

THE DETERMINANTS OF FINANCIALIZATION –
A BAYESIAN APPROACH¹

*LOS DETERMINANTES DE LA FINANCIARIZACIÓN -
UN ENFOQUE BAYESIANO*

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ABSTRACT

This study considers the determinants of financialization in a sample of 158 countries over the period of 2000-2016. The atheoretical Bayesian model averaging approach was applied in order to identify the macroeconomic determinants of the phenomenon. A broad set of variables was tested without adopting any theoretical perspective. It was revealed that the main determinants of financialization are connected with the real sphere of economy, demographic issues and the new conditions in which the global economy functions. At the same time, factors from the financial and monetary sphere, such as interest rates and CPI, were revealed to be insignificant. The Bayesian model averaging approach could be regarded as a promising method for quantifying and empirically investigating such a complex phenomenon as financialization.

Keywords: Financialization, Bayesian model averaging, global economy, heterodox economics.

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RESUMEN

Este estudio aborda los determinantes de la financiarización en una muestra de 158 países durante el periodo 2000 a 2016. Se aplicó el enfoque de promediado bayesiano del modelo teórico para identificar los determinantes macroeconómicos del fenómeno. Se probó un amplio conjunto de variables sin adoptar ninguna perspectiva teórica. Se reveló que los principales determinantes de la financiarización están relacionados con la esfera real de la economía, los problemas demográficos y las nuevas condiciones en las que funciona la economía global. Al mismo tiempo, los factores del ámbito financiero y monetario, como las tasas de interés y el IPC, resultaron insignificantes. El enfoque de promediado bayesiano del modelo podría considerarse un método prometedor para cuantificar e investigar empíricamente un fenómeno tan complejo como la financiarización.

Palabras clave: financiarización, promedio del modelo bayesiano. economía global, economía heterodoxa.

Clasificación JEL / JEL Classification: B50, C11, E44, G21.

1. INTRODUCTION

Beginning in the late 1970s, heterodox economists paid increasing attention to the phenomenon of financialization, related to its fourth wave, which exceeded previous waves in intensity and scope (Arrighi, 1994). Still, the very term 'financialization' — sometimes treated as a synonym of 'financialized capitalism' (Dumenil and Levy, 2005), having been designed to describe the growing role of finance in the economy, as well as its impact on the social, cultural and environmental aspects of society's functioning (Brown, Veronese Pasarella and Spencer, 2017) — has different meanings and definitions (see e.g. Brown and Spencer 2013; Epstein, 2005; Freeman, 2010; Krippner, 2005, Sawyer, 2013).

There is, however, a common core to this phenomenon. Usually, looking for more specific features of financialization in the economy, one might indicate the following processes and phenomena (Brown and Spencer, 2003): 1) the dissemination and rapid expansion of financial markets; 2) the deregulation of financial systems, as well as individual economies; 3) the constantly expanding range of financial instruments and institutions; 4) economic and social policy decisions favouring the development of financial markets; 5) the increase in credit sustained consumption; 6) the widespread and growing presence of institutions, instrument markets, financial schemes in economic and social life, and 7) the development of a specific (individualistic, market-oriented, utilitarian) financial culture. In all these aspects, one thing is always manifested — the superiority of the financial sphere over the real sphere of the economy.

Despite a growing predominance of finance over the real economy, sometimes perceived as a crucial factor contributing to financial crises (including the financial crisis of 2007-2009 — see e.g. Nölke, 2017), financialization still eludes unambiguous interpretation. The main reason for this is that financialization — as a research problem — is regarded differently by heterodox and mainstream economists. These disagreements mainly concern the nature and determinants of financialization, its consequences, and the applied methods of research,

According to the heterodox view, financialization is a negative phenomenon which is connected with the inadequate structure of the economy, and which generates (or reinforces) numerous biases in specific segments of the economy and society. Thus, its consequences are negative for both economic and social domains (see: e.g. Assa, 2008; Hein, Detzer and Dodig, 2016; Fine,

2013; Garcia-Arias, Horn and Toporowski, 2017; J. Jayadev and Epstein, 2005; Lavoie, 2013; Kedrosky and Stangler, 2011; Sawyer 2017; Orhangazi, 2008; Palley, 2007, 2012; Toporowski, 2012). Mainstream economists, on the other hand, perceive markets and financial systems as always efficient and sustainable. Therefore, they regarded the development of financial markets and the growing importance of the financial sphere as positive, being in line with the needs of participants in market processes. At the same time, they rather ignored the social nature of money and the influence of sociological and psychological factors (including animal spirits) on its value. As a result, the mainstream macroeconomists presented the problem of money in an increasingly simplified manner, reducing the monetary system almost solely to the monetary policy strategy of the central bank, and built macroeconomic models that neglected many important factors, such as financial intermediaries, the social role of money.

