

## Stress Tests as a Tool to Assess the Risk of Public Expenditure on Debt Servicing Increasing at Local Government Entities

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**Abstract** National and local government's public debt is of special interest to economic sciences. With interest rates in the EU countries now at historically low levels, there is risk of a trend change causing development expenditure to be crowded out from budgets in favour of debt servicing costs. The analysis (stress test) of the sensitivity of debt servicing costs in the local government sector in Poland to an unexpected growth of market interest rates above the values forecasted by the MoF confirms that local governments are exposed to interest rate growth risk, and consequently to the risk of their budgets incurring unplanned expenditure.

**Keywords:** • sub-central government • debt servicing costs • interest rate • risk

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[https://doi.org/10.4335/17.2.205-224\(2019\)](https://doi.org/10.4335/17.2.205-224(2019))  
ISSN 1581-5374 Print/1855-363X Online © 2019 Lex localis  
Available online at <http://journal.lex-localis.press>.

## 1 Introduction

The contemporary economic policy implemented in different countries takes account of the changing external and internal circumstances. Its contents reflect, to a great degree, political agendas developed in the course of electoral campaigns. The division into right and left when it comes to economic agenda, which dates back to the turn of the 19th and 20th century, has largely become out-dated. What remains slightly more clear-cut is the division into the followers of a greater dose of liberalism or a greater level of state intervention in the economic doctrine declared as the cornerstone of the policy proposed. In modern times the dominant views on the desired shape of the economic policy clearly followed the ideas of the economic school addressing current problems (Ghosh, 2013, Eberhardt and Presbitero, 2015, Ahlborn and Schweickert 2016). In the 1980s and 90s the monetarist school preferred free market and deregulation, pushing for reducing government expenditure in the name of faster long-term national income growth. In the recent years, neo-Keynesians point to the importance of adequate regulations and the significance of the state's tasks in economy, for example aimed to pursue a full employment policy. A number of economic analyses and econometric models were devoted to assessing which policy was, is or will be more rational, but the changeability of the external circumstances makes it impossible to settle this theoretical dispute. However, irrespective of which economic doctrine we hold to be dominant, each of them addresses the issues related to public debt and the optimum level of this quantity for a given country, region or individual local government entity.

When analysing the level of public debt and costs of its servicing, especially as regards finding the optimum level for a given entity, one should not only bear in mind the scenario adopted for the assumptions, but also examine various alternative scenarios of how the situation may evolve due to some emerging risks, especially that of a slower GDP growth, higher interest rates, exchange rate fluctuations and typically international circumstances, including: slower-than-expected growth of the global economy, especially in Europe, the consequences of Brexit as well as the consequences of changes in the monetary policy of major central banks, including EBC and Fed, and the capital outflows to underlying markets or other markets as a result of the geopolitical situation, among other things.

In the context of those objective elements and processes requiring in-depth analyses, and of the recent crisis, it is necessary to examine the impact of variable interest rates and exchange rate on how the level of public debt and costs of its servicing develop at local government entities. Moreover, the European Commission, as part of the 'Six-pack', especially the Council Directive 2011/85/EU of 8 November 2011 on requirements for budgetary frameworks of

the Member States, made it obligatory to present an exchange rate and interest rate sensitivity analysis in government projections regarding annual budgetary documents. The discussion presented in this article focuses on the first of the two elements, i.e. interest rate, as the exchange rate is of much lesser importance for local government entities than for the General Government (GG) debt. A decision was made to conduct analyses mostly based on this very factor, for several carefully identified reasons.

Risk management should be perceived as an integral part of a broader indicator-based strategic debt management. A strategic point of reference plays a major role in risk control. A benchmark, in its function as a management tool, requires the government to specify risk tolerance and other portfolio preferences as regards a compromise between the expected cost and risk. The risk management policy framework provides a key link between formulating and implementing debt management decisions (Palermo, 2014). The risk management framework involves, in most countries, market risk, credit risk and operational risk, while in relatively few OECD countries the risk of contingent liabilities is taken into consideration (though there is a growing interest in examining their role in this policy area) (Peterson, 1998).

