CRACOW UNIVERSITY OF ECONOMICS

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PUBLIC GOVERNANCE

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ISSN 1898-3529
e-ISSN 2658-1116

4 (50) / 2019

ZARZĄDZANIE PUBLICZNE
PUBLIC GOVERNANCE

4 (50) / 2019

CRACOW
UNIVERSITY
OF ECONOMICS

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The original version of the magazine is its printed version. The magazine is available in the following databases: CEEOL, CEJSH, BazEkon, BazHum, EBSCO (Business Source Corporate Plus, Ultimate Business Source), ERIH Plus, ICI World of Journals/ICI Journals Master List, ProQuest

ISSN 1898-3529
e-ISSN 2658-1116

Graphic Design – *Agata Łankowska*

Copy Editing – *Marta Olasik*

Publisher
Malopolska School of Public Administration
Cracow University of Economics
ul. Rakowicka 27, 31-510 Kraków
phone: + (48) 122 937 560
www.msap.uek.krakow.pl

Publishing Partner
Scholar Scientific Publishing Company
ul. Obożna 1, 00-340 Warsaw
phone: + (48) 22 692 41 18, 22 826 59 21, 22 828 93 91; Sales Department: ext. 108
e-mail: info@scholar.com.pl; www.scholar.com.pl

Typesetting: WN Scholar (*Jerzy Łazarski*)
Printing and binding: OSDW Azymut Sp. z o.o., Łódź, ul. Senatorska 31
Circulation: 200 copies

Contents

doi: 10.15678/ZP.2019.50.4.01

Zarządzanie Publiczne
Public Governance
No. 4(50)/2019
ISSN 1898-3529

Andrzej Sławiński

Will IT Technologies and Globalisation Change the Mechanism of Money Creation?[1]

Abstract

Objectives: The article addresses the question about whether IT technologies and the ongoing globalisation are likely to impact the money creation mechanism.

Research Design & Methods: For this purpose, the article reviews the experiences of free banking, the endeavours to promote the bitcoin as a new currency, the discussions on digital currencies issued by central banks, the experiences with Eurodollar market, and the emergence of imbalances in the TARGET2 (the Eurozone payment system).

Findings: The analysis leads to two general findings. The first one is that cryptocurrencies are unlikely to replace the existing monetary system. The second one is that the increasing globalisation creates the need for the most important central banks to expand their role as international lenders of last resort.

Implication / Recommendations: One implication of the main findings of the paper is that cryptocurrencies will have to go through a long evolution before they might have a chance to become an integral part of the monetary systems instead of being purely speculative assets. The other implication is that the experiences with the TARGET2 system revealed the ECB's large potential to prevent sudden halts in international trade.

Contribution / Value Added: The article's added value with regard to the existing literature is highlighting that the main reason why the deposit money created by commercial banks (making the bulk of money supply today) will not be replaced by cryptocurrencies stems mainly from the fact that the latter cannot be allocated in an economically rational way. The other contribution is underscoring that the TARGET2 imbalances reflected the positive role played by the ECB in alleviating the consequences of the global banking crisis of 2007-2009 and the Eurozone debt crisis of 2010-2012.

Article classification: research article

Keywords: money creation, bitcoin, central bank, digital currencies, Eurodollar market, Target 2 imbalances

JEL classification: E 40, E 58, E 65

[1] The paper is based on the presentation which the author had the opportunity to deliver during the *Good Governance* seminar organised by the Economy and Public Administration Department of the Cracow Economic University on 12th December, 2018. The author expresses his gratitude to the anonymous reviewers for their valuable and inspiring comments.

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Introduction

The goal of this paper is to investigate whether the emergence of the IT technologies and the advancing globalisation are likely to change the existing mechanism of money creation. The paper offers two general conclusions.

The first one is that the recently expressed hopes for cryptocurrencies and CBDC (central bank digital currencies) to substitute the recent forms of money do not sufficiently take into account the problem of the efficient money allocation. At present, this condition is met only by deposit money created by commercial banks. The second conclusion, illustrated by the functioning of the Eurodollar market and the Eurozone payment system (TARGET2), is that the efficient functioning of the global monetary system needs the most important central banks to play the role of international lenders of last resort.

The paper is organised as follows. Section 2 points out that, contrary to what is commonly believed, money is created not by central banks, but by commercial ones. Section 3 explains why cryptocurrencies in their present form should be treated as speculative assets used widely (due to their anonymity) for illicit operations rather than as genuine money. Section 4 discusses why, as far as electronic money is concerned, the only rational option for central banks is to issue cash substitutes as a means of payment rather than deposit money. Section 5 underlines that also the international currencies, such as the US dollar, are created by commercial banks. Section 6 underscores the role of the European Central Bank (ECB) in shielding Eurozone debtor countries from a much deeper financial crisis than that which they actually suffered. Section 7 draws lessons from the analysed experiences. Section 8 is a concluding part.

How is money created?

The vast majority of money supply comes in the form of deposit money, which originates from commercial banks' lending activity (McLeay et. al., 2014)[2]. Perhaps the best way to illustrate this fact is to recall how money was created in the free banking era, when there was no central bank in the United States (Sanches, 2016; Marszałek, 2014).

Money creation results from commercial banks monetising the streams of future loan repayments by borrowers. Nonetheless, from the technical point of view, commercial banks create money *out of thin air*, just by means of entering the same amounts (the loan and the deposit) on both sides of their balance sheets. James Tobin aptly described it as *fountain pen money*, since in his time the deposit money was created with the stroke of a pen (Tobin, 1963).

During the period of free banking, the banknotes and the deposits issued by commercial banks were trusted, because they were redeemable (on demand) into gold at a fixed parity and the government accepted them for tax payments. Today, deposit money is trusted, because it is redeemable into banknotes having the status of a legal tender.

Why was inflation relatively stable during the free banking era despite the absence of a central bank in the United States? The reason was that 19th-century banks extended almost exclusively short-term self-liquidating working capital loans, which financed mainly firms' running stocks (Gorton, 1993). In such an environment, the quantity of money increased in line with the supply of goods and services, which had an inflation-stabilising effect. That is why the Real Bills Doctrine, dominating at that time, reflected reality to a large extent.

The main reason why the Federal Reserve System was established in 1913 was that during financial crises (the especially painful one took place in 1907) commercial banks were incapable of mustering sufficient liquid reserves to meet deposit withdrawals, which resulted in runs on banks and their bankruptcies.

[2] The paper does not discuss the problem of *helicopter money* (money financing of budget deficit) as this concept still lacks institutional solutions which would effectively shield an economy from inflation risk (Turner, 2016).

Before the Federal Reserve was founded, the supply of banks' liquid reserves – in the form of the so-called *specie certificates* – reflected the amount of gold coins (species) deposited by banks at clearing houses. During a crisis, the clearing houses issued extra reserves through extending the so-called *loan certificates* to member banks, but their volume had to be fairly small, since they were not a legal tender (Gorton & Tallman, 2016; Moen & Tallman, 2013). The solution to this problem was to establish a central bank endowed with an unlimited capacity to issue liquid reserves. This became possible as the government assigned the status of a legal tender to the liquid reserves issued by the Fed.

The developments that led to the establishment of the Federal Reserve System illustrate that to manage the payment system and play the role of lenders of last resort during crises is among the most important functions of central banks.

Did bitcoin have a chance to become money?

The flagship Fintech innovations comprise the blockchain technology, and bitcoin intended to become a new global currency.

Initially, bitcoin and other cryptocurrencies attracted a great deal of popular interest as a result of the timing of their launch. Satoshi Nakamoto published his paper (2009) – a kind of manifesto on the need for a ground-breaking reform of the monetary system – when central banks had launched their quantitative easing programmes, which were erroneously interpreted as a massive 'money printing,' while in reality what the central banks actually increased was not the money supply, but liquid reserves during a particularly painful global banking crisis (Sławiński, 2016).

Nakamoto proposed to disrupt not only the central banks (since in his view they tended to 'debase money'), but also the commercial ones, since he considered them too risky due to the fractional reserve system (Nakamoto, 2009).

Commercial banks were indeed responsible for the global banking crisis of 2007-2009. However, its principal cause was not the fractional reserve system as such, but, rather, the banks' irresponsible lending policies resulting from excessively liberalised banking regulations and lax supervision due to the effective lobbying efforts on the part of large international financial institutions (Lall, 2012, 2015).

Bitcoin was intended to become a digital equivalent of the gold standard, hence the 21 million coins cap imposed on its issuance (Soderberg, 2018). The assumption behind it was that – under the gold standard – money was stable, because the supply of gold was limited. Such a reasoning is so simplistic that it is, in fact, wrong. Under the gold standard, there were two sources of price stability. First, commercial banks at that time (as mentioned above) extended predominantly short-term self-liquidating working capital loans. Second, due to a lucky coincidence, the global supply of gold (from new discoveries) grew more or less in line with the global GDP and the volume of transactions (Cassel, 1936). Moreover, the absence of exchange-rate risk facilitated a constant 'recycling' of capital from surplus to deficit countries. This ensured a uniform rate of growth of gold reserves and money supply in all countries participating in the gold standard system.

In this way, the limit on bitcoin issuance became an incentive for speculation rather than a factor that stabilised its value. Instead of being a stable currency, bitcoin became a highly speculative asset. Its volatility exceeds the volatility of exchange rates and S&P 500 index several-fold, which makes its role as money simply inconceivable (Danielsson, 2018)[3].

The general conceptual flaw inherent in the bitcoin project is its disregard of the fact that any monetary system is based on social agreement. Society empowers the authorities to organise an

[3] The proposals to issue stable coins with fixed exchange rate to the dollar (Al-Naji et al., 2018) are not a proper solution as these coins are not legal tenders and they are widely used (due to their anonymity) for illicit transactions (Eichengreen, 2019).

efficient monetary system. Trust in public institutions cannot be substituted for trust in a specific technology (Dodd, 2017). Additionally, had the fiat money been replaced by cryptocurrencies, it would have constituted an unfair misappropriation of seigniorage by private money issuers.

The weakness of the claims that cryptocurrencies constitute an alternative monetary system is illustrated by the fact that they could make an efficient monetary system only if they played a role of liquid reserves in a system containing commercial banks extending loans denominated in cryptocurrencies and a central bank conducting monetary policy and playing the role of the lender of last resort (Danielsson, 2018)

Will it be easy for central banks to issue electronic cash?

In some countries, especially in Scandinavian ones, cash has been on a steady retreat. On this wave of popular sentiment, in 2017 the Bank of Sweden announced its preparations for issuing a CBDC – central bank digital currency (Sveriges Riksbank, 2017). Yet, at the same time, the central banks of Denmark and Finland decided not to undertake such preparations (Grym et al., 2017; Gurtler et al., 2017), which suggests that issuing CBDC is a more difficult challenge than it might appear at first.

Central banks should not create deposit money. It should be created by commercial banks, since this guarantees its rational allocation to those who are efficient enough to repay the loans. In the past, central banks usually evolved from large commercial banks, but they gave up their commercial activities in order to properly fulfill their role of lenders of last resort (Bordo, 2014, 2017). Nowadays, central banks do not extend commercial loans. Hence, they do not have capabilities to allocate the newly created deposit money.

One might consider it rational for central banks to hold households' and firms' deposits, i.e. the money originally created by commercial banks. Such a change would give households and small firms direct access to the central bank's real-time payment system.

Still, this would not be a good idea. Opening up such a possibility for households would pose a challenge similar in nature to that faced by narrow banking (Goodhart, 2009). In peaceful times, households would keep their deposits with commercial banks as the latter ones would offer a higher interest and a wider range of services than those available at a central bank. However, during a recession, an increasing uncertainty would trigger a massive deposit flight from commercial banks to the central bank (Callesen, 2017). This would force central banks to supply commercial banks with ample liquidity in order to save them from liquidating a large portion of their assets, which might cause turmoil on financial markets. Moreover, if several central banks decided to hold household deposits, the increased uncertainty on international financial markets might trigger massive deposit flights, e.g. to the Swiss National Bank (Gurtler et al., 2017).

If it is not rational to allow the general public to deposit money with central banks, it seems obvious that the latter should at least be able to issue electronic cash. In fact, even this is not as simple as it might seem. The problem is that cash in circulation is not recorded in any personalised ledgers – the central bank balance sheet shows only the item termed "cash in circulation." However, electronic cash cannot exist without being individually recorded in a ledger (Grym et al., 2017). That is why the Riksbank announced that it would issue not electronic cash, but a digital *complement to cash* (Sveriges Riksbank, 2017). It will likely be a contactless payment card offering access to instant settlements within the Riksbank's payment system while protecting its owners' anonymity and privacy.

Who is creating international currency – commercial or central banks?

A bank in any given country, e.g. a UK-based one, can extend loans and create deposit money denominated in foreign currencies, e.g. in US dollars, as long as it has a *nostro* account in an American correspondent bank, which will process the payments in US dollars as ordered by the British bank and its customers.

This is how the Eurodollar market emerged in London in the 1960s[4], when the British banks started to extend loans denominated in US dollars during the global shortage of international liquidity in the wake of World War II. At that time, the increased global demand for the US dollar was due to the successive surcharge taxes imposed on capital outflow from the United States (Fieleke, 1971).

Since then, US dollar deposits have been created by large foreign banks not only in the UK. Today, a substantial share of the US dollar global supply results from dollar-denominated lending by non-American banks outside the United States. In 2012, approximately 30% of US dollar deposits were held by such banks (He & McCauley, 2012). In 2015, the aggregate amount of dollar-denominated loans extended by non-American banks outside the United States amounted to US$ 3.7 trillion (McCauley, McGuire & Sushko, 2015).

How is it possible for non-American banks to create and hold US dollar-denominated deposits? As was the case with the British banks in the 1960s, all they need is to have a *nostro* account at an American correspondent bank giving them indirect access to Fedwire (the Federal Reserve payment system). This is enough to secure the executing of US dollar payments ordered by the customers and to enable them to draw dollar-denominated cash from their bank accounts.

Milton Friedman offered perhaps the best summary of the reasons why US dollars can be created by foreign banks: "Euro-dollars, like 'Chicago dollars,' are mostly the product of the bookkeeper's pen" (Friedman, 1971).

The emergence of the Eurodollar market was among the most important factors which increased the supply of international liquidity. The supply of the US dollars created in the Eurodollar market made it possible to overcome the global liquidity shortage, which limited the need to issue the SDRs in the 1970s[5].

Until the Chinese renminbi ascends to the status of an international currency, which could take a long time (Prasad, 2018), the international monetary system will remain dominated by the US dollar and the euro. This creates the need for the Federal Reserve System and the European Central Bank to play the role of international lenders of last resort. The global financial crisis of 2007-2009 illustrated that both central banks were attempting to stand this challenge.

What facilitates the Federal Reserve to be a global lender of last resort is that many large foreign banks (mainly European ones) are among its prime dealers (Reinhart, 2011). Thus, during the recent global banking crisis of 2007-2009, they could borrow dollar liquidity directly from the Federal Reserve (Shin, 2012). The striking illustration of the Federal Reserve playing the role of the international lender of last resort was the US$ 600 billion liquidity swap lines that it extended in 2008 to the European Central Bank, which enabled European banks to replenish their dollar liabilities (Broz, 2015).

The ECB, in turn, was fulfilling the role of the international lender of last resort within the Eurozone, which was illustrated by the experiences with the TARGET2 imbalances.

[4] The origin of the term 'Eurodollar market' comes from London, i.e. was conceived of in Europe. While nowadays large banks in other financial centres (e.g. in Hong Kong) are also extending US dollar-denominated loans, the market for such loans is still referred to as Eurodollar market.

[5] The chances for SDRs to become a widely used international currency are, in fact, small, since there is only marginal private sector demand for SDRs as a currency used in foreign trade or for settling transactions on financial markets (Eichengreen, 2017)

What do TARGET2 imbalances tell us about money creation in a monetary union?

After the outbreak of the Eurozone sovereign debt crisis in 2010, the so-called TARGET2[6] imbalances attracted a considerable attention of economists and the media. The term 'imbalances' refers to the cumulated national central banks' (NCBs) claims or liabilities against the ECB. Some German economists raised the alarm that the peripheral Eurozone countries were 'printing money' to finance their trade deficits and compensate capital flight instead of launching bold economic adjustment efforts. Furthermore, these economists requested that the Bundesbank's claims against the Eurosystem should be repaid or at least collateralised with marketable assets (Sinn & Wollmershausser, 2012).

Discussing the validity of these claims offers an opportunity to emphasise certain important issues related to money creation in a monetary union, where the common currency is shared by a number of sovereign states.

To begin with, there is nothing peculiar about the fact that most of the Eurozone money was created in peripheral countries. The establishment of the Eurozone and the resulting substantial fall in interest rates in peripheral countries produced unsustainable credit booms in their economies. Spanish, Irish, and Portuguese importers chose to take loans from their domestic commercial banks in order to finance imports from, e.g., Germany or the Netherlands. Thus, the deposit money created in the peripheral countries' commercial banks was transferred to exporters in the core countries, which was why German companies did not have to borrow heavily from their local banks in order to replenish their money stocks (Kuzin & Schobert, 2015).

Where did banks – e.g. in Spain – obtain liquid reserves to execute payments conducted by the Spanish importers towards German exporters? They were borrowing them on the Eurozone interbank money market. It was easy, because before the outbreak of the global banking crisis of 2007-2009, banks in the Eurozone creditor countries had been re-lending payments received from exporters on the Eurozone interbank money market. This kept liquid reserves returning from banks in Eurozone surplus countries to banks in peripheral economies. As a result, the stocks of banks' liquid reserves both in creditor and debtor countries were small and stable in spite of very large trade deficits in e.g. Spain and sizeable trade surpluses in Germany. This was possible as liquid reserves were being continuously 'recycled' from the surplus to the deficit countries.

The problem with increasing TARGET2 imbalances (cumulated NCBs' claims and liabilities to the ECB) emerged during the global financial crisis of 2007-2009, when commercial banks suffered steep losses and ceased to trust one another, which froze the interbank money market. Consequently, e.g. Spanish banks were no longer able to borrow liquid reserves on the interbank money market and had to turn to their NCB (Banco de Espana) instead.

Banco de Espana, being actually a merely operational branch of the ECB, had to extend such loans as otherwise there would be a rise in market interest rate above the level set by the ECB. Then, Spanish commercial banks were transferring the liquid reserves, which they borrowed from the Banco de Espana to, e.g., German exporters' banks. Without an operational interbank money market, the latter were not re-lending these reserves to other commercial banks through interbank money market. They were depositing them with the Bundesbank instead. The outcome was an increase in Banco de Espana liabilities and Bundesbank claims against the Eurosystem.

[6] Initially, the TARGET (Trans-European Automated Real-Time Gross Settlement Express Transfer) system was created to constitute a platform for cross-border payments within the Eurozone (Handig et al., 2012). Then, it was transformed into TARGET2, i.e. the common payments system for banks in the Eurozone and in some other EU countries which (like Poland) participate in the system.

An analogous situation emerged in 2010-2012, during the sovereign debt crisis, which triggered capital flight from the Eurozone creditor to debtor countries. Why did this capital flight increase TARGET2 imbalances? The reason was that commercial banks in the debtor countries had to have enough liquid reserves to execute payments related to capital flight.

For example, if an international company decided to move its deposits from an Italian bank to a German bank, the Italian bank would have to borrow liquid reserves from Banca d'Italia to transfer them to the German bank, and the latter would deposit them with the Bundesbank. This way the capital flight from the Eurozone debtor to creditor countries would produce a sharp rise of TARGET2 imbalances.

In fact, the rise in TARGET2 imbalances did not mean that the Bundesbank or the Netherlandsche Bank were extending loans to the Eurozone debtor countries' central banks. The payments were flowing in reverse order. The NCBs in debtor countries were extending liquidity loans to their commercial banks, enabling them to execute payments related to capital flight to the creditor countries. Banks in the creditor countries were depositing this liquid reserves with their NCBs, e.g. the Bundesbank or the Netherlandsche Bank.

As the NCBs are only the ECB's regional branches, the balancing item for Banca d'Italia liquidity loans extended to Italian banks was its growing liabilities against the ECB. In the case of Bundesbank, the balancing item for its cumulating liabilities (resulting from bulging liquid reserves of German commercial banks) came in the form of increasing claims against the ECB.

In 2012, in order to neutralise the risk of a Eurozone breakup, the ECB announced the OMT (Outright Monetary Transactions) programme, which ended the Eurozone sovereign debt crisis. The risk of a Eurozone breakup subsided. The interbank money market started to operate again. Banks' liquid reserves were being again recycled from the creditor to the debtor countries. This brought a gradual shrinkage of the TARGET2 imbalances[7].

All in all, the TARGET 2 imbalances were not a symptom of a *stealth bailout* of the Eurozone debtor countries (Sinn & Wollmershausser, 2012), but an accounting reflection (in operationally decentralised system of Eurozone central banks) that the ECB was successfully fulfilling its role of the lender of last resort within the monetary union. In 2007-2009, the liquidity loans extended by the ECB allowed commercial banks in Eurozone debtor countries to continue credit and money creation, which was necessary to finance imports after the stoppage of capital inflows from the Eurozone core countries. This saved the Eurozone debtor countries from sudden stops, which were very common during the Asian crises in the late 1990s. In 2010-2012, the ECB's loans allowed commercial banks in Eurozone debtor countries to stay liquid despite capital flight to the Eurozone creditor countries, which otherwise might put at risk the mere existence of the European monetary union.

Discussion

The modern monetary system is the outcome of a long evolutionary process and some of its crucial elements have not changed much. Money is still created by commercial banks. Central banks still manage the payment system and provide commercial banks with needed reserves.

The contemporary monetary system works fairly effectively. Nakamoto's assertion (2009) that it should be dismantled, because central banks tend to debase money and commercial banks are inherently risky (due to the fractional reserve system), blatantly contradicts the reality. Central banks have been very effective in stabilising

[7] Since the launching of the ECB's QE in March 2015, TARGET2 imbalances started to cumulate again, but this time it did not reflect an accumulation of risks within the Eurozone, but, rather, resulted mainly from the decentralised method of buying securities by the NCBs (Gros, 2017; Eisenschmidt et al., 2017).

inflation, especially after gaining independence in the 1980s and the 1990s. The global banking crisis was not caused by the system of fractional reserves, but resulted mainly from crony capitalism. The main cause of the crisis was that large international banks were capable of effectively lobbying for excessive relaxation of bank regulations and supervision (Sławiński & Hausner, 2018).

The inefficiencies of the banking system are to be found in the operation of the payment system. Household transactions are still cleared in a slow and costly way, with cross-border payments being especially expensive. Even so, the blockchain technology and bitcoin cannot fix these distortions. In contrast to the other Fintech innovations (such as PayPal, Venmo, Alipay, We-Chat, M-Pesa, or Paytm), the blockchain technology and cryptocurrencies do not represent a genuine innovation even in the payment system (Roubini, 2018). Payments through the blockchain were slow and expensive, which was one of the reasons why a number of central banks have decided not to use this technology when issuing electronic cash (Grym et al., 2017; Gurtler et al., 2017; Soderberg, 2018).

As far as the globalisation is concerned, it does not change the process of money creation by much. International currencies are created by commercial banks as well. One example is the operation of the Eurodollar market. A considerable proportion of US dollars is created outside the United States by non-American banks. Large commercial banks in a given country can extend loans and create deposits denominated in US dollar or euros as long as their reputation permits them to open a *nostro* account in American or Eurozone correspondent banks.

The Eurozone monetary system does not really differ from a domestic one. Deposit money is created by commercial banks and the central bank (ECB) issues liquid reserves needed for interbank settlements. The EU member states' NCBs are, in fact, only ECB's regional branches, similar to the district Federal Reserve banks in the United States.

The difference is that when a common currency is shared by a number of sovereign states and there is a risk of a monetary union breakup, the creditor countries central banks' claims can be perceived as a part of their foreign exchange reserves and the debtor countries' central banks liabilities can be perceived as a part of their official foreign debt. This is the reason why the Eurozone creditor countries' assertions that their central banks claims should be at least collateralised with marketable assets are justifiable. The problem could be solved through using as such collateral the assets which were purchased by the Eurozone NCBs under the ECB's QE programme (Cecchetti & Schoenholtz, 2018; Hristov et al., 2018; De Grauwe et al., 2017; Whittaker, 2016).

Concluding remarks

From the historical perspective, innovations and globalisation have both been always shaping the monetary systems. The gold standard was a product of the 19th-century globalisation. The breakthrough payment innovation of the 19th century was the net-clearing system, which enabled smooth and cheap interbank settlements (Rolnick et al., 1998). This started the evolution towards the contemporary monetary system with monetary base – created by the central bank – and deposit money created by commercial banks.

The existing monetary system is the product of a long evolution, adjusting it to the evolving needs of the economy. The system contains three kinds of institutions which are needed to make it effective. Commercial banks are necessary for economically rational credit and money allocation. Central banks are indispensable for safeguarding price and financial stability. Governments are giving money the status of a legal tender and provide its holders with legal protection. Such a system is not likely to be easily replaced by a completely different one (e.g. cryptocurrencies). Nonetheless, it can be improved (Borio, 2019).

IT technologies are already improving the efficiency of existing payment systems. They make it possible to accelerate scoring within financial institutions. Hopefully, Fintech innovations will make it possible to reduce the costs of financial intermediation, which has been disappointingly stable for so many decades (Phillipon, 2016).