As a result of these different perceptions of financialization, only heterodox economists have undertaken studies on the determinants and consequences of this phenomenon. Surprisingly, the Global Financial Crisis 2007-2009 allowed their agenda to enter into wider awareness, including the narrative that depicts financialization as a source of the fragility and instability of individual economies. The crisis has also shown the ineffectiveness of mainstream macroeconomic models – especially DGSE ones (Allington et al, 2011; Dembiński, 2009; Palley, 2012; Mehrling, 2000).

However, heterodox economists were unable to propose a coherent, specific methodological framework for research on financialization, focusing rather on a narrative-approach, without the use of formal models and advanced quantitative research. Above all, they have tried to capture and understand the essence of this phenomenon in a broader economic and social context. Finally, they called into doubt the possibility of analysing the determinants of financialization with quantitative methods.

We argue that the phenomenon of financialization occurs, and that it is the source of various problems. Unfortunately, the lack of an unambiguous theoretical approach to the determinants of financialization prevents it being understood, controlled and modelled properly. Therefore, we argue that it is necessary to use the atheoretical approach to test the robustness of financialization determinants. The lack of an *a priori* theoretical structure removes the grounds for criticism and reduced the influence of ideological issues, and objectifies the research process. The only limitation is data availability and the time required for calculations. Knowing and understanding the determinants of financialization might help to reduce its negative effects. Moreover, the precise identification of the determinants of financialization may allow for effective competition with mainstream theories.

Our research questions are as follows: (1) what are the determinants of financialization in the global economy?; (2) how can financialization be quantified and empirically investigated?

Thus, the main goal of this paper is to identify the factors responsible for processes of financialization in the global economy. As an indicator of financialization, the ratio of financial sector assets to GDP was selected. Unlike the previous research on financialization, we use an atheoretical approach, namely the Bayesian model averaging approach. It is used to identify the potential factors responsible for financialization in a sample of 158 countries over the period of 2000-2016. Instead of a theory driven approach, we employ a data-driven one. Our contribution to the literature consists in presenting a novel methodology for the empirical analysis of this phenomenon, and in singling out determinants of financialization that have not been identified previously. To analyse this important economic and social problem, we combine a heterodox theoretical approach to financialization with quantitative methods typical for mainstream economics.

The paper is structured as follows. In Section 2, we discuss the results of previous (qualitative and quantitative) research on the determinants of financialization. Section 3 introduces the dataset and research design, and Section 4 contains the results. The conclusions are presented in Section 5.

2. THE DETERMINANTS OF FINANCIALIZATION – A LITERATURE REVIEW

Financialization is a phenomenon that extends far beyond purely economic processes. Its influence extends to the whole of social life in individual countries, as well as to the global economy. Thus, in the literature one might find, among others, such expressions as ‘financialization of commodities’ (Cheng and Xiong, 2014), ‘financialization of housing’ (Aalbers, 2008), ‘financialization of education’ (Eaton et al., 2016), or ‘financialization of water’ (Bayliss, 2014).

Looking at such a diversity of topics and issues, it is not surprising that there is no single, most important determinant of financialization. There is rather a number of processes and factors that have enabled and accelerated financialization. That generates a problem of the endogeneity of many determinants. It is characteristic that certain groups of determinants are closely related to each other, contributing to numerous feedbacks. What is more, in many cases it is difficult to distinguish between the specific cause of financialization, an indicator of financialization, or even a specific consequence of this very process. Therefore, when considering the determinants of financialization, it is necessary to talk about a combination of many, mutually stimulating factors, both at the microeconomic level (such as enterprises, households and specific markets) as well as at the macroeconomic level. In other, words, financialization is therefore both a result of the changes that are taking place within the private sector in the market and a result of the state’s decisions (i.e. those of governments and central banks) made in the area of social and economic policy, and regulations (Kotz 2008).

Still, some determinants of financialization have been identified. They are usually divided into micro and macroeconomic ones. Among the former, two more specific groups are distinguished (Palley 2007). The first one includes changes in the structure and functioning of the financial markets, while the second one – changes in the behaviour of non-financial institutions. Similar micro determinants were identified by other authors. For instance, according to Bhaduri (2011) at the very core of financialization stand financial innovations, as they allow the financial sector to overcome regulatory barriers and therefore increase its power and foster further development. The role of technological changes that make it possible to trade money very quickly is stressed – along with the liberalization of economies (especially allowing for massive capital flows) – by Fiasanos, Guevarra and Pierros (2016). These authors have tried to make the quantitative assessment of the role of technology a contributing factor, using the share of financial patents registered in the US economy as a share of all the registered patents in the country for most of the 20th century. It is treated as a proxy of the relative share of growth of the new technology and innovations.

