2018). Қазақ жазуын жаңғырту. Newspaper «Ана тілі». Retrieved from http://anatili.kazgazeta.kz/?p=50750.

www.nur.kz "Kazakh alphabet: history". Retrieved March 4, 2019.

The History of Turks. Retrieved 19/01/2019 from http://www.historyworld.net/wrldhis/PlainTextHistories.asp?historyid=ac94.

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RUHUI GAO[1] AND JINPENG ZHAO[2]

INVESTIGATE THE IMPACTS OF FISCAL AND MONETARY POLICIES ON DETERMINATION OF PRIVATE OWNERSHIPS OF PUBLIC PRIVATE PARTNERSHIP (PPPs) INVESTMENT IN CHINA

Abstract

This study aims to examine the effects of fiscal and monetary policies on determination of investments of privately-owned Public Private Partnership (PPPs) in the context of Chinese economy from the period of 1993 to 2017. The background of this study is inspired by the previous proposition, which claims that the investments of PPPs are subject to the macroeconomic condition. This study employs quantitative research method including linear regression econometric model and a series statistical tests to evaluate our hypotheses. Ordinary Least Squares method is used as calculation of estimators of coefficients and the tests of coefficients, validity and overall significance of the model are also examined. The results of the tests suggest that the tests of coefficient, the overall significance and validity of the model are failed at 5 percent significance level, which constitutes to the statement that the effects of fiscal and monetary policies are not statistically significant on determination of privately-owned PPPs investments in the context of Chinese economy. The result implies that the variations in macroeconomic condition by changing monetary and fiscal policies are not significant to affect the PPPs investment decision in China based on the data from 1993 to 2017.

Keywords: PPPs Investment, regression analysis, fiscal policy, monetary policy

JEL Codes: A12, C10, C13, E52, E62

Introduction

Public-private partnerships (PPPs) refers to a long-term commitment established between one or several private parties and government department for the purpose of delivering public goods and services. The private party is responsible for the managerial process as well as taking potential risks as World Bank defines. (worldbank, 2018) PPP arrangements have developed dramatically since 1990s in developing countries, which accounts for nearly 20 percent of total infrastructure investments (Hammami, Ruhashyankiko and B. Yehoue, 2006). Sachs, Tiong and Wang (2007) pointed out that it is rarely possible for Asian developing countries to satisfy their needs on the development of infrastructure by government's fund. Therefore, the demands of private investment are needed for financing PPPs projects in Asian developing countries. The evidence of rising demand of PPP projects in China can be obtained from the data published by World Bank (2018) in the sense that the annual quantity of projects is stably higher than 50 between 2011 to 2017, although the number of PPPs project in 2007 plunges from the top, which number is 104. Furthermore, the recent high demand of PPPs investments in China are also witnessed by the processing of China deeper opening-up reform and Belt-Road Initiative, which will attract more private capital to invest in Chinese infrastructure.

The motivation of our study is inspired by the emerging demands of PPPs projects arrangements in China since 2011 in the sense that the investment spending in PPPs arrangements exhibited an increasing trend in the last few years based on the database from World Bank. (Ppp.worldbank.org, 2018) Therefore, it is essential to find out the potential determinants that affecting PPPs investments. Motivated by the previous research work completed by Hammami, Ruhashyankiko and B. Yehoue

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(2006) whom propose that the macroeconomic policies are the key determinants of private sector's participation in PPPs as long-run profitability of the investment is subject to the macroeconomic condition. Moreover, a stable macroeconomic condition is more attractive for government to raise money to invest as well as financing according to Dailami and Leipziger (1998). Lots of researches have made significant effort on the impact between macro-economic environment and PPPs project. From the policy risk perspective, Sachs *et al.* (2007) find that the problem of land ownership and cumbersome regulatory frameworks will impact the PPPs project. In term of social risk level, via studying 15 key factors, such as pollutions, salary change and unemployment, Yuan *et al.* (2018) state that the balance between economy, environment and social should be cared and no single one should be omitted. The performance of a PPPs project is related to institutional environment in China and perfection of current laws, regulations and frameworks can improve the environment then reach an ideal performance (Zhuang *et al.*, 2014).

Fiscal and monetary polices are two important factors determining the stability of macroeconomic condition. As a result, PPPs investment may be subject to the fluctuations caused by monetary and fiscal policies. Alesina et al. (1999) identified that fiscal policies affect private investment through the channel, which fiscal policy increases the pubic wages and transfers such that the private sector benefits from the increased wage pressure in the sense that private investment and wages are pushed up. Furthermore, Friedman (1995) explored the relationship between the monetary policy and investment. Friedman (1995) argued that the real quantity of money affects the total aggregate demand. Therefore, the increase in aggregate demand has potential effect on investment. As quantity of money is controlled by the interest rate, PPPs investment may be affected by the variation of monetary policies. To sum up, the effects of fiscal and monetary policies on PPPs investment may constitute as the significant determinants.

The research is significant from previous work since the effects of macroeconomic condition including fiscal and monetary policies have not yet been tested much before. Also, the research focuses on the privately-owned PPPs project requiring the ownership of the projects should be 100 percent private. The privately-owned PPPs projects are not explored much from previous research. Finally, compared with the previous PPPs research evaluated in developed economies, the context of this study is conducted based on the data from a developing country, which also hasn't been examined much before.

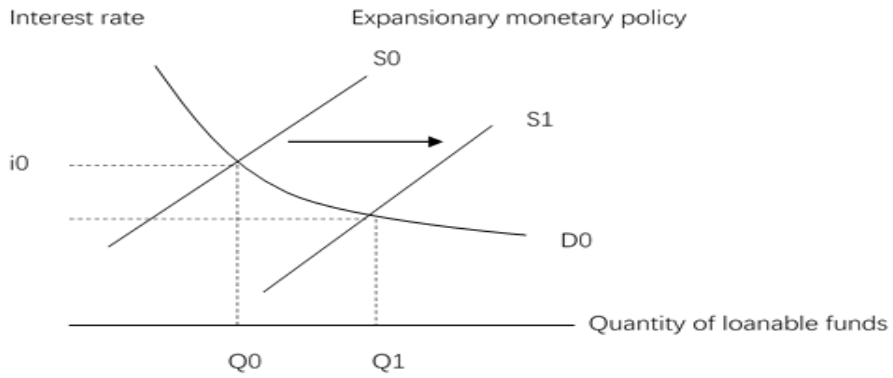
Theoretical background

This paper aims to investigate the impacts of monetary and fiscal policies on the determination of privately-owned PPP investments. As PPP is a type of investment, the macroeconomic variables may have potential effects on the determination of the PPP investment. The theoretical background underlying the research questions are based on macroeconomic concepts. The effects of fiscal and monetary policies on the determination of investment will be analysed in turn.

1)The effect of monetary policy on determination of privately-owned PPPs investment

Monetary policies can be classified as the contractionary and the expansionary. The effect of expansionary monetary policy on decision of investment is different from the effect of the contractionary one. Investment is stimulated under an expansionary monetary policy because the expansionary monetary policy reduces the interest rate, therefore the quantity of available loanable funds increases as interest rate getting lower. This can be illustrated in the figure below.

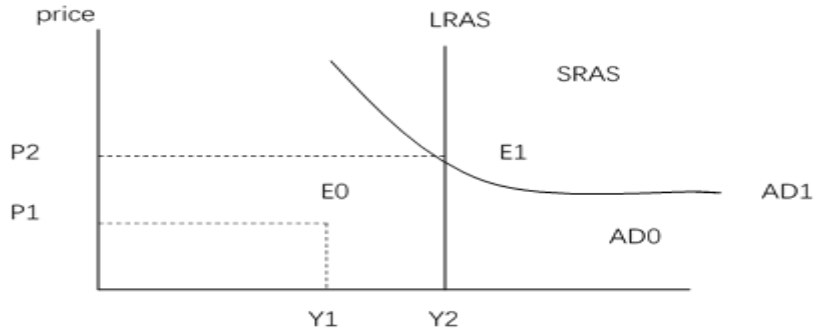
Figure 1. Demand and supply of loanable funds



Source: Authors.

As figure 1 shown above, the original equilibrium occurs at E0, where the equilibrium interest rate and quantity of loanable funds are i0 and Q0 respectively. An expansionary monetary policy increases the supply of loanable funds resulted in a rightward shift of supply curve from S0 to S1. The equilibrium point moves from E0 to E1 with a lower equilibrium interest level of i1 and increased quantity of loanable funds of Q1. With lower interest rate level and higher quantity of loanable funds, the aggregate demand of total output will expand to the potential output level. This can be illustrated in figure 2, as shown below.

Figure 2. Aggregate demand, short-run and long-run aggregate supply curve



Source: Authors.

As figure 2 illustrates above, the initial equilibrium state is at E0 with equilibrium price level and output of P1 and Y1 respectively. After an implementation of expansionary monetary policy, the aggregate demand curve shifts from AD0 to AD1 leading output level back to the potential output, which intersects with Long-run aggregate supply curve, denoted as Y2. Recall that output equals

$$Y = C + I + G + NX$$

Where Y denotes the total output, C denotes the consumption, I denotes the investment, G denotes the government spending and NX denotes the net exports.

An increase in total output in Y from the movement of aggregate demand curve resulted from an expansionary policy increases the overall level of investment. Additionally, lower interest rate from the implementation of expansionary monetary policy allows more loanable funds become available in the financial market, which in turn increases the level of investment as lower interest rate stimulates borrowings so that the opportunity cost of borrowing money becomes lower.

The same logic applies for contractionary monetary policy, which discourages the motivation of investment as interest rates getting higher and total output shrinks.

To sum up, the effect of an expansionary monetary policy is expected to have a positive effect on decision of investment. Whereas the contractionary monetary policy is expected to exert a negative effect on investment.

Since privately owned Public-private partnerships (PPPs) is a type of private investment, the effect of monetary policy on determination of PPPs is supposed to have the same outcome as analysed above.

Hypothesis A: the expansionary monetary policy has positive effect on privately owned PPPs investment and the contractionary monetary policy has negative effect on privately owned PPPs investment.

2) The effect of fiscal policy on determination of privately-owned PPPs investment

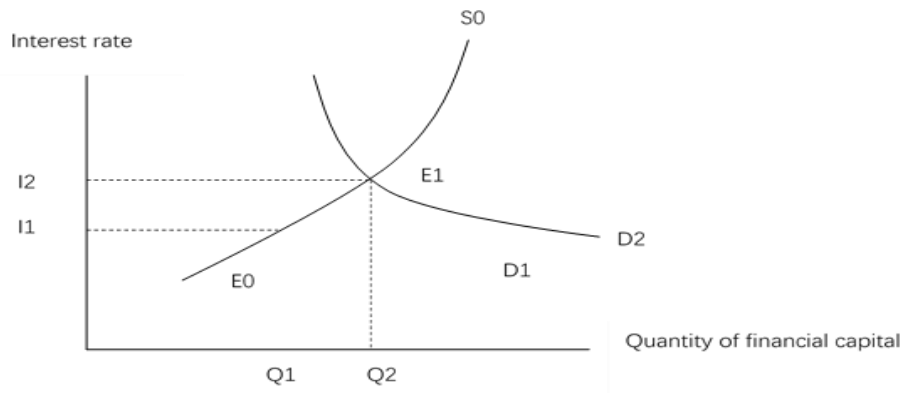
The implementation of fiscal policy by the government can have either expansionary or contractionary effect to the economy. An expansionary fiscal policy involves reducing taxes or increasing government spending, where as a contractionary fiscal policy associates with increasing taxes and reducing government spending. An expansionary fiscal policy typically results in a budget deficit as government reduces taxes and increases government expenditure to invest in infrastructures. Recall from the equation below

$$\text{Budget Surplus/Deficit} = \mathrm{T} - \mathrm{G} - \mathrm{TR}$$

Where T represents the government income from taxes, G denotes the government spending and TR denotes transfer payment paid by government.

With a budget deficit, government will demand more financial capital to finance the expenditure from the deficit. Therefore, available financial capital that serves for the purpose of private investment will be less given the fixed private savings rate and trade balance. This can be illustrated by the figure below.

Figure 3. Demand and quantity of financial capital demanded by government sector)



Source: Authors.

In figure 3, the initial equilibrium is at E0, with equilibrium interest rate and quantity financial capital demanded as I1 and Q1 respectively. The budget deficit resulted from an expansionary fiscal policy requires more financial capital from market to subsidize the shortfall, which drives the demand curve moving from D1 to D2. The new equilibrium now occurs at E1 with a higher interest rate. The higher interest rate from a budget deficit impedes private investment as higher interest rate increases the opportunity cost of borrowing money. Hence, investment of private sector will be discouraged.

The same logic applies for the situation when government is confronted with a budget surplus. Less demand for financial capital from the financial market retains the interest rate at a lower level. Private investment will benefit from the budget surplus.

To sum up, the expansionary fiscal policy leads to a budget deficit, which discourage investment decisions of private sector. The contractionary fiscal policy leads to a budget surplus and private sector's investment will not be deteriorated.

Since investment of privately-owned PPPs is a type of private sector's investment. Budget deficit is expected to have a negative effect on privately-owned PPPs investment, whereas budget surplus is expected to have a positive effect on privately-owned PPPs investment.

Hypothesis B: Budget deficit has a negative effect on privately-owned PPPs investment, whereas budget surplus has a positive effect of privately-owned PPPs investment.

Methodology

In the section above, two potential determinants of privately-owned PPPs investment are presented, which are budget deficit and interest rate. Regression analysis is recommended for this study as regression analysis investigate the relationship between variables. In our study, budget deficit and interest rate over time are set as independent variables and investment of privately-owned PPPs over time is set as dependent variable. Therefore, the expression of linear regression model is expressed as following equation.

$$Y_t = \beta_1 + \beta_2 X_{2,t} + \beta_3 X_{3,t} + \mu_t$$

Where Y denotes the privately-owned PPP investment, β_1, β_2 and β_3 denotes the coefficients of slope and independent variables. X_2 and X_3 represent independent variables of budget deficit and interest rate respectively. μ measures the residuals.

a) Data selection

With respect to the data selection, since this study aims to investigate the effects of fiscal and monetary policies on privately-owned PPPs investment in China. As a result, only privately-owned PPPs investment projects completed in China are chosen for the analysis of selecting dependent variable, which means that the PPP project should be 100 percent owned by a Chinese private entity. The privately-owned Chinese PPPs projects completed from 1993 to 2017 are chosen. The annually sum of total investment of privately-owned PPPs projects is identified as dependent variable. From 1993 to 2017, there are 24 observations are included in our sample because the data of the number of Chinese PPPs projects in 1995 is missing so that it is not accessible to calculate the total number of privately-owned PPPs investment in 1995.

Furthermore, the natural logarithm form of dependent variable is considered in this study, as the dependent variable is required to follow the normality assumption based on a small sample size. The form of the dependent variable is considered as below

$$\mathrm{Y} = \ln(\frac{Y_t}{Y_{t-1}})$$

Where Yt is the sum of total number of privately-owned PPPs investment during year t, and Yt-1 is the sum of total number of privately-owned PPPs investment during year t-1.

In the process of selecting the data of independent variables. Annually deposit interest rate is considered as a representation of measuring the effect of monetary policy due to the accessibility of the record of official interest rate during 1990s. As for the fiscal policy, annually budget deficit is selected as a measure of the effectiveness of fiscal policy. The natural logarithm applied to the dependent variable before is also considered as a transformation of the original variable because the measure of the percentage change of budget deficit is compatible with the variation of dependent variable, which is also depicted as the rate of percentage changes.

b) Checking Assumptions

Before running the linear regression model, several assumptions are required to be checked to ensure the regression model to satisfy the prerequisites. First of all, homoscedasticity is required to be checked, the plot of residuals is introduced for examining if there is an obvious pattern in the residuals. Secondly, there should be no autocorrelation between residuals, this is done by running a Durbin-Watson test, which is defined as below

$$\mathrm{d} = \frac{\sum_{t=2}^{T}(e_t - e_{t-1})}{\sum_{t=1}^{T} e_t^2}$$

where et is the residual term at observation at time t and T denotes the total number of observations. The rule of thumb is applied in this study given the small sample size, the d statistic is expected to lie in range between 1.5 to 2.5, which is identified as normal. Thirdly, it is also necessary to detect if there is a multicollinearity issue existing between independent variables. Given that there are only two independent variables in the regression model, the correlation pearson's product moment test is applied

to diagnose the collinearity between budget deficit and annually deposit interest rate. The null hypothesis of pearson's product moment test states that the true correlation is equal to 0 so that the null hypothesis is not expected to reject at given significance level.

c) Obtaining the Estimates

The estimators for $\beta_1, \beta_2 \; and \; \beta_3$ of the regression model are estimated using Ordinary Least Squares (OLS) method. The estimates of βs are calculated using matrix notation as following:

$$\hat{\beta} = (X'X)^{-1}X'y$$

Where X denotes the matrix of the independent variables with 24 rows and 3 columns and y denotes the vector of dependent variables with 24 observations.

d) Hypothesis testing

In section of theoretical background, two hypotheses have developed regarding to the effectiveness of monetary and fiscal policy against privately-owned PPPs investments. Precisely, the two hypothesis form that serves the testing purpose is as following:

Ho: $\beta_2 = 0$ against Ha: $\beta_2 < 0$, which states that as the growth rate of budget deficit increases, the growth rate of the number of privately-owned PPPs projects investment should exhibit a decrease.

With respect to β_3, the null and alternative hypothesis are Ho: $\beta_3 = 0$ against Ha: $\beta_3 < 0$, which states that as interest rate increases, the growth rate of the number of privately-owned PPPs projects investment should exhibit a decrease.

The one-tailed T-test of β_2 and β_3's is appropriate for testing the two statements above. The test statistics of the two hypotheses will be compared with the critical value of 5 percent alpha to make inference if the null hypothesis is statistically approved.