The challenge posed by globalisation is the growing need for the most important central banks to play the role of international lenders of last resort. The Federal Reserve was fulfilling such a role during the recent global financial crisis by providing large quantities of dollar liquidity directly to individual foreign banks, which are its prime dealers, and indirectly through foreign exchange swaps extended to the ECB and some other central banks. The ECB, in turn, played the role of the lender of last resort within the Eurozone, which saved it from sudden stops in 2007-2009 and a possible breakup in 2012.

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doi: 10.15678/ZP.2019.50.4.02

Zarządzanie Publiczne
Public Governance
No. 4(50)/2019
ISSN 1898-3529

Bartłomiej Biga

Patent Races and Institutional Solutions of Health Care Policy in Developed Countries

Abstract

Objectives: To identify the methods of the state's influence on health care system through intellectual property law mechanisms.

Research Design & Methods: Literature review based on the economic analysis of law.

Findings: An active role of the state in innovations in the pharmaceutical branch could bring benefits in the health care system. This role does not have to be limited to being a shareholder in selected projects (as a capital supplier).

Implications / Recommendations: The state is able to influence the speed, the structure, and the direction of patent races by setting a real width of the patent (court verdicts) and patent height (patent office's decisions) as well as the manner and the scale of compulsory licences usage.

Contribution / Value Added: Making changes in the speed, the structure, and the direction of patent races has got a strong impact on health policy. Appropriate influencing of the state on innovation activity in the pharmaceutical branch allows one to generate large benefits in the health care system.

Article classification: theoretical article: original literature review

Keywords: health care policy, patent, intellectual property, innovation, pharmacy

JEL classification: I18, L38, O30

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Introduction

Health care systems in developed countries have been shaped under the strong impact of the New Public Management and the Governance approach. Despite this fact, in the context of intellectual property, the scale of state-entrepreneurs collaboration is very minimal. This is the result of not recognising the common area of innovation policy and health policy. This area relies on patent for medicine and medical device. In spite of the fact that many reforms have been based on decentralisation, the usage of market mechanisms, and cross-collaboration, collaborations in the intellectual property creation have never been popular.

In this context, the implementation of the Governance and the New Public Management could be the solution for the permanently underfunded health. It would help the recipients of public services to understand the limitations and difficulties which appear in the system (Możdżeń, 2015, pp. 22-36). What is worth emphasising is the fact that the health care area is seen as extremely expensive even in developed countries. The main reason for that is the fact that they have to face the problem of the ageing society. Beside the Governance and New Public Management approach, the efficiency of the health care system could be achieved as a result of the co-creation of intellectual property, which also is the aim of this text.

Material and methods

The analysis of this paper is restricted only to developed countries, because over there one can observe the space to conduct more sophisticated policies in the area of innovation and health protection (Grodzicki & Geodecki, 2016, pp. 377-404). In the poorer countries, the health care systems focus only on providing basic care. What can be observed there is that innovation is replaced with imitations. However, the results of E. Adang and G. Borm's (2007) research revealed that there was no strong correlation between society satisfaction and financial input on a selected public policy area. It means that in certain circumstances society satisfaction can be achieved even without innovations.

The aim of the text is to identify the methods of state influencing on health care policy through shaping the model of legal intellectual property protection and active innovation policy in the pharmaceutical branch. As a result of a separation between the above-mentioned public policies, states deprive themselves of the opportunity to use one of the strongest grounds for an active policy in the area of pharmaceutical innovation. Thus, the society could be more in favour of investing a huge amount of money in the pharmaceutical branch if benefits were not almost entirely privatised. It is about situations when an active innovation policy in the pharmaceutical branch provides a significant share in the benefits of introducing a new drug into the state. Naturally, it would be realised in the form of savings in health care.

Moreover, the form of the collaboration with the pharmaceutical branch does not have to be limited to being a shareholder in the selected projects, or playing a role which makes risk management easier. The state is able to provide many different stimuli, whose results affect the health care system. Those stimuli can be based on the shaping of many phenomena related to intellectual property law. In this text, the subject of the analysis is the question of the possibility to make an impact on the speed, the structure, and the direction of patent races. Additionally, what is analysed is the reaction of the state to some inconveniences in this area – especially in the context of the above-mentioned risk-management.

Literature review

As H. Rothang (2010, p. 237) mentioned, "Healthcare systems can be characterized by the ways they fulfil three basic functions: financing, service provision and regulation, which can be conceptualized as the dimensions of a healthcare system. (…) Considering all dimensions of the healthcare system, the most remarkable development over the last 40 years is that distinct healthcare system types have become hybrids. The systems have thus, converged in the sense that they now have more similarities and are much less distinct systems than at the beginning of our observation period in the 1970s. Variation between healthcare systems has declined and the corridor for national features of the healthcare system has narrowed markedly."

According to OECD research (Kikuzawa et al., 2008, p. 386), health care systems are under the similar pressure worldwide. However, there are different answers involved, since in every country there are various debates about the organisation and financing of health care systems. Sometimes, the main topic is the issue of the total spending on that purpose (like in the US). In other countries, people discuss the role of the government in financing costs (Sweden, Canada) or the issue of restrictions in health care (Germany, the Netherlands). However, in public debates it is always just a small element of this complex issue.

There is research which suggests (Brest et al., 2012, p. 423) that citizens who live in centralised health care system or in a national system are more eager to support stronger government engagement in health policies. On the other hand, people who live in insurance systems are much more sceptical in this matter. It seems that it could be explained through the aversion of societies to experiment in the area of such important public policies. Therefore, we can observe such an attachment to the existing model and the acceptance of its deepening, because such actions are less risky than implementing elements from foreign models. Moreover, it is mentioned that health care systems can be characterised as CAS – Complex Adaptive Systems. It is the consequence of a high level of the unpredictability and resistivity of implementing changes in an imperious way.

In the second half of the 20^{th} century, the triumphant concept of the welfare state has led to an exponential increase in spending money on social and health care. Moreover, now it is magnified with the process of ageing societies. This has led many countries – even the most developed ones – to significant problems in financing such extended benefits. In addition – according to the public choice theory – in the face of the awoken public expectations, politicians do not want to have any cuts in the guaranteed benefits. Some authors indicate that the solution can be found in the strict cooperation with universities (Mamica, 2018) or local government units (Kudłacz, 2017). However, such a cooperation usually requires financial incentives from external sources (Kwaśny, 2017).

The only way to produce improvement in the financial situation of the discussed area (without drastic reduction in the quantity and quality of the benefits) was to undertake reforms aimed at improving the efficiency of the system. Therefore, it was natural to reach for postulates of the New Public Management that had been very popular since the 1980s. Hence, the introduction of reforms stimulating competitiveness, freedom of choice, and assessment through results, was visible in many countries. Moreover, the rules for the division of budget funds were predominantly based on performance indicators (Kodate, 2010, pp. 263-264).

Results

One of the most important elements of the new model based on shared management in the public sector is the public-private partnership (PPP). It is a model of cooperation between public finance sector entities and private partners, which is very popular in the world. In a typical PPP model, the private partner is responsible for providing a predetermined public service, not just for providing some assets for this service. It significantly differentiates such a model of cooperation from the traditional public procurement model, where the private sector is only responsible for providing assets.

In this context, the PPP model is very attractive from the public-interest point of view, because on the one hand it ensures the optimal spending of public funds (the decision to choose a PPP as the best form of implementation is preceded by many analyses) and on the other hand it guarantees the supervision and control of the public party over the type and quality of services commissioned to be provided by a private partner (Kalecińska & Herbst, 2011, p. 7).

There are international findings saying that PPP in health care most often takes the shape of two models of solutions:

1. contracting construction/modernisation and operation of a hospital in which medical services are provided by a public entity – a typical PPP model in health sector in the world; an option widely known and accepted by the market;
2. contracting medical services from a private entity (provided in a hospital built/modernised and operated by this entity) – an option quite rare; well-known examples in Spain, Portugal, and Australia.

Therefore, there is no formula in which co-operation within the framework of PPP would take place in the creation and commercialisation of drugs, which would then be used in the treatment of patients in health care system covered by the state. Undoubtedly, it would be a much more complicated and time-consuming formula. However, it would facilitate the management of risk by pharmaceutical companies. Moreover, the state would get a better chance of directing research, e.g. in order to take more cases of medicine for rare diseases into account.

In this context, it is worth mentioning that an interesting solution was adopted by the US Congress in the Orphan Drug Act in 1983. This document was supposed to be at least a partial solution to the problem of insufficient benefits for the drug inventor under standard patent protection due to the rarity of the disease, which naturally translates into a potentially low demand. It has been determined that a rarely used drug refers to diseases or conditions occurring in less than 200,000 people in the United States. Under the Act, drug manufacturers were granted tax concessions for clinical trial costs and other subsidies in order to cover the manufacturing costs of these products. In addition, producers obtained stronger exclusivity for seven years – during this period alternative medicine with different chemical composition was not allowed. This exclusivity could be revoked when the entity did not provide the patients with the drug, or when they ceased production.

The problem of too much focus of pharmaceutical companies on providing solutions for common but less serious ailments is perceived by many countries. It results in introducing various incentives in the form of general acts of law. Yet the same effect can also be achieved as part of PPP. Additionally, it would not be the only positive effect for the state, since it would also cause savings in providing health care.

The analysis of various forms of PPP shows that the combination of health policy and the regime of intellectual property protection is relatively rarely seen. In the area as sensitive as health and human life, the subject of patent racing seems to be the key issue. A patent race is the competition in which the main question is about which inventor will reach such a high level of advancement first so that they are able to submit a patent application successfully. The shape of the patent race does not only affect how quickly a solution can be found, but also for how many people it will be available during the first twenty years (during the period of validity of the patent whereby the manufacturer benefits from the monopoly privileges).

One of the basic determinants of the intensity of the patent race is the size of the prize, which is created by the length of the patent (duration), width, and height of the patents granted. The width of the patent determines how different the imitation must be in order not to infringe the patent. However, the height plays a special role here, as V. Denicolo (2000, pp. 488-501) has indicated. The height refers to the second type of a potential infringement, which is the improvement of the patented invention – mainly in the context of a small effort in relation to the increase in usability. The bigger height is when the more advanced future improvements are included in the original patent granted for the basic invention.

Even in the patent system which is globally strongly unified, individual states have got a certain space to conduct a separate policy. In principle – except for the length of the patent, which is regulated by international agreements – the question of specifying its width and height is in the hands of the law-abiding entities. Therefore, even without major legislative changes, it is possible to shift court judgments in imitation cases as well as in the manner of patent offices decisions (how a far-reaching improvement of the existing state of the art makes it possible to achieve a separated patent). On the one hand, the length, width, and height of the patent affects the degree of the acceleration of research, and on the other hand they cause a proportional increase in the phenomenon of duplication.

The innovation process has got several stages. The existence of these phases gives the legislator the opportunity to choose the moment from which it is possible to apply for a patent. A proper determination at this point can allow one to minimise the social loss associated with the patent race. Granting the possibility of applying for patents in advance – i.e. in a situation where the invention has not already been developed in an advanced form – would result in the competitors abandoning similar projects which generate the costs of research duplication. However, this stage cannot take place too early, because it could result in the invention being developed too slowly as the inventor with a patent has got a weaker pressure.

It is necessary to distinguish between a competition within the patent race and the one that takes place on the market of finished products. Although these are two different rivalries, in many cases they interact with each other. If the market for the product becomes strongly monopolistic, competition in the patent race will be more intense. As a result, the monopoly on the final market causes – indirectly, by stimulating the patent race – an increase in the pace of innovation. In addition, each form of uncertainty (Dasgupta & Stiglitz, 1977, pp. 25-27) is an important factor which discourages one from engaging in R&D. However, it is partly a natural feature of the innovation process or an immanent property of a business. Wherever it is possible to reduce uncertainty, legal regulations are needed to this end in order not to limit the degree of incentives for an inventive activity.

The issue of disclosing discoveries even before filing patent applications is usually seen in terms of non-cooperative strategies, where the only purpose is to improve the inventor’s own situation, usually related to the deterioration of the competitive position. The disclosure of such information can take the form of a defensive publication. It puts the solution into the state-of-the-art technology and, as a result, this solution cannot be patented by anyone, because the criterion of novelty cannot be met. Therefore, this strategy is based on blocking opponents from developing a certain solution, because it would be non-profitable due to the lack of patentability (and exclusivity). Defensive publications are useful in the situation where the company is not afraid of using a certain solution for competitors, and where the only goal is to exclude the possibility to be blocked by a patent, gained by a competitor. Defensive publication is easier than patenting, because it can be done on an earlier stage and it does not require going through a long and expensive procedure. Nevertheless, it can be a significant blockade and it can deprive the business competition project out of its meaning. Thus, it is a situation in which the company does not only decide on taking part in the patent race, but simply destroys its meaning, because no one will be able to receive an exclusivity prize.

However, S. Baker and C. Mazzetti (2005, pp. 188-189) noticed that this procedure might also be adapted and used as part of cooperative strategies. They provide an example of two companies that work on the same invention. For both parties, it would be beneficial to coordinate research, share first results, or specialise in a specific aspect of the invention. However, such a cooperation would be difficult due to the necessity of formulating an agreement specifying duties and entitlements related to the technology that will be created and developed. The sole possibility of publishing the results of works can serve as an alternative punishment for the player who failed. Therefore, it could be an enrichment for the system of invention stimulation with non-legal elements.

The research results (Judd et al., 2007, p. 27) indicate that the unconventional duration of a patent race is, in most cases, an optimal policy. Naturally, the unquestionable advantage of the patent race is the exclusion of enterprises characterised by the low efficiency in cost management. This happens somewhat automatically without involving the state, which, after all, does not have data in this area, on the basis of which it could make its decisions. However, looking from a different perspective, it may turn out that the need to eliminate less effective enterprises is very doubtful. Especially so in the face of the threat that players who are thrown out of a market can re-appear as 'patent trolls', who significantly worsen the overall balance of costs and benefits in the inventories protection law system.

Therefore, the aim is to balance it on the basis of the economic analysis of law so that the patent races generate an appropriate cost/benefit balance. In this context, costs do not only include the ones related to duplicating research, but they also regard the inconvenience resulting from the limitations of access to the invention (the level of that depends on the strength of the granted patent). Consequently, the acceleration of the research is not a goal in itself, which can be considered without any restriction. Due to the above-mentioned costs, in some situations the pace of research can be considered as too high from the social point of view. In the context of health protection, the following interchangeability can be observed: the drug will appear faster (owing to the fast patent race), but the granted monopoly will be strong, which will limit drug availability in the first years. Or, in another scenario, the drug will appear later, but the monopolistic power will be weaker and, thus, the drug will be cheaper and more available.

Naturally, the pricing strategy of a company even with a very strong monopolistic position will take into account the price flexibility of demand. However, in the name of maximising profit, the number of patients for whom the drug will be available will became much less important. It should also be remembered that in this situation price regulation based on demand does not work in a standard way. Furthermore, in many cases, buyers are not individuals, but, rather, it is about the state as part of a healthcare system. Moreover, even if the drugs are purchased by the patients themselves, in many developed countries there are widespread subsidy policies which greatly affect the actual availability of some treatments.

Without a large-scale research, it is difficult to answer the question about whether the current system of legal protection of inventions generates an appropriate, too little, or too high level of incentives affecting research in relation to the corresponding costs. On the one hand, the public is irritated by the high prices of innovative products, because their availability is extremely limited.

In principle, the legislator has to take into account three aspects affecting the economic analysis of the patent race. Firstly, at what stage it should be possible to apply for a patent; secondly, what the losses caused by the duplication of research will be; and, finally, what the costs of the monopoly would be. The general relation observed in such a profiled model is the following – an indication of the earlier stage of applying for a patent reduces the costs of the duplication of research, which is the effect of shortening the race. The weaker patent reduces the monopoly costs, but at the same time it slows down the innovation process. However, the patent race is a positive phenomenon, which increases the probability of granting the patent to the most effective entrepreneur (Judd et al., 2007, p. 3).

Individual entrepreneurs can differently value a patent which is a reward in the specific race. Generally, monopoly companies in a given market value the patent more (which will allow them to maintain this position) than potential new players, who would start gaining a given sector just on the basis of an exclusive right. The different value of the patent is also the result of unequal expectations regarding the discounting level of the innovative product as well as the different effectiveness of entities in the R&D area. To a large extent, this calculation is also dynamically influenced by the distance, which, in the opinion of a given entrepreneur, divides them from the finish line (Harris & Vickers, 1985, p. 195).

Discussion

Individual countries have the opportunity to influence the size of the patent race awards and, thus, the pace of these races and their shape. Changes in this area also affect the structure of innovative activities in the industry – the issue of broadening/narrowing the list of problems over which pharmaceutical companies work. It is worth considering remodelling the patent races with the alleviation of their fundamental rule – 'the winner takes everything'. It makes the patent race highly risky (which already at the beginning discourages entities which have risk aversion) and it generates huge losses for losers even if they were just behind the winner and incurred significant expenses. One of the forms of alleviation of these difficulties is to reconcile certain forms of the participation of losers in the benefits resulting from the created post-innovative equilibrium (Denicolo, 2000, p. 253).

However, the practical implementation of such an operation would be very complicated. It would be difficult to evaluate the involvement of individual entities in a specific race. Additionally, it would weaken the patent of the winner. Therefore, a better solution would be to weaken the patent *a priori*, which means that the involvement in the race will be smaller and, as a result, the loss of losers will be smaller, too. Moreover, the value of a patent will be easier to determine. By eliminating the risk of subsequent arbitrariness, it would be a sufficient incentive to invest in innovation. It is an intervention which would not complicate the industrial property law and would prevent the inventor from expanding the state of uncertainty.

Consequently, if the state is meant to be a more active player in pharmaceutical innovations in the name of benefits achieved in health care system, it is possible to take actions that will reduce the risk of entrepreneurs or direct their actions towards health policy objectives. Moreover, countries are entitled to grant compulsory licences (to force the delivery of a patented product at an arbitrarily-set price). The scale of using this mechanism is also an important stimulus for pharmaceutical concerns. Too much danger of arbitrariness in breaking the patent monopoly can effectively discourage the investment in new drugs, because this activity becomes even more risky. However, this does not mean that the policy of granting compulsory licences based on clear and reasonable premises cannot be part of the system which generates benefits in health protection through the impact on innovation in pharmacy by means of the mechanisms of intellectual property rights.

Conclusion

The role of the legal system is to construct a system of incentives for inventors in order to ensure that the patent race is of a moderate intensity. It is a phenomenon that naturally favours the realisation of the fundamental goal of industrial property rights, i.e. stimulating innovation. Yet it can generate extremely high risks as well – especially duplication research costs. Patent races are also an effective tool in the implementation of health policy. They influence the provision of the new drugs.

Thus, it needs to be remembered that from the social point of view the high speed of innovation is not an ultimate goal in itself. In all legislative works concerning the protection of inventions, this implies the necessity of a detailed analysis of the costs appearing on the social side. However, cost estimation is a difficult task. Moreover, societies have got different expectations regarding the pace of the inventions.

According to the intellectual property law, countries have got tools that allow them to play an active role in innovation processes in the pharmaceutical industry. The need for such actions can be noticed only if one takes into account those benefits which appear in health care system. States as large entities can solve problems related to running innovative activity in the pharmaceutical industry much more effectively. As a result, such an active policy is also accepted by entrepreneurs. It is possible, because profit would be the result of the surplus generated by the earlier described higher state efficiency. Consequently, the abovementioned benefits in health care will not appear at the expense of the profits of the pharmaceutical companies.

All this into account, the state cannot only be a shareholder in the selected research projects in order to provide capital for a later share in profits. Intellectual property law gives countries the chance to influence the pace of the patent race and its direction. In addition, the authorisation to introduce compulsory licences allows states to influence the pricing policy of pharmaceutical companies. All of these changes do not apply to consumers. To a large extent, they have consequences for the state itself, because in the majority of developed countries a broadly defined health policy has been implemented. Therefore, the perception of these connections is one of approaches when looking for efficiency in spending public funds on extremely expensive activities related to health protection.

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doi: 10.15678/ZP.2019.50.4.03

Zarządzanie Publiczne
Public Governance
No. 4(50)/2019
ISSN 1898-3529

Krzysztof Wąsowicz

The Effectiveness of Municipal Waste Management in Polish Cities*

Abstract

Objectives: To seek for the optimum economic model for public utility services in the sector of municipal waste management; to present the results of studies regarding the efficiency of companies in the sector of management of municipal waste and the systems that such companies function within.

Research Design & Methods: Multi-criterion rankings with the use of synthetic variable, the structure of which has been based on zeroed unitarisation (method of zeroed unitarisation – MZU). Owing to general financial data, technical and operational data, as well as output data, it was possible to determine rankings of effectiveness for companies in the system of municipal waste management and communes. What is more, a correlation diagram was created – the dependency between the aggregated effectiveness of companies and the aggregated effectiveness of waste management in communes.

Findings: Communes which entrust municipal companies with management of an integrated system for municipal waste management or/and its individual chains feature more properties of operating, economic, and financial effectiveness within the scope of management of municipal waste.

Implications / Recommendations: It is demonstrated that communes which entrust municipal companies with management of an integrated system for municipal waste management – or/and its individual chains – feature more properties of operating, economic, and financial effectiveness within the scope of the management of municipal waste.

Contribution / Value Added: Further extended research into the organisation and management of the municipal waste management system.

Article classification: The article presents an original and innovative analysis of the municipal waste management sector with the use of the developed research method of aggregation and unit efficiency ranking. The purpose is to continue the extended research on the organisation and management of the municipal waste management system.

Keywords: public utility services, municipal waste companies, economic effectiveness, taxonomic methodology

JEL classification: L300

* This project has been financed by the Ministry of Science and Higher Education within the „Regional Initiative of Excellence" Programme for 2019-2022. Project no.: 021/RID/2018/19. Total financing: 11 897 131,40 PLN.

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Introduction

Municipal waste management fits into many areas and fields of science. It includes paradigms of modern economics and public finances. Municipal waste is generated by consumers – inhabitants. Due to its specific nature, commonness, social character, lack of their individual management, despite individual decisions as to consumption and generated by-products, it constitutes a social and economic problem. The social aspect of municipal waste is expressed particularly by the peculiar paradox of transformation of private consumer goods into public anti-goods. The economic nature of municipal waste is related, in particular, to the usage of renewable and non-renewable resources that, during the process of individual consumption, are transformed into waste that pollutes the environment and leads to external costs (Bauer-Nawrocka, 2018).

Nowadays, the developmental challenges mainly concern the choice of the organisational and legal model for the functioning of municipal waste management. According to theory and practice within economy, this selection is between the self-governmental and the market model.

The aim of the study in this article is to assess the effectiveness of companies and systems that implement the tasks of municipal waste management in communes. The intention was to review the hypothesis regarding the advantage of self-governmental form of organisation and implementation of municipal waste management over its market alternative. The analysis assumed the increased significance of municipal companies implementing the tasks of the commune without tenders – in the in-house form – with regard to achieving ecological standards by communes.

The research employed an original method of assessing the integrated effectiveness – such a method allows one to analyse the dependency between operating indicators regarding the condition of municipal waste management in the commune and the financial characteristics (income of the commune from the fee for managing municipal waste, balance sheet, and output data of companies). The research was based on source studies – two questionnaires were prepared for communes and companies respectively.

Conclusions were formulated for further research (with the acknowledgment of a lack of complete data). The most important conclusion is that the self-governmental and the market system of municipal waste management should be complementary to each other rather than competitive, with such competition being detrimental to the community. The self-governmental form of operations of communities and entrepreneurs that implement public utility services is the most natural option and it allows the costs of the unreliable market to be avoided, which is more natural in the case of services and goods of individual rather than collective consumption, such as services of municipal waste management.

Municipal waste management in communes

Waste management is a complex, interdisciplinary concept that also covers activities within the scope of planning, implementation, as well as undertakings and technologies.

Waste management refers to issues and processes such as (Famielec, 2017a):

– regulations, any instructions, norms and standards within the scope of production and utilisation of waste,
– waste management plans at local, regional, national, and interstate levels,
– reporting alarming forms of production and management of waste, i.a. breakdowns covering amounts of generated waste, its composition and types,
– issues connected with determination of properties, composition, toxicity, etc. of waste, and assessments and forecasts as to the amount and type of produced waste,
– collection and transport of waste,

– processing of waste, methods, and technologies to recycle waste and recover raw materials and energy, or to utilise them,
– aspects connected with waste disposal through storing it at landfills, technologies for waste storage, landfill management, etc.

Waste management can be considered from the point of view of processes and subject matters (Poskrobko, 2007). In the case of waste management processes, the prevention of waste production is preferred, while waste storage is the least desired option. The subject matter setting differentiates between various types of waste, such as municipal waste, waste generated by households, as well as waste generated by business entities, mainly service providers, if such waste is similar to the one generated at households in terms of composition and characteristics.

The processes of gathering, transport, and management of municipal waste are not only of public but also of market nature. The market is a set of mechanisms that allows the contact of manufacturers (e.g. waste producer) with purchasers – recipients of waste, secondary raw materials. Entities within the system of municipal waste management should cooperate and have an agreement (Stern, 2010). This should ensure social and financial advantages (including profits) for most or all of the participants in the system, as well as make adjustments to the shortcomings of the market, limiting ineffectiveness. It requires establishing proper institutional structures with the involvement of the state and regional governments. They have various conditions and are integrated in many areas of social and economic life, which has been presented in Figure 1.