Liberalization on a massive scale became visible in the US economy mainly in the 1980s, and subsequently increased, with the Glass-Steagall Act being gradually relaxed by the Fed and eventually repealed in 1996. At the same time, US financial institutions, becoming increasingly active and aggressive in the foreign markets, lobbied for loose regulations (Komai and Richardson, 2011). Finally, the reform of FDIC to FDICIA (Federal Deposit Insurance Corporation Improvement Act), in 1991, institutionalized the “too big to fail” doctrine (Komai and Richardson 2011), increasing incentives for moral hazard on the parts of banks (see also Kregel and Tonvenarochi, 2014, Orhangazi, 2008, Toporowski, 2012).

Liberalization contributed to another important determinant of financialization – the emergence of the new types of financial instruments, and then increased trading in them. In other words, one might say, it gave additional acceleration to the creation and application of financial innovations. Financial innovations (e.g. securitization and structured financial products like ABS, CDO's or CDS), in turn, have played a key role in the development of recent financial practices that contributed significantly to the fast progress of financialization, both in individual countries and globally (Davis and Kim, 2015; Pozsar and Singh, 2011; Jurek and Marszałek, 2014). As Lapavitsas (2011, 2013) argues, innovations, financial liberalization, financial transaction speeds, speculative trading, asset securitization, shadow banking, internet finance, and geopolitical finance, such as banking finance, have been shifting their operations to open financial markets (which has led to the gradual separation of finance from the real economy).

The specific manifestations of financialization and, at the same time, its determinants, are also the aftermath of the following factors: the increase in the output value of the financial sector (including banks and other financial institutions) in GDP and the increase in the proportion of employment in the

financial sector, with reference to employment in non-financial enterprises. (Krippner, 2005, Sawyer, 2018). At the same time, it is also manifested in: the high global penetration of financial institutions, financial groups and financial transactions among countries, the substantial financial penetration of developed countries into developing countries, and the faster growth rate of the total amount of international capital flows over the growth of world output (Bonizzi, 2013).

Among other microeconomic determinants of financialization, those connected with the activity of non-financial agents are also indicated. First, financial activities occupy an increasingly important position in the activities of nonfinancial enterprises, such as financial products becoming one of the non-financial enterprise product lines (Milberg, 2008). Such phenomena as commodity financialization, water financialization, financial talents, and financial investment funds controlling the scale of industrial capital, are gradually becoming increasingly common (Anseeuw, et al, 2017; Basak and Pavlova, 2016). As a result, a larger portion of non-financial corporate profits were generated from financial channels (Krippner, 2005). This is connected with another important dimension of the increased financial activities related to nonfinancial corporations: the increased role of financial activities as a determinant of the pay packages of top management of non-financial corporations, including, most importantly, corporate CEO, whose incentives shifted towards more risky decisions and financial investments. (Lazonick, 2013).

The following factors are most often treated as macro determinants of financialization: economic and social policies in developed countries which have adopted the principle of the limited role of the state in economic life (e.g. by departing from the welfare state doctrine and economic interventionism, privatization, changes in pension systems), making the labour market more flexible (e.g. by weakening the role of trade unions, limiting the amount of the minimum wage, unemployment benefits), rigorous preference in economic price stability policy, and a policy of stimulating globalization, including by increasing the freedom of capital flows, macroprudential policy (Palley, 2012; Hein, 2012; Toporowski 2010). Some of the determinants are connected with institutional changes, like the collapse of Bretton Woods and the expansion of flexible exchange rates, the full dominance of fiat money within monetary regimes, the new political agendas set forth by Thatcher and Reagan in the 1980s, and the creation of the ECB (gradually) leading to central bank independence, zero inflation targeting, and the abandonment of the goal of full employment in favour of the so-called New Consensus Monetary Policy (Arestis and Sawyer, 2005). These processes brought about a clear deflationary policy bias in central banks (Palley, 1996). At the same time, the tendency towards free market orientation was succeeded by a policy regime in which the fiscal instruments had a critical role in economic activity, which additionally created demand for financial instruments.

Crucially, the abovementioned determinants have not been thoroughly operationalized and modelled econometrically. In the cited works on financialization, the narrative approach which combines one's own narrative of historical events tends to dominate (Shiller, 2019), or only descriptive statistics of times series are presented, without any rigorous econometric analysis. Such a state of affairs opens the door to the atheoretical approach used in this paper.