Furthermore, the overall effect of the explanatory variables and validity of the model also need to be examined. F test is recommended to be applied. For testing the overall effect of the model, the null hypothesis is specified as Ho: $\beta_2 + \beta_3 = 0$, the restriction matrix is defined as

$$\text{R} = [0 \quad 1 \quad 1]$$

$$\text{r} = 0$$

the null hypothesis is tested by $\mathbf{R\beta = r}$ with 1 degrees of freedom. The null hypothesis of F test regarding the validity of the model is specified as Ho: $\beta_2 = \beta_3 = 0$, and the restriction matrix is defined as

$$\text{R} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & 1 \end{matrix}$$

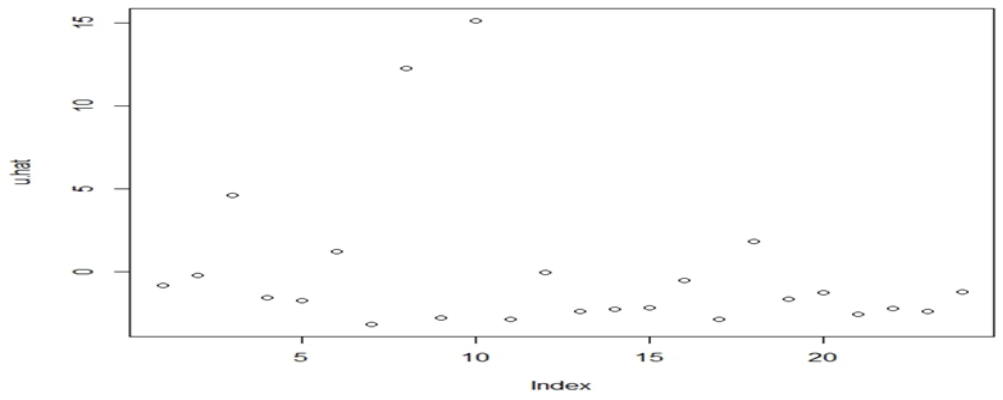
$$\text{r} = \begin{matrix} 0 \\ 0 \end{matrix}$$

the null hypothesis is tested with the restriction of $\mathbf{R\beta = r}$ with 2 degrees of freedom. The test statistics of the above two hypothesis using F test is expected to be compared with the critical value when alpha equals 5 percent.

Empirical results

In the section above, several assumptions before running the regression are required to be checked. First of all, the detection of homoscedasticity can be viewed from the residual plot. The residual plot is shown below

Figure 4. The plot of residuals



Source: Authors.

From figure 4, given the relatively small sample size of 24, the residual plot seems possessing an equal variance attribute except observation 8 and 10. Secondly, the Durbin-Watson test is employed to test the autocorrelation between residuals. The result of test statistics is 2.59471, which slightly exceeds the range of rule of thumb 1.5 to 2.5. Thirdly, the P-value of pearson's product moment test is 0.2923 leading to the result of accept the Null hypothesis at 5 percent significance level, which claims to be the true correlation between the two variables is equal to 0. Given the results above, the regression model is okay to be tested under the small sample size.

The OLS estimators of β_2 and β_3 is derived from $\hat{\beta} = (X'X)^{-1}X'y$. The second and third elements of vector $\hat{\beta}$ are selected in order to obtain the coefficients of budget deficit and interest rate. From the results of calculation, the estimate of β_2 is -0.03417 and the estimate of β_3 is -0.27545. The interpretation of the coefficients is that for one percent increase in budget deficit, the growth rate of privately-owned PPP investment decreases by -0.27545 percent. Similarly, if interest rate increases by one percent, the growth rate of privately-owned PPP investment decreases by -0.27545 percent, which claims to be consistent with our hypothesis proposed in our section of theoretical background.

Next, the results of T tests of the two one-tailed hypothesis suggests that the test statistics can not reject the null hypothesis of β_2=0 and $\beta_3 = 0$ against the alternative hypothesis that β_2 <0 and β_3 <0 at 5 percent significance level in the sense that the test statistics are -0.04896225 and -0.8250391 for β_2 and β_3 respectively compared with the critical value at 5 percent significance level, which is -1.720743.

Finally, the validity and overall significance F test results also indicate that the proposed model is not significant at 5 percent significance level. The F test statistics for β_2 =β_3=0 with (1, 21) degrees of freedom is 0.13637 and the p-value is 0.7156. Compared with the critical value at 5 percent significance level, which is 4.3248. Also, the test result of β_2 +β_3=0 indicates that the overall effect of the model is

not significant at 5 percent significance level with test statistics equals 0.35008 and critical value equals 3.4668, p-value equals 0.70867.

Discussion

From the test results above, the one tailed T-test, overall significance and validity F-test are failed at 5 percent significance level. The possible reasons of the failure of the test are summarized as following. Firstly, the limitation of the data may be one of the reasons. Because PPP projects launched in developing countries in 1990s as the case of the study, which aims to investigate the privately-owned Chinese PPPs investment, there are not enough annually time series data regarding the PPPs investment. For example, in our study, there are only 24 observations in the regression model, which is relatively small if the Law of Large Number and Central Limit Theorem are expected to be introduced when estimating the coefficients and running tests. Secondly, the potential patterns may exist in the residuals. Before running the regression model, the Durbin-Watson test and the plot of residuals are examined in order to detect autocorrelation and homoscedasticity of the residuals. The rule of thumb of Durbin-Watson test is applied in this study, which may not strictly be precise to detect the patterns of autocorrelation among residuals and the test statistics is slightly over the upper boundary may also contribute to the insignificant result. Similarly, in the plot of residuals for observing homoscedasticity, there are two observations are found to be outliers, which are number 8 and 10. There is only a residual plot for detecting homoscedasticity rather than running a numeric test, which constitutes the neglect of unequal variances so that the final test results may be affected. Thirdly, the model may be underspecified due to the existence of other omitted variables. For example, the potential variable affecting privately-owned PPP projects may be subject to the growth rate of the whole economy, namely the GDP growth rate. Since the growth rate in total output affects consumption, investment and government spending as a whole. An increase in total GDP growth rate may constitute to the growth of PPP investment. Fourthly, the transition mechanism of Chinese economy may be different resulting in a disconnection between goods market and financial market. For example, in our regression model, the second variable is the budget deficit. In section of theoretical background, it is proposed that the increased demand of financial assets by the government may shift the demand curve, which pushes the equilibrium interest rate to a higher level. The higher level of interest rate should discourage private investment decisions. But in reality, this proposition may not hold if any barriers in the transition mechanism in the financial market.

For further research, a large sample with more observations are recommended. Furthermore, the detection of homoscedasticity and autocorrelation should implement numeric tests and remedy methods are also need to be explored for the situation of heteroscedasticity and autocorrelation. Finally, more variables that have potential effects on PPPs investment should be introduced to the regression model with respect to the issue of under specification.

References

Alesina, A., Ardagna, S., Perotti, R. and Schiantarelli, F. (1999). Fiscal Policy, Profits and Investment. *National Bureau of Economic Research*.

Dailami, M. and Leipziger, D. (1998). Infrastructure project finance and capital flows: A new perspective. *World Development*, 26(7), pp.1283-1298.

Friedman, M. (1995). The Role of Monetary Policy. *American Economic Review*, Vol.58(No.1), pp.pp. 1-17.

Hammami, M., Ruhashyankiko, J. and B. Yehoue, E. (2006). Determinants of Public-Private Partnerships in Infrastructure. *2006 International Monetary Fund*, WP/06/99, p.3.

Regan, M., Smith, J. and Love, P. (2011). Impact of the Capital Market Collapse on Public-Private Partnership Infrastructure Projects. *Journal of Construction Engineering and Management*, 137(1), pp.6-16.

Sachs, T., Tiong, R. and Qing Wang, S. (2007). Analysis of political risks and opportunities in public private partnerships (PPP) in China and selected Asian countries. *Chinese Management Studies*, 1(2), pp.126-148.

Ppp.worldbank.org. (n.d.). *What are Public Private Partnerships? | Public private partnership*. [online] Available at: https://ppp.worldbank.org/public-private-partnership/overview/what-are-public-private-partnerships [Accessed 5 Jan. 2019].

Yuan, J., Li, W., Guo, J., Zhao, X. and Skibniewski, M. (2018). Social Risk Factors of Transportation PPP Projects in China: A Sustainable Development Perspective. *International Journal of Environmental Research and Public Health*, 15(7), p.1323.

Zhang, S., Gao, Y., Feng, Z. and Sun, W. (2015). PPP application in infrastructure development in China: Institutional analysis and implications. *International Journal of Project Management*, 33(3), pp.497-509.

R Code

```
install.packages("car")
library(car)

rm(list=ls(all=TRUE))   #Remove all objects in the memory
work_dir = getwd()      #get work directory path
setwd()                 #set the work directory

library(haven)          #load haven package to unwrap stata database
PPI_DB_021018 <- read_stata("C:/Users/x1c/Desktop/Research Project 20181016/PPI
_DB_021018/PPI DB 021018.dta")
View(PPI_DB_021018)
attach(PPI_DB_021018)

#create dataset
bind_data <- cbind(country,investment_real,private,physical_real,IY)
PPI.data  <- data.frame(bind_data)
PPI.data.China <- subset(PPI.data, country==28)
PPI.data.China.private <- subset(PPI.data.China, private==100.0)

#PPI.data.China.private.1993 <- subset(PPI.data.China.private, IY==1993)


#Construct Chinese Private PPI investment dataset by year
n <- 25      #without 1995 and 2018
PPI_0    <- 0
PPI_year <- matrix(0,nrow=25,ncol=1)
PPI_memory <- matrix(0,nrow=25,ncol=1)
```

```
for(i in 1:n){
  PPI_year[i] <- PPI_0
  PPI_year[i] <- sum(subset(PPI.data.China.private,IY==1992+i)$physical_real)
  PPI_0 <- PPI_year[i]

}

# input revised data for dataset
data_PPI_Revised <- read.table("C:\\Users\\x1c\\Desktop\\Research Project 20181016\\PPI_REVISED.csv",header=TRUE,sep=",")
PPI_Deficit <- matrix(data_PPI_Revised$LN.YT.YT.1.,nrow=24,ncol=1)
PPI_Investment <- matrix(data_PPI_Revised$PPI.LN.YT.YT.1..,nrow=24,ncol=1)
PPI_Interest <- matrix(data_PPI_Revised$Interest.rate,nrow=24,ncol=1)

# Calculating OLS Estimator
y <- PPI_Investment
x1 <- matrix(1,nrow=24,ncol=1)
x2 <- PPI_Deficit
x3 <- PPI_Interest
X <- cbind(x1,x2,x3)

tX.X <- t(X)%*%X
tX.X.inv <- solve(tX.X)
tX.y <- t(X)%*%y

#beta estimates are calculated by
b.hats <- tX.X.inv%*%tX.y
b.hats

b1 <- b.hats[1,1]
b2 <- b.hats[2,1]
b3 <- b.hats[3,1]

# calculate estimated variance
k <- ncol(X)
I <- diag(1,nrow=24,ncol=24)
Px <- X%*%tX.X.inv%*%t(X)      #Projection matrix  Px
Mx <- I - Px                   #Projection matrix Mx
u.hat <- Mx%*%y
ssr <- t(u.hat)%*%Mx%*%u.hat
sigma.sq <- as.numeric(ssr/24-k)
sigma.sq

#Transform sigma.sq from a matrix to a number, create K*k diagonal matrix with sigma.sq on the diagonal
sigma.sq.matrix <- diag(sigma.sq,nrow=k,ncol=k)
var.bhats <- sigma.sq.matrix%*%tX.X.inv    #Calculate variance of beta
```

```
#Extract varaicances from the matrix
var.bhats.1 <- var.bhats[1,1]
var.bhats.2 <- var.bhats[2,2]
var.bhats.3 <- var.bhats[3,3]

var.bhats.1
var.bhats.2
var.bhats.3

#Calculate standard errors of betas
se.b1 <- sqrt(var.bhats.1)
se.b2 <- sqrt(var.bhats.2)
se.b3 <- sqrt(var.bhats.3)

se.b1
se.b2
se.b3

#Hypothesis Testing
#Part A  T test: a) testing if Ho: b2<0 against b2>=0
b2_true <- 0
t_values_b2 <- (b2-b2_true)/se.b2
t_values_b2

#Calculate critical value of t-statistics at 5 percent significance
alpha <- 0.05
df.t <- 24-k
t.crit.b2 <- qt(alpha,df=df.t,lower.tail=TRUE)
t.crit.b2

# b)Testing if Ho:b3<0 against b3>\0
#Calculate critical value of t-statistics at
b3_true <- 0
t_values_b3 <- (b3-b3_true)/se.b3
t_values_b3

#Calculate critical value of t-statistics at 5 percent significance
df.t <- 24-k
t.crit.b3 <- qt(alpha,df=df.t,lower.tail=TRUE)
t.crit.b3

# F Test: testing the overall effect of betas and validity of the model
# Ho: beta2+beta3=0 beta2=beta3=0 or R.beta=r and beta2=beta3=0
# number of restrictions (number of "=" under Ho)
```

```
# Testing beta2+beta3=0
df.f.1 <- 1 #number of restrictions

R.1 <- matrix(0,nrow=df.f.1,ncol=k)
R.1[1,2] <- 1
R.1[1,3] <- 1
R.1

r.1 <- matrix(0,nrow=df.f.1,ncol=1)   #r=R*beta
R.1.bhat <- R.1%*%b.hats

varhat.R.1.bhat <- R.1%*%var.bhats%*%t(R.1)  #estimate of var(beta.hat)

# F-test
F.1 <- t(R.1.bhat -r.1)%*%solve(varhat.R.1.bhat,R.1.bhat-r.1)/df.f.1
F.1

crf.f.1 <- qf(alpha,df.f.1,24-k,lower.tail=FALSE)  #critical value
p.value.1 <-pf(F.1, df.f.1,24-k,lower.tail=FALSE)
p.value.1
crf.f.1

# F test: testing beta2=beta3=0
df.f.2 <- 2

R.2 <- matrix(0,nrow=df.f.2,ncol=k)
R.2[1,2] <- 1
R.2[2,3] <- 1
R.2

r.2 <- matrix(0,nrow=df.f.2,ncol=1)

R.2.bhat <- R.2%*%b.hats

varhat.R.2.bhat <- R.2%*%var.bhats%*%t(R.2)

#F test
F.2 <- t(R.2.bhat-r.2)%*%solve(varhat.R.2.bhat,R.2.bhat-r.2)/df.f.2
F.2

crf.f.2 <- qf(alpha,df.f.2,24-k,lower.tail=FALSE)
p.value.2 <-pf(F.2, df.f.2,24-k,lower.tail=FALSE)
crf.f.2
p.value.2
```

```
#Testing Assumptions

#Autocorrelation test: Durbin watson
durbinWatsonTest(lm(y~x1+x2+x3))

#Multicollinearity test: Pearson correlation test
cor.test(x2,x3)

#plot of varaibles to detect linear relationship
plot(y,x2)
plot(y,x3)

#scatter plot to check homoscadasity
plot(u.hat)
```

ELSA DHULI[1]

(NO) DIFFERENCES BETWEEN STATISTICAL INFORMATION FROM ADMINISTRATIVE SOURCES AND STATISTICAL SURVEY FOR ECONOMIC ENTERPRISES: CASE OF ALBANIA

Abstract

This study aims to analyse if there exist differences between two populations, administrative sources and statistical surveys, for the same variables. Administrative sources, mainly the tax system and the social contribution system, have historically been defined as data collections held by other government institutions, collected and used for tax administration, social security contributions or other services.

Currently, statistics on the production of short-term indicators such as net sales, employees and wages are covered by quarterly surveys at enterprises. If the purpose of the administrative source is the implementation of administrative procedures on taxes and social security contributions, the purpose of statistical survey is to measure the trend of the country economy. To analyse the (no) differences between the two sources are considered the variables: Net Sales, Number of Employees and Salaries.

The data are obtained from two administrative sources, the VAT file and the Pay Roll List data file. The economic activity code is obtained from the Statistical Business Register. The common database (Statistical Business Register - VAT file – Pay roll list) is linked to the data from Statistical Survey by a unique identification code. From the Quarterly Survey of Enterprises, the same variables were used: Net Sale, Employees and Salary. To answer the research question "Are there differences between the two populations for the three variables taken together?" MANOVA (Multivariate Analysis of Variance) was used.

In conclusion, the empirical evidence of current reporting from both sources in Albania allows the use of data from administrative sources by reducing the use of the same data from the Quarterly Statistical Survey, as the differences between variables taken together and divided do not differ statistically. This approach will be accompanied by the reduction of survey budgets, nonresponse rate and will increase the efficiency of the administrative sources.

Keywords: Net Sales, Employees, Salary, Quarterly Survey, Administrative Sources, MANOVA

JEL Codes: C21, D22, M21

1. Introduction

1.1. Administrative and statistical sources

The challenge for statisticians today is to increase the use of administrative sources for producing official statistics. Main reasons for using administrative sources include: reducing cost of statistical surveys, reducing response burden for businesses and increase efficiency of official statistics, timelines and frequency. For designing the quaterly statistical survey the European Regulation are followed, while the administrative data do not follow it. The definitions of terms and units in administrative data sources are not as they are in statistics. But these data sources have the advantage of being used as partial or full substitutes for short, monthly or quarterly statistical surveys, turning into a primary source of official statistics production (UNECE, 2011).

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One of the statistical activities, where a special attention is required in order to come close to the user is the use of administrative sources in short term statistics. Short term statistics serve as basic information for measuring the economic trend of the country by helping the decision makers to compile good policies, by making economic analysis in short time periods, facilitating the work of monitoring the decision makers and serving as a basis for gross domestic product. Nowadays, information on the short-term indicators, sales, employees and wages is quarterly and available to the user 75 days after the reference period (INSTAT, 2017). Administrative sources that are related to enterprises and contain the same information as Sale, Employee and Salary are the File of Value Added Tax and Social Security File. If we get the Net Sales value from the first file, we get information on the number of Employees and Wages in the Social Security File. From two populations, quarterly survey and administrative source, the information required about three varibles is the same.

The objective of the paper is to measure the equality between groups and within the group's means and cross products represented by vector dependent variables through multivariate analyses (MANOVA). As ANOVA measures the equality of means for different groups for one single variable, MANOVA does the same but for measuring the equality of means different groups for several variables, (Jonson, R., & Wichern, D, 2007).

The Value Added Tax file is built for administrative purposes and non-statistical, as well the Social Security file. Definitions of variables and unit that reports information on net sales, employees and wages, are according to the purpose for which they are collected. Let's consider both datafile administrative sources. Meanwhile, the quarterly survey is compiled for the purpose of producing quarterly statistics. The definition of variables and units from which the information is collected are clearly defined for the purpose of producing official statistics (UNECE, 2011).

Despite the problems administrative source carries and presents, there are several advantages that make it also usable for statistical purposes (UNECE, 2011). The use of administrative sources affects the level of erronerous answers from economic units, decreases the cost of production of quarterly indicators, has full coverage, is provided faster than statistical survey, and increases the efficence of the usage of administrative sources. However, apart from advantages, there are also disadvantages related to non-compliance of variables, errors that the administrative source carries which are not in the hands of statisticians and no direct contact with the enterprises.

But, the growing demand of users for quick and qualitative statistics, the need of statistical institututions to reduce the cost of producing statistics and decreasing the response burden from businesses, have made statisticians analyze alternative sources (Baigorri.A, Laux.R, Radermacher, W,2009).

Swedish researchers Walgren.A and Walgren.B (2011) have analyzed in their publication over several years on building records based on administrative data and surveys the differences between them.