The member states of the European Union have a specific hierarchy for handling municipal waste (Figure 2). This hierarchy recommends a desired sequence of actions regarding waste management, with the action that is higher in the hierarchy being always the preferred one. In Polish legislation,

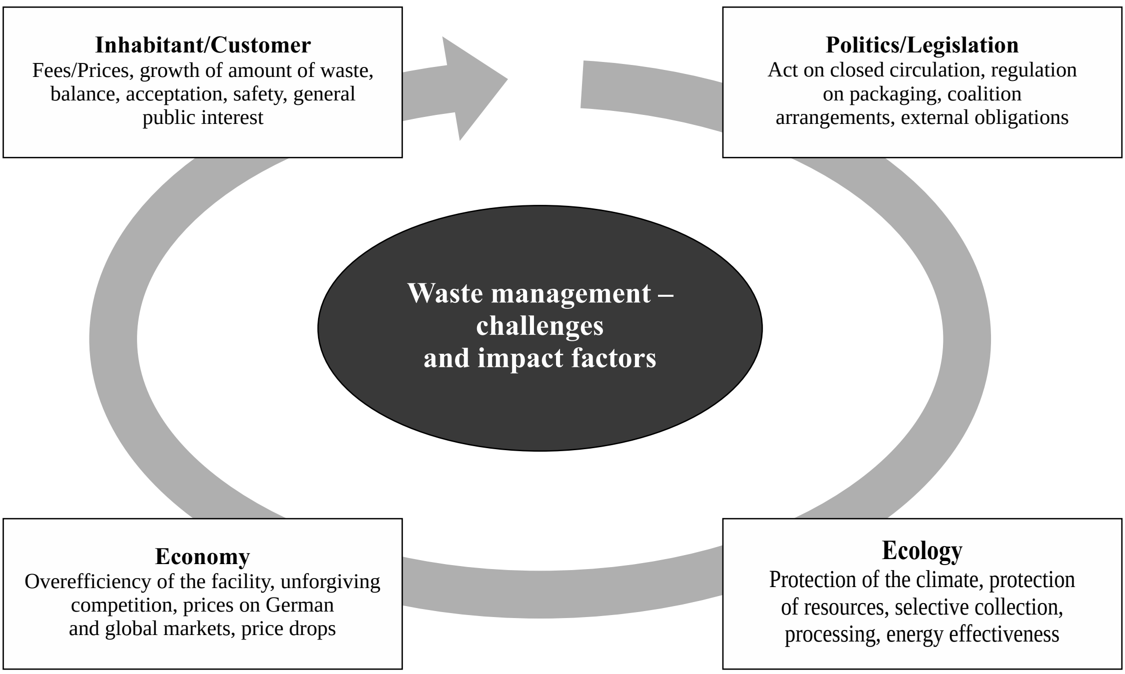

Figure 1. Conditions of waste management

Source: Wąsowicz, Famielec & Chełkowski, 2018.

the principles for the hierarchy of handling waste have been acknowledged in the Act on Waste (Famielec, 2017b).

Bearing in mind the hierarchy for handling waste, storage is the least acceptable – and, in the case of some groups of waste, even prohibited – solution concerning waste management. The development of waste management technology mainly strives for preparing waste for recovery, particularly for recycling. In order to achieve this, the European Union imposes standards regarding the minimum levels of recycling and preparation for re-usage of municipal waste that member states must comply with. The next action in this hierarchy is forwarding waste for energy recovery. By energy recovery one should mainly understand all thermal (incineration) processes that allow recovery of thermal energy (Highfill & McAsey, 1997).

The analysis of the extent connected with individual stages of waste management – according to the hierarchy presented above – is the foundation for the research conducted in this article.

Municipal waste in communes is connected with the idea of charging for municipal waste management. The financing of the municipal waste management system in a commune has currently been based on a public law fee for managing municipal waste. The fee is paid by entities that hold the status of real estate owners and, generally, it constitutes the income of the commune. Funds from the fee for managing municipal waste, pursuant to the act on maintenance of cleanliness and order in communes, have a 'designated character' and can be utilised only for the purposes provided for in the Act, i.e. for the financing of costs related to the functioning of the municipal waste management system. The financing of public procurement

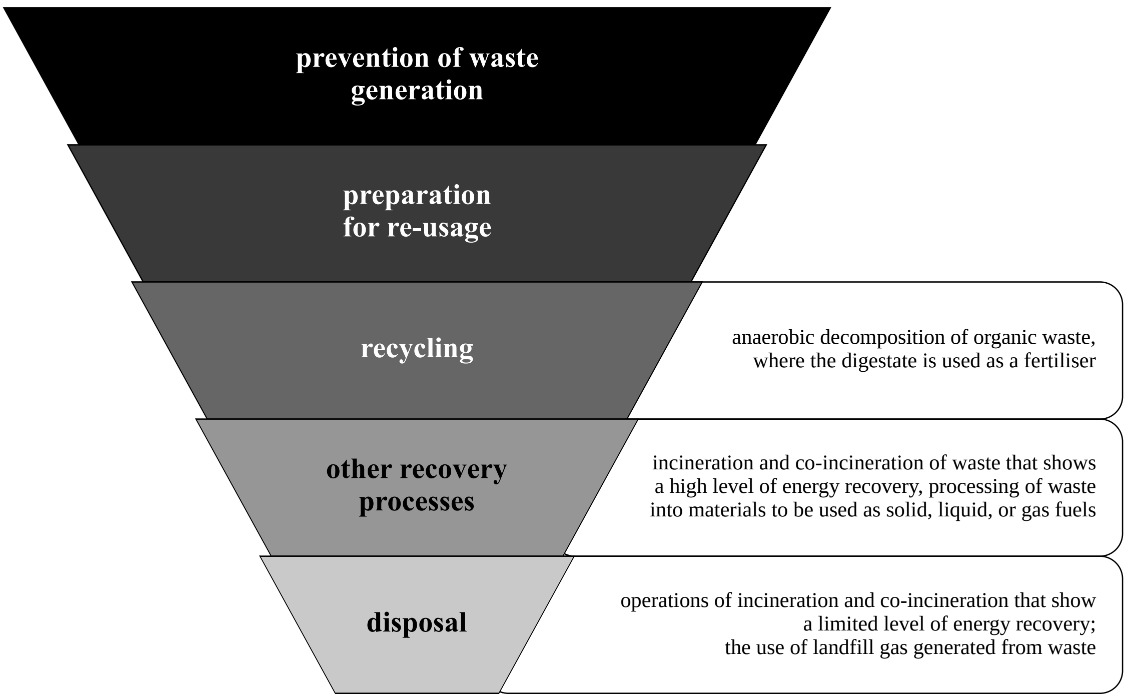

Figure 2. Hierarchy of treatment of waste along with the position of processes of processing waste into energy

Source: Wąsowicz, Famielec & Chełkowski, 2018.

for collection of municipal waste or collection and management of such waste constitutes an important element of this system. The concept of the municipal management system in Poland features its self-financing, i.e. the financing of planned costs of the system through fees for managing municipal waste. In order to assess the effectiveness, the following information was compared: the income of commune revenue on fees for managing municipal waste – assigned according to a statement – the monetary proceeds to the budget of the commune from fees for managing municipal waste, and the total current income of the commune. The analysis took into consideration the value of current expenditures of communes for the municipal waste management system, also including the following breakdown: expenses for collection, transport, gathering, recovery, and disposal of municipal waste, as well as expenses for establishing and maintaining points of selective collection of municipal waste.

Figure 3. Communes selected for studies regarding municipal waste management

Source: own analysis.

The test to assess the effectiveness was based on the analysis of selected companies and communes in which they function. The study covered thirty-eight communes (Figure 3) representing capital cities of particular voivodeships, large cities, localities in the Małopolskie Voivodeship, and communes. Based on publicly available data, an empirical database was elaborated to analyse waste management. Information was gathered based on the data included in reports made by the commune administrator, city mayor or president on the implementation of tasks regarding the management of municipal waste for 2018. A questionnaire was prepared in order to analyse the effectiveness of municipal waste management systems. Partial information was obtained from twenty-three communes (60.5% of the test).

Formulation of the basic financial data in the undertakings of municipal waste management

The conducted study selected fifty-two companies that serve a dominating role within the area of thirty-eight distinguished communes. As in the case of cities, a questionnaire was the basic source of information necessary to determine the effectiveness of companies. Responses were provided only by two entrepreneurs, while the whole questionnaire was completed by one company. Thus, the assessment of the effectiveness of companies operating in the sector of municipal waste management was performed based on financial statements filed in the National Court Register, mainly with regard to their financial outcome. Among analysed entities, there are nine commune companies that render their services under an entrustment agreement – so-called in-house – as well as forty-three municipal and private undertakings selected through a tendering procedure.

Municipal waste management companies are characterised by a high share of fixed assets, a relatively low level of foreign sources of financing, and the profits from conducted activity. A cursory analysis has proved that in-house companies generate half the revenue that is achieved by other studied companies. Among the distinguished groups of companies, the revenue of in-house companies is only 17.47% of the total value. Detailed analyses of the value of revenue generated by the analysed companies – by their organisational and legal forms, size, and area of operations – have been presented in Table 1. Limited liability companies constitute 85% of revenue in the group of analysed entities. In the division by company size, twenty-one medium-sized companies form over 61% of the revenue. What is interesting is the fact that the group of large companies (comprised of two companies) generates revenue very similar to twenty-nine small and micro companies. The highest revenue is generated by entities operating in specific cities of the Małopolskie Voivodeship – which is most certainly affected by the number and size of entities from that area – that were subjected to the analysis.

There are significant differences in terms of profits generated by various entities. In the case of the test of companies participating in tenders (a group with more representatives), it is on average about 1.5 million PLN compared to tens of thousands of zlotys of average profit of companies operating as a part of entrustment of services by a regional government unit. International concerns invested hundreds of millions of zlotys in companies operating within Poland. However, it is not reflected by the central tendency, since those values for the population representing tender participants and participants of the so-called in-house model are similar and amount to approximately 27 million PLN. In the case of current assets, there is a larger disproportion in favour of companies operating under tenders. Here, it should be added that entities outside the system of in-house services utilise short-term and long-term sources of financing to a several times greater extent. Such a difference is reflected in measures of the central value as well as in maximum values.

On the basis of the initial analysis, one can conclude that in-house companies feature a much smaller volume of financial values. As

Table 1. The structure of revenue of analysed companies by organisational and legal form, amount of revenue, and area of operations in 2018

Division criteria	Type of company		Number of companies	Share in the total value of revenue [%]
Organisational and legal form	Limited liability companies		48	85.98
	Joint-stock companies		4	14.02
Revenue*	Micro		5	1.77
	Small		24	18.17
	Medium		21	61.04
	High		2	19.02
Area of operations**	Voivodeship	Małopolskie	12**	21.77
		Podkarpackie	2	2.70
		Śląskie	3	5.48
		Opolskie	1	1.21
		Dolnośląskie	6**	8.73
		Lubuskie	1	1.01
		Wielkopolskie	6**	10.89
		Łódzkie	2	2.01
		Świętokrzyskie	2	4.62
		Lubelskie	1	1.84
		Mazowieckie	4**	15.93
		Kujawsko-Pomorskie	1	1.80
		Zachodniopomorskie	3	5.94
		Pomorskie	6	10.12
		Warmińsko-Mazurskie	2	0.83
		Podlaskie	4	5.12

* Applied criterion of amount of revenue on sales – turnovers for: micro – below EUR 2 million; small – from EUR 2 to 10 million; medium EUR 10 to 50 million; large – over EUR 50 million, at exchange rate of EUR 1 = PLN 4.27.
** ALBA SA, ENERIS EKOLOGICZNE CENTRUM UTYLIZACJI Sp. z o.o., SUEZ Polska Sp. z o.o., REMONDIS Kraków Sp. z o.o. operates within the area of more than one of the analysed cities. The revenue of those companies was presented proportionally by individual voivodeships.

Source: own analysis based on obtained financial data.

in the assessment based on the number of individual entities, the analysis of fundamental financial values indicates that solutions applying the entrustment model are uncommon in Poland. Apart from the MPO Sp. z o.o. in Kraków, the entities in that group must be qualified as medium-sized and small companies in the sector of municipal waste management. The achieved financial values are at a level lower than in the case of, e.g., private entities rendering services under a tender won in a particular commune.

Studies within the area of the municipal waste management system

In the situation of market economy, entities are obligated to effectively utilise their owned financial, material, and personal resources as well as to acquire new customers and maintain current ones, enhance technological processes, and manage their business in an efficient way. It requires determining whether the conducted business activity brings intended effects, and indicating directions for future development. Such approach combines with the notion of effectiveness, which must be understood as the best performance in production and distribution of goods and services at specific costs or the lowest possible costs for particular effects. Furthermore, it can be brought to rational management, i.e. in business activity one must operate in such a way that given specific measures they achieve the maximum degree of implementation of the goal or, given particular progress, they utilise as little resources as possible. In such cases, effective activity involves the application of one out of two principles of rational management, i.e. the rule of the maximisation of obtained results with owned resources, or the rule of the minimisation of incurred funds and costs for implementation of the scheduled tasks.

Effectiveness can be considered in terms of various aspects of the management process, i.e. technical, economic, environmental, etc. Compared to other companies, companies that render public utility services (e.g. municipal waste management) are subject to additional liability to a certain community. Thus, another type of effectiveness can be distinguished – social effectiveness (Wąsowicz, 2018).

In this sense, in order to ensure reliability and efficiency of waste management in a city, one must not rely solely on economic indicators for a company. The effectiveness of public utility activities might be measured by acknowledging three reference points (Figure 4). In this elaboration, the analysis has been made from the perspective of a company and a commune.

The assessment of the effectiveness of the waste management system in the analysed communes has been conducted on the basis of an analysis regarding the degree of collection of the fee for managing municipal waste, the adequacy of the fee for managing municipal waste, and the distribution of current expenditures of the analysed communes for the system. The achieved levels of recycling are a very significant indicator of effectiveness – the quality of waste management in a particular commune. One can, without a doubt, conclude that the higher the level of recycling for the fraction of raw materials in a particular year in the commune, the more effective and efficient the waste management system is. The dynamics of an increase in levels of recycling for the raw material fraction and for construction/demolition waste is also a significant indicator – it shows the degree under which the share of waste subjected to recycling

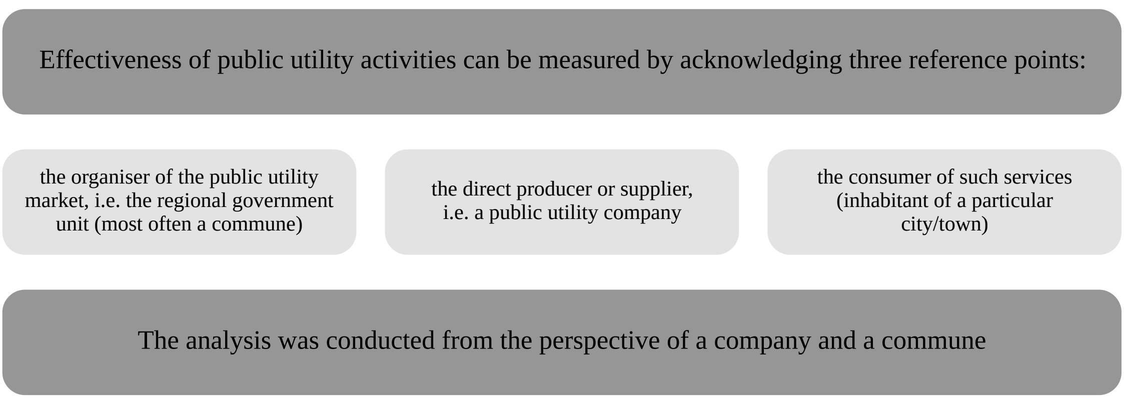

Figure 4. Measurement of effectiveness of public utility activities

Source: own analysis.

in a particular commune has changed throughout the years. The high value of this indicator testifies to the modernisation of the waste management system in the commune towards more efficient recycling and preparation for re-usage. From the point of view of system effectiveness, the possibly high level of recycling should be achieved at a possibly low utilisation of resources. Thus, comparing the unit cost of operations of the municipal waste management system with the degree of recycling indicates the amount of financial resources necessary to achieve the levels of recycling.

Points of selective collection of municipal waste (Polish abbreviation: PSZOK) are an important element of communal waste management systems. The greater the amount of waste collected at a point of selective collection of municipal waste per one inhabitant of the commune, the more efficient the waste management system is. The proposition of an indicator determining expenditures of the commune to organise points of selective collection of municipal waste, calculated per capita, should express the 'involvement' of the commune in the increase of selectively accumulated waste that can be used in the processes of recycling and preparation for re-usage. The determination of expenditures for points of selective collection of municipal waste – with regard to the amount of waste ending up at PSZOKs – shows that the effort and resources needed to collect waste at such points (a lower value of this relation stands for greater efficiency of selective collection compared to incurred costs). However, it should be highlighted that the effects of resources spent on points of selective collection of municipal waste can often become noticeable after some time from the date of their establishment, since the efficiency of operations of such an element of the waste management system in a commune is also influenced by the approach of the society, which must be properly shaped through relevant educational activities.

The effectiveness of municipal waste management companies has been determined based on the indicator analysis of available financial data (due to the lack of technical and exploitation data). The analysis has utilised profitability indicators that, due to their synthetic nature, can be applied in the assessment of entity effectiveness. However, owing to the specific social role of public utility companies, the primacy of generated profit is inconclusive. That is why the indicator of accumulated profit of companies operating within a particular commune to the size of expenditures for the waste management system should fall within a specific limited range.

The equities profitability indicator is the most adequate measure of advantages achieved by owners of such a business entity. Bearing in mind the fact that, in the case of market economy, capital can be invested in various undertakings, the possibility to assess the effectiveness of its investment in particular undertakings is of crucial significance for the owner of such capital.

Another group of indicators that creates a chance to compare the effectiveness of companies in the sector of municipal waste management is the group of financial indicators regarding the efficiency of operations, also called activity indicators. The activity indicator, connected with the use of assets, was distinguished.

Public utility companies owned by a regional government unit are subject to protection against two hazards that also discipline the managerial processes in private entities, i.e. protection against being taken over and against bankruptcy. Thus, when determining the effectiveness of management, it is also appropriate to assess the ability of a company to pay its liabilities.

In order to function and provide public utility services, companies in the selected sector must have assets. Fixed assets are the basic element that influences the effects of company operations. When utilised in a rational way, they shape an optimum level of production capacities of the company and lower unit costs. High productivity of fixed assets held by a company should be the general goal of management. This elaboration has distinguished between the relation between fixed assets and total assets as a measure of effectiveness (with acknowledgment of the specific nature of the sector).

The purpose of rational management in municipal waste management companies must not only be focused on increasing the effectiveness in the economic area, but also in the quality of life of the society, which requires, apart from financial criteria, e.g. ethical or environmental criteria that ensure better and more complete satisfaction of needs of a local community. Rational decisions can then be understood as actions and decisions that acknowledge the requirements of high economic effectiveness and increase the quality of life of the society. This is the context in which considerations regarding the effectiveness of entities in this sector should be presented. Unfortunately, the lack of responses from companies that received the questionnaire prevented a more complete analysis of the issue.

The analysis of the effectiveness of entities in the municipal waste management system with the application of taxonomic and statistical methods

The assessment of the effectiveness measures for companies that operate in differently organised municipal waste management systems in individual communes utilised a multi-criterion ranking. In order to create a ranking of communes and companies characterised by multiple criteria, the analysis applied synthetic variable, the structure of which was based on the method of zeroed unitarisation (MZU). MZU requires several steps. In the first stage, diagnostic variables X_j are divided into stimuli, inhibitors, and neutral variables; next, they are normalised into variables Z_j (Młodak, 2006).

For stimuli and inhibitors, the normalisation formulae are, respectively, (1) and (2):

$$z_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}},\ X_j \in S \quad (1)$$

$$z_{ij} = \frac{\max x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}},\ X_j \in D \quad (2)$$

In the case of the neutral variable, if the range of nominal values $<b_{1j};b_{2j}>$ is known, the normalisation formula is as follows:

$$z_{ij} = \begin{cases} \dfrac{x_{ij} - \min_i x_{ij}}{b_{1j} - \min_i x_{ij}}, & \text{when} \quad x_{ij} < b_{1j} \\ 1 \ \text{when} \ x_{ij} \in \left[b_{1j}; b_{2j}\right] & \\ \dfrac{x_{ij} - \max_i x_{ij}}{b_{1j} - \max_i x_{ij}}, & \text{when} \quad x_{ij} < b_{2j} \end{cases},\ X_j \in N \quad (3)$$

The next stage of the MZU involves the aggregation of normalised variables, e.g. through arithmetical means:

$$Q_i = \frac{1}{k}\sum_{j=1}^{k} z_{ij} \quad (4)$$

Values of the Q_i synthetic variable are normalised in the range [0,1] and allow for being organised according to the intensity of the analysed phenomenon. The higher the value of the Q_i variable achieved by an item (closer to 1), the higher rank it will have in the ranking of the analysed items (and vice versa).

In the area of the effectiveness of municipal waste management of communes, ten properties can be treated as stimuli, four properties as inhibitors, and four as neutral variables. Properties in the case of which the higher the value, the higher the effectiveness, included: the level of recycling and preparation for re-usage of municipal fractions – paper, metals, glass, and plastics; the level of recycling, the preparation for re-usage, and the recovery with methods other than safe for the construction and demolition waste which constitutes municipal waste; the relation of proceeds from fees for managing municipal waste to the current income of the commune; the relation of expenditures of the commune for the municipal waste management system to general expenditures of the commune; the amount of waste at the point of selective collection of municipal waste with regard to the number of inhabitants; the expenditures for the point of selective collection of municipal waste per capita; the expenditures for the municipal waste management system per capita; the dynamics of changes of recycling levels with methods other than safe with regard to the construction and demolition waste which constitutes municipal waste; the dynamics of recycling municipal fractions – paper, metals, glass, and plastics.

The following were qualified as inhibitors (the lower the value, the higher the effectiveness): the relation of current expenditures of the commune for the municipal waste management system to the amount of commune waste; the cost-effectiveness of the point of selective collection of municipal waste (expenditures for the point of selective collection of municipal waste/amount of waste at the point of selective collection of municipal waste); two synthetic indicators – (the current expenditures of the municipal waste management system/amount of commune waste)/the achieved degrees of recycling of fractions of waste, i.e. paper, metals, glass, and plastics; and the current expenditures of the commune for the municipal waste management system/amount of commune waste)/the achieved degrees of recycling with methods other than safe for the construction and demolition waste which constitutes municipal waste.

Neutral variables (the highest effectiveness if the values fall within a specific set) included: the proceeds from fees for managing municipal waste to expenditures for the municipal waste management system (a distinguished set around 1 – from 0.99 to 1.01); the proceeds from fees for managing municipal waste with reference to expenditures for collection and transport of waste (the optimum value of the set falls within the range from 1 to 1.15); the planned cost of the municipal waste management system and expenditures for the municipal waste management system (this is also a range oscillating around 1, yet with higher 'marginal values' – from 0.90 to 1.1); the total net profit of companies from a particular commune with regard to expenditures for the municipal waste management system (assuming that the specific nature of public utility services limits the value of profits within a specific range from 0.01 to 0.05). The results of the effectiveness ranking for twenty-three communes (out of thirty-eight that received the questionnaire) have been presented in Table 2.

Table 2. The ranking of communes according to the level of effectiveness of the municipal waste management system in 2018

Rank	Value of composite variable	Communes
1	0.6217	Zakopane
2	0.5932	Kraków
3	0.5819	Poznań
4	0.5802	Olsztyn
5	0.5611	Opole
6	0.5428	Pruszków
7	0.5401	Gdynia
8	0.5379	Tychy
9	0.5337	Wrocław
10	0.5322	Katowice
11	0.5246	Przemyśl
12	0.5091	Tarnów
13	0.4985	Jelenia Góra
14	0.4803	Wieliczka
15	0.4777	Rzeszów
16	0.4742	Nowy Targ
17	0.4601	Białystok
18	0.4568	Słupsk
19	0.4287	Warszawa
20	0.4131	Nowy Sącz
21	0.4122	Konin
22	0.3873	Lublin
23	0.3569	Łódź

– Communes with the municipal waste management system based on a model other than the in-house model.

– Communes with the municipal waste management system based on a model with a commune company without an in-house tender.

Source: own analysis.

According to Table 2, in the area of effectiveness the best results were achieved by the following communes: Zakopane, Kraków, Olsztyn. The other end of the ranking included: Łódź, Konin, and Lublin. Communes that implemented the in-house model are on the 1st and 2nd rank in the ranking and take places from 10 to 14 and 17. By analysing only the first and the last ranks, it is possible to conclude that communes which apply that model feature **higher effectiveness** than cities which apply the tendering model. In the case of central ranks from 10 to 17, among which six out of eight analysed communes apply the in-house model, it is justified to conclude that the companies feature **effectiveness that is not lower** than in the case of communes which apply alternative solutions for the municipal waste management system.

In the area of effectiveness of municipal waste management, six companies have the characteristics of stimuli, one reflects an inhibitor, and one – a neutral variable. The group of stimuli included the value of net revenue on sales, the yield of equity (profitability of equities), the total utilisation (rotation) of assets, the share of fixed assets in total assets, and the degree of the completion of the questionnaire by the company. It means that the higher the value of distinguished indicators, the higher the effectiveness of the analysed entity. The inhibitors included the relation between financial costs and total liabilities, while the indebtedness ratio was adopted as the neutral variable in the range (50%-67% according to the theory of financial management of enterprises).