In the recent years, interest rates in the European Union countries have been at historically low levels. However, symptoms of an increasing cost of capital are becoming visible. So the question is will there be a trend change after this period of low-interest rates and low cost of debt servicing, causing development expenditure to be crowded out from budgets in favour of the debt servicing category? When it comes to the exchange rate, the dynamics and scale of changes occurring on capital markets, including, especially the currency market, demonstrate that the changes in the currency valuation and perception are a phenomenon that anticipates real economic behaviours and processes. Therefore, it can be said that the exchange rate is a sort of a litmus test of the current situation and of future processes in real economy. However, due to some country-specific restrictions on local government's ability to borrow money in foreign currencies, the purpose of the article will be to focus on research into the impact of interest rate change on local government entities' expenditure on debt servicing, and, consequently the impact on their capacity to implement socio-economic measures.

This article concerns the stress test mechanism as a tool to assess the risk of public expenditure on debt at local government entities. Its main aim is to forecast the financial situation taking account of consequences of unexpected phenomena such as business cycle fluctuations and economic crises being part of the practice of medium-term planning in CEE, especially in Poland.

This article reviews the following hypothesis: Local governments do not present the analyses of potential outcomes of any negative changes that can take place in the market environment and their negative impact to absorption of additional debt servicing costs.

Local governments in Poland are exposed to interest rate growth risk and, consequently, to the risk of their budgets incurring unplanned expenditure, so the achieved results may be useful for improvement medium-term planning.

The results presented in the article are the effect of the application of the quantitative and qualitative research. The quantitative research concentrated on the method of statistical information systemisation, based on statistical source data analysis, statistic dependence methodology and scenario analysis using the stress test method. In the case of the qualitative research the achievement of the research's objectives described in this article was possible thanks to use of the methods such as: descriptive analysis, deductive and inductive reasoning, analysis and synthesis, and comparative synthesis.

## 2 Managing public debt drivers

Debt management is a process of establishing and implementing an effective public debt portfolio management policy to obtain the required amount of finance, meet the cost and risk targets and achieve other goals such as developing and maintaining an efficient debt market. Careful public debt management may help countries to reduce the costs of borrowing, mitigate the risks of re-financing, exchange rate fluctuations and debt accumulation.

The perception of the role of public debt, especially of its desirable and admissible size as part of public finance, has been a historically determined process. It involved spectacular examples of states going bankrupt due to their debt becoming unserviceable and then taking painstaking effort to rebuild their public finance. These developments unfolded amid changes in the social system and in laws, which are the product of the historical process. It is the historically evolving social system and its transformation that determine the changes in the area of state forms and law. As the state apparatus developed and its function grew in importance, the population's obligations diversified and increased. A complicated system was created to settle amounts payable in kind and by way of personal performance, to satisfy the increasingly diverse needs of the government apparatus. That's why French minister of finance under Louis XIV, Colbert, is quoted as saying that public finance is the most important element of statehood, which plays an increasingly important role in public life. His opinion indicates an inextricable link between public finance and the institution of state.

In some EU Member States, public debt was very high even before the 2008 crisis, threatening insolvency of several countries (among others, Ireland, Greece, Portugal).

When debt markets become unstable and financial stability is endangered by their behaviour, debt managers can play an important role in smoothing market distortions. During the recent global financial crisis, for example, debt managers in developed markets made dealership rules more flexible in an effort to relieve the pressure on banks' balance sheets. In many emerging market countries, governments have intervened in the bond market through different auction mechanisms to stabilize bond prices (IMF, 2015).

Another argument is that when public debt is high, public finance becomes largely susceptible to unfavourable interest rate fluctuations and business cycle disturbances (European Commission, 2015, Boris, 2014). Such disturbances, as a rule, are not unidirectional in nature. For interest rates, this may mean either an abrupt fall or increase. Central banks' direct response to the panic selling on financial markets was to unexpectedly cut interest rates. The consequence is, of course, a sharp decline in the profitability of the debt market, which only seemingly stabilises public debt at the cost level, encouraging further borrowing. A sudden and significant decline in the yield of debentures entails destabilised investor demand. Meanwhile, when public finance is in bad shape, even a slight interest rate increase may, on the one hand, cause government development programmes to be postponed, and on the other hand, there may be a concern about the country falling into a debt trap (Ahiborn, Schweickert, 2016). Both those phenomena may result in decreasing demand from institutional investors interested in buying treasury bonds. Interest rate changes may automatically increase the risk of higher debt servicing costs, and thus crowd out other pro-growth public expenditure. Greece, Ireland and Portugal, the countries the most affected by the European debt crisis, received financial support from the International Monetary Fund (IMF) and from the European Union (EU) as part of the European Financial Stability Mechanism (EFSM) and European Financial Stability Instrument (EFSF), without which they would be unable to solve their financial problems (Huang, Su, Joseph and Gilder, 2018). Also, fiscal turbulences again showed the need to introduce or, if it already exists, strengthen the relevant fiscal management framework (Vammalle and Hulbert, 2013).