"Even though statistics based on registers are the most common form of statistics, there is not a well built theory up to nowadays. As a consequence, are used ad hoc methods in the place of methodes based on generally accepted theories" (Walgren and Walgren, 2011). The main and the strongest benefits for carrying out statistical analysis come when it is possible to attach administrative data together from different systems. Nordic countries were among the first to develop a statistical database based on the systems (Walgren and Walgren, 2014).

For the purpose of this paper the common database is used created by matching variables needed from multi source (Statistical Business Register, Taxation data and Pay roll records). The Business Register is statistical product set up and maintened based on administrative sources and economic surveys from statistical office, while the Taxation data and Pay roll records are pure from administrative source.

The created registers have links between them and the administrative sources from which they are created. All this link that needs to be done under statistically controlled conditions provides powerful analysis of some cross-sectoral policy issues of great interest to governments and the public (Walgren and Walgren, 2011). Connections between different administrative sources and surveys require a common identifier, which is not always available for the relevant data groups. It also requires a public understanding of how these data are linked and the differences between data linked for statistical purposes and for administrative purposes. When linking sources for statistical purposes, all links occur within a statistical agency, and the only information to leave that field protected is in the form of grouped analysis, providing statistical information on business characteristics but not providing any information that can lead to extraction of privacy and confidentiality for businesses.

Walgren and Walgren (2014) emphasize, "We have outlined the key prerequisites for successful use of statistical records for statistical purposes." The main precondition is the principle of the identification number, "unified identification number systems are used across administrative sources." The positive condition in our case is the unique number used for in all public administration for businesses. It is named NIPT (Identification Number of Taxation Person).

2. Methodology: Sources, populations and variables used

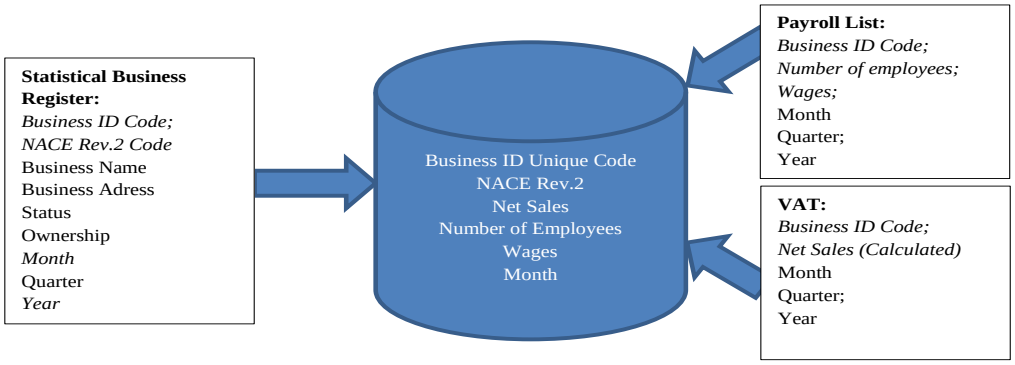
2.1. Sources used

For analysing the diferences between three variables on two populations (survey and administrative) the common database is used in panel data for 8 quarters for two years (2016-2017). For this study, it is used as administrative source of the Common Database which is created by matching the file of the Pay Roll List, the VAT File and the Statistical Business Register for the quarterly period of 2016-2017 (see Figure 1). Whereas, the Statistical Survey file is taken from the quarterly survey results in quarterly basis for the period 2016-2017.

The initial condition of building this common database was the creation of the database location: Server, Database; Required Access to Database; contacts to apply database access; script location - SQL; determination of the main switch; estimation of production time; back up and frequency. For each source are build two scripts including the codes to complete the further requests (for each variable is set a script number and number of steps to be completed for each script); rename of variables of Value Added Tax; divide of values for 1000; addition of variables from RSN (NVE, registration date); addition of “0” in the begining of each NVE code, so each of them contains four digits; calculation of monthy and quartelry sales; list of enterprses without of economic activity code and list of enterprises where the value of sales changes in months and quarters.

For the Pay Roll list are followed the same steps: rename LP variables; addition of data from LP to employees and wages; addition of empty columns from RSN for wage purposes; finding and updating ID codes = NIPT where economic activity is missing; creation of the STAPRO variable and STATUS file and creation with the data of the number of employees for monthly, quarterly, and annual periods. The last step is to combine two databases into a single one, for monthly, quarterly and annual periods.

Figure 1. Common database SBR-VAT-PRL



Source: Author.

The Quarterly Survey of enterprises, in quarterly periods 2016-2017 (INSTAT), covers the activites according to NVE Rev.2, grouped as in Table 1.

Table 1. Economic activities covered by Quarterly survey

NACE Code	Activity Description
B	Mining and Querring
C	Manufacturing
D	Electricity, Gas, Steam
E	Water supply, Treatment of waste and Waste
F	Construction
G	Retail, Wholesale and Repair of motor vehicles
H	Transport and Magazination
I (55.1)	Hotels
J (58;61;62)	Information and Comunication
M (71)	Arcitectural and Engineering activities
N (79)	Travel agencies

Source: Author.

Refered to the technical report prepared for the Statistics it is clarified that object of the study are all units in Albania according to fields of study. The observed unit is the enterprise. The population selected by the Statistical Register of Enterprises and classified according to the Nomenclature of Economic Activities, excludes:

a) Affiliates of Enterprises;
b) Outbound enterprises (NVE_code);
c) Group and activity groups that make up less than 5% of the total employment activity (Cutoff method).

The chosen method used for sampling procedure is Stratified Systematic Random Sampling (SSRS) (with cut-off). Stratification is based on the combination of economic activity group with size of unit. For the purpose of this article, the three variables taken from the two administrative sources (a joint file containing data from VAT and Pay Roll records) and the Statistical Survey (data from STS) were merged at the record level.

2.2. Statistical model

Pearson correlation was used to analyze the relationship of variables for both populations. Regardless of the contents of the "0" values in the file, the correlation analysis showed strong correlation between variables of the two populations, where for $\alpha = 1\%$ for example the correlation for the sales indicator ranges from 0.958 to 0.993, (see Table 2).

To compare the two populations used by the two Administrative Source files (Tax File and VAT file) and Statistical Survey (ATN) the Multivariate Analysis of Variance (MANOVA) was used, which is an extension of the analysis of variance with one variable (ANOVA). MANOVA model is used to compare population mean vectors if they are the same or if they are not the same and which mean components change significantly (Jonson and Wichern, 2007).

The data from the random choices are collected for each of the following populations:

Population 1:	$\mathbf{X}_{11,}$	$\mathbf{X}_{12,}$	...,	$\mathbf{X}_{1n1}$
Population 2:	$\mathbf{X}_{21,}$	$\mathbf{X}_{22,}$	...,	$\mathbf{X}_{2n2}$
.				
.				
Population *g*:	$\mathbf{X}_{g1,}$	$\mathbf{X}_{g2,}$	...,	X_{gng}

The zero hypothesis and alternative hypothesis in MANOVA are:

H_0: $\boldsymbol{\mu}_1 = \boldsymbol{\mu}_2 = \boldsymbol{\mu}_3 = \ldots = \boldsymbol{\mu}_g$
H_1: Not all $\boldsymbol{\mu}_i$ ($i = 1, 2, \ldots, g$) are equal.

$\boldsymbol{\mu}_i$ i mean of population
g number of populations
p number of variables

While ANOVA constitutes a test of equality of g population means, MANOVA is the test of equality of population centers or multivariate means. In ANOVA it has been observed that when H_o is rejected, population means are not the same, group variation or error is small compared to total variation.
By generalizing this in MANOVA it is expected that λ *of* Wilks will be relatively small in the case of downsizing H_o;
Wilks' Lambda "λ" is calculated:

$$\lambda = \frac{|\boldsymbol{S}_E|}{|\boldsymbol{S}_T|}$$

Where
λ Wilks' Lambda
$\boldsymbol{S}_E$ Sum of Squares and Cross Products errors (residuals)
$\boldsymbol{S}_B$ Sum of Squares and Cross Products
$\boldsymbol{S}_T$ Total matrices of Sum of Squares and Cross Products and Total errors ($\mathbf{S}_T = \mathbf{S}_B + \mathbf{S}_E$)
$|\boldsymbol{S}_E|$ and $|\boldsymbol{S}_T|$ Are respectively the denominator of $\boldsymbol{S}_E$ and $\boldsymbol{S}_T$.

In Wilk's lambda software (but also other test values like Pillai's trace and Roy's largest) can be transformed to F value, according to:

$$F = \frac{1-\lambda}{\lambda} \cdot \frac{n-p-1}{p}$$

2.3. Variables

The variables used independently in the two sources used in the study are three (Sales, Employee, and Wages). Variables have three approaches: original variables taken directly from the source, derived variables and calculated variables.

Sales variable is taken from VAT file. Where the VAT file variables are variables that have two approaches: taken from the direct source and calculated variables, such as the Sales variable, subject of the study, which is not found in the administrative source. VAT variables contain information for purposes of administering the taxation system.

Number of employees and Salaries (Wages) are taken from Pay Roll records. Where the Pay roll Records variables are for reporting social security and health insurance contributions, but may also be used for statistical purposes after the statistical treatment that is made. From the Pay roll list are generated direct variables (number of employees and salaries) and derivative variables, such as average employee salary which is not in the file. In the List of variables from the Pay roll records, are included the variables extracted from the Statistical Business Register and derived variables.

From the quarterly survey three variables are taken: *Sales, Number of employees, Wages.* Quarterly survey variables are compiled according to the requirements of the European Commission Regulation on Short-term Statistics, No.1165 / 98, as amended by 1158/2008, and Albanian statistical law and Official Statistical programme[2] which are applied by Statistical Offices for the production of short-term statistics. Quarterly survey has direct variables resulting from enterprise responses during the data collection. After the data collection some data processing, editing and imputation are done. The final results are taken in this study for the quarters analysed in absolute value in record level, no weighted. The ongoing study is foced in cases where the survey sample is linked to a one-to-one VAT file, after editing and imputation of problematic values.

3. Analysis of the data

3.1. Analysis of the differences between the two sources for the three variables

Before analyzing the difference of variables in both sources, their relationship was studied through Pearson correlation. Regardless of the contents of the "0" values in the file, the correlation analysis showed strong correlation between the variables of the two sources, where for $\alpha = 1\%$ correlation ranges from 0.958 to 0.993 for the sales indicator, from 0.994 to 0.996 for the index the number of employees and from 0.939 to 0.993 for the salary indicator. Although there are small differences from quarter to quarter, the correlation analysis between each of the two variables also shows a statistically significant relation to some of them with $\alpha = 1\%$ and for some others for $\alpha = 5\%$. The correlation values between the sale variables, employess and salary for both sources and administrative (Taxes, VAT) for the quarters of 2017 are showed in Table 2.

[2] Law on Statistics 17/2018 and OSP

Table 2. Corelation between variables, 2017

Correlation		Admin - Sales				Admin - Employees				Admin - Wage			
	Period	2017-1	2017-2	2017-3	2017-4	2017-1	2017-2	2017-3	2017-4	2017-1	2017-2	2017-3	2017-4
Survey-Sales	2017-1	0.984**											
	2017-2	0.962**	0.985**										
	2017-3	0.952**	0.969**	0.996**									
	2017-4	0.961**	0.957**	0.977**	0.998**								
Survey-Employees	2017-1	0.617**	0.542**	0.537**	0.582**	0.998**							
	2017-2	0.621**	0.544**	0.541**	0.586**	0.992**	0.993**						
	2017-3	0.620**	0.544**	0.542**	0.586**	0.990**	0.992**	0.995**					
	2017-4	0.617**	0.543**	0.540**	0.586**	0.991**	0.992**	0.996**	0.997**				
Survey-Wage	2017-1	0.693**	0.617**	0.602**	0.647**	0.844**	0.841**	0.842**	0.836**	0.961**			
	2017-2	0.725**	0.639**	0.632**	0.676**	0.849**	0.850**	0.849**	0.840**	.956**	0.967**		
	2017-3	0.710**	0.624**	0.617**	0.665**	0.864**	0.866**	0.868**	0.860**	0.952**	0.952**	0.967**	
	2017-4	0.722**	0.635**	0.628**	0.678**	0.881**	0.884**	0.887**	0.883**	0.968**	0.970**	0.983**	0.984**

Source: Author.

The GLM (General Linear Model) multivariate procedure was used to further analyze the differences between the three variables (Sales, Employee and Wages), as GLM is used to analyze the differences of one or more independent variables (usually with nominal measurement scale) from a linear combination of some dependent variables.

This test addresses the expectation for population averages, but not enough. The listwise option is selected for the test, which considers cases that have values in all three variables. Multivariate GLM (General Linear Model) procedure allows analyzing the differences between one or more independent variables (usually with nominal measurement scale) from a linear combination of some dependent variables.

In the case of the data source (independent variable) and dependent variables: Sales, Employees and Wages it is analyzed whether there are differences of all three variables (Sales, Employee and Wages) according to both sources (Administrative and Survey)? If yes: Is there any of the variables that distinguishes between groups? So the hypotheses will be checked whether or not the medium vectors of the same three variables in both data sources are:

$$H_0: \boldsymbol{\mu}_1 = \boldsymbol{\mu}_2$$
$$H_1: \boldsymbol{\mu}_1 \neq \boldsymbol{\mu}_2$$

ku,

$$\boldsymbol{\mu}_1 = [\mu_{11}, \mu_{12}, \mu_{13}]$$
$$\boldsymbol{\mu}_2 = [\mu_{21}, \mu_{22}, \mu_{23}]$$

$\mu_{11}, \mu_{12}, \mu_{13}$ are the means of Sales, Employees and Wage variables in Data Source 1 (Quarterly Enterprise Survey)

$\mu_{21}, \mu_{22}, \mu_{23}$ are the means of Sales, Employees, and Wage variables in Source 2 data (VAT File)

This procedure requires the fulfillment of the covariance and variances homogeneity assumptions as well as the normality of the distribution of sizes. Assumptions for the data structure for multivariate analysis are:

- The means vector belongs to a case-by-case choice of one of a population of mean μi, where i = 1, 2.
- Case choices from different populations are independent.
- All populations have a covariance matrix of the same, Σ.
- Each population has normal multivariate distribution.

The first approach is the volume of sample. When the volume of sample is large, according to the central limit theorem, the mood normality condition may be relaxed (Jonson and Wichern 2007). In our case, where, for example, the second quarter 2017 has been selected, the volume of sample in each group is large, for example 3969 enterprises from the second quarter of 2017 at STS and 3970 enterprises from the administrative source for the quarter received in the test. (The same calculations are done for all quarters).

Random selection is independent since data are obtained from various sources independently. First source is survey population and the other is administrative population.

By checking the assumption on the equality of covariance matrixes of dependent variables between groups, it is ascertained that they are not the same. When the assumption of covariance homogeneity is violated then it is refered to the correlations of the variables divided for both groups to judge the magnitude of the inconsistencies. When the test on the Equivalence of the Covariant Matrixes (Box's test) shows the suppression of the assumption and the volumes of choice are similar then Pillai's trace is the most appropriate multivariate statistic among other tests.
By developing matrixes for the sum of squares and mixed products between groups SB and error SE we find the value of λ.

$$\lambda = \frac{|\boldsymbol{S}_E|}{|\boldsymbol{S}_B + \boldsymbol{S}_E|} = \frac{|\boldsymbol{S}_E|}{|\boldsymbol{S}_T|} = \frac{\begin{vmatrix} 1{,}38\mathrm{E}+15 & 2{,}75\mathrm{E}+11 & 6{,}21\mathrm{E}+13 \\ 2{,}75\mathrm{E}+11 & 1{,}78\mathrm{E}+08 & 2{,}97\mathrm{E}+10 \\ 6{,}21\mathrm{E}+13 & 2{,}97\mathrm{E}+10 & 6{,}56\mathrm{E}+12 \end{vmatrix}}{\begin{vmatrix} 1{,}38\mathrm{E}+15 & 2{,}75\mathrm{E}+11 & 6{,}21\mathrm{E}+13 \\ 2{,}75\mathrm{E}+11 & 1{,}78\mathrm{E}+08 & 2{,}97\mathrm{E}+10 \\ 6{,}21\mathrm{E}+13 & 2{,}97\mathrm{E}+10 & 6{,}56\mathrm{E}+12 \end{vmatrix}} = 0.99972^{3}$$

Value of statisitic of F transformed by Wilks'Lambda is:

$$F = \frac{1-\lambda}{\lambda} \cdot \frac{n-p-1}{p} = \frac{1-0.99972}{0.99972} \cdot \frac{7939-3-1}{3} = 0.735$$

For 2 groups of 3 variables, the degrees of freedom of statistics F are p = 3 in the numerator and n-p-1 = 7935-3-1 = 7939 degree of freedom in the denominator as shown in Table 3. Multivariate tests with the value F (3; 7939) = 0.735, p = 0.531 show that variables values under both sources do not have statistically significant changes, so H_o is accepted. Therefore, it is assumed the assumption on variance

[3] For decimal reason the $\boldsymbol{S}_E$ value are looks the same with $\boldsymbol{S}_T$.

homogeneity. The same procedure is followed for the other quartres. In this paper is taken in consideration only one quarter, second quarter of 2017. This is also confirmed by the identical results at ANOVA for each of the three variables, Tests of Between-Subject Effects in Table 4. Although there is an overview of one quarter, the same conclusion is reached for the eight quarters analyzed in 2016-2017. All three variables together and consequently each and every one do not contribute to the distinction between data sources.

Table 3. Control over equality of variables means among groups Quarter II 2017

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
Intercept	Pillai's Trace	.111	329.106[b]	3.000	7935.000	.000	.111	987.317	1.000
	Wilks' Lambda	.889	329.106[b]	3.000	7935.000	.000	.111	987.317	1.000
	Hotelling's Trace	.124	329.106[b]	3.000	7935.000	.000	.111	987.317	1.000
	Roy's Largest Root	.124	329.106[b]	3.000	7935.000	.000	.111	987.317	1.000
Sources	Pillai's Trace	.000	.735[b]	3.000	7935.000	.531	.000	2.206	.209
	Wilks' Lambda	1.000	.735[b]	3.000	7935.000	.531	.000	2.206	.209
	Hotelling's Trace	.000	.735[b]	3.000	7935.000	.531	.000	2.206	.209
	Roy's Largest Root	.000	.735[b]	3.000	7935.000	.531	.000	2.206	.209

Source: Author.