The results of the ranking have been presented in Table 3. In the area of financial effectiveness, the best results were achieved by the following companies: Miejskie Przedsiębiorstwo Oczyszczania Sp. z o.o. in Kraków, ALBA S.A., and SUEZ Polska Sp. z o.o. The winner of the ranking is the only representative of in-house entities in the first ten ranks of the ranking. The next ten ranks also include only one company from the entrustment model – LECH Sp. z o.o. Other companies operating in that system are ranked in the third, fourth, and fifth ten of the ranking. Thus, it may be concluded that companies that operate in house are not more effective in the financial aspect than other companies. The first rank of Miejskie Przedsiębiorstwo Oczyszczania Sp. z o.o. in Kraków is the proof of skilful financial management of a company conducted by high-class managers.

Here, it should be added that effectiveness measured with the exclusion of missing technical and exploitation data does not constitute a full assessment of the value of companies in the in-house model.

Spearman's rank correlation coefficient was calculated in order to analyse whether the orderings of companies and communes are compliant, which means that the effectiveness of the commune translates into the effectiveness of companies that operate in such a commune[1]:

$$r_s = 1 - \frac{6\sum_{i=1}^{n}\left(d_x - d_y\right)^2}{n\left(n^2 - 1\right)} \quad (5)$$

where:
d_x, d_y – the ranks of the company in the rankings according to the effectiveness of the commune and own effectiveness,
n – the number of companies in the ranking.
The r_s coefficient takes values from –1 to 1 and its positive value stands for ordering compliance of items, while a negative value – for non-compliance (opposite rankings).

In this study, the value of the rank correlation coefficient of 0.099 is the indicator of the low ordering of compliance of companies and communes at the national level, and such dependency has no statistical significance (p-value > 0.1). Figure 5 presents the correlation diagram in which points represent companies with their corresponding effectiveness of the commune in which they operate (horizontal axis) and the aggregate effectiveness of their own activities (vertical axis).

[1] Only those companies for which the aggregated effectiveness indicator was calculated were acknowledged here and, at the same time, such a ratio was calculated for the commune in which the company operated.

Table 3. The ranking of municipal waste management companies according to the level of their efficiency in 2018

Rank	Value of composite variable	Company
1	0.5007	Miejskie Przedsiębiorstwo Oczyszczania Sp. z o.o. – Kraków
2	0.4835	ALBA S.A
3	0.4757	SUEZ Polska Sp. z o.o.
4	0.4348	Suez Zielona Energia Sp. z o.o.
5	0.3989	MPO m.s. w Warszawie Sp. z o.o.
6	0.3762	REMONDIS Szczecin Sp. z o.o.
7	0.3752	Eneris Surowce S.A.
8	0.3741	ENERIS S.A.
9	0.3617	ENERIS EKOLOGICZNE CENTRUM UTYLIZACJI Sp. z o.o.
10	0.3341	Suez Północ Sp. z o.o.
11	0.3237	Zakład Gospodarowania Odpadami Komunalnymi Sp. z o.o. – Olsztyn
12	0.3235	LECH Sp. z o.o.
13	0.3211	KOM-EKO S.A.
14	0.3177	Przedsiębiorstwo Gospodarki Komunalnej Sp. z o.o. – Koszalin
15	0.3159	SIMEKO Sp. z o.o.
16	0.3116	Miejskie Przedsiębiorstwo Gospodarki Komunalnej – Rzeszów Sp. z o.o.
17	0.3094	Zakład Zagospodarowania Odpadów w Poznaniu Sp. z o.o.
18	0.3050	REMONDIS Kraków Sp. z o.o.
19	0.3049	Miejskie Przedsiębiorstwo Oczyszczania Łódź Sp. z o.o.
20	0.3047	Trans-Formers Karpatia Sp. z o.o.
21	0.3020	Przedsiębiorstwo Gospodarki Komunalnej Sp. z o.o. in Słupsk
22	0.2898	Przedsiębiorstwo Usług Komunalnych S.A. – Kalisz
23	0.2861	Przedsiębiorstwo Gospodarki Odpadami Sp. z o.o. – Kielce
24	0.2742	MPGK Katowice Sp. z o.o.
25	0.2712	ALBA Sp. z o.o.
26	0.2717	FCC Polska Sp. z o.o.
27	0.2698	Przemyska Gospodarka Komunalna Sp. z o.o.
28	0.2686	Zakład Utylizacji Sp. z o.o. – Gdańsk
29	0.2684	MPO Białystok Sp. z o.o.
30	0.2623	Przedsiębiorstwo Gospodarki Komunalnej w Suwałkach Sp. z o.o.
31	0.2612	Miejskie Przedsiębiorstwo Gospodarki Komunalnej Sp. z o.o. – Jelenia Góra
32	0.2609	Miejskie Przedsiębiorstwo Gospodarki Komunalnej Sp. z o.o. – Tarnów
33	0.2537	Miejski Zakład Oczyszczania w Pruszkowie Sp. z o.o.
34	0.2532	MASTER-ODPADY I ENERGIA Sp. z o.o.
35	0.2527	PGKiM Sp. z o.o. in Konin
36	0.2503	AVR Sp. z o.o.

Table 3 – continuation

Rank	Value of composite variable	Company
37	0.2487	Miejskie Przedsiębiorstwo Oczyszczania Sp. z o.o. in Toruń
38	0.2459	Miejskie Przedsiębiorstwo Oczyszczania Sp. z o.o. Szczecin
39	0.2458	Eko Dolina Łężyce Sp. z o.o.
40	0.2430	BESKID ŻYWIEC Sp. z o.o. Żywiec
41	0.2401	Zakład Komunalny Sp. z o.o. – Opole
42	0.2347	Zakład Gospodarki Komunalnej i Mieszkaniowej w Malborku Sp. z o.o.
43	0.2234	Rejonowe Przedsiębiorstwo Gospodarki Komunalnej – Myślenice
44	0.2208	Zakład Unieszkodliwiania Odpadów Komunalnych Sp. z o.o. – Białystok
45	0.2115	Zakład Utylizacji Odpadów Sp. z o.o. – Myślenice
46	0.2113	Zakład Gospodarki Komunalnej w Wieliczce Sp. z o.o.
47	0.2111	Ekosystem Sp. z o.o.
48	0.2106	Przedsiębiorstwa Usług Komunalnych Sp. z o.o. – Tarnów
49	0.2101	Gdańskie Usługi Komunalne Sp. z o.o.
50	0.2001	Przedsiębiorstwo Gospodarki Odpadami EKOMAZURY Sp. z o.o.
51	0.1922	Zakład Gospodarki i Usług Komunalnych Spółka z o.o. – Lubań
52	0.1799	Inneko Sp. z o.o.

– Company rendering services under a won tender.
– Commune company without an in-house tender.

Source: own analysis.

The line visible in the chart represents the regression function with the following equation: y = 0.1984 + 0.2207*x. Its positive inclination confirms that higher effectiveness of communes is reflected by higher effectiveness of companies (an increase in aggregate effectiveness of communes by 0.1 will improve, on average, the aggregated effectiveness of companies only by about 0.022), but this dependency has no statistical significance (p-value for the regression coefficient is 0.276).

The above considerations prove that the analysis of the effectiveness of communes in municipal waste management confirms the advantage of the in-house model. The lack of a reflection of company effectiveness in the study results, above all, from the selection of available data. Since it was impossible to correlate the achieved financial values with other measures, a thorough analysis of the effectiveness of companies was prevented. A significant conclusion that resulted from the analysis of company effectiveness is that regardless of the organisational and legal form, the type of ownership, or the system model that the company operates in, effective management can be achieved through high financial effectiveness. An additional conclusion is that the effectiveness of a commune does not translate into the effectiveness of enterprises.

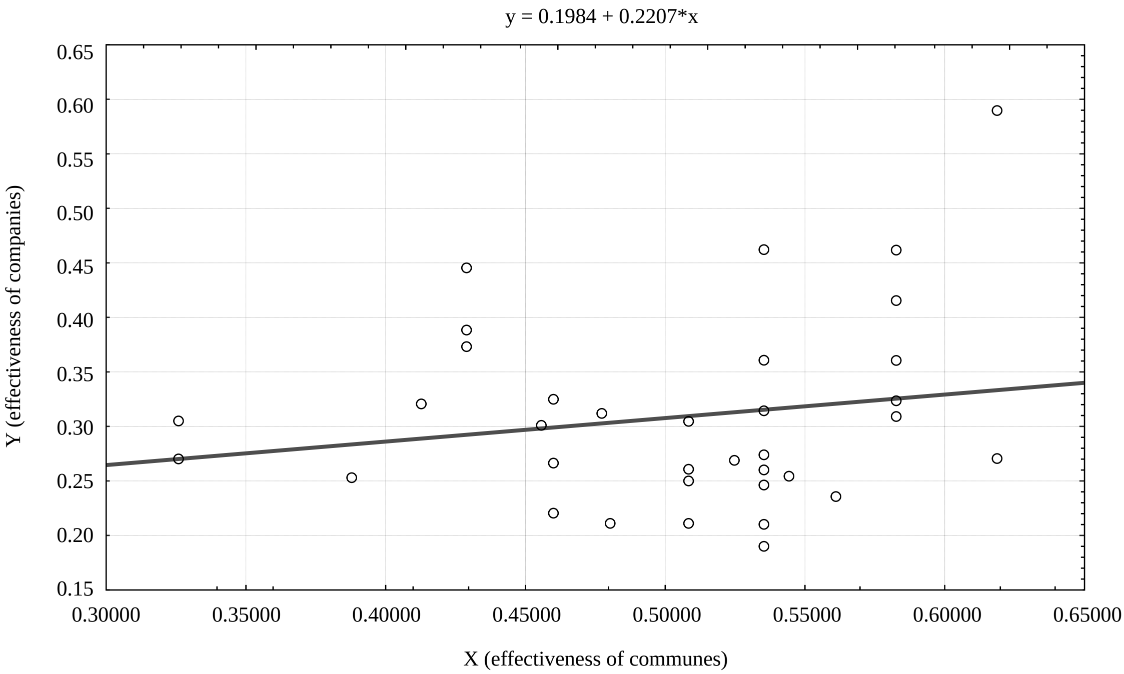

Figure 5. The correlation diagram presenting the relationship between the aggregated effectiveness of an enterprise and the aggregated effectiveness of communes

Source: own analysis based on Tables 2 and 3.

Conclusion

This article was the attempt at associating the analysis of municipal waste management in communes with the operational and financial activities of selected companies – representatives of every commune subjected to the study. They received a purposefully elaborated questionnaire for the study. Among others, the questions in the questionnaire referred to: owned facilities, the amount of waste gathered and processed at their own waste facilities, the effects of recovery and recycling, the equipment, the manner of performing tasks in favour of the commune, the number of served real properties, and general financial data. All the information is publicly available and it should be included in reports addressed to the commune and the Marshal's Office. Only two completed questionnaires were received from the companies, including one completed only partially. Financial statements (published in the National Court Register) were used to acquire data that was utilised to assess the financial effectiveness of the analysed companies and the correlation of that effectiveness with selected characteristics of the operating effectiveness of communes.

For the analysis, multi-criterion rankings were applied with the use of synthetic variable, the structure of which was based on zeroed unitarisation (method of zeroed unitarisation – MZU). Owing to general financial data, technical and operational data, as well as output data, it was possible to determine the rankings of effectiveness both for companies in the system of municipal waste management and for communes.

A correlation diagram was created – the dependency between the aggregated effectiveness of companies and the aggregated effectiveness of waste management in communes.

Being aware of the difficult obstacles regarding the acquisition of reliable data and the complex technical and technological dependency of municipal waste management in communes on financial management of companies – the majority of which were commercial companies (obligated to gain earnings through generation of profits) – the final conclusion was conceived of: communes which entrust municipal companies with the management of an integrated system for municipal waste management or/and its individual chains feature more properties of operating, economic, and financial effectiveness within the scope of the management of municipal waste.

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doi: 10.15678/ZP.2019.50.4.04

Zarządzanie Publiczne
Public Governance
No. 4(50)/2019
ISSN 1898-3529

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Innovation in Public Service Delivery in Terms of Shared Services Centres in Local Governments: A Case Study of the City of Toruń (Poland)

Abstract

Objectives: The public sector has been subjected to financial pressure. One of the tools to improve the environment of the public sector entities and introduce greater management flexibility in governance is establishing Shared Services Centres (SSCs).

Research: The article presents a case study regarding the implementation process and the effectiveness assessment of this solution based on the example of the city of Toruń.

Research Design & Methods: The paper provides a case study of SSC of the city of Toruń.

Findings: Based on the results, it can be concluded that the key barrier to the implementation of SSCs as the innovation tool of public management is the lack of understanding of business management tools among directors of public sector units that were not involved in the issue of management efficiency.

Implications / Recommendations: What appears to be the most challenging is the sociological factor that matters in terms of SSCs implementation. Social capital of the units' directors, trust, and reciprocity is much more important than institutional arrangements.

Contribution / Value Added: The paper shows the first evaluation of SSC in local government in Poland based on a case study. It is believed that this approach might be very fruitful for further theoretical research and practical implementation.

Article classification: research article

Keywords: public management, innovation in public management, shared services centres, collaborative governance, reforming public administration

JEL classification: H83

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Introduction

The recent decades have shown fundamental changes in public management. Fiscal pressure and seeking savings generated the necessity of searching for new tools for public administration management (McLaughlin, Osborne & Ferlie, 2002). This has led to a new public administration approach that incorporated business tools and good governance into public sector. The changes were expected to deliver better-quality services and an improved standardisation of tasks with less spending (Ringen, 1987; Forst, 1997; Kettl, 2000; Bovaird & Loeffler, 2004; Braun & Winter, 2005). Although there are no uncritical supporters of the new public management, the aspects that are being discussed in the public sector include management flexibility and the evaluation of received outcomes. One can also see that the focus has been shifted from legal procedures to the effects that public activity brings to the local community. As a result, we need to discuss new public management paradigms, where effectiveness is still indicated as an important element of public sector organisation[1]. However, there are other aspects that need to be taken into consideration when discussing the new public administration. These include: co-production of public services, hybrid organisation domain or collaborative and network governance, innovation in public administration, and service-dominant approach (Virtanen & Stenvall, 2014; Kinser & Vigota-Gadot, 2017).

From innovation to collaboration

By definition, innovation in public administration is the process of introducing new elements, such as new knowledge, a new organisational structure, a new management philosophy, and new processes, adding these to an already existing and working organisation. At present, public administration has a silo structure. In order to introduce innovation to its design, we suggest incorporating a joint-up organisation based on the collaborative-governance approach. The previous solution has not been applied in the public sector on the large scale (Osborne & Brown, 2005). One needs to bear in mind, however, that it is impossible to give a clear definition of the collaborative-governance approach. It stems from the fact that the general theory of collaboration does not exist (Wood & Gray, 1991). However, as Blomgren figured out, "collaboration suggests a closer relationship, it suggests that participants 'colabour', it entails a new structure, shared resources, defined relationships, and communication. Collaboration also involves creating, enhancing, and building on social and organizational capital in pursuit of shared purposes" (Blomgren, 2009). Researchers focusing on collaboration highlight elements such as: (1) process (Lawrance & Phillips, 2002; Amirkhanyan, 2009); (2) structure (Mandell & Steelman, 2003; Sowa, 2008); (3) participants (Ansell & Gash, 2008; Mullin & Daley, 2009), and, last but not least, (4) outcome process (Agranoff & McGuire, 2003; O'Leary, Gerrard & Bingham, 2006).

Why collaborate?

The choice of collaborative governance can be supported by the so-called collaborative advantage. This means that no department standing alone is able to achieve the same or better results or solutions as the structures collaborating with one another. This is also called the synergy effect that can be achieved by joint-working (Huxham, 1993). However, designing and implementing collaborative structures is not an easy task. There are several elements that have to be taken into consideration in order to ensure proper and sufficient work. According to Thomson, Perry, and Miller, there are five elements of collaboration that are crucial for a collaborative institution. They can be divided into two groups, namely institutional factors and sociological factors: (1) institutional factors: governance – understood as choosing partners, setting up decision-

[1] See also: Dunleavy P., Margetts H., Bastow S., & Tinkler J., *New Public Management Is Dead: Long Live Digital-Era Governance*. Journal of Public Administration Research and Theory, *16*(3), 01.07.2006, pp. 467–494.

making processes, and participating in group-brainstorming sessions and administration – these are the practical aspects of collaboration that include the participants who are perfectly aware of their roles and their efforts to achieve goals set before; (2) sociological factors: mutuality – it has the greatest importance in the social capital context, which is focused on communication and the efficient flow of resources and information to achieve better results; trust and reciprocity – developed between collaborative partners when they learn to count on each other and build commitments, and it might act as a social lubricant to enhance mutuality; autonomy – the tension that occurs when the parties of collaboration need to juggle goals settled for both the organisation and collaboration purposes. When collaboration occurs, organisations must not neglect their usual tasks; they have to dedicate their capacity for collaboration instead (Thomson & Perry, 2006; Thomson, Perry & Miller, 2007). Nonetheless, scholars agree that there is still much to be learnt about collaborative governance. A good example of such an activity is Toruń Shared Services Centre. Therefore, our case study examines its designing and implementation process.

Shared Services Centres (SSCs) – theoretical background

The revolution in public management has led to creating a new tool called 'shared services centres' (SSCs). SSCs were originally introduced in the British public sector[2], and only then in other European countries[3]. The implementation of shared services engagements has a long history. They were first introduced in business organisations when large corporations consolidated separate units to create a solitary entity (Lacity & Fox, 2008; Hesketh, 2008; Kamal, 2012). SSCs became especially popular in the early 2000s. They were introduced in order to bring savings in bureaucratic financial programmes, improve access to innovation, and make a more efficient use of the functions and competences of the employees (Ulbrich, 2003; Janssen & Joha, 2006; Wagenaar, 2006; Aksin & Masini, 2008; Becker et al., 2009; Miskon et al., 2010; McIvor et al., 2011). In short, as Quinn et al. figured out SSC's aggregate back-office services withing a single area to provide their services across the entire organisation (Quinn et al., 2000). As a result, we will define SSC as Bergeron said as "an accountable semiautonomous unit within an (inter)organisational entity used to bundle activities and provide specific pre--defined services to the operational units within that (inter)organisational entity, on the basis of agreed conditions" (Bergeron, 2003). Although SSCs have been operating in the public sector for many years, there are still few empirical studies that would allow one to indicate differences in the implementation of shared services centres into the public sector and business[4]. The experiences of Polish cities in this area are still at an initial stage due to their short period of validity. Therefore, the authors of this article do not focus on ideal types of the shared-service-centres organisation (Becker et al., 2009), the explanation of the organisational

[2] For more on theoretical foundations of the functioning of the SSCs in the public sector, see *Municipal Shared Services and Consolidation: A Public Solutions Handbook*, (eds.) Henderson, A. Routledge. New York, 2015, pp. 3-17. For more information on the applicable legislation on SSCs in the UK, see Sandford, Mark. *Local government: New models of service delivery*. House of Commons Library. London, 2015; Tomkinson, Ray. *Shared Services in Local Government: Improving Service Delivery*. Gower. London, 2007.

[3] International experience in implementing the SSCs is presented in the work by Deborah Peel, Brendan O'Keeffe, Linda Shi, Kendra Leith, and Karen Keaveney, entitled *Shared Services Across Local Government* (Dublin, 2011).

[4] One example is Becker, Niehaves & Krause, *Shared Services Strategies and Their Determinants: A Multiple Case Study Analyst in the Public Sector*, American Conference on Information Systems, 2009; another is Janssen & Joha, Emerging shared service organisations and the service-oriented enterprise: Critical management issues. *Strategic Outsourcing: An International Journal 1*(1), 2008; yet another is Janssen, Joha & Weerakkody, Exploring relationships of shared service arrangements in local government. *Transforming Government 1*(3), 2007.

transitional journey (Grant & Ulbrich, 2010), or even the rational motives for establishing shared services centres (Janssen & Joha, 2006). Instead, the authors have used the case-study methodology to figure out how the SSC management idea is being adapted at an early stage and how to transform previous, traditional ways of management into the SSC type. In Poland, SSCs were introduced on the basis of a report prepared by the Ministry of Administration and Digitalisation, entitled: *The Assessment of the Situation of Local Governments* (2012, p. 37). It drew attention to the fact that Polish local governments were burdened by costly legal solutions that in no way served to realise their mission (Modrzyński, Gawłowski & Modrzyńska, 2018). Although these legal regulations should focus on the standard of services provided to inhabitants, they aimed at indicating the manner in which local governments should deliver their services. In this way, the organisational and management decisions of local governments were limited. The indicated barriers in the management of local government units result from the public finance act which is in force. According to the act, all budgetary units have the same right to receive funds from the budget regardless of their size and the income they earn. The budgetary unit must have an approved financial plan, statute, it must manage the property, and all financial matters must be carried out by the chief accountant. Furthermore, each local governmental budgetary unit establishes its own accounting policy and has its own reporting obligations stemming from legal regulations, an archive, and a company social-benefits fund. Thus, the legal regulations do not give any room for flexible management depending on, e.g., the size of the unit. This problem was indicated in the governmental draft act amending the Act on Gmina Local Government and some other acts[5]. As the legislator pointed out in the justification to the act, local governments need more flexibility in organising their work so that they can adapt the solutions to local needs and possibilities (Modrzyński, Gawłowski & Modrzyńska, 2018). Moreover, the way in which local government units are handled has not changed during the last five decades. This was to be served by the increased independence and flexibility of the organisational structures stipulated in the project. The indicated objectives were achieved by adding Art. 10a et seq. of the Act on Gmina Government, Art. 6a et seq. of the Act on Poviat Government, Art. 8c et seq. of the Act on the Voivodeship Self-Government, as well as the relevant amendment to the Public Finance Act[6]. In the literature devoted to the issue of shared services centres, the main point of interest is the legal and organisational regulations determining the way they function and the potential benefits that the public (as well as private) sector is able to achieve through the introduction of this solution. Therefore, the implementation process of SSCs might be seen as a huge innovation in local governments. In this context, the idea behind shared services centres is to change the way in which organisational units are running and, in consequence, find new measures to improve public service delivery. Given the long experience of working without the necessity of collaboration among organisational units, we suspect that sociological factors seem to be more important that institutional ones. Therefore, the research hypothesis formed for the purposes of the article is that the directors of educational organisational units do not fully use the management possibilities of the managed units which result from the introduction of shared services centres. The hypothesis has been tested by means of answering the following study questions:

[5] What is worth emphasising is the fact that at the stage of the government legislative process of the indicated act, not all legal solutions in the scope of increasing the flexibility of local government units were taken into account. For example, during inter-ministerial consultations, the Ministry of Labour and Social Policy did not agree to cover social care institutions with the service of shared services centres.

[6] For more on the legislative process, see the legislative process on the website of the Sejm of the Republic of Poland http://www.sejm.gov.pl/sejm7.nsf/PrzebiegProc.xsp?nr=2656, accessed on 17.12.2017.

– How does the professional experience of the organisational units' directors influence the way that the SSC and the local government administrative unit cooperate?
– What chances and threats did the directors of the organisational units notice in the implementation of SSCs as the innovation process?
– What recommendations can be drawn for other SSCs implementations based on the Toruń case?

For the time being, there is a lack of knowledge about the way in which SSCs have been implemented as well as what the performance of this kind of organisations is in Poland. Therefore, we strongly believe that our research gives more insights into the SSCs issue, introducing a scientific debate about it.

Methodology

The theoretical framework of this study was based on the collaborative paradigm**.** It is defined as the process where collaboration is being built between organisations, different administrative levels, and even sectors. For instance, collaboration is established between the public and private sectors as well as non-governmental organisations to perform public functions (Emerson, Nabatchi & Balogh, 2011). This article presents the analysis of the experience gained in the first years after the shared services centres were implemented in Poland. The study was based on the opinions of directors in charge of local government organisational units founded by the City of Toruń. In order to find the answers, the authors applied the collaborative governance regime (CRG) in an intra-organisational dimension (Emerson, Nabatchi & Balogh, 2011). This gave a specific framework to this case study. CGR was chosen as it examines collaborative governance broadly and treats it as an emergent system. In order to obtain answers to the questions listed above, questionnaire surveys addressed to the directors of educational units were carried out. The study group included the following educational units: kindergartens, schools, pedagogical and psychological counselling centres, as well as youth centres of culture. All of these were being served by the Toruń Shared Services Centre (TSSC). The aim of the research is more descriptive in nature, but it also shows some evaluation insight into the SSC implementation process. The study consisted of two parts. The first one included the questions concerning the knowledge, experience, and managerial competences of the organisational units' directors. The second part of the questionnaire contained questions regarding the potential opportunities and barriers in implementing the Toruń Shared Services Centre. What is more, the respondents were asked to assess how administrative services function for public-finance-sector entities. The questionnaire was sent to sixty-eight local government units operating in Toruń. The questionnaire was divided into two parts. In the first one, there were five questions about directors' professional experiences. This part of the survey was inserted in order to figure out what the professional profile of the directors is. The second part was devoted to the respondents' ratings in terms of opportunities and threats concerning the implementation process of SSCs. In the questionnaire, the respondents were able to assess the significance for each of the answers, taking into account the following scale: from 1 to 5, where 1 is the INSIGNIFICANT element and 5 is VERY SIGNIFICANT element. There were twenty-four answers received, which constitutes 35.3% of the total study sample. In order to increase the number of answers, the authors did repeat the mailing of the questionnaires, but the directors failed to respond. The study was conducted in September-October 2017.