The risk management policy framework provides a key link between formulating and implementing debt management decisions (Power, 2004). Those in charge of public debt management should take care to ensure an optimum public debt portfolio structure (Reinhart, Rogoff, 2010). A major role in the portfolio structure should be assigned to the criterion of cost risk, to protect the government's fiscal position against various shocks (Quinn and Warren, 2017, Romp, de Haan, 2007).

The optimum debt composition is calculated by analysing the relative impact of risk and of different debt instruments' costs on the likelihood of the stabilisation goal not being well defined (Kluza, 2017).

The increase in knowledge of how to use financial instruments has made it necessary for local government entities to adapt their methods of managing interest rate and exchange rate variability risk to their specific operations.

The source of those turbulences was the financial crisis that started in the summer of 2007 on the US subprime mortgage market. This crisis very quickly degenerated into the most serious worldwide economic downturn since the Great Depression of the 1930s.

What followed later, that is in all of 2009 and the upcoming years, perfectly shows that the powerful currency valuation shifts were a harbinger of equally powerful disruptions in the real economy.

Risk aversion was rapidly growing. At first, observed on money markets of the developed countries (2007–2008), it quickly spread to other segments of financial markets as well, also in developing countries (including Poland). Financial asset price volatility and the risk premium greatly increased. This, in turn, entailed a sudden investor flight from risky and low-liquidity assets (including Polish zloty and the region's other currencies). With the option to use financial leverage, institutional investors were overexposed to financial assets compared to equity. As a result, even small losses were capable of causing liquidity and solvency problems in many investment banks. Since it was impossible to decrease the financial leverage by reducing the scale of expenditure (as a result of bearish global market sentiment), local governments started limiting their investment exposure, which entailed many negative consequences (Kluza, 2014).

### **3 Financial projections at local government entities and risks**

The intensification of the euro-area sovereign debt crisis triggered a wider debate on the possibility to improve security and stability of this source of finance (European Union, 2017). The European Parliament, on 6 July 2011 requested the European Commission to investigate the feasibility of common issuance in the context of adopting the legislative package on euro-area economic governance, underlining that the common issuance of Stability Bonds would also require a further move towards a common economic and fiscal policy (European Commission, 2011). These processes perfectly show that a deeper integration is just a matter of time, and that the sovereign bond market is becoming an integral point of reference for such concept. Consequently, it is obvious that irrespective of the type and nature of the actions to be adopted, they will have to be accompanied

by a substantially reinforced fiscal surveillance and policy coordination as an essential counterpart so as to avoid moral hazard and ensure sustainable public finances (European Commission, 2011).

At the time of quickly evolving changes in the external environment and the related risks, so significant for effective debt management, a major problem is that of proper management of risks to optimise their elasticity, and the possibility of precise use of corrective mechanisms resulting from the current stage of the business cycle. Implementing the risk management policy with a special focus on financial risks (interest rate risk, credit risk and exchange rate risk) in the general strategy became a rule in the business sector only after 2008. In the public finance sector, the issue of planned risk management is still underestimated and thus has a limited reach (IMF, 2016). A part of this problem is the issue of the changing interest rate and the impact of its change on local government entities' investment capability (Lucianelli and Citro, 2017). As a matter of fact, it should be borne in mind that generally a fiscal rule should be characterised by a lasting effect and invariability, which determines its proper application. It is a tool for imposing a long-lasting constraint on fiscal policy through top-down limits on budgetary aggregates (Shrithongrun, Kriz, 2014). On the other hand, though, the concept of fiscal stability and the resulting principle of risk management make it impossible to remain passive in the face of external environmental factors that increase the possibility and scale of widespread occurrence and aggravation of deficits.

An adequate public debt limit should reflect a given entity's current situation and the development challenges (mentioned in strategic documents) facing a local public sector entity as well as region-specific public debt management determinants (Bastida, Beyaert and Benito, 2013). When it comes to the outlook and assessment of an entity's current public debt situation, it poses no major difficulties, while the process is much less successful in the medium-term perspective (Checherita-Westphal, Rother, 2012).