Table 4. Tests of results effects between subjects, Quarter II 2017

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
Corrected Model	Sales 20172	1213552919.750[a]	1	1.2E+09	0.007	0.933	0	0.007	0.051
	Empl. 20172	1267.060[b]	1	1267.06	0.057	0.812	0	0.057	0.057
	Wage 20172	204723747.979[c]	1	2E+08	0.248	0.618	0	0.248	0.079
Intercept	Sales 20172	6.4E+13	1	6.4E+13	370.294	0	0.045	370.294	1
	Empl. 20172	1.7E+07	1	1.7E+07	740.537	0	0.085	740.537	1
	Wage 20172	2.6E+11	1	2.6E+11	320.442	0	0.039	320.442	1
Sources	Sales 20172	1.2E+09	1	1.2E+09	0.007	0.933	0	0.007	0.051
	Empl. 20172	1267.06	1	1267.06	0.057	0.812	0	0.057	0.057
	Wage 20172	2E+08	1	2E+08	0.248	0.618	0	0.248	0.079
Error	Sales 20172	1.4E+15	7937	1.7E+11					
	Empl. 20172	1.8E+08	7937	22313.4					
	Wage 20172	6.6E+12	7937	8.3E+08					
Total	Sales20172	1.4E+15	7939						
	Empl20172	1.9E+08	7939						
	Wage20172	6.8E+12	7939						
Corrected Total	Sales20172	1.4E+15	7938						
	Empl20172	1.8E+08	7938						
	Wage20172	6.6E+12	7938						

Source: Author.

While ANOVA allows us to understand which of the variables separately differ between the groups, the results in the Estimates Parameter (Table 5) determine whether the groups differ between them in each of these variables, as is shown for second quarter of 2017. It is noted that none of the variables does not significantly contribute to distinguishing the administrative source from the survey; while more "discriminating" weight has a Sales variable, but the latter is statistically insignificant (β = - 781,945, p = 0,933).

Table 5. Estimate of parameters for each variable in both sources Quarter II 2017

Dependent Variable		B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
						Lower Bound	Upper Bound	
Sales-2017 2	Intercept	89977.514	6583.505	13.667	.000	77072.112	102882.915	.023
	[Source=1]	-781.945	9311.069	-.084	.933	-19034.089	17470.198	.000
	[Source=2]	0[a]						
Employees-2017 2	Intercept	45.222	2.371	19.075	.000	40.575	49.870	.044
	[Source=1]	.799	3.353	.238	.812	-5.774	7.372	.000
	[Source=2]	0[a]						
Wage 2017 2	Intercept	5932.311	455.952	13.011	.000	5038.526	6826.096	.021
	[Source=1]	-321.167	644.854	-.498	.618	-1585.250	942.915	.000
	[Source=2]	0[a]						

Source: Author.

Changes in the survey methodology and the methodology of administrative data sources have a direct impact on the estimates derived from each source. Errors are present in both sources the administrative source and the preview, at a detailed level. In correcting values with important records, the chosen publishing method has been studied so that values that do not affect the calculation of the final result or the growth rate are not removed (small values), and meanwhile the growth rate is calculated before and after editing and imputation. Statistically errors values that have an impact have been corrected (Hoogland, 2009).

In addition, Quarterly survey estimates are not particularly focused on the average estimate, as much relevant information (such as full-time or part-time employment, self-employment, employment of foreigners, etc.) is missing which makes it impossible to apply the same methodology in both sources. Regardless of the errors inherent in the administrative source, as from the three indicators generated by administrative sources, variables on the number of employees and salaries are reported regularly every month there is the possibility of calculating these indicators from administrative sources.

4. Conclusions

The conclusions reached during the empirical analysis carried out on the main indicators generated by administrative sources that are potentially to be used for the production of official statistics show that in the panel created with the Statistical Survey and Administrative Source, the differences between variables taken together and separately do not differ statistically. This means that the current level of reporting on both sources constitutes empirical evidence on the use of administrative sources by reducing the use of statistical information from the Quarterly Survey.

Meanwhile, studies on finding methods and models for addressing different aspects of the use of data from administrative sources from statistics institutes of other developed countries continue. Meanwhile, other developing countries are pursuing and implementing best practices and are studying and analyzing the administrative sources available for future use in producing statistics.

References

Barcaroli, G., & D'Aurizio, L. (1997). "Evaluating editing procedures: the simulation approach". In *UN/ECE Work Session on Statistical Data Editing*.

Burger, J., van Delden, A., & Scholtus, S. (2015). "Sensitivity of mixed-source statistics to classification errors". *Journal of Official Statistics*, *31*(3), 489-506.

Chichester. Di Zio, M., Guarnera, U, Iommi, M., Regano, M. (2015). "Selective editing of business investments by using administrative data as auxiliary information*". UNECE, Work session on Statistical Data editing, Budapest, Hungary, 14 - 16 September 2015.*

Čiginas, A., & Kavaliauskienė, D. (2010). "Overview of use Administrative Data in STS". In *ESSnet Seminar*.

D'Orazio, M., Di Zio, M., & Scanu, M. (2006). "Statistical matching: Theory and practice". *John Wiley & Sons.*

De Waal, T., Van Delden, A., & Scholtus, S. (2017). "Multi-source Statistics: Basic Situations and Methods". *Discussion paper, Statistics Netherlands*.

EC (1998) Council Regulation (EC) No 1165/98 of 19 May 1998 "Concerning short-term statistics", amended.

European Communities (1999) "Use administrative sources for business statiscs purposes". *Hand book on good practices, Luxembourg 1999.*

ESS QAF (2015). "Quality Assurance Framework of the European Statistical System". v1.2. WEB: http://ec.europa.eu/eurostat/web/quality.

ESTP (2017). "Moving towards register based statistical system". *European Statistics Training Programm, 13 – 15 September 2017, Valencia, Spain*.

GDT (2014). Decision Nr. 922, Data 29.12.2014 Obligatory Tax declaration of the online form.

GDT (2008) Law Nr. 9920, Data 19.5.2008, For taxation procedure in the Republic of Albania, amended.

GDT (2014) Law Nr. 92/2014 On Value Added Tax in the republic of Albania.

Hoogland, J., (2009), "Detection of potential influential errors in VAT turnover data used for short-term statistics". Supporting paper for the Work Session on Statistical Data Editing in Neuchâtel, Switzerland, 5-7 October 2009.

INSTAT (2017), "Short term statistics" *Web: http://www.instat.gov.al/en/themes/industry-trade-and-services/short-term-statistics/.*

Johnson, R. A., & Wichern, D. W. (2007). "Applied multivariate statistical analysis". 6th. *New Jersey, US: Pearson Prentice Hall*.

Kovacevic, M. (1999). "Record linkage and statistical matching – they aren't the same!" *SSC Liaison*. Vol. 13, no. 3. pg. 24–29.

Laitila, T., Wallgren, A., & Wallgren, B. (2011). "Quality assessment of administrative data". *Statistiska centralbyrån.*

Lavallée, P. (2000). "Combining Survey and Administrative Data: Discussion Paper". In *Proceedings of the Second International Conference on Establishment Surveys, Survey Methods for Businesses, Farms, and Institutions, Buffalo, NY*.

Laux, R., Baigorri, A., & Radermacher, W. (2009). "Building confidence in the use of administrative data for statistical purposes". In *57th session of the international statistical institute-world statistical congress, web-publication*.

Lavallée, P. (2005). "Quality indicators when combining survey data and administrative data". In *Proceedings of Statistics Canada Symposium*.

UNECE (2007) *"*Register-based statistics in the Nordic countries" Review of best practices with focus on population and social statistics *United Nations Publication.*

UNECE. (2011). Using Administrative and Secondary Sources for Official Statistics-A Handbook of Principles and Practices.

Wallgren, A., & Wallgren, B. (2007). "Register-based statistics: administrative data for statistical purposes" (Vol. 553). *John Wiley & Sons.*

Wallgren, A., & Wallgren, B. (2014). "Register-based statistics: Statistical methods for administrative data". *John Wiley & Sons*.

M. VEYSEL KAYA[1], IBRAHIM AYTEKIN[2] AND ABDULKADIR TIGLI[3]

RECYCLING: AS THE ECONOMIC DIMENSION OF CYCLICAL ECONOMY

Abstract

The industrial revolution that started in the eighteenth century and the developments in technology initiated low-cost production line. While these developments in the industry have reached today, this circumstance has increased the production volume continuously and the necessity for raw materials, which is the basic input of production has increased. As a result, while the increase in production increased the market supply and decreased the prices due to the supply increasing. The decrease in prices increased the consumption volume and increased the amount of waste. Within this context, in the study, the recycling volume of the wastes, recycling volume and economic dimension of the recycling are examined. Additionally, in the study, the total waste amount of the US, the European Union and Turkey, and the cyclical economic dimensions of the waste were studied.

Keywords: Industry, economy, recycling, consumption, waste

JEL Codes: Q50, Q53, M00, M10

Introduction

From the beginning of human history to the present, mankind has gone through various stages. In this process, mankind has made its mark on revolution and inventions that have made way for remarkable changes in human history. The ultimate aim of mankind in the life is the effort to solve the necessity for food, drink and shelter so that they can maintain their lives. In this context, for carrying out this aim, the mankind has to produce firstly and then consume them. So, while mankind is only a potential consumer in its babyhood, in the later stages of life they become both a potential consumer and a potential producer.

By the industrial revolution, while the manufacturing process was accelerating, production costs have decreased and production diversity has increased. The increasing of diversity and cost decreasing in production reduced the prices of goods and services and encouraged people to consume more. As consumption increased, people's disposing their waste to the environment, has caused environment pollution, and there has revealed a case that threatening human health. In the period from birth to death of the humankind being as consumer, causes disposing waste to the environment in an inestimable amount. The humankind, -who has transformed from hunting and gathering to settled life, from production society to consumption society- is consuming adequately to harm the environment and nature day by day. So, recycling has become an inevitable problem in the world, where the world's population exceeds seven billion, the raw material problem has increased and the technology has developed enough to produce artificial intelligence. In addition, countries that dominate the global markets and have a shortage of raw materials, have established hegemony on underdeveloped countries, under the name of "raw material search".

In this context, the cyclical economy, which has become a fundamental issue today and which is one of the most subtantial steps of recycling, is examined in this study. It is also studied on the total amount of

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waste of a global scale, the US, the European Union and Turkey, after the recycling of this waste; it is demonstrated cyclical economic dimensions.

1. Recycling

The usage of cyclical materials, includes recycling, reutilize and renewal, is in the effort to bring waste production back to the economy as raw material and to reduce dependence on raw material imports. Accordingly, it has a potential to bring both environmental and economic benefits. Recycling is increasingly accepted as a resource utilization mechanism that would ensure social and environmental sustainability (EEA Report, 2017, 7).

1.1. The benefits of recycling

Recycling has inestimable benefits; notably environmental, economic and social benefits. In this context, environmental social and economic dimensions, which are the main benefits of recycling are embraced below.

1.1.1. Environmental benefits

Re-use programs have emerged from local solid waste reduction targets. Because, after recycling, reutilizing compared with the production of raw materials and new products; requires less resources, less energy, and less labor. Re-use offers an excellent environmentally friendly alternative to other waste management methods, reduces environmental pollution and the need for new natural resources. The US Environmental Protection Agency has recently identified that waste reduction as an important method of reducing greenhouse gas emissions, one of the factors causing global warming (Kralj and Markic, 2008, 411).

1.1.2. Social benefits

For many years, reusing has been used as a critical way of obtaining the materials needed for many disadvantaged populations. Reuse offers people a great way to buy food, clothing, construction materials, work equipment, medical supplies and other items that they desperately need. However, there are other ways of reusing. Most re-use centers are included in work-training programs and programs for disables or youth programs at risk (Kralj and Markic, 2008, 411).

1.1.3. Economical benefits

Recycling of materials is less costly than using raw materials to produce new products. Economically, reuse is the best way for all socio-economic environments to obtain the goods they need. Business furniture, household goods, automobiles, everyday items and almost all materials of recycling can be considered to be cheaper than new purchased materials (Kralj and Markic, 2008, 411).

2. Cyclical economy

There are three types of industrial economics: linear, circular and performance economics. The linear economy flows like a river and recycles natural resources into basic materials and products on sale. At the point of sale, the ownership and responsibility of risks and wastes are passed to the buyer (currently owner and user). The consumer decides whether to reuse or recycle old tires such as sandals, ropes or bumpers. The linear economy, in other words, is guided by ”fashion”, “emotion” and “progress”, a larger, faster and safer syndrome. It is effective in overcoming scarcity, but is often right to use resources in saturated markets. Companies earn money by selling high volume cheap and attractive goods. The

circular economy is like a lake. Reprocessing of goods and materials creates jobs and saves energy while reducing resource consumption and waste. Cleaning and reusing of a glass bottle is faster and cheaper than recycling a glass or producing a new bottle from minerals. For example, vehicle owners may decide to repair used tires or rebuild them or replace them with new ones (Stahel, 2016, 436).

2.1. Waste management and statistics of recycling

According to the Report of Recycling Sector Incent Report, which published by Turkish Evaluable Waste Materials Industry Association (TÜDAM, 2016) in August 2016, the waste and recycling statistics of globe, the US, the EU and Turkey are remarked below.

The amount of municipal waste in the USA is 243 million tons per year. 50 % of these waste is recycled and recovered. In the US, the annual amount of industrial waste is 300 million tons and 85 % of these waste is recycled. The annual turnover of the waste management and recycling sector in the US is $ 96 billion. The contribution of the waste management and recycling sector to the US economy is 14.1 billion dollars annually. One dollar spent on the return sector in the US returns to $ 1.23.

In the European Union, the country's daily waste production per capita is 1.2 kg. The annual municipal waste amount is 240 million tons. 5.5 % of these waste is recovered as energy and 46 % is recycled. From 1995 to 2008, the regular landfill rate in municipal waste was reduced from 62 % to 40 %. The annual total amount of waste produced is 242 million tons and the annual amount of packaging waste is 79 million tons. While the annual turnover of the waste management and recycling sectors is 149 billion dollars, a total of 1.5 million people are employed in the waste management and recycling sectors.

In Turkey, daily production of municipal waste is per capita 1.1 kilograms, the total amount of municipal waste is 30 million tons annually. The composition of municipal waste is as follows: Recyclable waste 25 %, organic waste 40 %, flammable waste 20 %, non-combustible waste 15 %. 50 % of municipal waste is wildly stored, while the remaining 50 % is embed in the municipal landfills. In total, 15-20 % of municipal waste can be considered as recycling and recovery. Turkey is composed of approximately 35 million tons of annual industrial waste. Economic value of recyclable waste landfill is over 2 billion TL, while Turkey's waste management and recycling sector has an annual turnover of $ 5 billion.

While the average per capita waste production in the world is 1.2 kg per day, municipal waste is 1.3 billion tons. While 1.67 billion tons of waste is produced annually, 1.2 billion tons of these waste is recycled. The annual turnover of the world recycling sector is 475 billion dollars, while the energy production from the waste is 13.6 billion dollars annually.

As it can be understood from the data, it is observed that humanity transformed into consumption society in time and those consumed turned into an industry that provides billion-dollar income through recycling. The European Union and the United States, while very serious progress on recycling, Turkey is falling behind in this regard.

Conclusions and evaluations

The industrial revolutions that initiated in the eighteenth century and the developments in technology accelerated the low cost production line. The establishment of factories by industrial revolutions and rapid industrialization increased the raw material demand and increased the production volume. The growth of the production volume increased the supply of goods and services and lowered the prices due to the increase in supply. The decrease in prices increased the consumption and increased the waste accordingly. According to the data, it is accepted that the world population exceeds seven billion. In this context, according to TÜDAM data, the world's average per capita 1.2 kg waste is multiplied by the

population of the world and approximately 8.5 billion tons of waste is encountered. Moreover, according to TÜDAM data, 1.67 billion tons of industrial waste is generated annually in the world and 1.2 billion tons of these wastes are recycled. While the total annual turnover of the world recycling sector is 475 billion dollars, the world's waste-to-energy production sector turnover is 13.6 billion dollars annually. Thus, 8.5 billion tonnes of waste 1.2 billion to be converted and 475 billion dollars benefit that the annual turnover of the recycling industry as its nominal value, 17th ranks in the world economy sequence, have more than half of Turkey's Gross Domestic Product, cyclical economy, how important a sector is the most important indicator of the transformation.

Considering that around 8 billion tonnes of waste has occurred in the world and only 1.7 billion tonnes of the total waste has been recycled, it can be said that the ratio is quite low. In addition, currently, the technology is developing rapidly, the products need to be produced more suitable for recycling. It is necessary to inform society about recycling, but also to municipalities as well as society. Municipalities have to leave waste boxes according to the type of waste in each district and this will be an important development for the cyclical economy. The economic dimension of recycling is becoming increasingly important in a period when the world population is growing rapidly and the raw material resources needed for production are now rapidly run out. In this context, the dependence on natural resources will be reduced by the production of the products in a appropriate way for recycling.

References

European Environment Agency (EEA) Report. (2017). Circular by Design Products in the Circular Economy, Report No:6.

Kralj, D. and Markić M. (2008). Building Materials Reuse and Recycle. WSEAS Transactions on Environment and Development, 5(4), 409-108.

Stahel, R. W. (2016). Circular Economy. *Nature*, (531), 435-438.

TÜDAM, (2016). *Geri Dönüşüm Sektörü Teşvik Raporu*. Türkiye Değerlendirilebilir Atık Malzemeler Sanayicileri Derneği, Ankara.

KATHRYN LUPSON[1]

TEACHERS BEING CREATIVE: TECHNOLOGY IN DRAMA

Abstract

The importance of creativity in the teaching of Drama in secondary schools has long been accepted (Davis 2010) and during the last 20 years, the importance of technology in the teaching of any school subject has grown. This thesis explores the journey of two Drama teachers as they attempted to develop their creative use of technology. My findings contribute to increased understanding of the challenges in developing the creative use of technology in Drama teaching. The research method used a naturalistic method of enquiry, based in two similar schools in the same county. An action research cycle took place over three phases during one academic year. The data collection methods used were video recording of the Year 7 lessons focussing on the teacher with both participants blogging about their experiences. The research challenges the view that creativity has a definitive meaning, rather that creativity is a fluid set of concepts that can be applied in a variety of styles in the classroom. The main findings of the research reveal the evolution of the creative attitudes of the participants as their technology use developed. The study reveals the creative journey of both participants, the divergence of these journeys and the potential to enhance the creative experience for teachers in our schools. It also challenges the belief that creativity in the classroom can be generated using a pre-determined set of approaches.

Keywords: Creativity, education, action research

JEL Codes: I21

In my research in two secondary schools in the East of England, I came to realise that Creativity in Education can be achieved using technology but not without some effort on the part of the participants. It is not that it is difficult but rather that the idea of integrating technology into our teaching is still in its infancy and that teachers need more confidence in their abilities. There are, of course some who will deny the importance of technology in our practice but I hope that the ideas that I have developed here will help them to overcome their objections and at least begin to develop a more creative approach to technology in their classrooms. Using Action Research, as I did, could be the way forward as it is not time-consuming in the classroom and does not detract your focus from the lessons.