The Toruń Shared Services Centre

The Toruń Shared Services Centre was established by the City Council of Toruń in November 2016 (Resolution No. 466/16 of the City Council of Toruń of 24 November 2016 on the creation of a local government organisational unit – the Toruń Shared Services Centre). The TSSC supports sixty-eight educational institutions, including kindergartens, primary schools, secondary schools, and centres of culture. In addition, on the basis of the act mentioned above, the service of the TSSC has covered other twenty-three local government organisational units of the City of Toruń (e.g. the Poviat Labour Office, the Business Support Centre, the Urban Town Planning Studio, and the City Guards). It provides the supported units with shared organisational, financial, and administrative services, consisting of: accounting; payroll issues of employees; financial and budgetary reports for financial and statistical operations; financial and accounting services for the Company Social Benefits Fund, the Employee Loan Fund; material support for students; settlements with the Tax Office, the Social Insurance Institution, and other institutions; tax settlement on goods and services; VAT returns for the City of Toruń and its adjustments. The process of commencing the TSSC operation and launching its activity was divided into four stages. At the first stage, i.e. from 1 January, 2017, the TSSC started to provide the shared service covering only the VAT settlement centralisation of all the organisational units of the Gmina. Then, on the following dates: 1 February, 1 May, and 1 August 2017, other shared services included in the planned scope were commenced and extended to subsequent educational units[7].

Study results

The first part of the study focused on the professional experience and competences that the directors of the studied organisational units have (cf. Figure 1). As for the formal requirements that are imposed on applicants for the management position at the educational institution, they need to hold a graduate or postgraduate diploma in management, or have completed a qualification course in education management (cf. Figure 2). These courses' curricula need to comply with the provisions for teacher training institutions. In addition, the applicants must have obtained the Master's degree and teaching qualifications for a given educational institution. In practice, it means that management positions are entrusted to teachers and guidance counsellors who have little or no management experience.

However, in the context of SSCs, it is important for the directors to know how to implement the management tools that are specific for business in the public sector they work for. It can be assumed that the lack of knowledge and experience

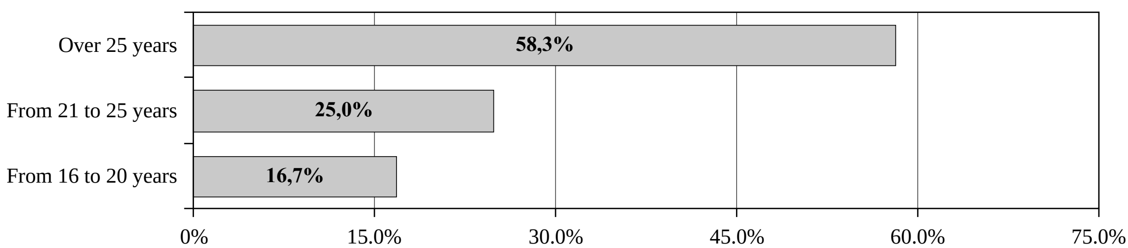

Figure 1. Presentation of the respondents' answers to the question: "How many years of professional experience do you have?"

Source: own study based on the results of the research.

[7] Cf. Resolution No. 466/16 of the City Council of Toruń of 24 November 2016 on the creation of a local government organisational unit – the Toruń Shared Services Centre – assigning it the statutes and shared service of organisational units of the Gmina of the City of Toruń, http://bip.torun.pl, accessed on 10.07.2017.

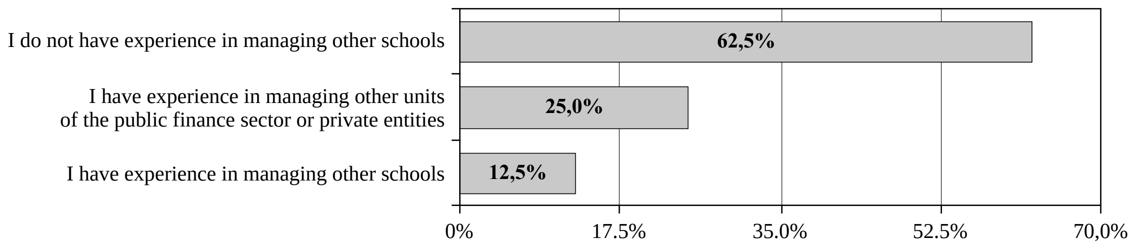

Figure 2. Presentation of the respondents' answers to the question: "Have you ever worked in other units (except for the one in which you currently work)?"

Source: own study based on the results of the research.

in this area has a huge impact on the effective implementation of changes. In the studied group, as many as 75% of the respondents have never worked in the private sector.

Over 80% of the respondents have at least twenty years of professional experience, and every fourth respondent has experience in managing local government organisational units. In the group of respondents with experience in managing entities, nearly 60% have been managing units for at least six years (cf. Figure 3).

The success of implementing business solutions in the public sector largely depends on the involvement of the team responsible for this task. It is especially challenging if the implementation is conducted in a very specific environment, such as educational units from our case study. The management staff of educational units in the vast majority have experience only in managing such units. In terms of statutory tasks – conducting usual tasks connected with educational activity – this kind of experience is undoubtedly a significant advantage. However, if an innovative business solution is implemented in the public sector, this factor can substantially impede or even barrier this process (cf. Figure 4).

Nearly 92% of the respondents participated in various managerial courses or trainings, mainly on educational units management. It is worth emphasising that all the respondents have expressed their willingness to improve their professional competences and qualifications in the future. The following key training areas were indicated (cf. Figure 5): finance management (21.4%),

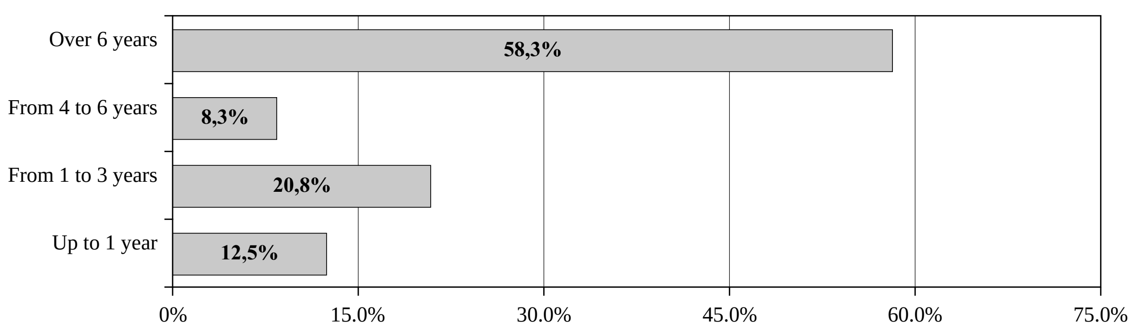

Figure 3. Presentation of the respondents' answers to the question: "How many years of experience in managing units do you have?"

Source: own study based on the results of the research.

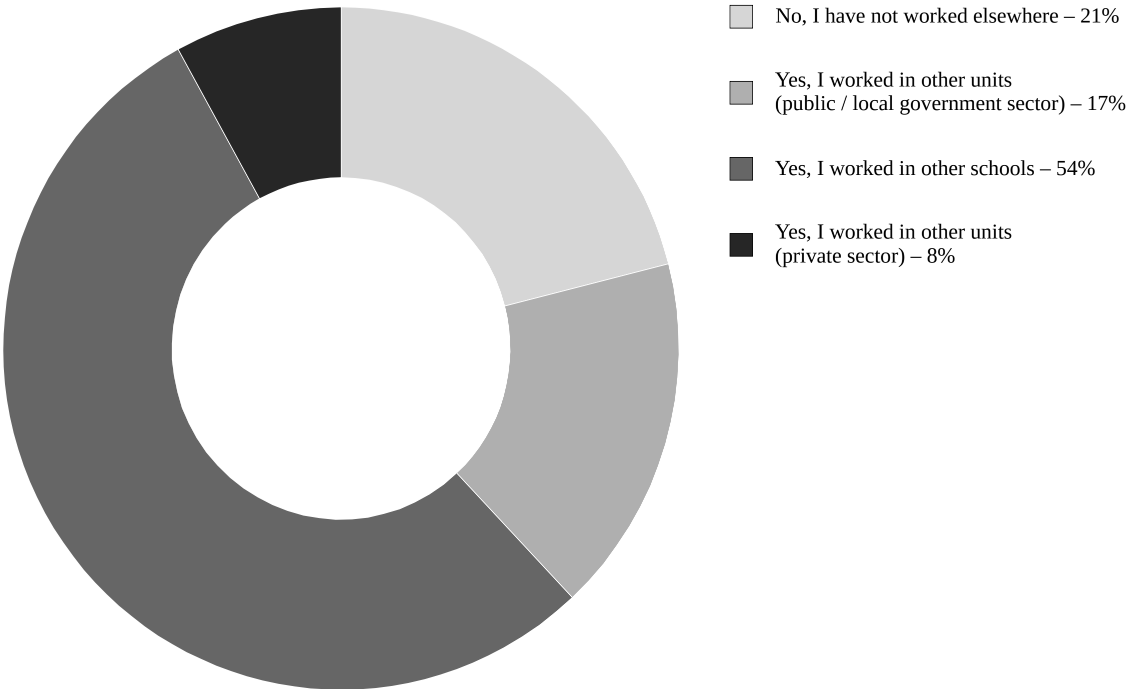

Figure 4. Presentation of the respondents' answers to the question: "Have you ever worked for another business sector (except for the one in which you are currently working for)?"

Source: own study based on the results of the research.

education law, and human resources management (19.6% of responses each).

The second part of the study concerned the knowledge and opinions of directors on the implementation of the maintenance tasks of local government organisational units by the TSSC.

The results obtained are significant from the perspective of identifying the opportunities and threats to the functioning of local government shared services centres. The idea of centralising financial, accounting, payroll, and tax services did not attract interest among the heads of units selected to be covered by the shared service. Almost all the respondents (95.8%) reacted to this project in a negative way. Unfortunately, also more than half of the respondents (58.3%) did not have knowledge about the functioning of shared services centres and the implementation of selected tasks in the formula of entrusting them to a shared service. The above factors were of key importance in further assessment of the functioning and efficiency of the SSCs. The greatest concerns among the management of units covered by the shared service were related to the limitation of access to information (average rating of 4.38) and the limitation of capabilities of managing the unit (average rating of 4.04).

After the several months of the functioning of the TSSC, the directors of the served units were not convinced about the validity and effectiveness of the back-office being centralised and implemented in the outside parent unit. Over 66% of the respondents would return to previous organisational solutions. In the opinion of the studied heads, the greatest benefits result from taking over the implementation of the tasks of centralisation of VAT (average rating of 3.79) and limiting the risk of conducted operation, and

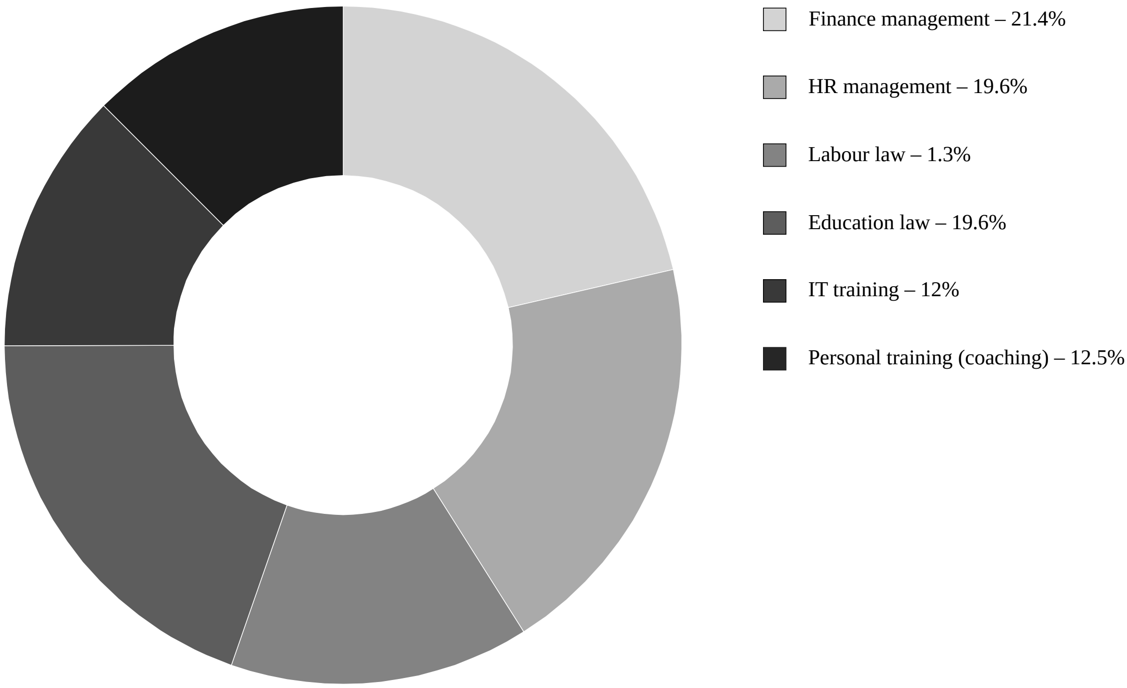

Figure 5. Presentation of the respondents' answers to the question: "In what subject area is the improvement of qualifications required?"

Source: own study based on the results of the research.

transferring these tasks to be performed by an external entity (average rating of 3.25). Table 1 presents the distribution of the respondents' answers regarding the opportunities/possibilities and threats/concerns of the heads of units covered by the shared service related to cooperation with the SSC. The most important areas for the heads of units who indicated the validity of extending the scope of the service provided are: legal service (25.6% of responses), IT service (18.6%), as well as health and safety service and fire protection service (16.3%). The areas indicated above are currently being implemented by external entities, i.e. in the outsourcing formula. Where the implementation of specific tasks has been elaborated on in a natural way in cooperation with an external entity, the heads of units naturally point to the possibility of them being covered by the shared service. Interestingly, none of the heads indicated the possibility of entrusting external entities with the tasks of cleaning the facility or, in this case, entrusting them with the shared service. Two observations can be made here. Firstly, services that are already being implemented by external entities in an obvious and natural way can and should be covered by the shared service. Secondly, the problem of services provided under the shared service concerns only the services provided so far by the employees of this unit. Therefore, the key aspect in assessing the validity and effectiveness of the functioning of the SSC is more about the reduction of the staff available to the heads of units than the nature and scope of the shared service provided (cf. Figure 6).

In addition, other significant problems indicated by the respondents included: the lack of sufficient knowledge and experience concerning how the TSSC should function (average rating of 3.88);

Table 1. Presentation of the results of the respondents' ratings to questions about the opportunities/possibilities and threats/concerns of heads of units covered by the shared service in cooperation with the TSSC

What threats/concerns did you identify in relation to covering the unit with the service of the TSSC?	**Share [%]**	**Average rating**
Lack of current access to information	28.4	4.38
Limitations with regard the ability to manage the unit	26.2	4.04
Limitations with regard to financial decision-making	25.9	4.00
Limitations with regard to personnel decision-making	19.5	3.00
What opportunities/possibilities did you identify in connection with covering the unit with the service of the TSSC?	**Share [%]**	**Average rating**
Raising the level of management efficiency with the units serviced	16.3	2.88
The possibility of focusing on the implementation of basic objectives of the unit	16.0	2.83
Management control – reducing the level of risk of the processes carried out (transferring their implementation to the TSSC)	18.4	3.25
Centralisation of VAT settlement (implementation by the TSSC)	21.5	3.79
Lowering the costs of the functioning of the unit, which he/she manages	14.6	2.58
Optimisation of employment in units covered by the shared service (e.g. no problems with the accountants going to retirement, leaves, etc.)	13.2	2.33

Source: own study based on the results of the research.

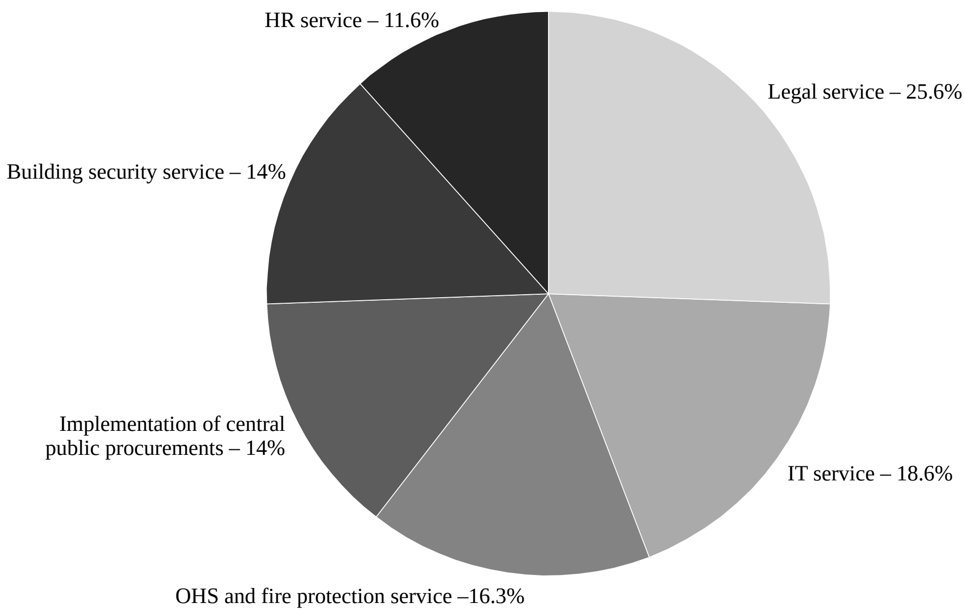

Figure 6. Presentation of the respondents' answers to the question: "Please indicate possible areas for extending the scope of the shared service provided"

Source: own study based on the results of the research.

the lack of support from consulting companies at the level of the serviced units (average rating of 3.71) (cf. Table 2).

On the other hand, the respondents positively assessed the fact that the City management and TSSC management were involved in the SCC implementation process. They also did not indicate this area as problematic when the tasks were being transferred from units to SSC (average rating of 2.75).

Table 2. Presentation of the results of the respondents' assessments of questions regarding problems occurring when transferring tasks covered by the shared service to the SSC

What problems did you experience when transferring the tasks covered by the shared service to the TSSC?	Share [%]	Average rating
Lack of/slight interest in the subject of the SSC on the part of the city's management	11.5	2.83
Lack of/low interest in the SSC on the part of the management of units covered by the shared service	11.2	2.75
Mental attitude of employees of units covered by the shared service (those who were transferred to the TSSC)	14.2	3.50
Lack of knowledge and experience	15.8	3.88
Lack of external support (e.g. consulting companies, legal offices)	15.1	3.71
Training (lack, inadequate number or quality)	14.4	3.54
Too short time of implementation of the TSSC in the Gmina	17.8	4.38

Source: own study based on the results of the research.

Another important aspect is that the idea of SSC is based on horizontal organisational structures, whose main principle is cooperation. In contrast, in the public sector, the organisational structure is usually based on rigid vertical relations. They usually involve a strictly defined hierarchical subordination. This discrepancy has led to the fact that the directors of units serviced by SSC found it problematic to cooperate with the TSSC as the new formula has its foundations in mutual cooperation and the transfer of information (average rating of 4.50 for cooperation and 4.04 for providing information respectively). Additionally, part of the staff, mainly accounting and payroll divisions workers, were relocated from their previous units to TSSC. Therefore, the remaining statutory tasks had to be distributed among the remaining administrative staff of the serviced unit. In the opinion of heads of these units, this is a significant problem (average rating of 4.67) related to the cooperation with the TSSC (cf. Table 3).

The implementation process of SSC can be divided into two parts. The first one involves the transfer of tasks from the local unit to SSC, while the second one is covering tasks by SSC on a daily basis. In the light of the first phase, the higher rates are gained by the answer concerning the adjustment of the service provided to the specificity of units – 2,71. It means that there is a room for improvement that directors see in terms of SSCs implementation (cf. Table 4).

With regard to the positive aspects of the cooperation with the TSSC on a daily basis, it needs to be pointed out that the average of ratings is significantly lower than the negative outcome (negative: 4.29, positive: 2.47). The respondents listed reducing the risk of conducted activity – transferring the responsibility for the implementation of processes to the TSSC (average rating of 2.79), and competences of the employees of the TSSC (average rating of 3.29) – cf. Table 5.

Table 3. Presentation of the results of the respondents' assessments of questions regarding the problems/threats occurring in cooperation with the TSSC

What are the problems/threats in cooperation with the TSSC?	Share [%]	Average rating
Poor information flow	18.8	4.04
More information/reporting obligations for the heads of the unit	21.7	4.67
The need to consult the decisions made with the TSSC	21.0	4.50
Maintaining the quality of the service provided at the level before taking over the service by the TSSC	20.2	4.33
Competencies of the employees servicing the unit	18.3	3.92

Source: own study based on the results of the research.

Table 4. Presentation of the results of the respondents' assessments of questions regarding the positive aspects occurring when transferring tasks covered by the shared service to the TSSC

What positive aspects occurred during the transfer of tasks covered by the shared service to the TSSC?	Share [%]	Average rating
Flexible terms of employees' transfer to the SSC	15.5	2.42
Adjustment of the service provided to the specificity of units	17.4	2.71
Providing comprehensive information	15.8	2.46
Training conducted by the TSSC	16.8	2.63
Meetings with the employees of the TSSC	17.9	2.79
Openness of the TSSC to the current problems of units	16.6	2.58

Source: own study based on the results of the research.

Table 5. Presentation of the results of respondents' assessments of questions regarding positive aspects of cooperation with the TSSC

What are the positive aspects of cooperation with the TSSC?	Share [%]	Average rating
Reduction of the risk of the decisions made	18.8	2.79
Limitations with regard to tasks performed by the heads of the unit	14.8	2.21
Reduction in the number of tasks of the head of the unit regarding the supervision over the unit	13.2	1.96
The ability to improve the quality of the service provided	15.7	2.33
Competences of the employees servicing the unit	22.1	3.29
Limitations with regard to personnel issues/problems in the unit	15.4	2.29

Source: own study based on the results of the research.

Discussion

It is not easy to achieve added value through SSCs. To illustrate the point, the UK Cabinet has had the longest experience in implementing SSCs as it launched the Next Generation Shared Services Centres strategy in 2014. However, the National Audit Office showed that some important tasks had to be improved (NAO, 2016). This is why Windrum and Koch argue that the innovation process is an art and as such has to be seen as a purposive act or a set of acts aiming to do something better, to satisfy a new need or to respond to new circumstances (Windrum & Koch, 2008). Therefore, one can say that the innovation was implemented by the top-down strategy. However, local governments were given a lot of room for modelling SSCs so that it fulfils their needs. This main element, called the policy legal framework, was a spark for a new intra-organisational collaboration. The above research aimed at checking how collaboration dynamics works in practice, in particular how implicit and explicit principles, rules, norms, and decision-making procedures are implemented. Implementing solutions from the business sector to the public sector is a difficult and time-consuming process. Therefore, it is important to find out what kind of drivers (leadership, consequential incentives, interdependence, and/or uncertainty) work.

Concluding the first part of the research devoted to professional experience of directors, we can highlight three crucial factors that are important in terms of SSCs implementation. Firstly, the vast majority of them (58.3%) have been working in the same unit for more than twenty-five years. Secondly, the unit that they are in charge of is the only one where they have been directors in more than 62% of cases. Last but not least, nearly 60% of the directors have been working for more than six years in the same position. These characteristics constitute a cornerstone of SSCs implementation in terms of social capital they possessed. These results show that during the implementation period much effort has to be put to explain the idea of SSC, their way of working, or even the preparation of the handbooks for directors. It is unlikely to find the respondents' support for the process unless they have been properly equipped with knowledge; it is hard to expect that the directors will support SSCs implementation in the light of their lack of cooperation experience with other units.

Following the sociological factors that exert influence on collaborative governance, there is an issue of trust and reciprocity between the units and SSC. The information gathered during the research and, consequently, the final results reveal that collaboration between individuals is a fertile ground for any collaborative structure and innovation process. Moreover, collaboration depends on the officials and managers that must be equipped with the skills that make them effective collaborators. Therefore, the first elements to be taken into consideration are the interpersonal and communication skills, as well as the ability to listen to and work with people. These skills, together with the knowledge of the subject, were the most frequently mentioned ones by the respondents. Consequently, the dimensions of collaboration order – proposed by Thomson, Perry, and Miller – should be reversed and put on top of the elements regarding social capital issues followed by the other institutional factors. The authors are aware of the fact that the presented research results show an incomplete picture of the issue. However, the lack of trust between the units' directors and SSCs seems to be obvious and might be a result of the outcomes of the first part of the research.