Development strategies and programmes, including public investment, as well as public finance consolidation and restructuring processes are multiannual in nature. The outcomes and material results of the actions undertaken are most often visible a long time after those actions were planned, quite rarely within one budget year. The Council Directive on requirements for budgetary framework of the Member States imposes a duty to base budgetary planning on credible and effective medium-term budgetary frameworks with a planning horizon of at least three years. According to that Directive, medium-term frameworks include multiannual objectives in terms of deficit and debt, expenditure and revenue projections, description of actions as well as an assessment of the impact of this time frame on the long-term sustainability of the public finances (Ghosh, Kim, Mendoza, Ostry and Qureshi, 2013). Each subsequent annual budget legislation should be



consistent with medium-term budgetary framework. The essence of such approach can be found in actions undertaken by respective countries. Since the inception of the European Union, Member States have committed to running a responsible economic policy that is conducive to stable and sustainable development across the entire association. The proper functioning of the community as a whole requires an adequate level of real convergence consisting in evening out socio-economic development disparities between respective regions and Member States, in efforts to synchronise business cycles etc.

Debt management at the time of low and ultra-low interest rates does not, these days, reflect the full significance of this process and of the risks directly involved, hence it is necessary to look at this phenomenon from medium-term perspective. Currently, it consists of conventional measures, often implemented in a schematic manner as part of top-down decisions without analysing the region-specific costs of debt servicing and the external environment. Once the period of cheap money is over, the terms of external finance and all debt management processes will very quickly and significantly grow in importance. However, the phenomenon itself has at least two dimensions. The first one, much more fine-tuned in terms of governance, is central debt management. The other dimension, often overlooked or marginalised, is debt management at a local level. A wide or even growing scope of tasks implemented by local government entities determines their progressive role in improving the living standards and quality of life of the local community and, thus, in shaping the dynamics of local development as part of sustainable development of the entire economy. There being no precise definition of the term "high debt", a number of suggestions are put forward as to how to limit this negative phenomenon. It should be mentioned here that even debt incurred for capital expenditure, referred to as "good" debt in the literature on the subject, can transform into a negative factor threatening the local government's financial stability due to the possible dynamic changes in the cost of money. There being no specialised approach, or even skills and knowledge as regards flexible and proactive use of relevant financial instruments, especially in the long-term horizon (above one year), the risk of excessive debt at the local level may very quickly rise from being a minor public debt risk to a leading risk of systemic importance.

Local governments have a limited impact on the short-term budget situation and a yet more limited impact on shaping local economic circumstances driving the size of their long-term budgetary revenues. On the other hand, local government entities are responsible for carrying out a wide range of tasks from the realm of social services, which generate the so-called rigid expenditure needs, which require higher financing at the time of an economic slowdown. Negative outcomes of an economic slowdown are also manifested in lower local government budgetary revenues coupled with delays depending on the structure of the local government revenue system. There are grounds to believe that when forecasting



the financial situation, one also needs to take account of consequences of unexpected phenomena such as business cycle fluctuations and economic crises as potential events that may adversely affect finance. That's why it needs to be assumed that work on financial projections and strategies should be an iterative process taking account of potential risks, especially those relating to local government debt due to its multiannual payment schedule. Meanwhile, one of the major tasks of state's supervisory authorities is to present an opinion on the correctness of the planned amount of this subsector's entities' debt resulting from the planned and incurred obligations, based on the resolution adopted by local governments on multiannual financial projection, and on budget legislation. In local governments, planning the borrowing needs for respective years and the related projected costs of current debt servicing will depend on the adopted assumptions as to the prospects for the directions and rate of the country's economic development. The practice of medium-term planning in CEE countries (e.g. in Poland), in place for several years now, shows the drawback of structuring those documents following one base scenario of a country's economic development. Usually local governments do not present the analyses of potential outcomes of any negative changes that can take place in the market environment and their impact on the projected values included in medium-term plans, especially the impact of changes of economic factors on the values related to debt and its servicing (Avarri-Galera, Buendia-Carrillo, Lara-Rubio and Rayo-Cantón, 2017). Consequently, legislative, executive and supervisory authorities of the local government as well as the public opinion have limited knowledge on the potential negative consequences that local government may experience in the event of a crisis or economic downturn. According to research, nearly 20% of local governments, for example in Poland, develop more than one financial projection scenario. In the literature on the subject it is deemed suitable to use three base scenarios of the future development of the local government's financial situation. It is of special importance to refer to a worst-case scenario, i.e. a scenario where the country's low economic growth limits budgetary revenues necessary to finance stable development of the local sector, and the changes taking place in the legal environment increase the restrictions on local government debt, while forcing local governments to undertake new tasks without guaranteed adequate funding. It is emphasised that the problem of debt control has top priority, and best practices of financial institutions indicate the need for regular use of stress tests to identify the risk exposure, especially in the area of debt management (Jones, Hilbers and Slack, 2004).