Creativity in the classroom

Based on my own experiences in secondary schools, creativity and technology were not linked in any way. Individual subjects are taught individually and the curriculum feels divided along the same lines as during the Industrial Revolution (Robinson, 2010). Schools are not providing the education that our students apparently need and at the forefront of all this is the push for a revolution in education (Robinson and Aronica, 2015), not just in terms of technology but also creativity. Robinson argues that the education system we have now disadvantages too many students, but there are many alternatives available to this traditional system. He states that this system is out of date and should be replaced with an organisation which values the individual, helps students to understand the world they live in, contribute to it and develop their own talents. In 2012 even the CBI called for an end to the "exam factory" system in schools, as employers were looking for other qualities in their candidates, such as creativity, communication skills and character, rather than a good set of exam results (CBI, 2012).

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With this in mind I decided to look at Creativity in my own field, Drama and include the use of technology as a specific focus. Drama teachers have always used more technology than other teachers due to their use of lighting systems, sound systems and the need to film the work for the exam boards. The method I used was Action Research as I felt this was the only way I could see the development of my ideas at first hand. My co-researcher was in a similar school, also as Head of Drama, so our experiences would be similar. Having said that, I also hoped that the method would lead us to a greater understanding of our own practice and this article will focus on how this happened in both our Drama Studios.

Action research in schools

After a period of discussion, we decided to undertake three cycles of Action Research during the whole academic year, one cycle every half term. We felt that this would give us ample time to reflect and develop our ideas in between cycles. The first cycle took place in the second half of the autumn term, the second cycle in the second half of the spring term and the final cycle in the second half of the summer term. Both of the participating schools had a timetable in which Drama lessons took place once every two weeks, thus giving us a very similar approach to the lessons. We discussed the options and we felt that half a term for planning and half a term for carrying out the research in each cycle would be the most effective way to ensure that we had plenty of time for reflection and careful consideration of the next steps. The role of Head of Department gave us both the ability to decide on any changes to the curriculum which we felt were necessary in order to carry out the research.

During our first face to face discussion we decided that a Year 7 (11 years old) group would be the best to work with for several reasons: according to Prensky (2001) they are the most likely to be "digital natives"; from our joint experience of over 40 years, they would be the most enthusiastic with something new. We also considered the fact that it would be a good way to move the integration of technology through the school if we used the youngest age group to begin. We had a total of 22 lessons a year to work with. I chose the class that I thought would be the most receptive from the few lessons that I had taken with them. We discussed the possibility of using the same class with different technology during each cycle. Ultimately my co-researcher decided to use his iPad for every cycle and focus on developing his use of it. I decided to use a different form of technology each time as I wanted to use the technology that was readily available in the department.

One of the major decisions, taken at this time, was the decision for both of us to record our thoughts, ideas and outcomes of lessons in a blog, one for each of us that we would both have access to in order to reply. We discussed the regularity of the blogging and decided that it would be better for each person to write an entry when they felt they had something to say in terms of preparation, reflection, new ideas and so on. The author is referred to as AU and the co-researcher as CR. The lessons would also be filmed, focussing on the teachers primarily. This would give us the opportunity to watch back the lesson and comment on any aspects we may have missed during the lessons. The filming would prove to be an invaluable resource for the blog itself and the changes in practice that we were able to implement as a result.

The results of the blog and video data

During this first cycle, I was determined that the new approach to technology use in Drama would be creative and would show me that the future for Drama teaching did indeed include technology. However, the difficulties that I encountered in the first few sessions using my flip cameras creatively, soon led to some negative blog entries on my part and had me reconsidering my entire approach.

I felt rushed and not totally in control at all times. However it was exciting and added a level of challenge for me as well as the students (AU 7/11/2013).

In actively trying to teach creatively I felt that I had pushed myself too far and was not able to cope with the pressure of using all this technology in one lesson. I wrote,

For my part I was trying to do too much too soon and will have a look at the tasks I have included for the next lesson and see if there is a way to let the students have more time with the cameras (AU 7/11/2013).

It is clear from this statement that I also felt that the students had missed an opportunity to develop their skills with the flip cameras as well. Woods' (1990) features of creative teaching - relevance, ownership, control and innovation, had been largely forgotten by me at this point. My ideas were relevant, intended to give the students more ownership of their work and it was certainly innovative. The element that was lacking was control. I was keeping total control of the lesson and the technology for myself and not relinquishing it to the students to help them become more creative. I had not previously considered this to be an important part of the creative process and the initial lessons showed this to be an error on my part. I did reflect on this part and wrote, "If I was to do it again I would cut down the number of activities in the lesson and spend more time explaining how to use the cameras and giving them time to play with them" (AU 7/11/2013). I should have included here some thoughts about how this would have given both the students and me more control over the filming and the work achieved.

I had followed the idea of the NACCCE report (1999) that, "Teachers can be highly creative in developing materials and approaches that fire children's interests and motivate their learning" but the reality had been somewhat chaotic and I felt that I had not achieved my goals for that lesson.

In the same initial blog entry I noted that, "… I need to achieve less in the lessons but in more depth" (AU 9/11/2013), meaning that I should have had fewer activities in every lesson in order to achieve greater development of the students' ideas. I felt that I was missing opportunities for creativity with the fast pace of the lessons. Perhaps this was due to the need I felt to have everything running smoothly and to be in complete control of the outcomes. During the following few lessons in the cycle, I clearly tried to develop the "control" (Woods 1990) aspect of creativity more, by allowing each group the control over where and when to watch their work back. Each group was allowed to choose to watch their work back on the camera itself rather than on the projector screen. Deciding that each group could watch their filming back individually on the camera, gave them even more ownership of the work and released me from control over the lesson in that I could spend time observing and helping the students. This also meant that the students had more time to develop their own ideas creatively as they did not have to watch everyone else's work as well. This also eliminated any criticism or fear of the same from the rest of the class and gave each group more confidence. After the final lesson I wrote, "despite my initial concerns and high levels of stress I am beginning to see what I had created as a theory actually coming to pass in the classroom" (AU 8/12/2013). I could really see that teaching creatively with the technology was having an effect on the learning and improving the quality of the lessons as well as improving my own practice. It was at this point that I referred back to the DigiLit (2014) framework in order to place my experiences within their definitions of confidence and competency for staff, which were "Entry, Core, Developer and Pioneer". I found myself at the "Developer" level rather than the "Pioneer" that I had hoped for, as I had not fully managed to integrate the technology into my practice.

The video data from this cycle revealed the development of my teaching creatively in greater detail. During the first lesson, I found few examples of Creative Teaching on my part, "I give pupils open choice of machine in order to see where their ideas will lead them" (AU 8/11/2013) is one of the only examples. This shows how preoccupied I was with the students' use of the cameras. I had become too

involved in this, to the detriment of my teaching, in that I had lost sight of the lesson objectives and my aims in terms of teaching creatively. I had turned my focus too far towards the use of technology and had lost the creative aspect of the work. By the next lesson, I had relaxed with the technology and was able to adapt to the situation. I was feeling more comfortable with the cameras and the idea of using the technology was becoming embedded into my teaching. There are therefore more examples of Creative Teaching to be found. After a suggestion from a pupil, I responded by changing my lesson plan to include the idea of right and left Twix, the advert having recently appeared on the television for the first time. The task I had set was to create a chocolate making machine but the students added a new twist in referring to the advert:
(https://www.youtube.com/watch?v=62xLWZgx4Ko&index=5&list=RDw0QpPNcT-J4)

where there were two rival factories, each making one side of the bar of chocolate. They really wanted to add in this extra aspect of rivalry and I felt that this was a good sign that they were completely involved in the process. They chose either "right" or "left "Twix to create in their machine and so the idea became theirs. The footage from the third lesson in this cycle showed that I had moved a little closer to the idea of being a "Pioneer" in that I was able to remind the pupils of the intentions of using the technology, "use long range shots to capture all the elements of physical theatre being used" (AU 6/12/2013). This showed that I was thinking about the aims of the lesson and not worrying so much about the technology itself as it was becoming a more natural part of the teaching.

In comparison, the blog entries of my co-researcher do not reveal the same issues regarding Teaching Creatively. His first entry refers to the apps he is using with the iPad, "….I tell you what….If i[sic] could design, i [sic]would make changes left right and centre to some of these apps…" (CR 18/11/2013). This is more of a general comment than the ones I was making but still is an aspect of creativity in that he is looking at the wider picture. Many of his comments that I coded as Creative Teaching are of the same ilk, discussing the possibilities of the apps he is using with regard to the lessons he is teaching. He wrote, "I think this app can be tweaked so it doesn't just bring up random people - you can set it to bring up specific students" (CR 18/11/2013). It became clear that CR was concentrating on the technological details in terms of being creative and this gave a different emphasis to his work. The work of Pegrum et al (2012) focussed on student teachers using iPads in class and most of them developed their own individual teaching style with the iPad. I think that is what happened with CR. We both accepted the idea of using technology to teach more creatively and took it in completely different directions. CR was more interested in the technology itself and how it could be used to teach creatively whereas I was more focussed on the teaching creatively using the technology.

At this moment, CR too was at the "Developer" stage rather than the "Pioneer" due to the problems he was having with the technology and the fact that he wanted more technology in order to be able to achieve his goals. CR had a different agenda for technology use and this became increasingly clear as the lessons progressed. His blog reflected clearly that he intended to use all the technology himself and so his entries were more focussed on his own actions and made little reference to the students' ideas or actions. He wrote, "I held the iPad and filmed all three groups. This was soooooo easy. No wires getting in the way, no need for a tripod. I could see so easily on the big screen" (CR 2/12/2013).

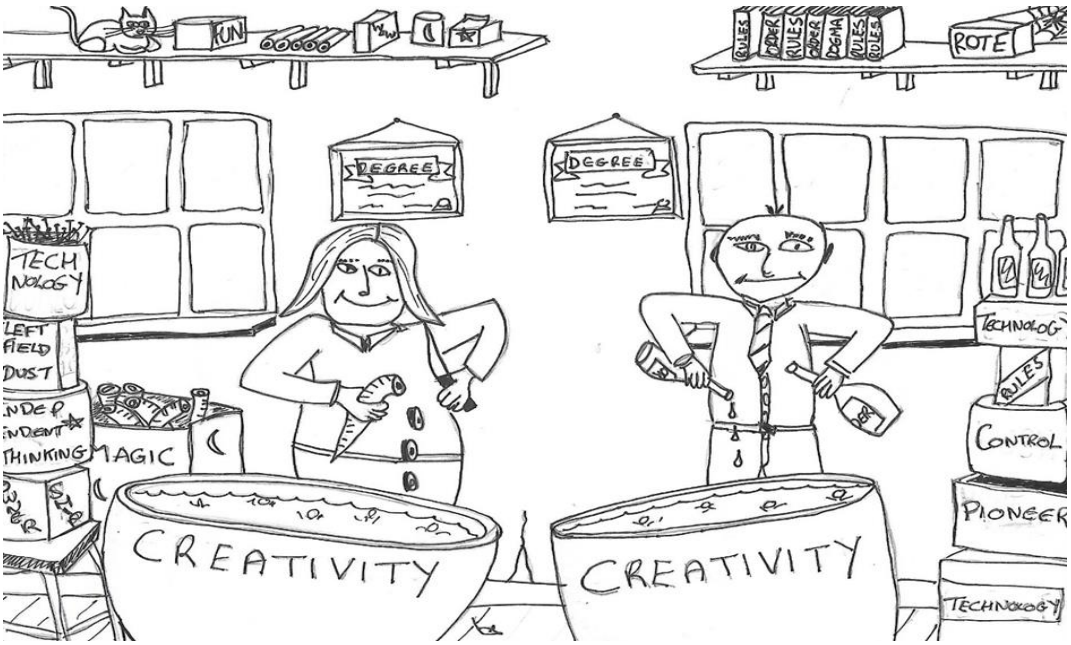
As the cycle progressed CR used the iPad to play back the students' work and his enthusiasm was palpable, "This was a joy. I was already getting excited about the thought of watching the work back and analysing it" (CR 2/12/2013). He had refocussed his ideas on the hardware, rather than the software and this was having a positive effect on his teaching. After the second lesson he wrote, "A couple of times I paused it and re wound it and re wound it in slo mo so the students could really see in detail. This worked well when highlighting an excellent moment" (CR 2/12/2013). He was clearly working towards the "Pioneer" stage with his technology use. His focus was on teaching creatively with the technology and I had not yet reached this stage. He reflected on the work achieved after the lesson,

So even though I didn't get through what I wanted to get through, I know why. But the use of the iPad, was there [sic] best bit and worked very well indeed, and clearly highlighted even more what I already know was an issue (CR 2/12/2013).

The class were passing through a difficult time and had brought some issues into the classroom with them. CR saw the problems in the work through using the iPad and was able to adapt his teaching accordingly, this is surely one of the aspects of teaching creatively.

For me, the most interesting discovery was the variance in the results from one teacher to another. This has led to me considering how the research was carried out, how the two practitioners varied in their approach to the use of technology and how, given the same set of creative principles to work with, the results were so different.

Photo 1.



Source: Source: Mixing it up – Cooking Up Creativity Lupson and Smith (2016).

As my main focus was how creativity could play an important part in the development of technology use in Drama, this drew all the other threads together. Technology use in Drama is developing as individuals become more aware of the opportunities available to them. Some schools still have to appreciate this and provide better support. In my own case I had to promise not to need anything new in terms of technology in order to carry out the research. Indeed I wanted to develop the technology I already possessed rather than spending money on a piece of equipment which might not have been productive. A second reason for this would be that in disseminating this research I did not want teachers to feel that they had to spend money on a new piece of equipment. The precarious position of Drama in the curriculum added to the pressure I felt not to spend any money but when the opportunity arose to join a group working on the feasibility of buying iPads, I decided to add my efforts and we were successful. The literature suggested that the iPad was the way forward and my research played an important role in convincing senior management to commit the necessary funds to the project. In this

way I felt that the research was influencing school policy and that the place of Drama in the school was somehow more secure for having been involved in such an important decision. The results of the data showed this purchase to have been a major step forward in the development of the creative use of technology, not only in Drama but also in the other subjects who were given an iPad, such as Geography and History. The members of those departments began to ask me for advice on the best apps to use and how to use the technology with the students. After Creativity, technology was firmly placed at the heart of my Drama lessons, as a significant tool in the development of the students' work. Within the rest of the department there was still a little resistance, as referred to by Williams (2008) but with the passage of time and some encouragement this began to disappear. I have since left the school and heard that Drama has been dropped at GCSE level albeit temporarily so whether the research will have a lasting effect remains to be seen. The creativity developed by the students will not have disappeared however. They learned how to experiment, take risks with their work and bring in ideas from outside the framework of the individual subject. Perhaps in this way Jahnke's (2012) idea that a learning culture "gets creative by fostering independent, self-reflective learning and critical thinking" will permeate through the school in the way I had intended. The Year 7 students were chosen deliberately so that the ideas could be developed through the school as the years passed. The lessons I learned about the importance of creativity, the need to give the students more independence in their learning and the key role that technology can play in developing these, have stayed with me and I am sharing them with other professionals.

References

CBI Confederation of British Industries (2012) *First Steps – A new approach for our schools*. Available at www.cbi.org.uk (Accessed 23 August 2016).

Hall, R. Atkins, L. and Fraser, J. (2014) *Defining a self-evaluation digital literacy framework for Secondary educators: The DigiLit Leicester Project*. Available at www.researchinlearningtechnology.net (Accessed 03 May 2015).

Jahnke, I. (2012*)* Preparing Didactical Designs for Learning to be Creative Using iPads. In MLCW2012 *Mobile Learning and Creativity Workshop at the European Conference on Technology Enhanced Learning*, ECTEL 2012 Available at http://www.isa-jahnke.com/publications. (Accessed 27April 2015).

National Advisory Committee on Creative and Cultural Education (NACCCE). (1999) *All Our Futures: Creativity, Culture and Education.* Report to the Secretary of State for Education and Employment and the Secretary of State for Culture, Media and Sport.

Prensky, M. (2001) Digital Natives, Digital Immigrants Part 1. *On the Horizon*, vol.9, no.5, pp.1-6.

Robinson, K. (2010) *How schools are killing creativity*. Available at www.ted.com (Accessed 03 May 2012).

Robinson, K and Aronica, L. (2015) *Creative Schools: Revolutionizing Education from the Ground Up.* Penguin: Random House UK.

Williams, P. (2008) Leading schooling in the digital age. *School Leadership and Management*, vol. 28, no. 3, pp213–228.

Woods, P. (1990) *Teacher skills and strategies.* London: Falmer.

BANU TURKSEVER[1] AND ASUMAN DUATEPE PAKSU[2]

THE EFFECTS OF MODEL USAGE IN ARITHMETIC SERIES ON 6TH GRADE STUDENTS' ACHIEVEMENT AND RETENTION

Abstract

This is a quasi-experimental study which aims to investigate the effect of the use of models in arithmetic series 6th grade students' achievement and retention. The implementation was carried out in a secondary school in the western part of Turkey in 2016-2017 academic year. The study was carried out on 45 sixth grade students. The application was carried out by the same mathematics teacher who was attending classes in the experimental and control groups. 16-hour lesson plan developed by researchers was implemented to both the experimental and control group. Application, a total of 18 hours, including one hour of pre-test, one hour of post-test, lasted approximately three weeks. Quantitative research methods were used to collect data. As a data collection tool, the algebra achievement test developed by the researchers was used to investigate the effect of model use in algebra teaching on students' achievement on algebraic expressions and the retention of their learning. Data analyses showed that both groups has displayed improvement from pretest to posttest. According to inferential analyses, no statistically meaningful difference was detected between students' achievement and retention scores.

Keywords: Arithmetic series, algebra, model, achievement, retention

JEL Codes: I20, I21

Introduction

Algebra has many different functions such as a school course, a language, a problem-solving tool, a generalization tool… (Dede and Argün, 2003). As Davidov (1972) stated that one of the most basic teaching objectives of the school should be to develop generalization skills of students (stated in Zazkis, Liljedahl and Chernoff, 2008), generalization function of algebra is significant. According to NCTM's (2000) standards, generalization is one of the main objectives of mathematics teaching. Amit and Neria (2008) indicated that generalization's role is important particularly on mathematical achievement and learning.

Cooper and Warren (2008) and Tanışlı and Köse (2013) considered generalization as the strongest predictor of improvement of algebraic thinking. It is significant to establish a strong communication with students in teaching mathematics and to use abstract symbolic expressions in mathematical communication as well as oral, written and visual expressions and models when necessary. Students should be assisted to create meaning and abstraction from their concrete experiences (MEB, 2013). Stating that students can understand better with the help of concrete and pictorial representations, Akkan (2016) indicated that it is important to use visual and movable objects that are designed to appeal various senses and to represent abstract mathematical concepts. Likewise Şahin (2012) said that in order to be able to make abstraction in mathematics learning, activities with enough concrete objects should be done at the beginning of algebra learning.

