Credit expansion and social welfare in the European Union

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Abstract

The aim of this paper is to analyse the impact of the credit expansion process on social welfare through the financial-monetary dimension with a focus on 22 economies from the European Union. In order to achieve this aim, the study seeks, on the one hand, to analyse the short-term dynamics (from one quarter to the other) of the relationships between the total volume of domestic credit to private sector (highlighting thus the credit expansion process) and the GDP per capita (the proxy for social welfare) and, on the other hand, to determine the impact of credit expansion on social welfare on medium and long term using the multiple regression model. The findings revealed that even the correlation between the credit expansion and social welfare is very strong and positive in almost all the analysed countries, the total volume of domestic credit to private sector influences unidirectionally the GDP per capita in only 11 of the 22 states. However, on medium and long term, the credit expansion process has a positive effect on social welfare in all the analysed EU countries.

Keywords: social welfare, credit expansion, financial crisis, GDP

Introduction

The analysis of social welfare is a topic of great interest for researchers, as well as for policy makers. The prosperity of a society, also known as *social welfare*, is considered to be an important barometer of efficiency of economic policies implemented by the governments. The relationship between credit expansion and social welfare was analysed and debated by various schools of economic thought. While the Austrian scholars blame and discourage the state interventionism in economic activity, considering that the expansion of credit generates a cyclical and uncontrolled increase in the supply of money, with a direct negative impact on social welfare, the promoters of Keynesism converges to the need for the state intervention in the economy to achieve economic balance and full use of labour in order to establish welfare in society. Beyond these epistemological debates, the researchers all around the world focused their attention on studying the impact of credit expansion on welfare through various socio-economic dimensions. The results of the studies based on the financial-monetary dimension has divided the researchers on those who claim that access to credit is felt on social welfare through various socio-economic benefits (Karlan and Zinman, 2007,

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pp. 1-38) and those who argue that access to credit is not necessarily a lever to improve social welfare (Chiu *et al*., 2012; Breu, 2013).

In this context it is very important to understand what is the real impact of the credit expansion process on social welfare through the financial-monetary dimension. In order to answer this question I will perform an analysis of the impact of the credit expansion process (the total volume of domestic credit to private sector) on social welfare (GDP per capita) from a comparative perspective, with a focus on 22 economies from European Union (including the case of Romania), using the cross-correlation analysis, Granger's causality analysis and applying the multiple regression model.

The present paper is structured as follows: part 1 captures briefly the state of the literature in the field, part 2 presents the dataset and methodology used in the study, part 3 presents the results of the empirical analysis and part 4 resumes the main findings of the research.

1. Literature review

The fluctuations of welfare at society's level are mostly associated with cyclical fluctuations in the economy: high levels of welfare correspond to phases of economic growth, while lower levels of welfare is recorded during the decreasing phases of the business cycle.

From the perspective of the main schools of economic thought, the most important actor who participates in the promotion of social welfare and the propagation of business cycles is the state. As the vehement followers of economic liberalism, the Classical School of Economics, as well as the Austrian School of Economics, blamed and discouraged state interventionism in the economic activity, considering that the absenteeism of the state power in the economy would lead to prosperity and better life. In their view, government interventions in the areas of socio-economic life unbalance the system, disturbing the established harmony in society. As Adam Smith mentioned, the best governance policy for increasing the wealth of a nation is the one that governs and intervenes less (Elliott, 1990, p. 26).

The most prominent representatives of the economic liberalism stream, the Austrian scholars, claim that the expansion of credit and deposits without saving (by fiduciary means), as a result of the fractional reserve ratio and managed by a central bank, generates a cyclical and uncontrolled increase in the supply of money, with a direct negative impact on social welfare (Mises, 2007, pp. 550-566; Huerta de Soto, 2011, pp. 380-400).

On the other hand, the promoters of Keynesism converged to the need for the state intervention in the economy to achieve economic balance and full use of labour in order to establish welfare in society. Keynes sees the state as a direct agent in the real economy. The state is that actor who helps

to overcome the negative aspects of the capitalist economy through its interventions. In his opinion, in order to overcome a recession, the state activates its macroeconomic policies (especially the fiscal policy) and boost the aggregate demand, this way compensating the lack of private demand (an important factor of recession).

As a result of the fundamental debate among the largest schools of economic thought, the *welfare state* appears on the international arena, a concept of governance in which the state plays a key role in the protection and promotion of the economic and social welfare of its citizens. It is based on the principles of equal opportunities, fair distribution of wealth, and public responsibility for those who cannot rely on minimum provisions for a better life. The state of welfare is seen as a response to the socio-economic pressures that all modern societies face as a result of urbanization, population growth and economic development. The issue of redistributing wealth is essential to assessing the welfare state's social and welfare policies. For some, the central objective of welfare state intervention is to prevent poverty and to support vulnerable groups, while others claim that social policies should not be directed only to the poor, but to all citizens of the welfare state.