3. DATA AND RESEARCH DESIGN

The database developed for the purpose of this study combines statistics from several sources, namely the International Monetary Fund, the World Bank, the United Nations, Eurostat, and World Atlas. The survey takes into account a group of independent variables that represents the potential factors responsible for financialization in 158 countries for 2000-2016 (see the Appendix). Initially, we attempted to develop a dataset for all economies, but due to the lack of some specific information, this task turned out to be feasible only for a limited number of countries. As a synthetic measure of financialization, the ratio of the financial sector assets to GDP was employed, following Krippner (2005) and Palley (2012).

In accordance with the atheoretical approach, we propose quite a new set of potential macroeconomic determinants of financialization. The determinants identified on the basis of the literature review in Section 2 have only been partly included in the analysis, since there was no possibility of collecting such a broad sample of comparable and consistent data for all of them. Given the above, the potential factors of financialization in economies were divided into three groups (see Table 1). The first group involved variables that describe the initial condition of the economy at the beginning of the research period of any given country. The second group of factors involved variables presented as averages for the analysed period. The third group consisted of dummy variables.

One of the most significant challenges of contemporary macroeconomic theory and economic policy is to identify accurately the determinants of economic growth. The literature on economic growth, e.g., Sala-i-Martin et al. (2004) and Cuaresma et al. (2014), encompasses a range of studies that refer to various factors and groups of factors responsible for the processes of economic growth. These studies provide the foundation for the considerations below and for applying Bayesian methods.

There is a consensus in the literature that methods developed on the basis of Bayesian econometrics are generally applicable in the analysis of the determinants of economic growth, but they can also be exploited in the analysis of other economic phenomena, such as financialization (Stell, 2020). From a statistical point of view, one has to address problems with selecting the proper set of independent variables during the model construction, and

TABLE 1 . VARIABLES AND THEIR DEFINITIONS

Variable	Definition	Source
X ₁	Natural logarithm of GDP per capita in 2000	World Bank
X ₂	Population in 2000	World Bank
X ₃	FDI (Foreign Direct Investments) inflows % GDP (2000-2016 average)	World Bank
X ₄	FDI outflows % GDP (2000-2016 average)	World Bank
X ₅	HDI in 2000	United Nations
X ₆	Unemployment rate (% of total LF) (2000-2016 average)	World Bank
X ₇	Inflation CPI (2000-2016 average)	World Bank
X ₈	Interest rate (2000-2016 average)	IMF
X ₉	Annual GDP growth (2000-2016 average)	World Bank
X ₁₀	Urban population, % of total population (2000-2016 average)	World Bank
X ₁₁	Military expenditure, % of GDP (2000-2016 average)	World Bank
X ₁₂	Health expenditure, % of GDP (2000-2016 average)	World Bank
X ₁₃	Government expenditure on education, % of GDP (2000-2016 average)	World Bank
X ₁₄	Female population, % of total population (2000-2016 average)	World Bank
X ₁₅	Female Labour Force participation rate, F/M ratio (2000-2016 average)	World Bank
X ₁₆	Export, % of GDP (2000-2016 average)	IMF
X ₁₇	Import, % of GDP (2000-2016 average)	IMF
X ₁₈	Current account, % of GDP (2000-2016 average)	World Bank
X ₁₉	GVA (Gross Value Added), agriculture, % of GDP (2000-2016 average)	World Bank
X ₂₀	GVA, industry, % of GDP (2000-2016 average)	World Bank
X ₂₁	GVA, services, % of GDP (2000-2016 average)	World Bank
X ₂₂	Employment in agriculture, % of total employment (2000-2016 average)	World Bank
X ₂₃	Employment in industry, % of total employment (2000-2016 average)	World Bank
X ₂₄	Employment in services, % of total employment (2000-2016 average)	World Bank
X ₂₅	Armed forces, % of total LF (2000-2016 average)	World Bank
X ₂₆	Government expense, % of GDP (2000-2016 average)	World Bank
X ₂₇	Final consumption, % of GDP (2000-2016 average)	IMF
X ₂₈	Gross capital formation, % of GDP (2000-2016 average)	IMF
X ₂₉	Change of migrant stock, % annual (2000-2016 average)	United Nations
X ₃₀	Refugees stock, % of country population (2015)	United Nations
X ₃₁	High-tech export, % of GDP (2000-2016 average)	World Bank
X ₃₂	Energy production in 2000, Gigajoules per person	United Nations
Dummy variables		
D ₁	Dummy_developed, developed in 2014	United Nations
D ₂	Dumm_EU, EU member in 2016	Eurostat
D ₃	Dummy_Islam, Islamic state in 2016	World Atlas
D ₄	Dummy_big, Population above 50m. In 2000	World Bank

Source: World Bank, United Nations, IMF, Eurostat, World Atlas.

the goodness of fit of a statistical model has to be evaluated. Moreover, with a large number of variables and different selection procedures, it is difficult to decide which model and variables are the most appropriate to use in the analysis of the dependencies. Additionally, Raftery et al. (1997) showed that process modelling approaches lead to different estimates and conflicting conclusions about the estimates. From a Bayesian point of view, model uncertainty is a natural aspect of building a strategy and can be incorporated in the construction process. For example, Zellner (1971) showed that one can calculate the posterior odds ratio between two competitive models and obtain a posterior probability of both of them. Using Bayesian inference, one can gain not only the posterior probability of the model, but also the posterior characteristics of the parameters, such as the mean, variance, and quantiles (see Koop 2003). Since we have the characteristics for all the models, we can calculate some interesting measures across the whole model space, instead of making inferences based on a single model.