Despite these drawbacks emerging during the implementation of the TSSC, there is a bright side of this process. Directors demonstrate the openness to extend the scope of the shared services. Therefore, the conclusion can be drawn that it is not the scope of the service that is the key here, but, rather, the nature and method in which it is implemented. It is the impact of the functioning of the TSSCs that occurred after the implementation (Emerson, Nabatchi & Balogh, 2011). Apart from the lack of strong drivers in implementing SSCs secured by law, one can say that there is still plenty of room for improvement. The directors of the budgetary units express their willingness to develop further. It appears to be surprising due to the fact that they have criticised the solution itself. However, it is worth remembering that people who are in charge of the budgetary units are primarily responsible for the budget implementation, but not for raising funds for the functioning of the entity which they manage. In such an environment, the unit's functioning costs take a back seat (the costs level is determined by a resolution taken by a decision-making body, e.g. the Gmina Council). Additionally, the accounting and payroll staff of the serviced units were transferred to the TSSC. This reduction in workforce has negatively influenced the respondents' assessment of the SSC.

Last but not least, there is a question about the losses of the respondents and their influence on the final outcome of the research. As the researchers, we are convinced that we used all possible tools to encourage them to take part. Therefore, we are very unhappy that they failed to respond to the questions. However, we are certain that their absence from the research did not affect the results in the first part of the outcomes. However, it is hard to predict how it could influence the second part of the research. We suspect that a director might fail to take part in the research due to their unwillingness to show resistance to the SSC implementation. However, they did not want to reveal their attitude to this implementation. The reason for this might have been the fact that during the period when the research was conducted, financial irregularities in some units were revealed. Presumably, this fact has to be taken into consideration during the next research regarding SSCs in Poland. In order to avoid this problem in the future, it is highly recommended that different research methods should also be implemented, such as interviews with the units' directors. Despite the lack of the respondents, it is proved that sociological factors play a crucial role in the way in which SSCs are implemented.

Nevertheless, we strongly believe that our research outcomes provide an interesting lesson to be learned with regard to the TSSC case, which might be used for conducting further research in subsequent cities.

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doi: 10.15678/ZP.2019.50.4.05

Zarządzanie Publiczne
Public Governance
No. 4(50)/2019
ISSN 1898-3529

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Social Choice, Social Sustainability, and Why the Neoclassical Approach Fails to See the Difference

Abstract

Objectives: The neoclassical economic framework is a dominant approach in both theoretical and applied fields, such as public policy design. Despite the substantial amount of criticism towards the neoclassical assumptions of rational choice and obstacles related to preference aggregation, there is a minor concern regarding the underlying philosophy of the mainstream public policy design, namely static social utility maximisation under exogenously given social preferences.This paper analyses the inherent biases of the public policy based on the neoclassical background, attempting to prove that although such an approach can theoretically lead to the socially optimal outcome, it is hardly in line with the long-run social survival and development objectives. Other than this, the paper attempts to explore how incorporating alternative approaches towards individual and collective rationality into the theory of social choice can allow for designing a more sustainable public policy.

Research Design & Methods: The paper presents the review of the relevant literature alongside the theoretical inquiry into the underlying logic and philosophy of the neoclassical approach towards the public policy design as well as the most relevant non-mainstream theories.

Findings: It is demonstrated that the assumptions behind the neoclassical framework are inconsistent with the notions of social evolution and social sustainability.

Implications / Recommendation: The persistent idea that public policymakers should attempt to maximise social utility implies artificial limitations for public policy as well as ill-designed goals and objectives. There is a strong need to reconsider the appropriateness of using the neoclassical analytical framework in public policy design.

Contribution / Value added: The framework discussed in this article serves as the ground for more sustainable public policy design principles.

Keywords: public policy, social norms, social preferences, social sustainability

Article classification: research article

JEL classification: B25, B55, D02

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Introduction

It would be a mistake to state that the reason of economics always governs public policy design. Nevertheless, one can observe some links between economic policy and popular ideas in economic theory (see e.g. Williamson, 1990). When designing public policy, policymakers and, primarily, professional economics advisors, are governed by the ideas inhabited in the dominating school of economic thought even if this pattern of behaviour is sometimes sustained unconsciously. Public policymakers demonstrate resistance to the limitations of economic methodology, commonly applying ready-to-use solutions, even though they are based on extremely questionable theoretical grounds. During the last decades, economic science has evolved radically. Therefore, it is worth discussing how the developments in this field might affect the process of public policy design in the future.

Having been developed at the end of the 19th century, the neoclassical school of economic thought is still dominating in all the fields of economics, including the area of individual and social choice. The normative and positive principles of neoclassical public policy were best summarised by Arrow (1963): i) the task of the public policy involves the maximisation of static social welfare; ii) being aggregate of the rational agents' preferences, social preferences are characterised by all the attributes of rational choice, namely completeness, reflexiveness, transitivity, and, subsequently, path-independence (Plott, 1973). The former idea (although it might not be expressed explicitly) seems to persist in the modern studies devoted to the public economic policy (see e.g. Bauer & Knill, 2012; Friedman, 2002).

The substantial amount of criticism towards the principles discussed above arises from the inconsistency of rational choice theory with human behaviour (Camerer et al., 2004; Kahneman, 2003; Tversky & Kahneman, 1974). Besides, one would have to mention numerous studies discussing the obstacles related to defining aggregate social utility function under the ordinal utility preferences assumption (see: Arrow, 1963, 1983; Buchanan & Tullock, 1965; Congleton, 2002; Geanakoplos, 2005; Hammond, 1976; Mueller, 1979; Parks, 1976; Vickrey, 1960). Nevertheless, it seems that the underlying principle of neoclassical public policy as the goal of social utility optimisation is hardly challenged in the literature of the subject.

The neoclassical public policy is biased by the questionable objectives as well as a complete lack of a dynamic perspective. Even if one forgets about the debatable assumption of preferences rationality, the neoclassical framework still fails to address the problem of social sustainability. The notion of social sustainability has been introduced for the purpose of the current discussion due to the lack of appropriate terminology. Social sustainability can be understood as the principle supporting survival of the society in the long-run perspective. Although there is no inherent conflict between the aforementioned idea and the objective of social utility maximisation, the policy implications dictated by them might be radically different. For instance, a high degree of income inequality might be precisely a social choice if, among other assumptions, all the agents are characterised by a high degree of inequality tolerance, which does not repeal the devastating consequences of social polarisation (Piketty & Goldhammer, 2014). Besides, the assumption of the exogenous and stable social preferences creates an artificial trade-off between maximising social welfare and promoting social sustainability; the famous equity-efficiency trade-off can be treated as a specific case of the general problem mentioned above. Unable to analyse public policy design as a dynamic process, neoclassical economics pursues the idea about the existence of some ideal equilibrium point, which contradicts the evidence about social norms development and transformation (Smith, 2009). Strongly influenced by A. Smith's (1761) works on the importance of moral reasoning in the process of social exchange, there is currently a re-emerging trend towards incorporating human values and social norms into economics (Smith

& Wilson, 2019). Accepting the idea that social norms ensure a sustainable social outcome, at the same time – at least to some extent – being shaped by the external regulatory environment provides new opportunities for the policymakers. This paper, therefore, attempts to demonstrate that there is no place for the notion of social sustainability under the neoclassical framework, while simultaneously indicating possible areas for public policy development based on the non-mainstream economic theories.

The structure of the paper is as follows. The first section demonstrates a gradual evolution of the concept of rationality in economics, from neoclassical-hyper rationality to the ecological rationality paradigm. The second section discusses how the process of development and transformation of social norms can be incorporated into the formal economic analysis as well as the problems arising from neglecting this issue in the public policy design. The third section discusses the notions of optimal and sustainable public policy, and the final section draws conclusions and examines implications.

Decision-making from the constructivist and ecological perspective – optimisation versus survival

Under the normative neoclassical theory, public policy should be implemented in a way that maximises social utility function (Arrow, 1963; Plott, 1973). Being an aggregate of the rational agents' preferences, social preferences are characterised by all the attributes of rational choice, namely completeness, reflexiveness, transitivity (Arrow, 1963), and, subsequently, path-independence (Plott, 1973). At least to some extent, neoclassical public policy theory incorporates neoclassical principles of the rational choice. Therefore, the entire discussion should be initiated by the analysis of rational choice principles both from the perspective of neoclassical and non-mainstream approaches.

Simon (1996) distinguishes between two types of rationality, namely a substantive one and a procedural one. The former form of rationality describes the process of adjustment to the external environment conditions or, in simple words, optimisation. Simon (1996) identified optimisation methods as a particular domain of the entire scope of design practices, describing the logic behind any optimisation process as the interaction between the "inner" and "outer" environment of the design problem. The "inner environment" is composed of the finite set of alternatives, which are commonly specified as a range of "command variables." The "outer environment" consists of a set of parameters "which are known with certainty or only in terms of a probability distribution" (Simon, 1996, p. 116). The goal of optimisation lies in adapting the "inner environment" to the constraints imposed by the "outer environment" or finding the optimal values of command parameters subject to the external constraints. According to Smith's (2003) terminology, this kind of rationality is also referred to as constructivist rationality, being identified as a product of pure reason. It is crucial to mention that Simon (1996) discusses optimisation as a particular domain of design, which is supposed to explain the world of artificial objects. With a reasonable degree of simplification, one can describe the neoclassical notion of rationality as a constructivist rationality artefact applied as the positive principle. Under the neoclassical assumptions, the process of adaptation is not required owing to the assumptions of perfect information (i.e. the absence of uncertainty) and the perfect computational abilities of decision-makers. Relying solely on the substantive rationality allows for predicting the system's behaviour without any further insight into the decision-making process, as Simon (1996) underlines. Agents, rational in the constructivist sense, are utterly predictable (Lawson, 2003), which makes it possible to analyse economic choices by applying rigorous logic, analogously to the natural sciences. Perhaps this can explain the widespread popularity of the neoclassical setting (Heise, 2012).

The inconsistency between the neoclassical assumptions about perfect information and perfect computational abilities on the one hand, and the reality on the other has motivated the development of two rival theories: heuristics and biases approach as well as the ecological rationality paradigm. The former concept arose mainly owing to the seminal paper of Tversky and Kahneman (1974), and further attempts to describe and analyse systemic biases of human behaviour (Camerer et al., 2004; Kahneman, 2003). From such a perspective, an inclination to follow the 'rule of thumb' arises from the lower cognitive cost of heuristics in comparison to the optimisation approach. At the same time, heuristics strategy is not supposed to lead to the optimal outcome, implying a cost-efficiency trade-off of heuristics. Berg (2014) refers to this approach as the consistency school of bounded rationality, justifying the suggested terminology by the fact that empirically observed patterns of decision-making are juxtaposed with the criterion of logical consistency (or constructivist rationality). In other words, the principles of logic and optimisation are recognised as the only normative concepts of rationality, although they are being rejected as the positive theory of the system's behaviour.

The consistency school of bounded rationality leaves no room for Simon's procedural rationality; in contrast, the idea of ecological rationality is the direct descendant of this notion. Unable to access and assess the entire scope of relevant information, human beings must rely both on the conscious analysis and the feedback obtained from the external environment (Simon, 1990). The procedural rationality is revealed in the process of identifying the appropriate path of adaptive behaviour (Simon, 1996), while the reinforcement of effective behavioural patterns and the rejection of ineffective ones ensures the process of the natural selection of heuristics (Simon, 1978). Under the constructivist framework, the necessary condition for the rational choice is to outperform all the available options in terms of the expected outcome. In contrast, a procedurally rational choice has to be the result of the intelligently selected decision-making strategy, while superiority of the chosen option is neither a necessary nor a sufficient condition. Strongly inspired by the ideas described above, the ecological rationality paradigm implies that:

(i) the external environment is too complex (see also Arrow, 1986) and uncertain for any kind of optimisation strategy (Gigerenzer, 2000, 2007, 2008a, 2015).

(ii) survival in this complex environment is ensured by communication and interaction rather than means of formal logic (Gigerenzer, 2008b; Katsikopoulos et al., 2010; Smith, 2003; Smith, 2009); to put it more simply, even if efficient optimisation were possible, it would still be unsustainable in the long-run perspective.

Perhaps the crucial point is that ecological rationality proclaims long-term survival as the main objective of individuals and societies, which is in contrast to the neoclassical approach proclaiming the maximisation of the social utility as the only possible public policy goal. Social interaction, feedback process, and social ties are all crucial to the survival of social groups and individuals within these groups. Therefore, social norms play a vital role in achieving a sustainable outcome from the evolutionary perspective, which is developed and adjusted by means of collective intelligence.

Social norms and institutions from the perspective of the neoclassical and the ecological approaches

Social norms can be understood as uncodified rules, principles, and values governing the process of social exchange and social interaction (Smith, 2009). Treating social norms in line with the aforementioned definition would require a holistic view of society and admitting that any social group is a much more complex structure than the sum of individual agents. This idea goes beyond the strictly atomistic neoclassical approach implying that the system cannot possess any characteristics that are not attributed to one of its elements. Therefore, explaining the nature of social norms under the neoclassical framework would be an extremely complicated task.

Nevertheless, the inability of the neoclassical school to address social norms does not imply posing an economic human being as the utterly selfish human being, which is in contrast to the common misconception (Carey, 1865; Caporael et al., 1989; Elster, 1989; Etzioni, 1990; Thompson, 1875). Under the neoclassical framework, the notion of social norms is replaced by the concept of exogenously given social preferences (alternatively, other-regarding preferences), which allows for assessing the phenomenon of pro-social behaviour using conventional optimisation tools (Bénabou & Ok, 2001; Brennan et al., 2008; Dawes et al., 2007; Heffetz & Frank, 2011; Kroll & Davidovitz, 2003; Morawetz et al., 1977; Andreoni & Varian, 1999; Bowles & Gintis, 2000; Lind & Tyler, 1988; List & Cherry, 2000). The early altruism-rationalising approaches assumed an intrinsic reward for altruistic behaviour, which is in line with the principles of teleological behaviourism (Rachlin, 2002) whereby the future discounted benefits of a selfless act offset the costs (Axelrod, 1984; Becker, 1974; Guttman, 1996; Hirshleifer & Rasmusen, 1989; Stark, 1995). More recent theorists emphasise the internal reward for altruistic behaviour (i.e. “warm glow” of giving – Andreoni, 1990; Andreoni & Miller, 2002). Nevertheless, neglecting the process of social preferences formation is a common trait for all the aforementioned models (Berg & Gigerenzer, 2010): people act for the good of others because they derive some utility from acts of altruism, while the nature of this phenomenon remains beyond the agenda.

In contrast to neoclassical agents, human beings with limited knowledge and analytical capacity cannot rely on the cost/benefits analysis when interacting with others. Then, the principle ‘make good for others whenever you benefit from that’ is not sustainable or even applicable. Real people usually follow the principle of social heuristics, i.e. ‘make good for others whenever you find it appropriate’, where a judgment about appropriateness is unconsciously made based on the context. One can justify the human inclination not to cooperate with strangers by the lack of relevant information and an impotence to predict the future path of interaction (Marsh, 2002), while it is pretty doubtful that such reluctance is the product of the constructivist analysis. This common feature of human behaviour is an example of social norms or adaptive mechanisms developed in the process of social evolution. As individuals, we rely on social norms because of the uncertain nature of the environment surrounding us and our inability to analyse it in its entire complexity; if certain social norms turn out to be inefficient, we reject them and develop new adaptive tools, as Gigerenzer’s approach suggests. Simultaneously with this notion, Smith attempts to take a closer look at the process of developing and adjusting implicit rules of behaviour by the entire society. In line with Simon’s (1996) notion of complex behaviour arising from the complexity of external environment surrounding agents, Smith (2009) discusses how changes in the institutional environment trigger the process of social norms’ evolutionary development.

Social norms are commonly treated as a mechanism facilitating the occurrence of Pareto-efficient outcomes (Boersen et al., 2008). Nevertheless, it would be wrong to automatically equate social norms with the mechanism leading to long-term sustainability. As discussed earlier, social norms, as a particular type of heuristics, pass the process of evolutionary selection (Simon, 1978), ensuring that functional social norms prevail. Nevertheless, norms, effective under a particular institutional setting, are not by default the most sustainable pattern of social interaction. The efficient institutions hypothesis (North & Thomas, 1973) is not utterly uniform once the neoclassical system of values is abandoned. By transforming social norms, agents might adapt to the existing institutional environment in an effective way, which, however, does not imply that the resulting social outcome is sustainable. In other words, the fact that society self-regulates its functioning by developing and adjusting social norms does not imply the lack of necessity of public planning, as discussed in the next section.

Public policy – the optimal design versus the sustainable design

Simon (1996) establishes the scientific status for design, treating it as a field of science dealing with artefacts (artificial objects and social structures). The science of design, therefore, can be treated as a unified system of knowledge from different scientific disciplines "with problem solving at the glue" (Huppatz, 2015, p. 29). In other words, the science of design "is concerned with how things ought to be" (Simon, 1996, p. 114). Thus, it goes beyond the positive logic by default. Therefore, although the neoclassical approach towards decision-making is inappropriate as a descriptive principle, one might still argue for its suitability for the public policy design, since 'optimal social policy' is something on the normative side of economics. For a moment, one can leave aside the potential biases of the neoclassical public policy resulting from the poor empirical fit of its underlying principles. Let us assume that information is indeed perfect and one has sufficient computational resources to define and evaluate all the possible alternatives to determine the optimal one. In such case, the process of public policy design takes the form of a two-stage sequential game. At the first stage of the game, public policymakers choose the policy, while at the second stage agents adjust their internal environment to the external constraints, following Simon's optimisation algorithm. Being aware of the social choice at each of the hypothetical public policy paths on the one hand and the corresponding ordinal utility level assigned to this outcome on the other, public policymakers choose the appropriate social policy design at the first stage. Assuming the stable and exogenously given preferences, the resulting system is an equilibrium: none of the variables is going to change unless changes occur in the external environment.

Under Smith's ecological rationality framework, institutions (or regulatory frameworks) serve as the canvas for the process of social norms development and transformation. Following Simon's (1996) notion about two components of the evolutionary mechanism (i.e. generator and test), Smith (2003) argues that both forms of rationality co-exist organically whereby constructivist rationality serves as the generator, ensuring the sufficient variety and appropriate institutions, and sustainable behavioural patterns are selected through the trial and error process. Although Smith does not present this idea explicitly, particular social norms can be developed through the transformation of the external regulatory environment. The constraints imposed by the external environment (institutions) trigger the process of the evolutionary adjustment of the internal social environment, changing the rules of the game and requiring further steps from central authorities. The resulting infinitely repeating process perfectly illustrates Simon's (1996) ideas about public policy with no final goal in transforming the environment instantly. The straightforward implications are that: i) any appropriate public policy is subject to the instant and never-ending process of adjustment and transformation; ii) maximising social utility should not be the primary objective of public policy. Numerous historical examples suggest that major institutional transformations are often painful for the society (alternatively, inefficient from the neoclassical optimising perspective). Abandoning racial segregation in the US schools in 1954 triggered widespread protests, since social norms of that time were elitist to a great extent. Even though racial segregation at schools still exists contemporarily (Rothstein, 2014), the initial change in the formal regulatory framework has triggered positive changes in the social values (Wells & Crain, 1994) despite initial social dissatisfaction.

However, as mentioned earlier, there is no inherent contradiction between the attempts to raise the level of social utility and pursuing the sustainable path of social development. As Smith (2009) states, social norms and values tend to adjust to the formal institutional setting. In simpler words, initial social disutility triggered by the changes in the regulatory framework tends to disappear in the long-term perspective. Even though the sustainable public policy design might diminish social utility in the short-run perspective, the flexibility of the institutional environment ensures the eventual adjustment to the new reality. It should be mentioned, nevertheless, that accepting the idea of procedural rationality in public policy should not be biased by the neoclassical inclination to anticipate the long-run policy implications, treating the proposed social policy design mechanism as a sequential game. All in all, admitting that we live in the world of uncertainty and that the mechanism of social norms selection hardly follows the optimisation principle, we should also agree on our impotency to accurately forecast the results of our actions in the long-run perspective.

Conclusion

Although the neoclassical approach towards decision-making has been proved to be invalid as the positive principle of decision-making, it still dominates in the area of public policy design. The optimisation approach towards public policy implies that the primary objective of a policymaker is to define an equilibrium point maximising the social welfare, while any deviation from this pattern is inefficient. The neoclassical approach neglects the fact that the character of social choice might be inconsistent with the long-run social goals, at the same time assuming exogenous and stable preferences. This line of thinking implies the artificial trade-off between social utility maximisation and social sustainability. There is strong evidence in favour of the idea that social norms are subject to transformation and adjustment to changes in the regulatory environment. Numerous historical examples suggest that although major institutional changes are rather painful and diminish social utility (thus being inefficient from the neoclassical perspective), society still gains in the long-run perspective. Therefore, there is a paramount need to reconsider the appropriateness of the neoclassical principles for public policy design.

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doi: 10.15678/ZP.2019.50.4.06

Zarządzanie Publiczne
Public Governance
No. 4(50)/2019
ISSN 1898-3529

Grzegorz Parosa

Savings and Liquidity Gluts and the American Long-Term Interest Rates Before the Great Financial Crisis

Abstract

Objectives: This article examines the impact of the global savings glut on the long-term interest rates in the United States before the Great Financial Crisis. It presents the impact mechanics of global savings on interest rates, discusses arguments supporting and contradicting the significance of this phenomenon, presents an alternative concept, namely global liquidity glut, and estimates the significance of both phenomena in shaping long-term interest rates in the USA before the crisis.

Research Design & Methods: First, the impact of purchases of the US treasury bonds made by foreign investors on long-term interest rates is being assessed. Second, metrics representing global savings and liquidity gluts are being used to explain those purchases. Finally, a counterfactual exercise is used to reveal the impact that each of those factors had on the American ten-year treasury yields.

Findings: The statistical analysis of both effects shows that foreign purchases of the Treasuries lowered the US long-term interest rates by up to 140 bps, with excess global savings depressing them by approximately 45 bps, and excess liquidity by another 75 bps.

Implications / Recommendations: Monetary policy, as well as savings rates, might have wider than only local consequences. Excess liquidity and savings in one country can impact interest rates in other areas.

Contribution / Value Added: This article presents an alternative and neglected in literature explanation for the phenomena of low long-term interest rates before the Great Financial Crisis in the USA, namely global liquidity glut that depressed interest rates more powerfully than excessive global savings, contributing to the development of the investment bubble on the housing market and, thus, the Great Financial Crisis.

Keywords: Great Financial Crisis, savings glut, banking glut, liquidity glut, global liquidity

Article classification: research article

JEL classification: E210, E220, E510

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Introduction

The Great Financial Crisis of 2008 in the United States was the most severe one since the Great Depression and the Second World War. Many factors, including market abuse, inefficient institutions, and legal and regulatory failures made mortgage financing too cheap and accessible, fuelling the real estate bubble. One of the factors facilitating access to credit was undoubtedly its low cost. Several factors contributed to the low cost of financing, and the concept of global savings glut is one of them. It ties together current account imbalances experienced by the global economy in the early 21st century and purchases of the US Treasuries made by foreign investors.

The objective of this article is to confront the prevalent in literature explanation of low levels of long-term interest rates in the US before 2008, namely savings glut against another possible explanation – liquidity glut. The first chapter of the article is devoted to explaining the phenomenon of savings glut and its origins, and discussing the arguments of its proponents. The second chapter focuses on the shortcomings of savings glut theory, presenting counter-arguments to those described in the previous part. The third chapter introduces an alternative explanation for the low level of long-term interest rates in the US before the Great Financial Crisis – liquidity glut. Finally, in the last chapter, the impact of foreign investors on yields on the US Treasuries is assessed and then decomposed into savings and liquidity gluts' effects in order to determine which effect, if any, had had a greater impact on long-term interest rates in the US before the crisis.

The essence of savings glut

From the US current account deficit to excess savings

In 2005, Ben Bernanke, not yet the chairman of the Federal Reserve Bank, investigated the problem of growing current account deficit in the United States. These considerations – exploring why the world's largest economy is a net borrower – led Bernanke to formulate the concept of global savings glut. The current account balance can be viewed from two different perspectives (Bernanke, 2005). The first one is directly related to the surplus of imports over exports. If Americans receive payments for goods and services sold abroad that are insufficient to cover their foreign purchases, they must borrow the difference on international financial markets. However, Bernanke prefers to look at the deficit in terms of savings and investments. In his opinion, the strong increase in imports of foreign goods to the United States was related to the increase in 'excessive' savings overseas. Countries with excess savings, wishing to invest them in the US, had to convert them into dollars. This resulted in the appreciation of the American currency. The more expensive dollar increased the profitability of exports to the United States, reducing the international attractiveness of goods produced there and leading to a decrease in US net exports, creating a current account deficit. This approach constitutes the essence of the savings glut concept.

Sources of excess savings

There exist many reasons for the excess of savings in the global financial market. Developed countries are mostly the ones with ageing populations, where a growing proportion of life is spent in retirement. Citizens of these countries are saving more to make sure that they can support themselves after leaving employment. These savings are not invested locally as those countries often experience slow economic growths (e.g. Japan), low population growth, and high fiscal burdens (e.g. Germany), all of which effectively depress returns on investments (Domeij & Floden, 2006). Nevertheless, the surplus of these countries, excluding Japan, constitutes merely 10% of all the savings that came to the US.

Japan is an important source of global savings. The economic crisis of the early 1990s, because of the height of corporate leverage, quickly became a balance sheet crisis (Risaburo, 2010). Excessive leverage led many companies to bankruptcy, while others, unwilling to share their fate, began to fix their balance sheets, making companies stop borrowing and investing, and start saving (debt rejection syndrome) (Koo, 2004). This behaviour of the corporate sector made it a net supplier of capital. If companies did not invest their savings, those savings, although smaller than before the crisis, had to be invested abroad.