Usage of model contributes to the improvement of many skills such as problem solving, communication, reasoning and connection (MEB, 2013). MacGregor and Stacey (1997) indicated that teaching materials is one of the most important factors affecting the students' achievement. Radford (2008) stated that the

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students supported with the models were successful in making algebraic generalizations. Similarly, Akkaya and Durmuş (2006) and Bekdemir and Işık (2007) also suggested that students should use concrete models so that they will analyze, evaluate, create new concepts and make generalizations.

In the literature, there are studies examining the effect of different methods and techniques used in algebra learning on students' achievement, retention and attitude towards mathematics. Koğ and Başer (2012) revealed that the lessons supported with the visualization on algebraic expressions and equations are more effective in changing the attitudes of students towards mathematics, developing their conceptual learning and problem solving skills compared to traditional teaching method. Yılmaz (2015) showed that algebra teaching with journal writing activities helped students in better understand the lesson, provided opportunities to see their mistakes, contributed to their recall and increased their algebra achievement scores.

Literature revealed that the usage of different methods and techniques in algebra instead of traditional methods, have positively influenced students' achievement at various grade level (Aydın, 2007; Bal, 2016; Gürbüz, Pırtıcı & Toprak, 2014; Koğ & Başer, 2012). Secondary school students learned the subject more easily and their academic success and motivation increased due to the alternative methods and techniques used in the field of algebra learning (Bal, 2016; Gürbüz, Pırtıcı & Toprak, 2014; Koğ & Başer, 2012). A research suggested that the abstract linear algebra course which the preservice primary mathematics teachers had difficulty in become more interesting when it was more concrete (Aydın, 2007). In addition, it can be said that the alternative methods and techniques used in the algebra contributed to the students' academic achievement as well as their attitudes towards mathematics, development of problem solving skills and conceptual learning (Aydın, 2007; Koğ & Başer, 2012).

Researches on the effect of activities on students' algebraic thinking levels displayed that the activity-based teaching approach in algebra was more effective and provide long lasting learning, and also helped students to have positive attitudes (Batdı, 2014). In a similar way, it was found that the activities carried out in Yılmaz's (2015) study helped the students to understand the lesson better, enabled them to strengthen what they learned, provided opportunities for them to see the mistakes they made, contributed to their recall. In the study of Yenilmez and Teke (2008), it was found that activities contributed to students' level of algebraic thinking. As a common finding of these studies, it can be said that the activity-based mathematics courses had positive effect on students' achievement and retention at various grade level. In addition, alternative methods and techniques used in the courses have been reported to affect the students' ability to use mathematics in daily life positively as well as their academic achievement (Doruk and Umay, 2011).

Aim of the study

This study aimed to investigate the effect of the model usage in arithmetic series on 6th grade students' achievement and retention. The main research question was "Is there a statistically significant difference between the achievement and retention scores of experimental group students supported by the use of model and the control group students who are not using these models?" Based on the main research question, sub-questions were as follows:

1. Is there a statistically significant difference between total achievement scores of experimental group and the control group students?
2. Is there a statistically significant difference between conceptual achievement scores of experimental group and the control group students?
3. Is there a statistically significant difference between procedural achievement scores of experimental group and the control group students?

4. Is there a statistically significant difference between total retention scores of experimental group and the control group students?
5. Is there a statistically significant difference between conceptual retention scores of experimental group and the control group students?
6. Is there a statistically significant difference between procedural retention scores of experimental group and the control group students?

Method

This is a quasi-experimental study which aims to investigate the effect of the model usage in arithmetic series on 6th grade students' achievement and retention. The implementation was carried out in a secondary school in the western part of Turkey in 2016-2017 academic year.

Participants

The population is sixth grade students in a town in Aegean region. The sample is two sixth grade classes involving 45 sixth grade students (23 female and 22 male) in this population. There were 21 students in experimental group and 24 students in control group. Table 1 shows the distributions of students into experimental and control group in terms of gender.

Table 1. The distributions of students into experimental and control group in terms of gender

	Groups		
	EG (%)	CG (%)	total
Female	10 (48)	13 (54)	23(51)
Male	11 (52)	11 (46)	22 (49)
Total	21 (100)	24 (100)	45 (100)

Source: Authors.

The instrument

As a data collection tool, the algebra achievement test developed by the researchers was used to investigate the effect of model use in algebra teaching on students' achievement of algebraic expressions and the retention of their learning. This test involves 20 multiple choice questions which cover all the expectations related to algebraic expressions in the 6th grade curriculum. The number of the questions related to each expectation is displayed in Table 2.

Table 2. The number of the questions related to each expectation in achievement test

Expectations	Number of questions
Write a verbal expression corresponding for a given algebraic expression and an algebraic expression corresponding for a given verbal expression.	3
Calculate the values of an algebraic expressions for different natural number value of the variables	1
Explain the meaning of simple algebraic expressions	2
Make addition and subtraction with algebraic expressions	4
Multiply an algebraic expression with a natural number	4
Express the rule of arithmetic sequences in letters	6

Source: Authors.

Procedure

In this quasi-experimental study two different learning environments were compared in the second term of the 2017-2018 academic year. At the beginning of the study, both groups got the achievement test. After that while the experimental group students learned algebraic expressions with models, the control group students learned it with traditional teaching. The students in both groups were taught the same mathematical content at the same pace. The application was carried out by the same mathematics teacher in the experimental and control groups. 16-hour lesson plan developed by researchers was implemented to both the experimental and control group. Application, a total of 18 hours, including one hour of pre-test, one hour of post-test, lasted approximately four weeks (There were five mathematics classes in each week and each lesson lasted 40 minutes). The treatment period is showed in Table 3.

Table 3. The treatment period

	Experimental Group	Control Group
Pretests	Algebraic expression test	
Treatment	Model usage on algebraic expression	Traditional teaching on algebraic expression
Posttest	Algebraic expression test	
Retention test	Algebraic expression test	

Source: Authors.

Findings

The finding of the data analyses will be given in the order of research questions. The first research question was “Is there a statistically significant difference between total achievement scores of

experimental group and the control group students?" In order to answer this question, firstly the total achievement of both group were checked for the normality. The achievement scores of the experimental group was normally distributed but the achievement scores of the control group was not normally distributed (D'Agostino-Pearson Omnibus Test experimental group (DP) = 1.14, $p>0.05$; control group (DP) = 6.77, $p<0.05$). Therefore, a non-parametric test, the Mann-Whitney U test was used. According to the results of this test, the range of the achievement scores of the experimental group students (19.55) was lower than the range of the achievement scores of the control group students (26.02). However, no statistically significant difference was detected between the total score of both groups ($U=179.500$, $Z=-1.658$, $p>0.05$). The reason for the achievement score of the control group was higher than that of the students in the experimental group might be the experimental groups' higher pretest scores. The score of the experimental group increased from 37.62% to 80.48% and the score of the control group increased from 25.83% to 77.50%. The posttest score of the experimental group was higher than the posttest score of the control group. The reason for this may the activities used in the experimental group.

The second research question asked whether there is a statistically significant difference between conceptual achievement scores of experimental group and the control group students or not. The conceptual achievement scores of the experimental group was normally distributed but the conceptual achievement scores of the control group was not normally distributed (D'Agostino-Pearson Omnibus Test experimental group (DP) = 0.01, $p>0.05$; control group (DP) = 6.55, $p<0.05$). Therefore, a non-parametric test, the Mann-Whitney U test was used. The result of this test displayed that the range of the conceptual achievement scores of the experimental group students (19.55) was lower than the range of the conceptual achievement scores of the control group students (25.75). However, no statistically significant difference was detected between them ($U=186.000$, $Z=-1.568$, $p>0.05$). Although there was no statistically significant difference between the posttest and pretest scores for four questions with conceptual content (related with the expectations of "Write a verbal expression corresponding for a given algebraic expression and an algebraic expression corresponding for a given verbal expression." and "Explain the meaning of simple algebraic expressions."), it was found that the conceptual achievement score of the control group was higher than that of the experimental group. Students' score increased from pretest to posttest in both group. The progress of the experimental group was from 58.33% to 85.71% and that of control group was from 38.54% to 78.13%. The higher posttest score of the experimental group can be the result of the activities supported by the use of the model.

The third research question examined whether there is a statistically significant difference between procedural achievement scores of experimental group and the control group students or not. The procedural achievement scores of the experimental group was normally distributed but the procedural achievement scores of the control group was not normally distributed (D'Agostino-Pearson Omnibus Test experimental group (DP) = 0.47, $p>0.05$; control group (DP) = 13.76, $p<0.05$). Therefore, the Mann-Whitney U test was used. According to the results of this test, the range of the procedural achievement scores of the experimental group students (20.14) was lower than the range of the procedural achievement scores of the control group students (25.50). However, no statistically significant difference was detected between them ($U=192.000$, $Z=-1.377$, $p>0.05$). The reason for the procedural achievement score of the control group was higher than that of the students in the experimental group might be the control groups' lower pretest scores. Although the students' score increased from pretest to post test in both group, the experimental group's score increased from 32.44% to 79.17% and the score of the control group increased from 22.6% to 77.34%. The posttest score of the experimental group was higher than the posttest score of the control group. The reason for this may the activities used in the experimental group. When the posttest scores were examined for each question, a remarkable result was seen related to the question 19. This question was on the expectations of "Express the rule of arithmetic sequences in letters." While the 29.17% of the control group students responded this question correctly, 76.19% of the experimental group students answered it correctly. This might be stemmed from the usage of models' contribution to students' procedural attainment.

The fourth research question was "Is there a statistically significant difference between total retention scores of experimental group and the control group students?" The total retention scores of the experimental group was normally distributed but the total retention scores of the control group was not normally distributed (D'Agostino-Pearson Omnibus Test experimental group (DP) = 2.91, $p>0.05$; control group (DP) = 103.91, $p<0.05$). According to the results of Mann-Whitney U test, the range of the total retention scores of the experimental group students (24.48) was higher than the range of the total retention scores of the control group students (21.71). However, no statistically significant difference was detected between them ($U=221.000$, $Z= -0.716$, $p>0.05$). The difference between the retention score and the posttest score of both groups was negative. In other words, the scores of both the experimental group and the control group decreased from the posttest to the retention test. While the decrease in the experimental group was 1.67%, the decrease in the control group was 3.54%. The reason for the less decrease in the experimental group's score might be more permanent learning had taken place with the help of the models used in this group.

The fifth research question asked whether there is a statistically significant difference between conceptual retention scores of experimental group and the control group students or not. The conceptual retention scores of the experimental group was normally distributed but the conceptual retention of the control group was not normally distributed (D'Agostino-Pearson Omnibus Test experimental group (DP) = 4.49, $p>0.05$; control group (DP) = 22.73, $p<0.05$). Consequently the Mann-Whitney U test was used. According to the results of this test, the range of the conceptual retention scores of the experimental group students (24.83) was higher than the range of the conceptual retention scores of the control group students (21.40). However, no statistically significant difference was detected between them ($U=213.500$, $Z=-1.026$, $p>0.05$). Data showed that in both the experimental group and the control group the conceptual retention score was higher than the posttest scores. In other words, in both the experimental group and the control group, there was an increase in conceptual content from the posttest to retention test. The increase of the experimental group was from 85.71% to 90.48% and the increase of the control group from 78.13% to 79.17%. It can be said that the activities supported by the models might be the reason of the more increase in the experimental group.

The last research question asked whether there is a statistically significant difference between experimental group and the control group students' procedural retention scores or not. The procedural retention scores of the experimental group was normally distributed but the procedural retention scores of the control group was not normally distributed (D'Agostino-Pearson Omnibus Test experimental group (DP) = 1.63, $p>0.05$; control group (DP) = 44.55, $p<0.05$). According to the results of the Mann-Whitney U test, the range of the procedural achievement scores of the experimental group students (24.02) was higher than the range of the procedural retention scores of the control group students (22.10). However, no statistically significant difference was detected between them ($U=230.500$, $Z=-0.495$, $p>0.05$). The procedural retention test of the experimental questions in both experimental and control groups was lower than the procedural posttest scores. However, the decrease in the experimental group (3.28%) was less than the decrease in the control group (4.68%). The reason for the less decrease in the experimental group's score might be more permanent learning has taken place due to the models used in this group.

Discussions

The correct response rates of both the experimental group and the control group increased from pretest to posttest. The experimental group's score increased from 37.62% to 80.48% and the control group's score increased from 25.83% to 77.50%. The reason for higher score in the posttest of the experimental group might be the activities supported with the use of the model. The finding of the study related with achievement supports the findings of previous studies (Bal, 2016; Batdı, 2014; Gürbüz, Pırtıcı & Toprak,

2014; Yenilmez & Teke, 2008; Yılmaz, 2015), which provided evidence to show the efficiency of different methods in algebra facilitating better understanding of algebraic concepts.

In both the experimental group and the control group, there was a decrease in correct response in the three weeks after the posttest so the difference between the retention test and the posttest score was negative. However, the decrease in the experimental group was 1.67% and the decrease in the control group was 3.54%. The reason for the decrease in the score of the experimental group is that more permanent learning has taken place due to the models used. The result of the study related with the retention of achievement is consistent with the result of Batdı (2014) and Kutluca and Akın (2013).

Conclusions and recommendations

The quantitative analyses confirmed that the model usage in arithmetic series had an effect on 6th grade students' achievement and retention but there was no evidence about the statistical significance of this effect.

More quantitative studies should be conducted on the effects of model usage in different topics of algebra. More researches on the comparison of model usage and other teaching methods would be profitable. Replication of this study on different grade samples and other mathematics topics are recommended to provide more in-depth results. This would help to determine whether model usage is an effective teaching method for a wider range of age groups and regardless of the concepts being taught. Complete randomization if provided in a replication of this study would allow researcher to generalize over a wider population.

References

Akkan, Y. (2016). Cebirsel Düşünme. E. Bingölbali, S. Arslan, İ. Ö. Zembat (Ed.), *Matematik Eğitiminde Teoriler* içinde (1. baskı, s. 43-64). Ankara: PegemA Yayıncılık, s 43-64.

Amit, M., and Neria, D. (2008). "Rising to the challenge": using generalization in pattern problems to unearth the algebraic skills of talented pre-algebra students. *ZDM, 40*(1), 111-129.

Akkaya, R. and Durmuş, S. (2006). İlköğretim 6-8. sınıf öğrencilerinin cebir öğrenme alanındaki kavram yanılgıları. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 31*(31), 1-12.

Aydın, S. (2007). Bazı Özel Öğretim Yöntemlerinin Lineer Cebir Öğrenimine Etkisi. *Elektronik Sosyal Bilimler Dergisi, 6,* 214-223.

Bal, A. P. (2016). The Effect of the Differentiated Teaching Approach in the Algebraic Learning Field on Students' Academic Achievements. *Eurasian Journal of Educational Research, 16*(63), 185-204.

Batdı, V. (2014). Etkinlik Temelli Öğrenme Yaklaşımının Akademik Başarıya Etkisi (Meta-analitik ve tematik Bir çalişma. *e-International Journal of Educational Research,* 5 (3), 39-55.

Bekdemir, M. and Işık, A. (2007). İlköğretim öğrencilerinin cebir öğrenme alanında kavram ve işlem bilgilerinin değerlendirilmesi. *The Eurasian Journal of Educational Research, 28,* 9-18.

Cooper, T. J., and Warren, E. (2008). The effect of different representations on Years 3 to 5 students' ability to generalise. *ZDM, 40*(1), 23-37.

Dede, Y. and Argün, Z. (2003). Cebir, öğrencilere niçin zor gelmektedir? *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *24*(24), 180-185.

Doruk, B. K. and Umay, A. (2011). Matematiği günlük yaşama transfer etmede matematiksel modellemenin etkisi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *41*(41), 124-135.

Gürbüz, R., Pırtıcı, Z., and Toprak, Z. (2014). Aritmetikten cebire geçişi sağlayacak etkinliklerin tasarlanması, uygulanması ve değerlendirilmesi. *Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi*, *8*(1), 178-203.

Koğ, O. U. and Başer, N. E. (2012). Görselleştirme Yaklaşımının Matematiğe Yönelik Tutum ve Başarıdaki Rolü, *İlköğretim Online, 11*(4), 945-957.

Kutluca, T. and Akın, M. F. (2013). Somut Materyallerle Matematik Öğretimi: Dört Kefeli Cebir Terazisi Kullanımı Üzerine Nitel Bir Çalışma. *Türk Bilgisayar ve Matematik Eğitimi Dergisi*, *4*(1), 48-65.

Milli Eğitim Bakanlığı, (2013). *Ortaokul matematik dersi 5-8. sınıflar öğretim programı.* Ankara*:* MEB.
MacGregor, M., and Stacey, K. (1997). Students'understanding of algebraic notation: 11–15. *Educational studies in mathematics*, *33*(1), 1-19.

National Council of Teachers of Mathematics (NCTM). (2000). *Principles and Standards for School Mathematics*. National Council of Teachers of, 2000.

Radford, L. (2008). Iconicity and contraction: A semiotic investigation of forms of algebraic generalizations of patterns in different contexts. *ZDM*, *40*(1), 83-96.

Stacey, K. (1989). Finding and using patterns in linear generalising problems. *Educational Studies in Mathematics*, *20*(2), 147-164.

Şahin, Ö. (2012). *Cebir öğretiminde somut-yarı somut-soyut öğretim tekniğinin öğrencilerin başarılarına, tutumlarına ve kalıcılığına etkisi*. Unpublished master thesis, Atatürk University, Erzurum.

Tanışlı, D. and Köse, N. Y. (2013). Sınıf öğretmeni adaylarının genelleme sürecindeki bilişsel yapıları: Bir öğretim deneyi. *Elektronik Sosyal Bilimler Dergisi*, *12*(44), 255-283.

Yenilmez, K. and Teke, M. (2008). Yenilenen matematik programının öğrencilerin cebirsel düşünme düzeylerine etkisi. *İnönü Üniversitesi Eğitim Fakültesi Dergisi 9*(15), 9(15), 229-246.

Yılmaz, N. (2015). Cebir Öğretiminde Yazma Etkinliklerini Kullanmanın Ortaokul 7. Sınıf Öğrencilerinin Başarılarına Etkisi. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*. *15*(1), 356-376.

Zazkis, R., Liljedahl, P., and Chernoff, E. J. (2008). The role of examples in forming and refuting generalizations. *ZDM*, *40*(1), 131-141.

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NADA EL BIJRI[1] AND DAOUI DRISS[2]

MOOD EFFECTS IN INVESTORS DECISION

Abstract

This paper is produced to study the relation between the effects of life with the mood of the investors. More specifically, we try to understand according to investors what are the effects that impact their mood and therefore impact their decision to buy or sell in the stock market? We will try to develop more than 20 interviews (between women and men) in the Moroccan financial market namely the Casablanca Stock Exchange.

We will try to develop more than 20 interviews (between women and men) in the Moroccan financial market namely the Casablanca Stock Exchange.