Consider the normal linear regression for a dependent variable y :

$$y = \alpha l_N + X_j \beta_j + \epsilon \tag{1}$$

where α is a constant, l_N denotes an $N \times 1$ vector of ones, X_j is an $N \times k_j$ matrix of regressors in model M_j ($j=1,2,\dots,K$), and β_j is a $k_j \times 1$ vector of parameters. ϵ is a vector of dimensions $N \times 1$ with a normal distribution $N(0, \sigma^2 I_N)$ where σ^2 is the variance of random error ϵ and I_N is an identity matrix of size N . Data are taken from $i=1,2,\dots,N$ objects.

To illustrate Bayesian model averaging, one can calculate the posterior mean of regression parameters across the whole model space using the following equations:

$$E(\beta|y) = \sum_{j=1}^{2^K} E(\beta_j|y, M_j) Pr(M_j|y) \text{ for } j=1,2,\dots,2^K \tag{2}$$

with the variance:

$$Var(\beta|y) = \sum_{j=1}^{2^K} [Var(\beta_j|y, M_j) + E(\beta_j|y, M_j)^2] Pr(M_j|y) + E(\beta|y)^2 \tag{3}$$

where $Pr((M_j|y))$ denotes the posterior probability of the model $M_j, \sum_{j=1}^{2^K} Pr(M_j|y) = 1$ and $E(\cdot)$ and $Var(\cdot)$ are the expected value and the variance of the parameters, and is the total number of all linear combinations in the regression model. From equations (2) and (3), it is clear that the posterior mean and variance calculated across the whole model space are weighted averages of the posterior means and variances of the individual models.

The calculation of the posterior model probability and estimation of parameters in the linear regression model is a well-known topic in the Bayesian statistics literature, so here we just provide a common overview of the main steps used, especially those related to the model averaging framework.



For computational simplicity, we use a natural conjugate normal-Gamma prior of the regression parameters (see DeGroot 1970, Koop 2003); thus, standard noninformative priors for α and intercept α , were assumed, which are common parameters in all regression models:

$$p(\alpha, \sigma^2 | M_j) \propto \sigma^{-2} \tag{4}$$

and for the regression coefficient β_{-j} , we assume a normal prior distribution with the mean 0_{k_j} and covariance matrix $\sigma^2 [g_j X_j^T X_j]^{-1}$:

$$p(\beta_j | \sigma^2, M_j) \propto \frac{1}{\sigma} \left\{ \exp \left[-\frac{\beta_j^T g_j X_j^T \beta_j}{2\sigma^2} \right] \right\} \tag{5}$$

From Equation (5), it is clear that the covariance of the prior distribution of β_j depends on σ^2 . Additionally, note that the prior covariance matrix is proportional to the data-based covariance matrix and g -prior (here, g_j). The basic idea, underlined by Zellner (1986), of the g -prior is to assume a common prior distribution for the regression coefficients due to the computational speed required for posterior distributions and convenience in the model selection framework. In this case, we used the “benchmark” prior, which is popular in the Bayesian model averaging framework and was recommended by Fernández et al. (2001) and Ley and Steel (2009). In this approach, $g_j = 1/k^2$ for a large number of regressors, *i.e.*, $N \leq k^2$ and $g_j = 1/N$ when $N > k$. We assume that the residuals in the regression model are normally distributed; therefore, the likelihood function has the following form:

$$p(y | \alpha, \beta_j, \sigma^2, M_j) \propto \frac{1}{\sigma^N} \left\{ \exp \left[-\frac{(y - \alpha 1_N - X_j \beta_j)^T (y - \alpha 1_N - X_j \beta_j)}{2\sigma^2} \right] \right\} \tag{6}$$