#### **4 Overview of the research model – the use of stress tests to assess financial management risks faced by a local government entity as exemplified by Poland**

The reason why Poland was chosen for the analysis is that its local government sector overcame the budget deficit, and in 2016 it even achieved a surplus of 0.3% of GDP without a major reduction in public debt, which still stands at a 5% of GDP. In Poland, in 2004–2016, GG debt did not exceed the reference value of 60%, and that of LG fluctuated from 4.33% to 5.26% of GDP. Meanwhile, the sector's deficit in this period (apart from 2007) was above 3% for GG, hence remedial action in the form of Excessive Deficit Procedure (EDP) was implemented twice for Poland. At the same time, a very significant consolidation was taking place in LG as the deficit was reduced from -1.1% of GDP to a surplus of 0.3% of GDP. The size and structure of the excessive GG deficit recorded in Poland were quite diverse in the period under analysis. In 2004–2008, good economic times were taken advantage of insufficiently at the general government level and very well at the local government level to reduce the deficit; on the other hand, such situation indicated there were structural causes of the excessive deficit.

The scenario method was chosen for research. The variability and instability of the external environment often make it impossible to draw the right conclusions from the analysis of processes taking place in the environment. There are many non-continuous phenomena taking place in the economic reality, and their incidental occurrence may have both positive and adverse effect on the behaviors of an organization. To properly assess the reality, it's necessary to take account of multi-dimensional and multi-variant potential states of the environment; such opportunity is provided by scenario methods using the stress-test method.

A stress test is a test used to identify the sensitivity of a given financial institution's portfolio to an extreme but possible events (Vasilopoulos, 2013). Stress tests are based on analytical methods meant to measure an institution's sensitivity to a change of one of the risk factors (Jones, Hilbers, Slack 2004). They are one of the risk management techniques used at financial institutions, providing a basis for strategic planning and a better understanding of the risk exposure, and they should be based on events with severe consequences, which are quite unlikely but possible. The tests may be either obligatory, regulated by laws/ imposed by a supervisory authority or conducted on a voluntary basis by financial institutions. The structure of stress tests includes core macroeconomic data such as gross domestic product, level of investment, unemployment rate, public debt, public finance deficit and data on interest rates, exchange rates and price indices (Strang, Korstanje, Vajjhala, 2018, Dallago, 2016). An important element of tests is their calibration, i.e. identification of the size of shocks as they are to reflect a situation that is likely to occur, and similar to extreme events from the past. As for

hypothetical shocks, they will involve events that have never been observed yet but are possible in the future (Fernandez-Perez, Frijns, Fuertes and Miffre, 2018). Test scenarios are built assuming their economic and logical consistency and based on the real interdependence between risk factors, taking account of the changes to the environment resulting from political, economic and legal developments.

An analysis (stress test) was conducted of the sensitivity of debt servicing costs in the local government sector in Poland to an unexpected growth of WIBOR 3M rates i.e. a growth above the values forecasted by the Ministry of Finance presented in the guidelines for the public finance sector. The sum total of the related debt servicing cost increase reflects the scale of potential additional expenditure to be incurred by local government entities in excess of the amount assumed in planning documents.

Based on the reporting data of all of Poland's local government entities, i.e. 2808 entities, published on the Ministry of Finance website, the average quarterly balance of debt liabilities in 2014–2016 and debt servicing expenditure (costs of debt financing) in 2014–2016 was established, broken down into local government entity types in Poland. Then, the average interest rate was calculated for debt obligations of all local government entities in Poland in respective quarters of 2014–2016. These data were confronted (respectively for given periods) with data on the reference value of interest rate for loans on the Polish interbank market, i.e. with WIBOR 3M rates, following which the average spread over WIBOR 3M rate was calculated for 2014–2016 local government debt. Using projections data on multiannual planning, data from medium-term local government documents in Poland for 2018–2021 were collated as regards the projected debt balance and projected debt servicing expenditure, and it was calculated how much the interest rate on debt obligations as projected by the local government sector in Poland exceeds the WIBOR 3M rate projected by the Ministry of Finance.