Keywords: Mood, decision making, behavior finance

JEL Codes: A10

Introduction

At first sight working on the mood of investors seems a more psychological than financial topic. However, we cannot deny the existence of the large number of work that has already been done within this subject in psychology, feasibly the issue may also have its place in financial behaviour.

The question of the effects of mood on the decisionmaking of investors in the Moroccan financial market is a subject that has never been treated before. The main goal of this paper is to explore the effects that possibly affect the investors mood in their daily decision making.

The idea is to explore all the impacts (daily activities, personal circumstances, religion and sports) that may impact the investors mood, which will subsequently affect their decision making in the Moroccan financial market, principly between man and woman.

Literature review

Several studies specify that mood is a state of general emotion that influences a financial decision. A good mood leads to a good understanding of the information, a good organization and an ease in the resolution of the problems (optimism), (Mickael Mangot, 2005). (Wright and Bower, 1992), have shown that "People in a bad mood attach a probability twice as likely to suffer a serious car accident as optimistic individuals".

According to several macroeconomic studies, researchers link abnormal returns to mood. It can be influenced by several effects, namely the weather effect, (D. Hirshleifer & T. Shumay 2003). Both researchers tested the performance of financial markets based on weather conditions. The results showed that there is a difference between days when the weather is nice and the days are darker.

The second effect is the moon effect; (Dichev & Janes, 2001) studied the impact of the moon on yield and found gaps between the periods of the full moon and the new moon.

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There is also the weekend effect, or in other words the Monday effect. Several psychologists have tried to study this phenomenon and explain that Monday is the day when the mood is bad and therefore the returns are minimal. (Gibbons & Hess 1981), and (P. Alphonse & al).

The holiday effect is one of the most studied effects on the American and European markets by different researchers. We cite the work of (J. Lakonishok & S. Smidt 1988) followed by those of (P. Brockman and D. Michayluck, 1998) and (Vergin & Mc Ginnis, 1999) who confirm that the returns are rather high the day before the holidays. (O. Dodd, A, Gakhovich, 2011) confirm this later.

The last effect is Haloween; "Sell in May, and go away". This is the citation on which researchers base this effect because, according to their studies, the greatest returns are realized between November and April. (Jacobsen & Bouman 2002) were the first to speak about this effect, after (B. Jacobsen & C. Zhang, 2014) and (M. Kaustia & E. Rantapuska, 2014) furthered this study to confirm the existence of haloween effect.

Our literature review will consist of different sections namely the different areas that impact the lives of Moroccans in general: (religion and culture, sport, family).

Culture and religion

Morocco is considered as a collective region between Moroccans (BALAMBO, 2013). (Hofstede, 1984) presents collectivism as: "the individual is motivated by the interests of the group. The group can be the extended family, the clan, the tribe, or some other type of group that people have learned to relate to. The economic behavior in such a society will be incomprehensible and irrational for those who consider that the ultimate interest is the ultimate motive ". Allali (2008) continues that "fundamental values animate Moroccan society despite its great diversity. Without taking these values into account, any attempt to understand the relationship between national culture and management in Morocco in a company would be in vain". These 3 fundamental values are: allegiance, family dimension and sanctity of dignity.

The weight of religion must also be taken into account when studying Moroccan culture, "religious traditions play an important role, especially in Muslim countries (Morocco is an example)" (Hofstede, 1998). The weight of religion in Morocco is considerable in Moroccan culture, the celebration of religious holidays represent for Moroccans a part of their culture and their identity. It is a sense of belonging and pride that Moroccans cultivate through these holidays. "Traditions and customs are for us what are the roots for a tree," says Dr. Amal Chabach, a sexologist.

The sport

The implantation of sport in the country of the world and its impact on human psychology differs from one region to another. (Ben Larbi & Leblanc, 1991). It is conceived as a practice that allows maintaining physically and morally those who follow it.

The public presents itself as the engine of a team. There are different types of individuals namely spectators and supporters. Uruguayan Eduard Galean described the viewer as a person who seeks a quality show without worrying about the team that offers it.

As Nick Hornby describes the supporter as "a person who desires above all a victory of his favorites, regardless of the quality of the match: he can not appreciate, at the moment, the beautiful actions of the opponent".

Being a true supporter requires a long-term attachment to a given club and a loyalty even to moments of defeat. The commitment to his team and his membership represents for him a sporting identity.

Therefore, the emotions of the fans change depending on whether it is a defeat (a dejection) or a victory (joy, euphoria) which impact the mood of the supporters.

Football is the most popular sport and has the highest number of supporters in Morocco. In order to continue to advance knowledge on the impact of sports events on the psychic state of Moroccan investors, a qualitative research in the form of semi-structured interviews will shed new light on this relationship.

Family conflicts or family celebrations

Family-work conflict is defined as "a form of role conflict in the career-oriented person, arising when the demands of work and the demands of the family are mutually incompatible" (Higgine and Duxbury, 1992).

A study conducted in 2004 by Sophia Belghiti-Mahut on "the determinants of the advancement of female managers" found that more the family-work conflict increases, the hierarchical progress of women decreases. This means that the family is encroaching on the work and that it impacts the advancement of the hierarchy mainly for women.

The question is: does the family role affect the mood at work and therefore the decision-making?

Conclusion

This study in the Moroccan financial market will be our first exploration in the Moroccan context. It will allow us to clarify our ideas about the effect of mood on the decision making of investors on the academic level. However, the only limit that may exist is the number of interviews conducted. For this purpose, and in order to generalize our results, we envisage a quantitative study after the finalization of our qualitative study with a larger population.

Reference

Allali, B, 2008, “Culture et gestion au Maroc: une osmose atypique. Gestion en contexte interculturel: approches, problématiques, pratiques et plongées”, Québec, Presses de l’Université Laval et Télé-université (UQAM), 1-36.

Balambo, M. A, 2013, “Culture nationale et développement de la confiance inter organisationnelle en milieu supply chain: Le cas du Maroc”, In Colloque LOGISTIQUA'13, 23.

Bouman, S., Jacobsen, B. 2002, “The Halloween indicator « Sell in May and go away »: Another Puzzle”, The American Economic Review, vol. 92, no 5, p. 1618-1635.

Brockman, P., Michayluk, D. 1998, “The persistent holiday effect: additional evidence”. Applied Economics Letters. Vol. 5.

Dodd, O., Gakhovich, A. 2011, “The holiday effect in Central and Eastern European financial markets”. Investment Management and Financial Innovations, Vol. 8, N°4.

Dichev, Ilia D. and Janes, Troy D., (August 2001) Lunar Cycle Effects in Stock Returns Available at SSRN.

Gibbons,, Patrick HESS 1981, "Day of the week effects and asset returns". The Journal of Business, Vol. 54, No. 4.

Harrab, S, 2017, « Peut-on humaniser la finance ? » Revue du Contrôle de la Comptabilité et de l'Audit ISSN: 2550-469X, N° 1 : Juin 2017.

Brockman, P, Michayluk, d, 1998, "The persistent holiday effect: Additional evidence", Applied economics letters.

Higgins, C. A, & Duxbury, L, E, 1992, "Work-family conflict: A comparison of dual career and traditional career men." Journal of organizational Behavior, 13, 389_411.

Hirshleifer, D., Shumway, T. 2003, "Good Day Sunshine: Stock Returns and the Weather". The journal of finance, Vol. 53, N°3.

Hofstede, G, 1984, "Cultural dimensions in management and planning", Asia Pacific journal of management, 1(2): 81-99.

Hofstede, G, 1998, "Masculinity and femininity: The taboo dimension of national cultures" (3), Sage.

Jacobsen, B., Zhang, C. 2014, "The Halloween indicator, "sell in May and go away": an even bigger puzzle", SSRN Electronic Journal.

Kaustia, M & Rantapuskia, E 2016, " Does mood affect trading behavior?", Journal of financial Markets, 29, p. 1-26

Lakonishok, J. et S. Smidt 1988, "Are Seasonal anomalies Real? A ninety-year Perspective" Review on Financial Studies, 1(4), 403-425.

Mangot, M. 2008. « Psychologie de l'investisseur et des marchés financiers ». Ed. DUNOD.

Vergin, R, Mcginnis, J. 1999 "Revisiting the Holiday Effect: is it on holiday?" Applied Financial Economics. Vol. 9.

Wright, W. F., and G. H. Bower, 1992, Mood efects on sub jective probability assessment, Organizational Behavior and Human Decision Processes 52, 276{291.

NORA BENAHMED[1] AND SAMIA EL FASSI[2]

THE WORK OF MAMPRENEURS: WHAT IMPACT ON FUTURE GENERATIONS?

Abstract

We were inspired by the following definition to begin our research on the hypothesis of a link between the entrepreneurial woman and the transmission of the entrepreneurial spirit to her children and to the development at a micro-economic scale of socio-economic level; « An entrepreneur is a woman who has founded, bought or inherited a business, which assures all financial, administrative and social risks and who participates in day-to-day management. » (JUMP: Empowering women, advancing the economy 2010). According to a report by AFEM -Association of Women Entrepreneurs of Morocco- (2015), 86% of women entrepreneurs in Morocco have children, and 76% of them are married. This led us to question the situation of women entrepreneurs at the same time as being moms and responsible. Two essential axes in the development of any family. The relationship between maternity and women's entrepreneurship seems interesting to us, in the sense that being a mom and a business woman owner at the same time will have an impact on the educational and socio-economic levels. The objective here is to demonstrate that the Moroccan entrepreneur woman can contribute effectively to the development of her family and inculcate in the education of future generations an entrepreneurial spirit that can lead Morocco forward.

Keywords: Entrepreneurship, social, family

JEL Codes: D00

1. Introduction et problematic

Living in a society where the male sex is dominant, the situation of Moroccan women in society has always been interesting to us. More specifically the woman in difficult and quite delicate situations.

In Morocco, women's entrepreneurship is now perceived as a major lever in its economic development. Over the years, women have shown their important contribution to the Moroccan entrepreneurship sector. Ranging from micro-enterprise to SMEs, companies directed by women present different activities and work in several sectors, according to several criteria (age, level of study, family status...). No one can deny that a woman is a business leader in her own family first and foremost, so she unconsciously develops an unconventional spirit of entrepreneurship that drives her directly or indirectly to start her own business, and consequently to invest in the labor market.

We put as a first hypothesis to our research a strong link between the professional life of an entrepreneur's life and her personal and family life. This led us to question the situation of women entrepreneurs at the same time as being moms and managers. Two essential axes in the development of every family and society.

Our main questioning turns around the mother-child relationship and theoretical propositions that are put forward to understand an entrepreneur in general and a mampreneur in particular.

Does the mampreneur care about her socio-economic environment and family ? Is there a cause-and-effect relationship between her and her environment ?

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Our exploratory approach to theoretical studies will allow us to shed more light on these questions, several questions whose aim is to find pertinent answers throughout this modest work.

2. Theoritical context

In the world of research, several theories are discussed in order to find the one that best understands our subject. In our case - which concerns entrepreneurship in general -, several theories have been interested in the subject. Some are more relevant and others less so.

The literature has been very interested in the issue of entrepreneurship, demonstrating many theories that could be used in many types of research. Indeed, there is a plurality of theories dealing with this subject, which makes limiting and identifying the subject difficult.

In order to find theories consistent with our subject, namely those related to entrepreneurship, but more specifically the entrepreneurship of mothers that we name "mampreneurs", we looked for theories that deal more with the behavior of the entrepreneur, in his way of seeing things and interpreting the way of doing business, paying attention to the impact this has on the environment (impact on the education of children, on their socio-economic development, their influence through entrepreneurship ...).

So we tried to find theories about their behavior, which can guide their work and their way of seeing things and acting.

Going into entrepreneurship and starting an own project is primarily an intention of the entrepreneur, which triggers the desire to do this. The question of **intention** is therefore essential to begin any synthesis on entrepreneurship.

According to the literature, Shapero and Sokol (1982) were the first to highlight the approach of intentions in entrepreneurship. They were able to put into practice the following theory:

Theory of the entrepreneurial event:

According to Shapero and Sokol, the setting of the entrepreneurial act is not the result of any coincidence, but rather is based on two groups of intermediate variables out coming from the socio-economic environment of the future entrepreneur, namely :

- **Perceptions of desirability:** family, friends and relatives are a very important source for the future entrepreneur. Their experiences influence very closely. In fact, the failures of others in their own entrepreneurial experiences may just as well be a brake that can push them back from the world of entrepreneurship, but also be a motivator to allow them to not make the same mistakes and learn of these failures instead of being discouraged.
- **Perceptions of feasibility:** to talk about a project, is also to talk about available financial resources, the coherence of the project idea with the target population or the place ... For the two authors, the availability of financial resources (family support, savings saved ...), the help and support of the spouse or relatives, advice and training act on the perceptions of feasibility of the entrepreneurial project.

According to the authors, the release of entrepreneurial intention does not come from pure hazard, but rather comes after an event that disrupts our lives and interrupts their normal routine.

This event can be the arrival of a baby - as motherhood invokes new perceptions of life -, the death of one of the parents, divorce, prison, failure in studies ...

In conclusion, the entrepreneurial intention is mainly based on the perceived desirability of the action and its feasibility.

Theory of reasoned action:

This theory comes from social psychology, it is also interested in the dependence of the behavior of the individual of the intention. Here, intention is considered as a mediating point between the attitudes and behaviors of the individual.

Ajzen and Fishbein (1991) were the first to create a model inspired by the theory of reasoned action. However, this theory is only applicable to natural and normal behaviors, and does not address complex behaviors that require specific effort and exchange. This is why several studies have criticized this theory.

Ajzen (1985) himself has put this theory into consideration, adding to it improvements, which has given rise to a new and more appropriate theory, which is the theory of planned behavior.

Theory of planned behavior:

This theory follows the same principles of the previous theory, adding to it a new component "perceived behavioral control", which will be used in the case where the behavior of the individual is complex and is opposed to reality because of lack of confidence for example.

"This addition was made to account for moments when people intend to conduct behavior, but the actual behavior is annoyed because individuals miss confidence or control over behavior" (Miller, 2005)

The name “planned” comes from the fact that this theory assumes that the behavior of the human being must go through planning in order to be emotional.

The study of intention is the main concern of this theory, which consists of three main dimensions, namely attitudes associated with behavior, subjective norms and perceptions of behavioral control.

- **Attitudes towards behavior :** Attitude represents for researchers a form of positive or negative evaluation of a situation, a person or an object. The degree of this evaluation depends mainly on the expected results expected of the behavior aspired by the individual.

Attitude is composed of beliefs about the commitment to behavior but also the evaluation of consequences of behavior.

- **The subjective norms :** They represent the beliefs of the individual towards the people that are important for him in what he would like to undertake. The individual then moves to a reference group before adopting a particular behavior. The behavior taken into account therefore depends on the values of the reference group of the individual.
- **Perceived behavioral control :** It refers to the degree of confidence that the individual has in his own means and abilities and the availability of the resources necessary to achieve the desired behavior.

Like what has just been mentioned, several theories have been interested in our subject and have tried to answer more or less the main question that we ask, starting from the principle of intention that pushes entrepreneurs to start their own project.

Since we are interested in the relationship between the woman entrepreneur and her motherhood at the same time, the intention is to help the family, to follow the children's education, to instruct them ... In this case, the theories mentioned above are useful to us in that the point of departure and motivation of the mampreneurs is therefore this intention to provide for the needs of their families and to help them financially as well as on the educational aspect of the children future generations.

We then assume that this intention is the main motivator of mampreneurs, and therefore the positive impact of their work on future generations.

On the other hand, when we talk about entrepreneurship, we are talking about business, which, without the entrepreneur, can not achieve anything or make any profit. In this case, the entrepreneur is the one who manages it, and who develops its operating conditions.

Indeed, the entrepreneur is the person who can hold the viability and durability of his entity. It can not be dissociated from the socio-cultural and economic context in which it evolves.

Economics, sociology, management and anthropology are all disciplines that bear interest in the study of the entrepreneur. For economists, the concept of the entrepreneur has evolved with time and the mutations of capitalism. According to the economic theories, the entrepreneur has been qualified as an intermediary, a risk taker, an innovator ... And as the socio-economic situation has changed, the entrepreneur has become an essential player in the economic development of the economy.

In this same context, we have tried to see theories of the economic entrepreneur enriched by an interdisciplinary approach of the entrepreneur.

Many readings assume that the entrepreneur has been defined for the first time by the classics. However, important and fundamental elements of the study of the latter were developed by the mercantilists.

In his treaty on political economy (1924, p.297), "A de Monchretien" (1576-1621), uses the word "entrepreneur" to designate an individual who contracts with the public authority to carry out various works or any mission. Merchants, according to Monchretien, have a very important social role similar to that of the brain in the human body.

The importance given to the entrepreneur by the mercantilists has been much more developed among the classics. Focusing on the English classical school, we will talk about A. Smith and D. Ricardo.

A. Smith: He separated the functions of the capitalist from those of the manager. For him, the role of entrepreneur is not very apparent, except in the concept of the division of labor. It implies an authority that ensures its cohesion, represented here by the entrepreneur himself.

The **theory of the invisible** hand introduces the static presence of the entrepreneur. In fact, according to this approach, the economic individual, while seeking only his personal interest, works much more effectively for the interest of society than if he intended to work there. Thus, the invisible hand for A.Smith is the self-regulating process not calculated by reason that produces social cohesion and the general interest. Market mechanisms are the invisible hand that ensures the harmony of individuals considered rational. The market price is therefore realized by the invisible hand.

D. Ricardo: His research is based on the fusion Entrepreneur \ Capitalist, the second interesting more than the first in his perspective of studying economic dynamics.

J. B. Say: He will move away from the line of study of A.Smith and D.Ricardo, extending the analyzes of Turgot and Cantillon. He will distinguish between entrepreneur and capitalist and introduce the notion of risk. He will affirm that the interests of the entrepreneur are not those of the capitalist. For him, the entrepreneur is the one who combines means of production.

According to Say, the occupation of the entrepreneur is characterized by the fact that the latter acts for his own account.

A. Marshall: It is in the same line as Say. According to him, the entrepreneur is well before the capitalist and can not be confused with it. Before capitalism, the entrepreneur ruled over the system of homework, a system of small trades led by the workers themselves ... With the development of large companies and the rise of the industrial economy, the role of the entrepreneur will evolve into management and management functions.

A. Marshall emphasized the entrepreneurial and managerial qualities of the entrepreneur and his ability to know how to organize the work of a large number of people. Its function is to direct production so that a given effort can provide the greatest possible effect in meeting human needs. From all these theories, we can see that the entrepreneur has a primary role in the good running and proceedings of his business, bringing together all his characteristics of manager and social role within his entity. The work of the entrepreneur generally reflects positively or negatively on the efficient conduct of his business and its continuity. The qualities of the entrepreneur affect the quality of the company.