It is well known from the Bayesian literature that with a natural conjugate framework and integrating out intercept α , the posterior for β_j follows a multivariate Student-t distribution, where the posterior mean and covariance matrix of regression coefficients can be written as follows (see Fernández et al. 2001; Koop, 2003):

$$E(\beta_j | y, M_j) = \left[(1 + g_j) X_j^T X_j \right]^{-1} X_j^T y \tag{7}$$

$$\text{Var}(\beta_j | y, M_j) = \frac{N S_j^2}{N - 2} \left[(1 + g_j) X_j^T X_j \right]^{-1} \tag{8}$$

where:

$$S_j^2 = \frac{\frac{1}{g_j + 1} y^T P_{X_j} y + \frac{g_j}{g_j + 1} (y - \bar{y} 1_N)^T (y - \bar{y} 1_N)}{N} \tag{9}$$

and $P_{X_j} = I_N - X_j (X_j^T X_j)^{-1} X_j^T$. After integrating out all the parameters, the density of the marginal distribution of the vector y is given by:

$$p(y|M_j) \propto \left(\frac{g_j}{g_{j+1}}\right)^{\frac{k_j}{2}} \left[\frac{1}{g_{j+1}} y^T P_{X_j} y + \frac{g_j}{g_{j+1}} (y - \bar{y}|_N)^T (y - \bar{y}|_N) \right]^{\frac{N-1}{2}} \tag{10}$$

Since there is the marginal data density $p(y|M_j)$ in Equation (10), the posterior probability of any variant of regression model M_j can be calculated by the following formula, which is essential for Bayesian model averaging:

$$Pr(M_j|y) = \frac{Pr(M_j) p(y|M_j)}{\sum_{j=1}^{2^K} Pr(M_j) p(y|M_j)} \tag{11}$$

where the expressions $Pr(M_1), Pr(M_2), \dots, Pr(M_K)$ denote the prior probabilities of competitive models. In this study, the very simple assumption is taken that all linear combinations are equally probable: $Pr(M_j) = 1/2^K$ and $\sum_{r=1}^m Pr(M_r) = 1$. Therefore, Equation (11) can be simplified to:

$$Pr(M_j|y) = \frac{p(y|M_j)}{\sum_{j=1}^{2^K} p(y|M_j)} \tag{12}$$

The estimation of parameters in the linear regression model and the computation of marginal data density is a very well-known issue in the Bayesian literature, and it does not require, in most cases, advanced computation techniques (see Koop 2003). On the other hand, we have to face the problem of obtaining posterior quantities for a large set of exogenous regressors. For example, if we consider $K = 20$ independent variables, we have to estimate 2^{20} , i.e., more than one million linear combinations, which requires tremendous computational CPU time. Both from a practical and computational point of view, this does not seem reasonable. If we decide to choose only the “best” model, we will probably neglect much information from the other potentially interesting competitive models. On the other hand, if we need information based on the whole model space, we will have to estimate a tremendous number of combinations, some of them with very low posterior probability. Moreover, we will have to spend a great deal of CPU time obtaining all the estimation results for all the linear combinations. A much better idea is to use a “smart” algorithm that finds the most probable models and ignores low probability models with a reasonable CPU time (Błażejowski et al. 2019). One such procedure is the MC³ algorithm (Markov chain Monte Carlo model composition), which was developed by Madigan et al. (1995) based on the Markov chain Monte Carlo method. This method facilitates easy “capturing” of the models with the greatest explanatory power. This means that we focus on the most probable variables and models, while neglecting the least likely ones.

Since an atheoretical approach for a large number of combinations of determinants is used, the usage of BMA (Bayesian Model Averaging) with MC³ is crucial for the study. The candidate model M^* is accepted with the probability:

$$\alpha(M^{(i-1)}, M^*) = \min \left\{ \frac{p(y|M^*) Pr_{\text{min}}(M^*)}{p(y|M^{(i-1)}) Pr_{\text{min}}(M^{(i-1)})}, 1 \right\} \tag{13}$$



where M^{i-1} denotes the previously-accepted model in the Markov chain of models.

After a sufficient number of iterations, we get an equilibrium distribution $Pr(M_i|y)$ of the posterior model probabilities, and the posterior mean and variance are calculated across the whole model space. Using a Monte Carlo simulation, we can also derive additional posterior characteristics that are useful for the Bayesian averaging approach. One of them is the posterior inclusion probability ($PIPP_r(i|y)$), i.e., the probability that, conditional on the data, but unconditional with respect to the model space, the independent variable is relevant for explaining the dependent variable y . The value of the posterior inclusion probability indicates the importance of an independent variable in the regression model.