To simplify further analyses, an assumption was made that this spread is equivalent to the level of projected provision for securing local governments against the interest rates increasing above the level presented in the Ministry of Finance projections.

A key part of analyses was based on calculating the degree of sensitivity (stress testing) of the servicing costs of the projected debt obligations of local governments in Poland in the event of market WIBOR 3M rates increasing over the rates projected by the Ministry of Finance in its guidelines for the public finance sector. The last stage of research involved establishing the scale of potential additional (i.e. exceeding the amounts of provisions already projected) local government sector's expenditure on debt servicing to exceed the amounts

presented in official local government documents related to medium-term planning documents for 2018–2021.

To establish potential interest rate growth scenarios in Poland, the fluctuations of the following indicators during the last financial crisis were analysed: NBP (National Bank of Poland) reference rate, WIBOR 3M (Warsaw Interbank Offer Rate) rate and the yield of 10-year treasury securities issued by Poland (SPW).

As revealed by the analyses conducted, NBP reference rate rose by 2 percentage points at the peak of the world financial crisis. The spread between the lowest and highest rate in 2007–2012 is 2.5 p.p. Meanwhile, the spread between the lowest and highest rate of WIBOR 3M in 2007–2012 is 3.0 p.p. As regards the yield of 10-year SPWs, the spread between the lowest and highest yield in 2007–2012 is 3.5 p.p.

Based on the analysis of data on interest rate fluctuations in 2007–2012 (Diagrams 1-3), the following stress test scenarios were adopted: highly likely 0.5 p.p. interest rate increase, likely 1.0 p.p. interest rate increase, possible 1.5 p.p. interest rate increase, interest rate increase similar to changes recorded in 2007–2012, i.e. 3.0 p.p. interest rate increase (Annex: Diagram 1 – WIBOR 3M (%) 01.2007-12.2012; Diagram 2 – NBP reference rate; Diagram 3 – yield of 10-year treasury securities (SPW)).

Shock calibration at the level of 0.5, 1.0, 1.5, 3.0 interest rate increases is reflected in table 5.

Market interest rates in Poland have been historically low since 2015, amounting to 1.72 % per year (see Table 1).

In the period of interest rates falling and maintaining historically low levels, Polish local government sector's total nominal expenditure on debt servicing was falling (see Table 2).

It is especially noteworthy that in 2015 the costs of local government's debt servicing in Poland were reduced by PLN 402.4 million compared to 2014, i.e. by nearly 16.5%, despite the local government sector's nominal debt as of the end of Q4 2015 going up by PLN 894 million compared to the same period in 2014, i.e. despite the debt increasing by nearly 1.3 % (see Table 3).

In 2014–2016, local government debt reached its maximum level as of the end of Q1 2015, amounting to PLN 71,663 million. Local government debt in nominal values reached PLN 68,522 million as of Q4 2016 and was slightly lower, by 0.5% and by 347 million, than debt as of the end of Q1 2014 amounting to PLN

68,869 million. In the years under analysis, Polish local government's nominal revenue growth was found to be higher than its nominal current expenditure. Consequently, in nominal terms, the local government sector's operating surplus grew from PLN 16,326 million as of the end of 2014 to PLN 20,500 million as of the end of 2016 (see Table 4).

Analyses of debt servicing expenditure indicate that the ratio of debt servicing costs to local government's operating surplus decreased from 15% in 2014 to 10% in 2016 (see Table 5).

As revealed by data presented in Tables 5– 8, an additional 0.5 p.p. interest rate increase would require Polish local government's expenditure on debt servicing to grow from PLN 75,7 million a year to PLN 338 million, an additional 1.0 p.p. interest rate increase would require Polish local government's expenditure on debt servicing to grow from PLN 395 million a year to PLN 674 million, and an unplanned 1.5 p.p. interest rate increase would require Polish local government's expenditure on debt servicing to grow from PLN 778 million a year to PLN 1,010 million. Meanwhile a 3.0 p.p. increase would cause local government expenditure in 2017–2021 to grow from PLN 1.7 billion to PLN 2.0 billion.

## 5 Results

Local governments in Poland are exposed to interest rate growth risk and, consequently, to the risk of their budgets incurring unplanned expenditure. The scale of this risk, estimated based on a stress test for interest rates growing as much as during the last financial crisis, is from nearly PLN 0.8 billion (for a 1.5 p.p. interest rate growth) to PLN 2.0 billion a year (for a 3.0 p.p. interest rate growth). One of the effective methods for eliminating the risk of debt servicing costs in the local government sector increasing is to incur obligations based on fixed interest rate. Table 9 presents the percentage share of fixed interest debt obligations in total debt obligations for selected local governments in Europe (see Table 6).