Speaking of methodology, we mainly talk about defining the main steps with sufficient precision to clearly understand the why and how of the subject. However, having concrete results is not yet part of the methodology with which we begin our work.

In fact, we first focused on entrepreneurship in a general way. Searches and readings over time have allowed us to focus more on the intent of the mampreneurs specifically to push them to act effectively on the education of their children, and therefore to find out if they will have an impact. Favorable or unfavorable impact on future generations.

After a collection of primary data from AFEM1 - cited at the very beginning -, we focused on theories with a strong connection to the subject. The methodology considered in the next stage of our research is an empirical type methodology, so that we can collect real data from observations of the behavior of women who started their project while being mothers. These observations will serve as a random sample of 300 women and a questionnaire will be developed specifically for them. The development of this last will be done according to the situation of life perceived in Morocco. The analysis of the data collected through this questionnaire will then be done later. We must also start from the general to the particular, by first highlighting the observed women of the country involved - especially Morocco - in order to allow all readers of future articles from all countries to understand the scope of research in their country.

3. Conclusion

We first looked at entrepreneurship in a general way. Research and readings over time have allowed us to focus more on the intention of the mampreneurs specifically to push them to act effectively on the education of their children, but also on the role of the entrepreneur within its own business, and therefore whether they will have a positive or negative impact on future generations. After a collection of primary AFEM data - cited at the very beginning - we focused on theories with a strong connection to the subject.

[1] AFEM: Association of the Moroccan Entrepreneur Woman

The mampreneurs are our main source of research, especially in their socio-economic impact on future generations. By following the methodology explained earlier, we will be able to better understand the data collected and to better define the subject. Also, we will be able to delimit the brakes that could stop our research, and try to diverge them.

References

Aude d'Andria, Inès Gabarret, Femmes Et Entrepreneurs : Trente Ans De Recherches En Motivation Entrepreneuriale Féminine « Revue de l'Entrepreneuriat », 2016.

B. Berger, culture entrepreneuriale, Esprit d'entreprises, cultures et sociétés, B. Berger et alii, Paris, Maxima, 1993.

B. Berger, Culture entrepreneurialem oderne, Esprit d'entreprises, cultures et sociétés, Brigitte Berger et alii, Paris, Ed Maxima, 1993.

C. Comet, POUR UNE THÉORIE DES PROCESSUS ENTREPRENEURIAUX Introduction au dossier, La Découverte « Revue Française de Socio-Économie », 2011.

C. B. Berger. et Alii, Esprit d'entreprise, Cultures et Sociétés, Paris, Maxima, 1991.

E. M. Hernandez, Entrepreneuriat et théorie de la fme, Revue Française de gestion, n0138, 2002.

J. J. Pluchart, L'approche Par Les Ressources Des Réseaux D'accompagnement Entrepreneurial « Recherches en Sciences de Gestion », 2014.

M. Bourgain, Pierre Chaudat, Vie Professionnelle Et Maternité : Représentations Comparées De Jeunes Entrepreneures Et Cadres En Tpe Et Pme En Croissance , « Revue de l'Entrepreneuriat », 2015.

S. Bouitillier Et D. Uzunidis, L 'entrepreneur, une analyse socio-économique, Paris, Economica, 1995.

T. Verstraete, Entrepreneuriat connaître l'entrepreneur, comprendre ses actes, Paris, L'Harmattan, 1999.

T. Verstraete, « Entrepreneuriat : De La Théorie À La Pratique » Nouvelle Rubrique De La Revue De L'entrepreneuriat, Boeck Supérieur | « Revue de l'Entrepreneuriat », 2012.

T. Lebègue, L'accompagnement Institutionnel Des Femmes Entrepreneures Quel modèle d'accompagnement pour les femmes créatrices de très petites entreprises ? « Revue de l'Entrepreneuriat », 2015.

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BASAK BOGDAY SAYGILI[1] AND BUKET ERTUGRUL AKYOL[2]

TO SIMPLIFY IN FASHION CONSUMPTION BEHAVIORS

Abstract

Clothing, which is an important part of life since the existence of humanity, has formed the concept of fashion with the transition from function of covering to decorate function in centuries. Fashion concept M.S. Although it started to occur in 1000 years, the main formation occurred with the beginning of the industrial revolution. Nowadays, with the speed brought by globalization, the ever changing fashion has accelerated its consumption. Fashion, one of the main topics of consumption, causes consumption in the national and global resources as well as the consumption of personal resources.

Fashion is one of the main topics of consumption because it serves many stages of the hierarchy of needs. However, at the time of depletion of resources, this study has been carried out in order to reduce consumption in our fashion in order to use our brain power and more efficiently.

In this study, a case study method was used. Interview form was used to obtain data. In this case study, a working woman who closely followed the fashion wore the same garment for 40 days, combining the basic selected clothes with different details In this study; the results of the interview form about how the basic clothes used can be put together and how the working woman who closely follows the fashion affects the psychological state of wearing the same clothes for 40 days and effective time management is revealed.

Keywords: Fashion, minimalizm, simplfy, consumption

JEL Codes: Z00, Z10, Y90

Introduction

Fashion, one of the main topics of consumption, renews itself every day with the requests of change. The clothes used since the existence of mankind have been depleted in the same culture as before, maybe in 100 years, then in the last decade and then in the present day. It is a period in which the concept of fashion is no longer in the clothes and more and more styles come to the fore. In this case, everything is fashionable, man's clothes according to his own body to prefer. This change in fashion can increase production and consumption more or less. It can also make thinking and behaving less in fashion to shorten the time spent on clothes in everyday life. People were squeezed from the colorful, patterned and strong character clothing of the 1980s and from the 1990s onwards they began to use minimalism in fashion (Mackenzie; 2017: 124). However, while the changing pattern styles of those days, the minimalism mentioned in this study is to combine more with less clothing. In the 1990s, the simplification of the molds in today's clothing has been formed in order to be combined with many clothes.

The fall in textile production costs in the late 19th and early 20th century and the emergence of ready-to-wear clothing in the second half of the 20th century have enabled fashion products to reach large masses rapidly and have ceased to be an area of fashion that elite could have (Sahin; 2017:12). This situation created the concept of oluştur consumer kavram fashion. From this period on, formal variability is greater. Consumer fashion covers the likes of social groups in all strata of society (Crane; 2003: 177).

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The production of the products produced according to consumer fashion decreases as the production increases and as the price decreases, the consumption increases. This product is expensive in individual production or in Haute-couture if the fashion becomes fashionable. When it comes to mass production, both price decreases and production increases. Price thought consumption increases. Due to the very clothes mass production consumption in Turkey is too much. apparel industry and the evolving design education in Turkey to live in Turkey offers the opportunity to follow the world fashion. apparel company in Turkey, as well as other sectors of the fashion system and also increasing with each passing day due to the development of people of fashion consumption is triggered.

The development of the media also revealed the immediate consumption of fashion. Developed social media tools in the last 10 years has led to the rapid consumption of fashion. In order to prove the existence of people in social media and to be more visible, it is more focused on clothes consumption.

The philosophy of Maslow's hierarchy of needs; it is the action / behavior of man to realize his / her potential. Each stage in this hierarchy is the necessary priorities for the realization of the potential(Peace; 2016: 36). Fashion; are the elements that allow individuals to be recognized according to the society they are in and with small details in this society. When the fashion is mentioned, it is generally mentioned about the clothes and other accessories covering the body. For centuries, beri Fashion beri represents economic power. Fashion, high-income in the world to bring new products to them and then these products are followed by different social communities, followed by high-income new follow-up with new differences and follow-up by the followers to this day, different forms of clothing has formed the change of fashion (Brauel; 2004: 294).

There has been capitalism in the world for 250 years and Marxism for over 100 years. However, we can say that the ı Information Age in started after the Second World War by encouraging the universities to increase their education all over the world and to continue their education at university. In the information age, knowledge-makers and those who manage the information constitute the öt non-capitalist society bil (Drucker; 1993). The formation of a non-capitalist society does not mean the complete disappearance of capitalism and Marxism. However, most of the countries covered by the developed countries constitute the non-capitalist society. Knowledge should be produced in order to take part in the non-capitalist society. Time is needed to produce knowledge and it is necessary to make as little use of what the capitalist world has to offer us.

Wars and global warming, etc. from the 1990s to the present. The reason that the world's resources are being exhausted requires that every human being be more responsible towards the world as a person and the resources should be directed towards less consumption. In order to be able to use and improve the resources of the world better, it needs information about material consumption. Time is one of the most important sources of information consumption. There are many resources available for more information. However, these sources should be minimized or minimized, as well as knowing the route to be reached, the time we spend or the time we spend. In this direction, time-consuming activities and materials in daily life should be minimized as much as possible by minimizing time spent.

Method

In this study, interview method was used. Interview method, which is the most used method in social sciences; it is a communication process based on asking and answering questions for a serious predetermined purpose (Stewart and Cash; 1985'den alıntılayan Yıldırım, Simsek; 2008: 119). At the center of the study there is a working woman who follows the fashion closely. She wore the same outfit for 40 days, combining various combed T-shirts and black canvas pants with different details. Nowadays, when the media increases the consumption every day, it is difficult to wear the same clothing for 40 days. The study was conducted in the context of time and psychology for wearing the same

clothing for 40 days. The person who was interviewed, having made such a study voluntarily, caused this work to be resolved positively. First of all, the student was informed about the psychological situation and the psychological situation at the end of this study. After psychological data, data on time management were obtained.

Findings

Clothes are one of the basic needs of life. The sector is the locomotive sector of many developing countries, not only meeting this need, but also the sector in which people use their place in society and individuals to identify and hide their personalities. Consumers who are attracted to the consumption of this sector are experiencing psychological pressure not to find suitable clothes in many clothes.

The woman we researched is 39 years old and lives in Niğde. Teacher is. She is also a Ph.D. student and is an administrator or a member of many organizations. To follow fashion is one of the greatest pleasures. In our interview form with our women, 8 questions were included in our study.

Question 1: What is the reason that leads you to this work?

Answer 1: The dissatisfaction reached by the media and the social media increase the consumption, they have difficulty in combining them with the clothes, they are lost in the clothes warehouses, and it is difficult to get dressed to go to work in the mornings, they spend a lot of time and consumption is reduced not only by reducing the waste of water and food but also by reducing the clothes. based on the idea that benefit can be provided. First of all, with media tools and social media advertising, public relations, promotion, sponsorship and sales campaigns, companies make the brand value of the product and make the continuity of the company sustainable. In line with these goals, every brand or firm is doing a lot of work in order to create more loyal and more dependent individuals (Aktas, Ozupek, Altınbas; 2011: 116). Nowadays, if brands make these studies in a conscious way, they should consciously exchange their consumers.

Question 2: Before you begin, can you give us some information about your psychological state?

Answer 2: Before carrying out this study, the participant stated that she had bought all the clothes and which makeup materials to buy and which accessories she wanted to wear. He stated that he bought even 25 pairs of shoes from a branded shoe store, even buying two of the same clothes. In short, he said that he was shopping crazy. He felt that he felt like a slave to the things he did not know the number of overflowing wardrobes. People, social media accounts of luxury things they have (latest model cars, expensive watches, branded socks, etc.) to try to exist is also a force to simplify. Fashion, clothes and more than the value of the use of clothes is attributed to the unsatisfied. Clothes, people, power, love, wealth, etc. Symbols are given the promises of winnings. Since people who want to have or own these symbols are targeted, they are promised that they will get rid of the emotional crisis with fashion shopping (Hoskins; 2015: 121).

Question 3: What were the reactions you received when you started this work?

Answer 3: The women in our research center stated that those who knew themselves closely stated that they could not wear the same clothing for 40 days. He stated that he made jokes that his colleagues might have problems in cleaning and that there were those who argued that if it was materially appropriate, people would buy and take what they wanted. He said that almost everyone asked how long their clothes were washed. In the course of this study, there are people who want to share the same experience, but the majority of them are not supporters of this kind of work.

Question 4: Do you think you have contributed to the ecological system with this study?

Answer 4: The researcher in our study stated that this study and its contribution to the ecological system were definitely contributed. . Before I started the process, I read in one of my research that the micro-fibers that make up the texture of the garments cannot be separated by the soil and passed into the body of the plants and passed on to the body of more developed organisms ". Therefore, this study will bring less consumption and awareness to the environment, and the environment is affected by this situation, we think that the consumption has reached the awareness of the ecosystem damage will be reduced (Hoskins;2015).

Question 5: Do you think that you save time with this work?

Answer 5: The women in our research center stated that this study provided a great time saving. He stated that y What I wear, what I wear, y and the time spent on his family and work, mentally especially women get rid of a process that takes a lot of time and time. She also realized how much time she spent on shopping and how much time she spent on shopping in shopping malls, in particular under the name Ayrıca Activity Ayrıca. As mentioned in many time management books, Sabuncuoğlu and Pasha (2002); In order to manage the time and save time, it is emphasized that there are actions in which how, what, when and what are to be done between today and the future. Our life goals

Question 6: How did you feel psychologically in the time period you did this study?

Answer 6: The women in our study stated that it was very convenient to wear the same clothing in the first days of this study, but after the 2nd week there was a burden on the clothes and was psychologically uncomfortable. He stated that he wanted to give up but he could not keep him proud of the social media due to the shares he had made and continued to work.

Question 7: What has changed in your life after this study?

Answer 7: The woman at our research center said, or I feel that I am getting a certain amount of refinement from the impositions of brands and advertisements. If not necessary, I take care not to take. I've started to see stores as a touristic trip, but as a place I go to find what I need more. I'm spending a lot less money on clothes. In Our research participant stated that the distribution of credit cards changed considerably and that the change in clothing expenditures decreased and the distribution of spending decreased and varied.

Question 8: How did you feel psychologically after this study?

Answer 8: During this study, the women at the research center stated that some days were very hard, they felt a great deal of pressure on them, but the less they provided more comfort and time, and the more they became happier with the peace of redundancy. In this process, I made people focus on what I did, not what I was wearing, and that was my focus. I realized that I had to work continuously to pay for my purchases so that I was constantly playing from the time I had to live.

Results

The concept of fashion consists of the protection of the body and the emergence of the apparel with the veiling instinct, the stage of necessity of security need according to Maslow's hierarchy of needs, belonging and respect, and the stage of respectability stage of self-realization. Fashion that serves these three stages is one of the main topics of consumption. This consumption; At the same time brings the brain and time consumption.

In this study, case study method was used. The interview form was used to obtain data. In the case study, a 39-year-old working woman followed the fashion well, wearing the same garment for 40 days, combining the basic garment with different details. In this study; The results of the interview form about effective time management and how the working woman who followed the fashion closely affected the psychological state of wearing the same garment for 40 days.

- With the feeling of dissatisfaction as a result of the increase in consumption due to various reasons, there is difficulty in making the clothing combi.
- Increased consumption due to various reasons brings more consumption. Although this situation has a feeling of dissatisfaction and no longer makes it happy, it still causes an excessive exchange of clothes. In the early stages of shopping, while providing relaxation and satisfaction, then causes pressure and dissatisfaction in human psychology. In this respect, the consumption of clothes can be evaluated as other addictions. Especially in recent years, similar situations have been observed with mobile phone addiction and media addiction.
- Reducing consumption not only by reducing water and food wastes but also by reducing clothes. The first aim of directing natural products in clothing is direct human health (causes of breathing cells in the body, etc.) and the second aim is that there are no harmful products in the environment. Polyester etc. Fabrics with contents cannot be transformed in nature or damage the nature like plastic bags. At the same time, this study will bring less consumption and bring awareness, and the environment is affected by this situation, we think that the consumption has reached the awareness of the loss of ecosystem will be reduced.
- The reasons that led our participant to this work were that she first felt that she had no clothing, despite the many of her clothes, and that many people only tried to exist with her clothes.
- In the course of this study, our participant came in many negative comments, which were positive and reduced his motivation. There were many who stated that he could not but that supported our participant.
- This study shows that combining simple clothing saves a lot of time. Nowadays, when there is a lot of time and time management, there is a support for time management in this study.
- As mentioned in many personal development books, people need to tell different people to achieve their goals. Thus, it makes it impossible to give up goals. This situation has been proven once again in this study.
- It is a great convenience to wear the same clothing, but it has been revealed that it is felt as a burden on hard clothing and under psychological pressure.
- After this study, our participant has been saved from brand addiction and the urge to buy. It has started to prefer more basic clothes which are more natural, comfortable and can be easily combined with accessories. With this study, he discovered that he could use the same product in many different places.
- When the consumption comes with the fashion unconsciously, it requires shopping every season. This situation may turn into addiction in humans after a while. When it turns into addictions, it turns people into a system they try to pay for, as well as causing ecological damage and a great loss due to time loss.
- The participant has reached a great psychological relief. The simplification of the clothes in the household goods, teachers and students as well as stationery and so on. many products have gone to simplify. In short, he has simplified the way of life. People are greeted with their looks, sent off by their ideas. Garment is important. But it should not be at the center of life. Too many kinds of clothes only wear the user, takes time.

References

Aktas, H., Ozupek, and M. N., Altunbas, H. (2011). "The Brand Preference And Medıa Consumıng Behavıour Of Chıldren*" Selçuk İletişim,* Cilt:6, Sayı:4, Konya.

Barış, G., (2016). *"İhtiyaç Nerede Biter de Lüks Başlar?"* https://www.researchgate.net/publication/322540352_Ihtiyac_Nerede_Biter_de_Luks_Baslar [accessed Dec 27 2018].

Brauel, F., (2004), "In Material Civilization, Structures of Everyday Life" - "Maddi Uygarlık, Gündelik hayatın Yapıları", İmge Kitapevi Yayınları, Çevirmen: Mehmet Ali Kılıçbay, Ankara.

Crane, D., (2003), " Fashion And Its Social Agendas"- "Moda ve Gündemleri" Ayrıntı Yayınları, İstanbul.

Drucker, P. F., (1993). "Post-Capitalist Society"- "Kapitalist ötesi toplum" , Çeviren: Belkıs Çorakçı, İnkılap Kitapevi, Ankara.

Sahın, Y., (2017). "Modanın Tanımı ve Kapsamı", N.Ertürk, E.Varol, *Moda Tasarımı*, Anadolu Üniversitesi Basınevi, Eskisehir.

Hoskins, T. E., (2015). "*Foya*"- "Foya-Modanın Anti-Kapitalist Kitabı", Ütopya Yayınevi,Ankara.

Mackenzie, M., (2017). "Isms: Understanding Fashion", "İzmler: Modayı Anlamak", Hayal Perest Yayınevi, İstanbul.

Sabuncuoglu, Z., and Pasa, M., (2002). "Zaman Yönetimi", Ezgi Kitabevi, İstanbul.

Yıldırım, A., and SIMSEK, H., (2008). *"Sosyal Bilimlerde Nitel Araştırma Yöntemleri"*, Seçkin Yayıncılık, Ankara.

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