The reason for the increased savings in the so-called Asian Tigers was different. Their saving was caused by the fear generated by the crisis that hit that region of the world at the end of the 20th century (Felipe, Kintar & Lim, 2006). Fearing a similar crisis, those countries started to accumulate considerable foreign exchange reserves, commonly called war chests, which could be used in a situation of sudden foreign capital outflow in order to stabilise exchange rates. Moreover, underdeveloped banking sectors across developing economies depress corporate investment rates, pushing savings abroad (Wam, Weng & Xu, 2017). From 1980 to 2014, Asian countries generated about 1/3 of the world GDP growth and half of the savings growth (Arora, Tyers & Zhang, 2014).

By far, the biggest source of savings in the world was China. Since 1990, Chinese citizens, companies, and the state taken together generated about 1/3 of new global savings (Arora, Tyers & Zhang, 2014; Ma & Yi, 2010). The high propensity of the Chinese to save is a result of the demographic structure, their wealth, changes in the pension system, and the restructuring of companies. High savings help orient the economy towards exports by keeping the exchange rate low versus the dollar, a typical strategy for China as well as many other developing countries (Dooley, Folkerts-Landau & Garber, 2009). The fast growth pace of the Chinese economy combined with a high propensity to save makes China generate significant amounts of savings every year (Hall, 2017).

There is yet another reason for increased savings in oil-exporting countries. From the 1980s to the beginning of this century, oil cost between \$20 and \$30 per barrel. In 2002, however, its price started to increase, reaching \$150 in 2008. Such a strong increase in oil prices boosted the value of exports from oil-producing countries and, subsequently, the current account surplus, generating significant additional savings in these countries. Of course, these countries did not have enough investment opportunities, so the funds quickly returned to international markets (Belke & Gros, 2010). It should be noted, however, that such a process had taken place also before the analysed period and is usually called petrodollar recycling (Nsouli, 2006). On the other hand, it was the strongest in 2008, when the Great Financial Crisis had already begun, ablating the importance of oil exporters in causing the crisis.

The direction of capital movements on the world market of 2001-2008

The analysis of global savings in static terms is not sufficient to show the impact of their global excess on the US long-term interest rates. It is also necessary to prove that savings generated outside the United States have largely flowed into that country.

More light on the problem of international capital flows is shed in Figure 1, which shows the accumulated current account balances over the period of 2000-2008. It can be easily seen that the US deficit had to be covered by surpluses of the rest of the world. It is also clear that significant current account surpluses were generated by three groups of countries:

1. Highly developed ageing countries, such as Japan and Germany,
2. Oil exporting countries, led by Saudi Arabia,
3. China and the Asian Tigers (they started generating high surpluses after the South Asian crisis, so this is not visible on the map).

Having identified potential sources of financing for the US deficit, it must be established what

Figure 1. Accumulated current account balances worldwide in the years 2000-2008 in USD bn.

Source: World Economic Outlook, International Monetary Fund, 2018.

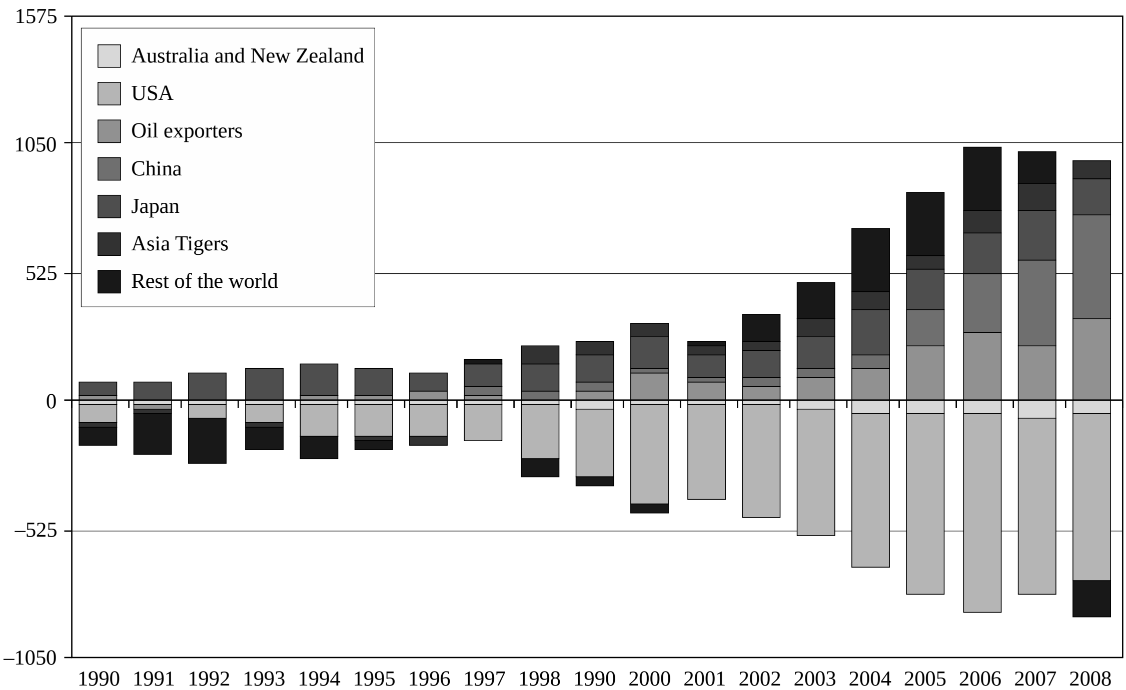

Figure 2. Current account balances of selected countries in the years 1990-2008 in USD bn.

Source: own elaboration based on Balance of Payments, OECD.Stat.

part of the US deficit they could cover. Figure 2 presents changes in current account balances in countries constituting the above-mentioned groups and the United States in the years 1980-2008. A strong negative correlation is clearly visible. The correlation coefficient between the US current account deficit and the sum of surpluses of countries from the three groups mentioned above (-0.85) confirms this observation. In the years preceding the crisis, the USA had used 10% of all global savings, and 75% of the global current account surpluses flowed there.

Factors attracting capital to the US

Two phenomena are still puzzling. Why did global savings go en masse to the United States and why did they continue to flow to the United States despite the falling long-term interest rates that made investing there less attractive (Dooley, Folkerts-Landau & Garber, 2009)?

The quality of institutions is crucial to the investment climate. Whether the legal system in a given country is stable and guarantees justice and order, minimises corruption, and ensures a high level of protection of property rights determines investment decisions (Chinn & Ito, 2006). The United States has always been at the top of rankings devoted to such issues. It is not without reason that investors all over the world used to say that money invested in the US “flew to safety” (Chandrasekhar & Ghosh, 2005). No less important are formal institutions, closely related to financial markets. Highly developed financial markets, rich in complex financial instruments, were able to absorb the excess savings (Clarida, 2005) created on less developed markets. In addition, market development in the US caused the rate of savings to decrease, which further increased the demand for savings from outside (Bernanke, 2005).

These factors combined with the size of the American economy, and historical events led to the use of the US dollar as a world currency. This means that most of the world’s reserves are held in dollar-denominated securities. This, on the one hand, increases the demand for such instruments and, on the other, makes other countries able to accept relatively lower rates of return than on identical non-dollar-denominated investments (Chandrasekhar & Ghosh, 2005).

These factors, obviously, did not change abruptly in the run-up of the crisis. Therefore, they could not directly contribute to the increased inflow of funds to the US during this period. Their role should be seen as a counteracting mechanism that would normally lead to a reduction in the amount of money invested in the United States. The obligation to select dollar-denominated assets for reserve purposes and the desire to acquire the least risky assets motivated so many investors to invest in the US.

Relevant research confirms that the quality of US institutions (Alfaro, Kalemli-Ozcan & Volosovych, 2007), the deregulation of the US banking sector of the 1980s, which opened it to external financing (Hoffmann & Stewen, 2014), and the use of the USD as a global reserve currency (Chandrasekhar & Ghosh, 2005) were important factors in attracting savings to the US in the wake of the Great Financial Crisis.

By 1995, for two decades, labour productivity in the United States had been increasing by 0.5 to 1% per year. Since 1995, however, there was a significant acceleration to 3% annually. This leap is usually attributed to technical progress and the development of the so-called new economy (Bems, Dedola & Smets, 2007). Such an important change had several important consequences. First of all, higher productivity increased the expected rates of return in the USA, resulting in an inflow of capital to the USA, which, in turn, contributed to the appreciation of the dollar. Secondly, the investment rate in the US alone also increased. Finally, expectations of higher rates of return led to an increase in asset prices, the wealth of households, and their expected future income. This resulted in a decrease in the savings rate and an increase in consumption. Labour productivity growth is the single best predictor of many economic phenomena of the US economy at the turn of centuries. This includes current account deficits, rising asset prices, and falling savings rates. Research shows that this is one of the key factors influencing the US current account deficit, explaining even 1/3 of its value (Hunt & Rebucci, 2005).

The conundrum

According to the pure theory of expectations, long-term interest rates should move as their short-term counterparts do. Both were moving in line with this theory's predictions until 2002. In the second half of 2004, FED ended its policy of maintaining interest rates at 1% and initiated a series of Fed Funds Rate hikes, bringing it to 5.25% by mid-2006. By the end of 2004, however, the growing Fed Funds Rate was accompanied by a falling yield on a ten-year US government bond. The general downward trend in bond yields continued until mid-2005. In the light of pure expectation theory, such market behaviour was atypical and could indicate that the investor's perception of future economic conditions was negative. This led to the question of what, if not the decision of the FED, drove the yields on ten-year bonds. For Alan Greenspan, the natural candidates were global savings coming to the US, most likely in the form of mass purchases of US bonds by foreign investors and the governments of developing countries (primarily China and the Asian Tigers) (Greenspan, 2010).

The criticism of the savings glut concept

America consuming too much

For most part of the 1990s, the US had to raise between 3% and 7% of its GDP from abroad to cover its investment needs. This situation started to change in 1998 when the capital requirements of the world's largest economy began to exceed the savings of the Americans by an even higher margin. In 2004 and 2005, investments exceeded savings by 13%. This was due to a stronger fall in the savings rate than in the investment rate. Research suggests that on the verge of the crisis, the United States experienced a shortage of savings rather than an investment boom (Hubbard, 2006). Excess savings flowing into the US should cause an investment boom; instead, in the pre-crisis period, consumption was on the rise (Laibson & Mollerstrom, 2010).

David Laibson and Johanna Mollerstrom (2010) propose another explanation for the events before the crisis. In their research, they take into account the existence of the real estate and stock market bubble. For eighteen OECD countries, bubbles in asset markets explain the growing consumption, foreign capital inflows, and falling bond yields better than the competing concepts. In these authors' opinion, rising property prices explain half of the volatility of current account deficits.

The fact is, however, that a very strong link between the savings of China and the USA existed. The correlation coefficient between these values was -0.71. This means that the Chinese were saving for the Americans and the Americans were consuming for the Chinese. In the face of the aforementioned studies, the United States, which consumes a large part of its income and sucks in the world's savings, is to blame for this phenomenon to a greater extent (Summers, 2004).

Twin deficits

The twin deficit theory states that the current account deficit is positively correlated with the budget deficit. The government's debt is partly financed by foreign funds, whose inflow increases the current account deficit. Increasing government spending also drives domestic demand. This causes interest rates to rise relatively to rates in other countries. Higher interest rates attract investors who need to convert their resources to invest, strengthening the demand for the currency of a country that increases its budget deficit and leading to the appreciation of its exchange rate. As a result, imports into that country become more attractive and exports do not create the current account deficit to such a great extent (Corsetti & Müller, 2006).

However, the significance of this dependence is highly questionable. In the history of the United States, there were periods in which both deficits increased and decreased simultaneously, as well as periods in which they moved in opposite directions. For example, when the trade balance deteriorated between 1990 and 2005, the government's debt fell in the 1990s and rose strongly after 2000. The situation was different in the 1980s, when the deterioration and subsequent improvement in the trade balance was accompanied by an increase and subsequent decrease in the budget deficit (Bems, Dedola & Smets, 2007).

Twin deficits were repeatedly analysed quantitatively. Unfortunately, the results differ significantly. Depending on the group of countries, period, and methodology, correlation coefficients vary between 0.07 and 0.375 (Bems, Dedola & Smets, 2007). From the point of view of this article, the most suitable studies conducted for the United States in the period preceding the Great Financial Crisis show a correlation coefficient of 0.2 (Erceg, Guerrieri & Gust, 2005). Combined with the previously described mechanism of the budget deficit influencing the current account deficit, the fiscal deficit run by the US government before the crisis had had some impact on the current account deficit, but it was not a key factor in its creation.

Parsimonious Asia

The concept of developing countries flooding the world with money and thus contributing to the decline of interest rates in the USA is opposed by the main party accused, namely the Chinese. They claim that the level of savings in their country was regular, and it is the Americans who consumed too much (Batson, 2009). The opinion of the Chinese seems to be confirmed by relevant research. While after 2000 there was indeed a clear increase in savings in South-East Asian countries, a more detailed analysis dating back to the early 1990s shows that nothing unusual happened with savings rates there. Everything seems to indicate that it was not the excessive savings at the beginning of this century, but, rather, it had been low levels of savings in previous years that had been an anomaly (Felipe, Kintar & Lim, 2006). This situation was most likely caused by the crisis of that region in 1997. The subsequent growth should rather be seen as a return to average. One exception is China, whose savings in relation to GDP not only returned to the pre-crisis levels, but increased by ten percentage points. This was caused by reasons unique to China, such as the speed of income growth and the changing demographic structure (Modigliani & Cao Shi, 2004). It should also be noted that Chinese investments grew only slightly more slowly during this period.

It seems that the problem of Asian countries was not an elevated level of savings in relation to the normal volume of investment opportunities, but too few investment opportunities in relation to the historically normal level of savings (investment drought) (Felipe, Kintar & Lim, 2006). As in the case of savings, the fall in investment happened after the Asian crisis. The main reasons for this involve weak credit production and overcapacity created before the crisis (Felipe, Kintar & Lim, 2006). The low level of investment in Asia led to a weaker economic growth, which, in turn, contributed to lower imports from the United States and lower economic activity there, which, in turn, reduced interest rates. Lower expected returns in Asia also resulted in the relative attractiveness of the USA to the investors, further strengthening the dollar and – through an increased demand for the US Treasuries – depressed the long-term US interest rates. Studies indicate that these mechanisms had a significant impact on the creation of the US current account deficit, explaining 30% of its value (Ferguson, 2005).

The conundrum – a mystery solved

The behaviour of long-term interest rates after the Fed Funds Rate increased in 2004 and

2005 suggests the presence of a factor other than short-term interest rates that drove their long-term counterparts. However, the research does not support the conclusions of the former Chairman of the FED, namely that this factor was the excess of global savings flooding the US.

It is difficult to accuse foreigners when similar phenomena did also occur in the US and the share of the Treasuries with a maturity longer than five years in foreign government portfolios amounted only to 27% (Tao, 2005). It turns out that the most important factor in shaping the conundrum was the time premium, i.e. the compensation demanded by investors in return for postponing consumption over time. Its fall can be attributed to the decreasing market volatility and a greater predictability of monetary policy (Backus & Wright, 2007).

Some authors indicate that the unexpected behaviour of long-term interest rates was due to the inertia of the bond market (Fels, 2005). In their opinion, the amount of excess monetary liquidity on the markets was unprecedented, and small changes in short-term interest rates could not change that in a short time. Among others, John Taylor (2009) claims that the cause of the conundrum should be seen in keeping the Fed Funds Rate too low for too long, which led to the creation of excessive liquidity. It is highly likely that if the monetary authorities had raised the interest rates earlier, the conundrum would have occurred with reduced force or not at all.

The mere fact that the conundrum existed does not entitle one to draw conclusions about the influx of savings occurring before it, as Alan Greenspan does. After all, if at the time of the conundrum the inflow of foreign funds was as strong as before, it could not cause long-term rates to fall only after the Fed Funds Rate had been reduced. In such a situation, it is expected that the rates would be reduced by a certain amount throughout the period of the increased inflow of the foreign funds. The conundrum must have been caused by a factor taking effect precisely when short-term interest rates started to be raised. This coincidence makes it much more probable that maintaining interest rates on the record-low level of 1% reduced the efficiency of monetary policy.

Global savings ex-post

The strongest argument against savings glut was made, among others, by John B. Taylor (2009) and Stephen Roach (2009). The former one not only believes that global savings glut did not exist, but he even claims that there was a global savings shortfall. This thesis is confirmed by the IMF research (Terrones & Cardarelli, 2005). Global savings in 2002 were on their lowest levels since the 1970s (the IMF analysis goes only that far). In 2002, although savings started to grow, they remained at record-low levels until 2004.

However, such an argument could only be used after the period to which it relates. Monetary policymakers did not have access to relevant data when deciding on the level of short-term interest rates. The increase in the current account deficit combined with rising savings rates in some countries might have led to the conclusion that a surplus of savings existed and depressed long-term interest rates. The data available at that time indicated a significant fall in inflation to only 0.6% per year, suggesting a real risk of deflation (Zandi, 2009). Mitigation of that risk became the main objective of monetary policy during that period (Bernanke, 2002).

The mere absence of a surplus of global savings in absolute terms does not, however, directly contradict the savings glut theory, which states not so much that there were too many savings, but that they were unevenly distributed. It is therefore sufficient to increase the ratio of savings of the rest of the world to savings in the United States. For long-term interest rates in the US, whether a fixed part of growing savings or a larger part of fixed or falling savings flowed to the US was irrelevant; the result in both cases would be the decline of interest rates.

The review of empirical studies on the savings glut's impact on the US economy

The impact of foreign investments on long-term interest rates in the US was thoroughly analysed. Bertaut (2011) indicates a drop in yields by 11 to 15 bps in response to purchases worth USD 100 billion. Warnock and Warnock suggest that such purchases lower rates by 15-32 bps, Beltran reports 49 bps, Gagnon 6 bps, D'Amico and King 10 bps, and Hamilton and Wu 4 bps. Rudebush, Swanson and Wu, on the other hand, found no impact of bond purchases on their profitability (Bertaut et al., 2011).

Francis and Veronica Warnock (2006) verified the impact of American ten-year bond purchases by foreign investors on long-term interest rates, and came to the conclusion that foreign purchases had lowered the yields on the ten-year Treasuries by 90 bps before the crisis. They also stated that two-thirds of this decline could be attributed to purchases made by countries from South-East Asia. The development of this study is presented later in this paper.

Vipin Arora, Rod Tyers and Ying Zhang (2014) investigated the impact of surpluses in China's and Japan's current accounts on the yields on long-term US government bonds while controlling the effects of monetary policy. They found out that every additional $1 billion of surpluses in these two countries results in a 4.6 bps drop in real US yields.

Pietro Cova and Filippo Natoli (2016) analysed the impact of the savings glut on the yields of ten-year US bonds before the crisis, comparing it with the impact of the banking glut. They estimated the total impact of savings glut to be 80 bps. The significance of savings glut was also analysed by Alejandro Justiniano, Giorgio Primiceri and Andrea Tambalotti (2013), who indicated that a decrease in bond yields before the crisis by ca. 100 bps had been caused by excessive savings. Bertaut (2011) also assessed the significance of this effect, finding a 50-140 bps drop in ten-year bond yields due to savings glut. Steinberg (2019) established that the global savings glut accounted for almost the whole US trade deficit, but was not the main factor driving real interest rates.

Liquidity glut

An alternative to the concept of savings glut is the theory of liquidity glut discussed in this chapter. It assumes that it was not excessive savings, but excessive monetary liquidity that flowed into the USA, depressing long-term interest rates.

Monetary liquidity

Monetary liquidity is linked to short-term interest rates and the aggregate money supply – it determines the state of money markets (Becker, 2007). Different indicators are used to measure monetary liquidity. The Marshallian K seems to be the most appropriate indicator for an international liquidity analysis (Fels, 2005). It is obtained by dividing one of the monetary aggregates by the nominal value of GDP. Since central banks nowadays are putting a very small amount of money into circulation directly, the widest available aggregate, M3, seems most appropriate (Becker, 2007).

It should be noted that the global liquidity at the M3 level is mostly American. As an issuer of the dollar, the FED controls 40%. Another 30% is held by the European Central Bank, and another 15% by the Bank of Japan. 5% is issued by the Bank of England, while the rest of the world controls 10% of the world's liquidity (Belke & Gros, 2010).

The impact of global liquidity on bond yields has been studied. Mesut Türkay (2018) proves that global liquidity can explain 10% of the volatility of government bond yields. Simon Gilchrist, Vivian Z. Yue and Egon Zakrajsek (2016) point to a decrease in the US risk premiums of 5-15 bps in response to a 10-bps decrease in the Fed Funds Rate and a 4-10 bps decrease in premiums in other developed countries. Marcel Frazscher, Marco Duca and Roland Straub (2013) analysed the impact of unconventional US monetary policy on yields of government bonds issued by non-US governments. According to these authors' study, the entire quantitative easing programme in 2010 was responsible for a drop in risk premiums in developed countries of about 210 bps as well as in developing countries of approximately 160 bps.

The right amount of liquidity and the effects of its excess

In order to determine whether central banks supplied too much money to international markets, it is necessary to define what the right amount of money is. In order to support all transactions in the economy, the money supply should grow at the rate of economic growth, assuming that its velocity is constant[1]. Each additional increment is an excess of liquidity (Fels, 2005). Money not used in economic transactions must be used differently. There is extensive literature available on the effects of excess liquidity, which clearly states that it leads to inflation through three channels (Baks & Kramer, 2007). First, excess liquidity means that there are more funds for which a relatively fixed amount of goods can be bought. Secondly, an increase in liquidity combined with an increase in asset prices gives the impression of improving economic conditions and, as a result, improves investor sentiment. Finally, a decrease in interest rates associated with an increase in liquidity causes a reduction in the discount factors used to valuate future cash flows. The effects of excess liquidity might, therefore, be similar to the proposed effects of excess savings.

Global liquidity before the crisis

The changes in the Marshallian K between 1995 and 2008 in countries responsible for the creation of most of the world's liquidity are presented in Figure 3. Any increase in the Marshallian K should be interpreted as the creation of excessive liquidity. It is clear that the global money supply

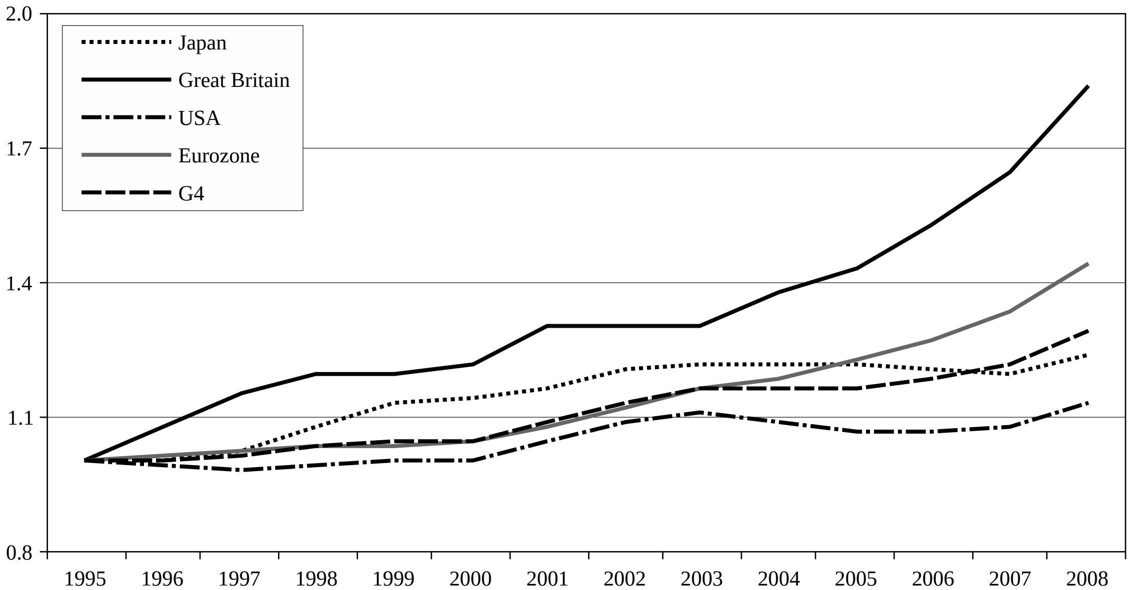

Figure 3. The Marshallian K for the creators of world liquidity in the years 1995-2008, 1995 = 1

Source: own elaboration based on data from OECD.Stat.

[1] In fact, due to increasing specialisation, the value of transactions in a given economy is growing faster than the economy itself, which inflates the amount of 'excess' liquidity suggested by this indicator.

remained relatively stable until 2000, with the only exception being Japan, which was still struggling with the effects of the crisis of the early 1990s. The intensive creation of excessive liquidity began in 2001. By 2004, the international market had been flooded by a money surplus of nearly 20% of issuers' GDP (Becker, 2007). In 2004, the United States stopped its monetary expansion, but concurrently the European Central Bank and the Bank of England increased their activity in this field. This resulted in a continuous increase in global excess liquidity in the period preceding the outbreak of the crisis in 2007 (Belke & Gros, 2010).