For some local government entities, fixed-rate debt obligations represent a margin of their debt (Tallinn, Riga) as opposed to those having exclusively fixed rate debt obligations (Oslo, Lazio Region).

In practice, local governments in Poland, unless they issue fixed interest rate bonds, have limited options to obtain fixed-rate credits. An analysis of the market situation indicates that few banks provide such offering in practice. The most advantageous terms are offered, subject to meeting additional conditions, by a non-commercial bank, European Investment Bank.

## 6 Conclusion

Research presented in the article indicates that public finance measures consisting in risk assessment in public debt management contribute to greater sustainability of broadly defined local government finance (Megersa, Cassimon, 2015). Stress testing demonstrated that of paramount importance is to choose the right public debt management methods at local governments, especially as regards implementing solutions to mitigate the consequences of the changing interest rates (Patillo, Poirson, and Ricci, 2002). Indeed, such measures may directly translate into a region's capacity for growth. The results obtained show how the offering of commercial banks in this respect falls short of the needs. With respect to the local government sector, such offering is presented by non-commercial banks, subject to local governments meeting relevant credit conditions. In most situations, the instruments currently in place do not protect the local government sector against negative consequences of the changing external environment as regards a potential interest rate increase. From the perspective of the socio-economic policy, identifying a clear source and intended use of loans contracted by the state was a major tenet of the orthodox public finance theory. The research results presented in the article indicate that in the period analysed we can distinguish the following interrelations:

- a low-interest rate level without a properly designed mechanism to mitigate the risk of its increase in public debt securities does not positively contribute to the level of socio-economic development;
- the local government sector currently has limited interest rate risk management capability.

Research also confirmed that local government entities are unable, as part of financial planning, to effectively take advantage of the period of low and ultra-low interest rates. Anticipatory measures such as obtaining fixed-rate external finance are virtually not used, and the officials' awareness and knowledge in this respect are visibly limited. Efficiency and current security, though illusory in quite many cases, become the foundation of significant risks in the future.

Deliberations held for the purposes of the article also confirmed that risk management should be viewed as an integral part of broader strategic framework for indicator-based debt management. The risk management policy framework provides a key link between formulating and implementing debt management decisions. The following types of risk exist within this framework, in most countries: market risk (interest rate risk and currency risk), credit risk and operational risk (Kluza, 2014). Hence, it's worth conducting detailed analyses and stress tests that help minimise the negative effects for the population of a given country or region, should one of the risks materialise (Zimmer, Gründl, Schade, and Glenzer, 2016). Moreover, importantly, the local community and all

stakeholders should have access to the results of stress tests of local government entities' resilience to potential absorption of additional debt servicing costs in situations of turbulence and crises on financial markets.

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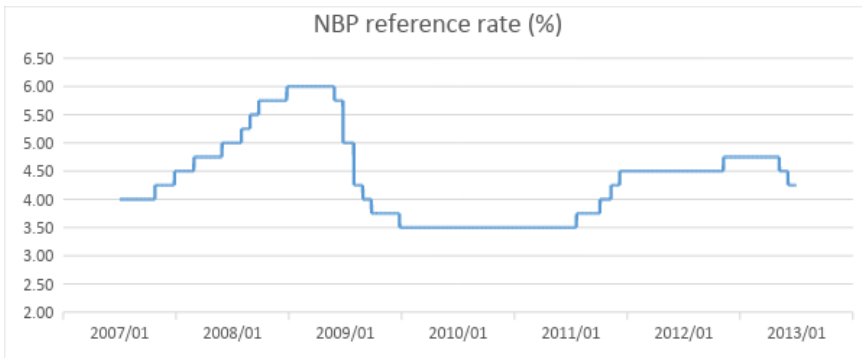
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**Appendix:**

**Graph 1: WIBOR 3M (%)**



**Graph 2: NBP reference rate (%)**



**Graph 3: Yield of 10-year treasury securities (SPW)**



**Table 1:** WIBOR 3M rates in 2014–2016

WIBOR 3M (%)	2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	2.71	2.71	2.59	2.06	1.86	1.68	1.72	1.73	1.69	1.68	1.71	1.72