In another train of thoughts, the last decade is characterized by an increasing interest in the empirical study of the credit expansion process. Gorton and He (2008, p. 1181) have shown that commercial and industrial credit performance is an autonomous source of macroeconomic fluctuations. Levine and Zervos (1998, pp. 553-554), using comparative studies of several countries, found a positive and significant correlation between the initial level of banking development and the future rates of economic growth and productivity over a period of 18 years.

This study cannot overlook the theoretical contribution brought by the Austrian School of Economics to the study of the impact of credit expansion on socio-economic life. Since the turn of the last century, Mises (2007, pp. 550-566) and Huerta de Soto (2011 pp. 380-400) has stressed that the expansion of credit and deposits without saving (by fiduciary means) as a result of the fractional reserve ratio and managed by a central bank generates a cyclical and uncontrolled increase in supply with a direct effect on social welfare. The Austrian scholars blame and discourage the state interventionism in economic activity, considering that the absenteeism of the state power in the economy would lead to prosperity and a better life (Percic, 2013, p. 16).

The impact of the credit expansion on social welfare has been studied through various socio-economic dimensions. Some studies have attempted to quantify the impact of credit expansion on welfare through its indirect effects on consumption (Gertler *et al*., 2009, p. 269), while others have studied the impact of the credit through the dynamics of high school enrolment (Levine and Rubinstein, 2013, pp. 1-30) or family structure (Hacamo, 2014, pp. 1-50).

The study of the impact of credit expansion on welfare through the financial-monetary dimension has divided the researchers into two opposite sides. On the one hand, there are those researchers who claim that access to credit is felt on social welfare through various socio-economic benefits (Karlan and Zinman, 2007, pp. 1-38), and, on the other hand, there are authors who argue that access to credit is not necessarily a lever to improve social welfare (Chiu *et al*., 2012; Breu, 2013).

Percic (2014, pp. 511-518), analysing the short-term dynamics (from one quarter to the other) of the relationships between the total volume of credits given to the non-banking private sector by the credit institutions and the GDP per capita and GDP per person employed in eight developing and advanced economies from the area of Central and South-Eastern Europe, found that there is a moderate dynamics of the relationships between credit expansion and social welfare through the financial dimension.

Using modern monetary theory to study the welfare effects of inflation and different credit arrangements, Chiu *et al*. (2012, pp. 29-30) proved that, in a monetary economy, credit arrangements are not necessarily welfare-improving, because agents may fail to internalize the effects of their actions on others' liquidity constraints. Moreover, Breu's quantitative analysis has shown that increased access to credit in the United States since 1990 has not been beneficial in terms of welfare (Breu, 2013, p. 243). In another train of thoughts, Breu highlighted that technological improvements have an ambiguous impact on welfare as, on the one hand, they expand access to credit and, on the other hand, reduce the utility of non-borrowers.

Extending access to credit is a key ingredient of global development strategies. The microfinance industry has grown exponentially over the past 20 years under the premises that widening access to credit will help improve the well-being of the poor (Morduch, 1999, pp. 1609-1610). This pressure was determined by both theoretical and empirical motivations. The theoretical models show that information asymmetries can lead to credit market dysfunctions, which can affect the poor. The empirical results reveal strong negative correlations between the level of access to credit and macro-level poverty (Levine, 1997, pp. 720-721) and a positive impact of access to microfinance at micro level (Pitt and Khandker, 1998, pp. 986-988).

It should be noted that the credit expansion process, initiated long before the crisis, has a profound negative effect on households. Kang and Sawada (2008, pp. 454-455), studying this phenomenon in South Korea for the financial cut-off of 1996-1997, found that the probability of welfare decline as a result of credit constraints has increased significantly.

2. Data used and methodological approach

To analyse the impact of credit expansion on social welfare through the financial-monetary dimension across the European Union, I chose a sample of 22 states. The selected countries cover all the geographical areas of the European Union, with the aim to make a uniform distribution of the economies and the possibility of applying the process of comparing geographical areas and highlighting the specificities of each of them. Moreover, to study in depth and to identify the specific trends at the level of the countries that are close in terms of economic development, I decided to distribute the sample on three clusters, depending on the GDP per capita indicator (see Table 1). I didn't consider the remaining 6 EU countries because the data for them was just partially available for the selected reference period.