In the period of 2001-2008, there was an excess of liquidity worldwide. However, the sources of this liquidity evolved over time, and in order for the liquidity glut theory to be deemed valid, it must be proved that liquidity can move across borders just as much as savings in the savings glut theory can. The best proof of the international character of liquidity seems to be Japan. The country had a policy of keeping interest rates permanently at 0%, which made it an excellent source of liquidity. In the period of 2004-2007 alone, the loans taken out in Japan by foreign banks under the carry trade mechanism increased from 2.7% to 43% on the Japanese interbank lending market (Becker, 2007). Similar mechanisms were also observed in the United States and the European Union (Baks & Kramer, 2007), where an increase in money supply resulted in an increase in the liquidity of the rest of the world.

The excess of liquidity also better fits the events that took place after the outbreak of the crisis (Bracke & Fidora, 2008; Reiseman, 2010). The banks experienced shortages of capital, not liquidity, and increasing the latter did not bring any results. The very fact that the crisis broke out also comes as a surprise, if it was caused by savings. Those savings did not disappear in 2007-2009; on the contrary, they grew further in that period (World Bank, 2010). Studies confirm that global liquidity affected the real estate market much more than the prices of consumer goods or other investment assets did (Darius, 2010).

Global Banking Glut

After the end of the Great Financial Crisis, Claudio Borio and Piti Disyatat (2011) criticised the concept of savings glut for focusing on the imbalance of current accounts between countries and ignoring the importance of financial flows, financial sector regulation, and excessive credit supply. They claimed that the problem was not directly caused by excessive savings, but by excess financial flexibility in the financial sector.

Borio and Disyatatat's comments reflect the global banking glut theory (Shin, 2011). According to this theory, the main factor lowering interest rates in the USA was purchases made by banks, mainly European. International bank financing was made possible in the US by the deregulation of the sector in the 1980s (Hoffmann & Stewen, 2014). Because banks did not buy government bonds, they could not influence their yields in a direct way. Yet, instruments directly related to mortgage loan financing (MBS) were of great interest to European banks. The increased demand for these instruments caused their valuations to increase and the yields on them to decrease, which, in turn, led to a relative increase in the attractiveness of American government bonds, which consequently attracted investors who expected the rates of return to fall further. In this way, purchases of instruments based on mortgage loans not only fuelled the real estate bubble in a direct manner, but they also facilitated its creation by depressing long-term interest rates (Justiniano, Primiceri & Tambalotti, 2007). Indeed, while the inflow of foreign funds into the government bond market before the crisis had been about $1 trillion, purchases of corporate bonds and mortgage-backed securities by European banks amounted to $1.25 trillion (Bertaut et al., 2011).

Empirical research confirms the important role of purchases made by banks. Bertaut (2011) estimates their impact on ABS yields at 60-160 bps. Maria Punzi and Karlo Kauko (2015) studied the importance of bank inflows and the acquisition of the Treasuries by foreign investors for the supply of mortgages and real estate prices. The banks' actions explain 17% and 36% of their volatility respectively, and the purchase of bonds only 0.2% and 0.4%. Moreover, Pietro Cova and Filippo Natoli (2016) examined the impact of this mechanism on the yields of ten-year US government bonds, finding out a decrease in their yields of 30 bps at the beginning of the 21st century and as much as 200 bps just before the crisis – much more than the impact of savings glut. Similarly, Alejandro Justiniano, Giorgio Primiceri and Andrea Tambalotti (2013) claim that banking glut depressed the Treasury yields by 40 bps.

Global banking glut is no alternative to the concepts of savings glut and liquidity glut. Rather, it is a possible channel of transmission of excessive savings or liquidity to the American market. The purchases of European banks could be financed both by savings and by excess monetary liquidity. Measuring global liquidity with the Marshallian K based on the M3 aggregate allows for taking into account not only the effects of monetary policies conducted by countries, but also for taking into account bank credit – liquidity created by banks. In this way, the research carried out in the next chapter takes into account global banking glut effects in the size of the savings glut effect (if European banks financed themselves with savings) or liquidity glut (if banks financed their activities with less restrictive capital requirements and cheaper money related to the loose monetary policy applied by the monetary authorities in different countries during that period).

The statistical analysis of the savings and liquidity gluts' impact on the US long-term interest rates

Capital inflows to the USA and long-term interest rates

The research presented in this chapter is an extension of that carried out by Francis and Veronica Warnock (2006). They conducted a study of the factors determining long-term interest rates in the US between 1985 and 2005. For the purpose of this work, the study was repeated for the period 1995-2008. The same explanatory variables were used to explain the yields on ten-year US government bonds and the data was obtained from the same sources. Two variables had to be dropped as the budget deficit and the expected

Table 1. Description, data sources, and results of estimating the model of yields of ten-year US government bonds

Explanatory variable	Coefficient	Description	Data source	p-value
πe_{t+10}	1.255	Expected inflation in 10 years	Philadelphia Fed's Survey of Professional Forecasters	$8.66*10^{-11}$
ff_t	0.275	Fed Funds Rate	FRB Data Download Program	$9.63*10^{-25}$
$\pi e_{t+1} - \pi e_{t+10}$	0.210	Inflation expected next year minus inflation expected in 10 years	Blue Chip Survey	0.011
rp_t	0.957	Risk premium	36-month long-term interest rate variation (moving average)	0.015
$foreign_t$	-0.267	Foreign purchases of 10-year US bonds	Treasury International Capital System	$9.33*10^{-5}$

Source: own elaboration.

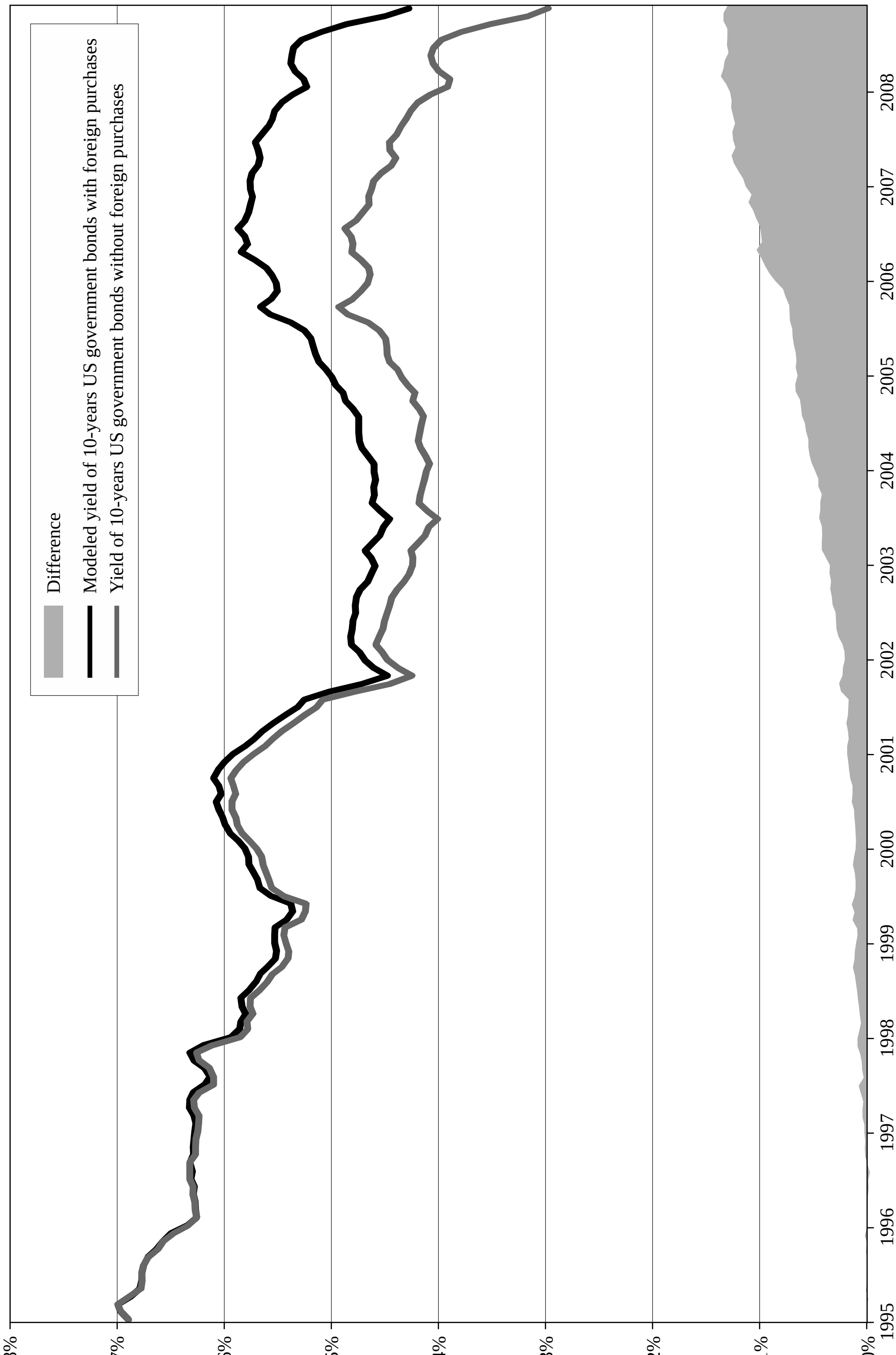

Figure 4. Yield on the ten-year US government bond with and without taking into account the demand shock associated with the inflow of foreign capital in the years 1995-2009, and the difference

Source: own elaboration.

GDP growth in the following year turned out to be statistically insignificant between 1995 and 2008. The estimated formula was, therefore, as follows:

$$i_{t,10} = a + b\pi e_{t+10} + cff_t + d(\pi e_{t+1} - \pi e_{t+10}) + \\ + e(rp_t) + \varepsilon_t$$

All explanatory variables used – alongside the results of the estimation obtained using LSM as well as the data sources – are listed in Table 1.

The R^2 coefficient of the model is 0.82. Thorough tests of statistical correctness of the model did not show any irregularities.

In order to determine the impact of foreign capital inflows on long-term interest rates, an alternative scenario was calculated. It assumes that the explanatory variable responsible for the capital inflow to the US takes a constant value, equal to that from the beginning of the period. In this way, the demand shock associated with increased purchases of the US Treasuries by foreign investors was eliminated. Figure 4 presents the yields on ten-year government bonds, indicated by the model with and without the analysed demand shock.

Figure 4 leaves no doubt as to the significance of foreign inflows for the long-term interest rate developments in the US. The growing importance of this factor in the period between the 2001 crisis and the one starting in 2007 is also clearly visible. While before the year 2001 foreign capital had had a marginal impact on ten-year government bond yields, in 2005 it was 80 and in 2008 it amounted to 140 basis points. These results are consistent with those obtained by Francis and Veronica Warnock (2006).

Savings glut or liquidity glut?

After determining that purchases made by non-US entities were responsible for reducing ten-year bond yields by as much as 140 basis points in 2007, it remains to be clarified why those purchases were made. The paper presents two alternative explanations: excess savings and excess liquidity.

In order to determine the significance of each of these two factors, a multiple regression model was estimated. To explain foreign purchases of the American Treasuries, two variables representing the two discussed phenomena were used. The sum of savings in the countries previously identified as sources of excess savings in relation to their GDPs acted as representations of the savings glut. The Marshallian K for the countries-sources of global liquidity represented global liquidity. The estimated formula is as follows:

$$foreign_t = amk_t + bsr_t + \varepsilon_t$$

The regression might overestimate the share of the liquidity glut effect in depressing the long-term interest rates because of an upward trend both in the variable representing this effect and in bond purchases made by foreign investors. Moreover, some steady growth of the Marshallian K is natural and results from the growing specialisation of the economies. Therefore, the results of the estimation with de-trended Marshallian K are presented. The trend was established based on the growth of this indicator in the years 1995-2000. The Marshallian K was growing steadily then by about 1% a year. The entire trend has been removed, which, in turn, might underestimate the share of the liquidity glut effect in the overall reduction of yield of ten-year bonds. However, it is not possible to determine which part of this increase occurs due to the growing specialisation of economies and which part is due to the increase in excessive liquidity. The explanatory variables, the results of the estimation done using LSM, and the data sources are all listed in Table 2.

The R2 coefficient of the model is 0.91. Taking into consideration the mechanisms described above, it can be concluded that both variables analysed together are responsible for the variance of the yields on ten-year US government bonds over the considered period. The relevant tests leave no doubt as to the relevance of both explanatory variables.

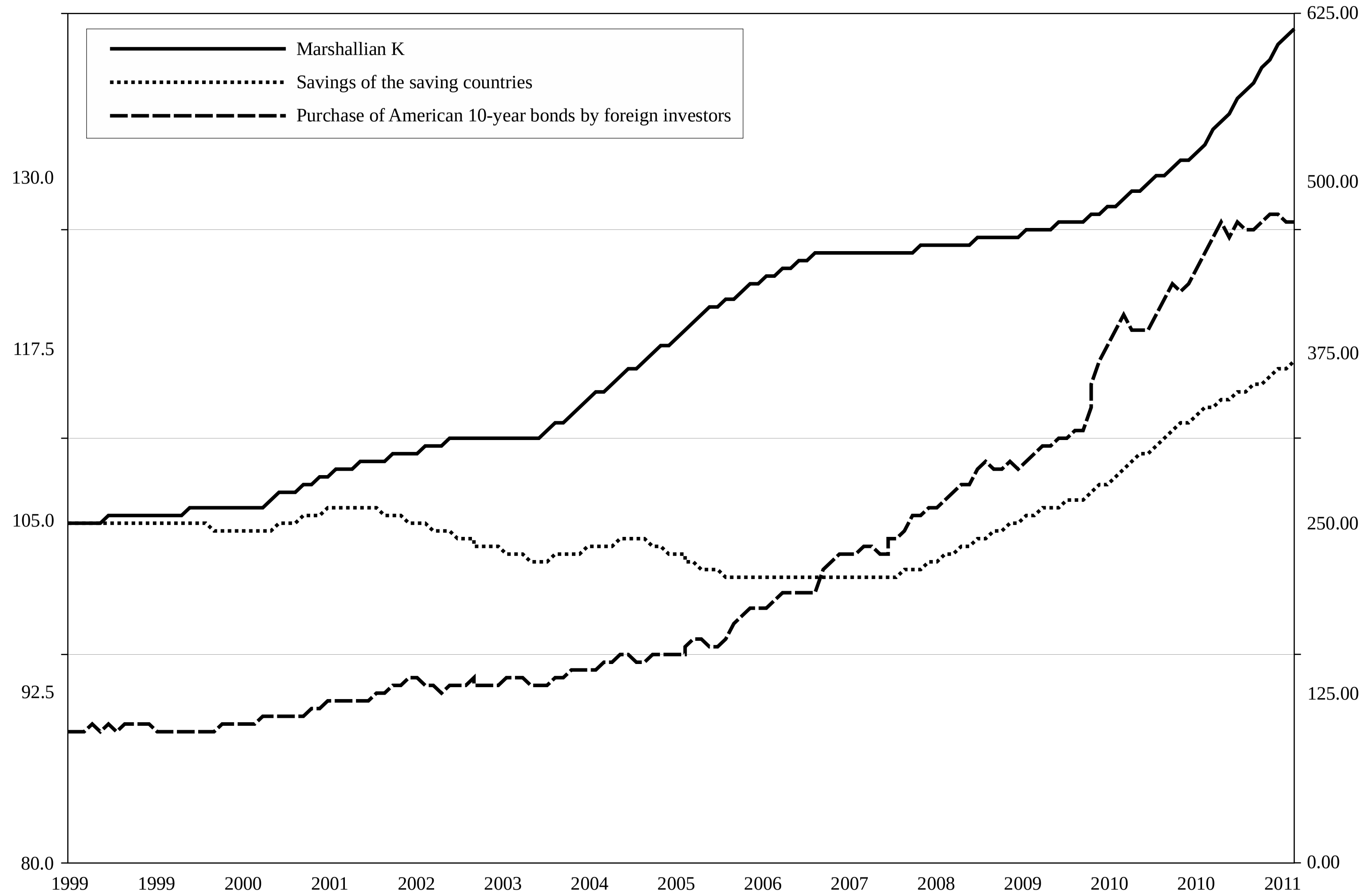

Figure 5. Marshallian K, savings rate in countries suspected of generating excessive savings (left axis) and the purchases of the US ten-year bonds by foreign investors (right axis) in 1995-2008. 1995 = 100

Source: own elaboration based on OECD.Stat data.

Table 2. Description, data sources and results of the estimation of the sources of the US ten-year bond purchases model

Explanatory variable	Coefficient	Description	Data source	p-value
mk_t	0.171	World Marshallian K	OECD.Stat	$2.92*10^{-59}$
sr_t	51.046	Savings rate in global surplus saving countries weighted by their GDP	Global Development Finance, The World Bank	2.62*10-37

Source: own elaboration.

In order to determine to what extent each of the examined effects was responsible for purchases of American bonds, four scenarios were estimated and compared. In the first one, both the demand shocks related to savings and liquidity gluts were included. The second and third ones take into account only one of these factors, while the fourth one assumes that foreign purchases of the American Treasuries did not take place. The first and the fourth ones were already presented in the previous subsection. Figure 6 demonstrates all four scenarios.

The impact of both effects increased over time, but the weight and direction are different. This phenomenon is presented in Figure 7, showing the impact that each of those particular factors had on the long-term interest rate in the USA.

Until the beginning of 2006, out of the two factors analysed, only liquidity was significant in depressing long-term interest rates. The excess of savings was smaller in this period than in 1995, and this shortfall relatively increased the yield on bonds by about 20 bps. Later, however, savings started to increase and in 2007 they reduced

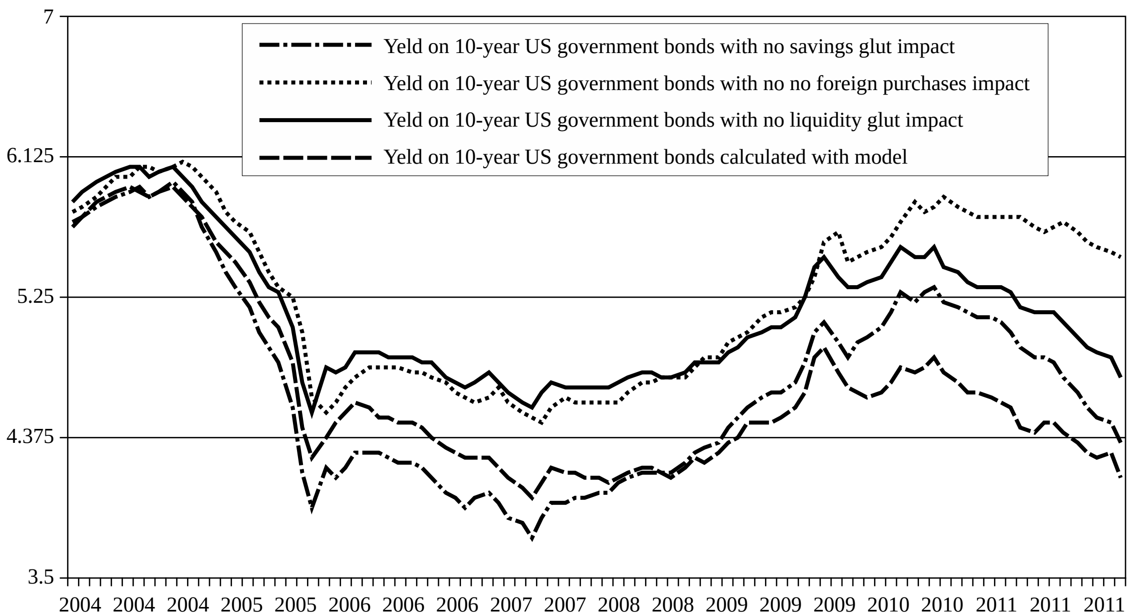

Figure 6. Yields on ten-year US government bonds with and without taking into account demand shocks related to the inflow of global savings and liquidity in 2000-2008, p.p.

Source: own elaboration.

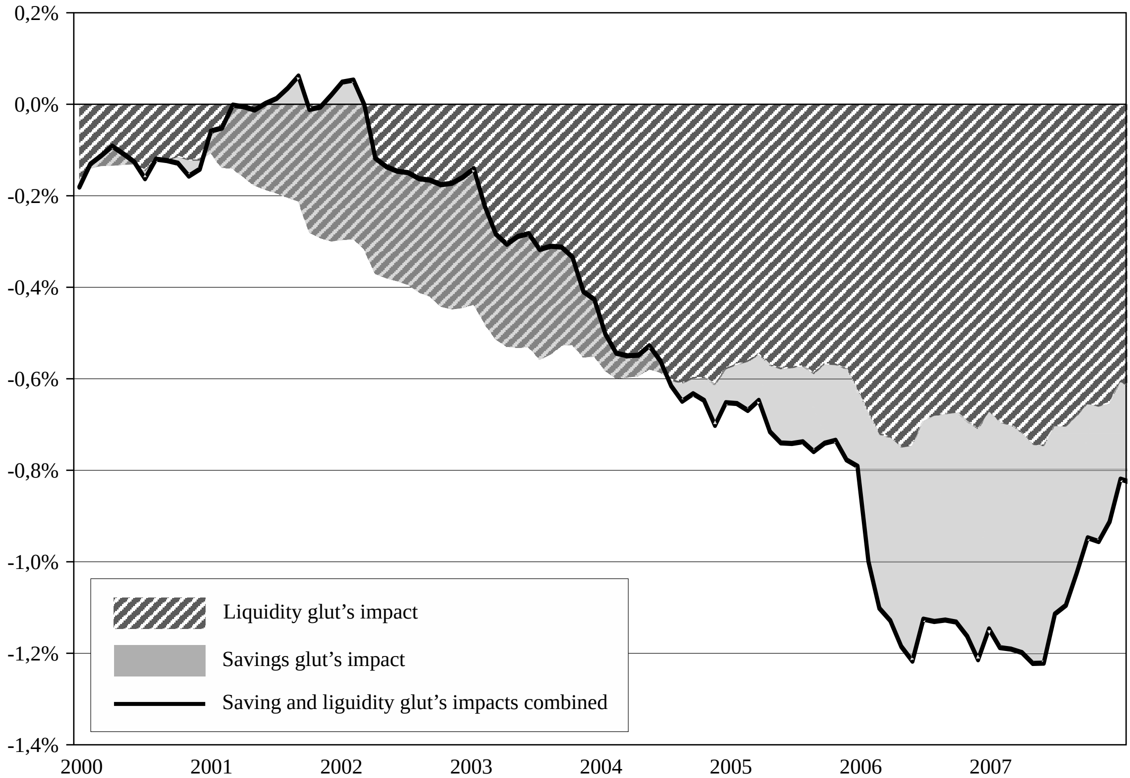

Figure 7. The impact of global savings and liquidity gluts on the profitability of ten-year US government bonds in the years 2000-2008

Source: own elaboration.

the long-term interest rates by 45 bps. Nevertheless, the importance of savings is marginal when compared to monetary liquidity. It was decreasing interest rates throughout the whole period. In 2000, it was 20 bps. and in 2008 – 75 bps. Both factors explain the 120 out of 140 bps drop in long-term interest rates caused by foreign purchases of the Treasuries.

It should be remembered that the development of the speculative bubble had taken place earlier, i.e. before the supply shock associated with the accumulation of savings started to be significant. In 2006, the existence of a real estate bubble was a fact (Zandi, 2009). In the period of 2000-2006, practically only excess liquidity reduced long-term interest rates, which is why – assuming that it was the low interest rates that contributed to the crisis – it was the global liquidity glut that helped its creation, not the savings glut.

Concluding remarks

A closer look at the countries that were excessive savers shows that they have no common denominator. Savings of countries with ageing populations constitute too small a portion of global savings to affect interest rates in the US. The Asian Tigers increased their savings during the considered period, but this was a return to the long-term average. This increase in savings surpassed growth in investments, forcing savings abroad. Oil exporters always recorded significant surpluses, and a significant growth took place long after the bubble in the US real estate market had developed. China, in turn, was indeed saving more and more. At the same time, Americans were saving far less than their economy required during that period, and they had to cover these deficiencies on international markets.

The US Treasuries were bought with funds originating in many parts of the world, leading to a reduction of long-term interest rates by 140 bps in 2007. Such significant purchases of American bonds were possible due to the investment attractiveness of the US. A high quality of institutions, a wide range of available financial instruments, highly developed financial market, high productivity, and attractive rates of return were just some of the factors attracting capital. High consumption and insufficient savings to cover investment needs were also of great importance. This, combined with the ability to issue a world reserve currency, enabled the United States to raise any amount of capital.

However, the attractiveness of the US alone could not finance the purchase of the Treasuries. This paper discusses two possible sources of the financing of those purchases: savings gluts and liquidity gluts. Although the former ones actually existed, its significance in shaping the level of long-term interest rates before the Great Financial Crisis in the US had been relatively low, peaking at 45 bps in 2007. Moreover, its impact became significant when the real estate bubble had already existed. The issue of excess liquidity is different. In contrast to savings, it reached record levels in the period of 2001-2007. Sources have changed over time, but through the far-reaching integration of financial markets, one can talk about global rather than local liquidity. It flowed to the United States and lowered the yields on government bonds – both directly and indirectly – by up to 75bps, resulting in a cheaper mortgage and, consequently, helping the real estate bubble grow.

Further research is necessary to establish whether similar effects occur today, when levels of current account imbalances are similar to the pre-Great Financial Crisis levels and after the tightening of monetary policy in the US, as well as the continuing of ultra-low interest rate policies and the quantitative easing in Europe and Japan.

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