4. A BAYESIAN APPROACH TO THE DETERMINANTS OF FINANCIALIZATION – RESULTS AND DISCUSSION

The following prior assumptions were specified: a uniform prior over the model space (the prior average model size was 17) and the benchmark g-prior by Fernández et al. (2001). In order to obtain the results 15,000,000 Monte Carlo simulations were run. The first 10% burned-in draws were made to eliminate the influence of the starting (initial) values. The number of iterations was considered sufficient because the correlation coefficient between the numerical and analytical model probabilities was above 0.99. An equal prior probability for all the potential financialization determinants was assumed. This means that there was no preference for any variables associated with financialization theory or another fixed assumption, and the BMA approach was used to find the most probable ones (Błażejowski et al. 2016). As a dependent variable Y , describing the scale of financialization, the average relation of financial sector assets to GDP was accepted (according e.g. to Kripner, 2005). All the calculations were performed in the BMA 2.01 package by Błażejowski and Kwiatkowski (2015) for the gretl 2020d program. The most probable variables were defined as those with the highest Posterior Inclusion Probabilities (PIPs). The posterior means of regression parameters and the posterior standard deviations, as well as the PIPs, are included in Table 2.

The most probable variable among all the determinants of financialization was X_1 – the natural logarithm of GDP per capita in 2000. This is tied with convergence theory. It can therefore be concluded that the initially lower level of economic development is conducive to a higher dynamics of financialization. It could be easier for financial institutions to expand in countries that are relatively less developed.

The variable found in the second positions of the ranking is export as % of GDP (X_{16} , 2000-2016 average). It implies that openness of the economy, technological advantage facilitating exports can be a determinant

of financialization. This is also evidence of the strong link between the real economy and the financial economy, especially under the current conditions of the new economy.

The third variable, namely refugees stock (X_{30}), seems to be quite surprising. But it can be explained while analysing the main destinations of refugees – being typically highly developed countries. Moreover, a large number of refugees might contribute in a given country to the faster development of finance, as they enter financial markets, generate funds and remit them to their countries of origin. This suggests that migration should be monitored at the global level since it could soon have a significant impact on the dynamics of financialization.

A higher population (X_2 , Population in 2000) at the beginning of the research period influences the degree of financialization later. This could be an important signal for countries like Nigeria and Brazil. As in the case of exports, GVA in industry as a % of GDP (X_{20} , 2000-2016 average) also shows a strong relationship between the real economy and financialization. National economies generating more GVA from industry demand strong support from the financial sector.

What characteristic is that the most probable variables do not include those usually associated directly with financial and monetary systems – inflation (CPI) and interest rates. In the first case, this can be attributed to the fact that CPI reflects only changes of prices of goods and services, yet while analyzing financialization one should also take into account the prices of financial assets. Concerning the second case – it can indicate problems that central banks have with controlling financial markets. It is widely argued that contemporary central banks are limited in their direct impact on liquidity and the loan policies of financial institutions, as the latter are – due to the development of financial engineering and securitization – no longer dependent on refinancing in central banks. At the same time, monetary policy, based on so called “New Consensus Macroeconomics”, to some extent restricts the ability to conduct discretionary monetary policy and makes central banks dependent, in a way, on financial investors.

It also became clear that government expenditures are improbable (the posterior inclusion probability is low) as a determinant of financialization. This

TABLE 2. POSTERIOR ESTIMATES OF THE DETERMINANTS OF FINANCIALIZATION

Variable	Definition	PIP	Mean	Std.Dev.
X_{16}	Export, % of GDP (2000-2016 average)	1	0,005032	0,000519
X_1	Natural logarithm of GDP per capita in 2000	0,999987	0,185328	0,022504
X_{30}	Refugees stock, % of country population (2015)	0,991764	0,023824	0,006156
X_2	Population in 2000	0,989169	0	0
X_{20}	GVA, industry, % of GDP (2000-2016 average)	0,979686	-0,009629	0,002182

Source: The authors' own estimation.

can suggest that the scale of intervention of the government in the economy does not contribute to financialization.

Table 3. includes the top five models according to their posterior probabilities. The total probability of the presented models was 0,35691.

The value of the best model had a posterior probability equal to 0.162, and the posterior probabilities of the others were lower than 0.08. This means that there was no one dominant specification, and inferences based on just a single model were illusory, because most information included in the whole model space would be omitted. Therefore, these results could justify the necessity of using the BMA approach instead of classical inference.

TABLE 3. THE RANKING OF MODEL PROBABILITY

Model j: P(M) Variable	M_1 $0,1617$ $\beta^{(M_1)}$	M_2 $0,0782$ $\beta^{(M_2)}$	M_3 $0,0233$ $\beta^{(M_3)}$	M_4 $0,0225$ $\beta^{(M_4)}$	M_5 $0,0139$ $\beta^{(M_5)}$
X_1	0,184035	0,174442	0,222993	0,185414	0,178123
X_2	$6,37 * 10^{10}$	$5,84 * 10^{10}$	$6,04 * 10^{10}$	$6,08 * 10^{10}$	$6,43 * 10^{10}$
X_{13}					0,01807
X_{16}	0,005064	0,004915	0,005121	0,005068	0,005079
X_{20}	-0,010261	-0,009753	-0,010322	-0,009523	-0,009947
X_{24}			-0,003932		
X_{25}				-0,026053	
X_{30}	0,022767	0,023851	0,02437	0,02735	0,023619
X_{31}		0,004332			

Source: The authors' own estimation.