Source: Own compilation

**Table 2:** Polish local governments' expenditure on debt servicing in 2014–2016 (PLN million)

Details	2014	2015	2016
City counties (cities with Powiat rights)	1,093.0	905.5	885.9
Communes (Gminas)	925.2	771.5	701.3
Counties (Powiats)	211.4	171.5	156.0
Voivodeships	210.1	188.7	184.6
<b>Total Local Governments</b>	<b>2,439.7</b>	<b>2,037.3</b>	<b>1,927.8</b>

Source: Own compilation

**Table 3:** Local government debt in Poland in 2014–2016 (PLN million)

Details	2014				2015				2016			
	I qt	II qt	III qt	IV qt	I qt	II qt	III qt	IV qt	I qt	II qt	III qt	IV qt
City counties (cities with Powiat rights)	30 924	30 604	30 426	31 527	32 427	32 432	32 393	32 770	33 031	32 664	32 439	32 612
Communes (Gminas)	25 464	24 988	24 903	25 711	26 163	25 843	25 530	25 347	25 059	24 320	23 679	23 636
Counties (Powiats)	5 826	5 737	5 715	5 837	5 881	5 773	5 702	5 759	5 759	5 602	5 493	5 512
Voivodeships	6 656	6 619	6 605	6 972	7 191	7 044	6 982	7 065	7 104	7 003	6 854	6 762
<b>Total Local Governments</b>	<b>68 869</b>	<b>67 947</b>	<b>67 649</b>	<b>70 047</b>	<b>71 663</b>	<b>71 091</b>	<b>70 607</b>	<b>70 941</b>	<b>70 953</b>	<b>69 589</b>	<b>68 466</b>	<b>68 522</b>

Source: Own compilation

**Table 4:** Operating surplus of local government in Poland in 2014–2016 (PLN million)

Details	2014	2015	2016
Current revenue	171 713.6	176 053.5	200 695.2
Current expenditure	155 387.6	157 820.8	80 195.3
<b>Operating surplus</b>	<b>16 326.0</b>	<b>18 232.7</b>	<b>20 499.9</b>

Source: Own compilation.

**Table 5:** Stress-test of debt servicing costs: additional 0.5, 1.0, 1.5 and 3.0 p.p. interest rate increase variant (PLN million)

Details	2018	2019	2020	2021
<b>additional 0.5 p.p.</b>				
City counties (cities with Powiat rights)	–	–	78.2	10.2
Communes (Gminas)	62.5	119.3	171.7	111.4
Counties (Powiats)	6.6	20.8	34.2	23.5
Voivodeships	6.5	31.6	53.8	37.9
Total Local Governments	75.7	171.7	338.0	182.9
<b>additional 1.0 p.p.</b>				
City counties (cities with Powiat rights)	127.6	187.8	271.5	195.6
Communes (Gminas)	193.0	232.5	266.7	189.0
Counties (Powiats)	33.8	44.4	54.1	39.8
Voivodeships	41.5	63.1	82.0	62.4
Total Local Governments	395.8	527.9	674.3	486.8
<b>additional 1.5 p.p.</b>				
City counties (cities with Powiat rights)	317.0	384.9	464.8	381.0
Communes (Gminas)	323.5	345.8	361.6	266.5
Counties (Powiats)	61.0	68.1	74.0	56.2
Voivodeships	76.4	94.7	110.1	87.0
Total Local Governments	777.9	893.5	1 010.5	790.7
<b>additional 3.0 p.p.</b>				
City counties (cities with Powiat rights)	885.4	976.3	1 044.8	937.3
Communes (Gminas)	714.9	685.5	646.4	499.3
Counties (Powiats)	142.5	139.0	133.6	105.2
Voivodeships	181.3	189.3	194.5	160.6
Total Local Governments	1 924.1	1 990.1	2 019.4	1 702.5

Source: Own compilation

**Table 6:** Share of fixed interest debt obligations in total debt obligations for selected cities in Europe

Local government entity name	Country	Share of fixed interest rate obligations (%)
<b>Tallinn</b>	Estonia	8.0
<b>Riga</b>	Latvia	17.0
<b>Brno</b>	Czech Republic	35.6
<b>Ostrava</b>	Czech Republic	46.0
<b>Izmir</b>	Turkey	88.3
<b>Lombardy Region</b>	Italy	94.0
<b>Oslo</b>	Norway	100.0
<b>Lazio Region</b>	Italy	100.0

Source: Own compilation based on rating agencies' materials

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