6. CONCLUSIONS

The main goal of this paper was to identify the determinants of financialization in the global economy. To investigate this phenomenon, we proposed and applied an atheoretical instrument, namely the Bayesian model averaging approach to a sample of 158 countries over the period of 2000-2016. Therefore, our study is data-driven. We focus on potential macroeconomic variables that could determine financialization and analyse their impact on the relation of financial sector assets to GDP, which is a proxy of financialization.

Based on the literature review, the main determinants of financialization are indicated as being microeconomic factors connected with the functioning

of financial markets and entities, as well as macroeconomic ones, such as decisions from the area of monetary policy or macroprudential policy. However, it is outlined that in the case of analyzing financialization it is necessary to consider a combination of many, mutually stimulating factors. Thus, in the study we applied the Bayesian model averaging approach that enabled us to include in the analysis a wide set of variables without adopting any theoretical perspective or any specific narration with regard to it.

Using this method, we identified rather new determinants of financialization that had not previously been considered and discussed. The most probable variables in the categories of the PIP were strongly connected with the real sphere of the economy, demographic issues and new conditions under the global economy functions (like refugees and the so-called new economy). Moreover, our study showed, rather surprisingly, that among the tested potential determinants of financialization those linked directly with financial and monetary sphere were unimportant, such as interest rates and the level of inflation (measured by CPI).

The BMA approach can be regarded as a promising method for quantifying and empirically investigating such a complex phenomenon as financialization. The results of this study strongly emphasize the need for applying a different perspective in studies on the determinants of financialization. However, the results should be treated with caution. Yet, they may help to build theories of financialization, complementary to existing ones, combining mainstream and heterodox theories of economics. This basis will provide the possibility to formulate policy recommendations that are more adequate for tackling the phenomenon of financialization and its consequences. But even at this stage it is evident that financialization has once again proved to be more complex and its determinants more multidimensional than had been expected, and this has opened new avenues for further research.

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APPENDIX 1

TABLE 1. THE LIST OF ECONOMIES ANALYZED

Afghanistan	United Kingdom	Malawi
Angola	Georgia	Malaysia
Albania	Ghana	Namibia
United Arab Emirates	Guinea	Niger
Argentina	Gambia, The	Nigeria
Armenia	Guinea-Bissau	Nicaragua
Australia	Greece	Netherlands
Austria	Guatemala	Norway
Azerbaijan	Guyana	Nepal
Burundi	Honduras	New Zealand
Belgium	Croatia	Oman
Benin	Haiti	Pakistan
Burkina Faso	Hungary	Panama
Bangladesh	Indonesia	Peru
Bulgaria	India	Philippines
Bahrain	Ireland	Poland
Bosnia and Herzegovina	Iran, Islamic Rep.	Portugal
Belarus	Iraq	Paraguay
Belize	Iceland	Qatar
Bolivia	Israel	Romania
Brazil	Italy	Russian Federation
Barbados	Jamaica	Rwanda
Brunei Darussalam	Jordan	Saudi Arabia
Botswana	Japan	Sudan
Central African Republic	Kazakhstan	Senegal
Canada	Kenya	Singapore
Switzerland	Kyrgyz Republic	Sierra Leone
Chile	Cambodia	El Salvador
China	Korea, Rep.	Serbia
Cameroon	Kuwait	Slovak Republic
Congo, Dem. Rep.	Lao PDR	Slovenia

Congo, Rep.	Lebanon	Sweden
Colombia	Liberia	Syrian Arab Republic
Cabo Verde	Sri Lanka	Chad
Costa Rica	Lesotho	Togo
Cyprus	Lithuania	Thailand
Czech Republic	Luxembourg	Tajikistan
Germany	Latvia	Timor-Leste
Djibouti	Morocco	Trinidad and Tobago
Denmark	Moldova	Tunisia
Dominican Republic	Madagascar	Turkey
Algeria	Maldives	Tanzania
Ecuador	Mexico	Uganda
Egypt, Arab Rep.	Mali	Ukraine
Spain	Malta	Uruguay
Estonia	Myanmar	United States
Ethiopia	Montenegro	Uzbekistan
Finland	Mongolia	Vietnam
Fiji	Mozambique	Yemen, Rep.
France	Mauritania	South Africa
Gabon	Mauritius	Zambia
Zimbabwe		