Table 1. The sample of European Union member states distributed on development clusters and geographical areas

Cluster	Country	Abbreviation	Geographical areas
Cluster A *GDP per capita > 40.000 EUR*	Austria	AT	Central Europe
	Denmark	DK	Northern Europe
	Ireland	IE	Western Europe
	Luxembourg	LU	Western Europe
	The Netherlands	NL	Western Europe
	Sweden	SE	Northern Europe
Cluster B *20.000 EUR < GDP per capita < 39.999 EUR*	Belgium	BE	Western Europe
	Cyprus	CY	Southern Europe
	Finland	FI	Northern Europe
	France	FR	Western Europe
	Italy	IT	Southern Europe
	Germany	DE	Central Europe
	Spain	ES	Southern Europe
	United Kingdom	UK	Western Europe
Cluster C *GDP per capita < 19.999 EUR*	Bulgaria	BG	Eastern Europe
	Croatia	CR	Southern Europe
	Czech Republic	CZ	Central Europe
	Greece	EL	Southern Europe
	Hungary	HU	Central Europe
	Poland	PL	Central Europe
	Portugal	PT	Southern Europe
	Romania	RO	Eastern Europe

Source: Author's elaboration

In order to quantify the credit expansion process in the European Union, I opted for the descriptive variable *the total volume of domestic credit to private sector*. In terms of financial instruments, the credit comprises loans and debt securities. The data series has a quarterly frequency, includes the total balance at the end of the reference quarter and covers the 2001 (first quarter) and 2017 (fourth quarter) or 01:01-17:04 intervals. The primary data source is the World Bank database.

To describe social welfare the variable *GDP per capita* was chosen[1]. This decision was taken for several reasons:

1. The GDP per capita indicator is the most commonly used indicator of the quantification of social welfare at global level;
2. This indicator has records with high statistical frequency for all countries from the selected sample;
3. There is not enough statistical data for the alternative indicators as they do not have a constant frequency of estimation (for example, the Human Development Index has a random recording frequency, because it has been calculated every 10 years up to 2000, once every 5 or 3 years between 2000 and 2010 and annually after 2010).

The data series has a quarterly frequency ranging from 2001 (first quarter) to 2017 (fourth quarter) or 01:01-17:04. The primary data source is the Eurostat database.

The first stage of the study consists of a preliminary analysis of the time series, aiming in this way to test the normality of the data distribution and their stationarity. Also, this stage includes the transformation and adjustment of time series to ensure the hypothesis of normality and stationarity.

The second stage of the study consists, on the one hand, in identifying the short-term causality relationships between the descriptive variables of the credit expansion process and social welfare and, on the other hand, in determining whether short-term turmoil that can appear in the process of credit expansion and social welfare are tied, without taking into account the medium and long term trends of the descriptive variables analysed.

In order to determine whether there is a short-term co-movement between credit expansion and social welfare, the cross-correlation analysis for the descriptive variables of the two phenomena studied was used. For a pair of variables, the cross-correlation determines the linear interdependence between them and estimates the extent to which the movements of these two variables are interconnected. The cross-correlation is determined by the following calculation formula (1):

$$r_c = \frac{\sum_{i=1}^{n}(x_i - m_x) \times (y_i - m_y)}{\sum_{i=1}^{n}(x_i - m_x)^2 \times (y_i - m_y)^2} \quad (1)$$

where:

r_c – the correlation coefficient;

x and y – the pair of analysed variables;

m_x and m_y – the mean values of the two variables.

[1] There are other strictly monetary variables that can be used to quantify social welfare, such as the *average wage*, the *minimum wage* or the *average household income*. In this regard we suggest consulting the study on the impact of credit expansion on social welfare in Romania and the Republic of Moldova where these variables were used (Percic *et al.*, 2015).

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For the purpose of determining short-term causality relationships between credit expansion process and social welfare, Granger's causality analysis was used (see Apostoaie *et al.*, 2013, pp. 668-673, for details).

In order to determine whether the medium and long-term turmoil that may arise in the credit expansion process and social welfare are linked, the multiple regression model has been used (2):

$$GDPpc = \beta_0 + \beta_1 CR + \beta_2 Crisis + \varepsilon \quad (2)$$

where:

GDPpc – the dependent variable (the social welfare descriptive variable);

CR – the independent variable (the credit expansion descriptive variable);

β_0 – constant;

β_1 and β_2 – the coefficients of the independent variables;

Crisis – the dummy variable that captures the crisis (0 - there is no crisis, 1 - there is a crisis);

ε – the error term of the equation.

The coefficients of the independent variables, β_1 and β_2, show how much the dependent variable (GDP per capita or GDPpc) changes as a result of the variation with a unit of one of the independent variables, while the other independent variables remain constant. In order to understand the social welfare behaviour during the times of crisis, I have decided to include in the model a dummy variable, which takes the value of 1 in times of crisis and the value 0 when there is no crisis. For this study, I estimated dummy variables for each country, as not all the countries were similarly affected by the crisis (a dummy variable takes value 1 if the first difference GDP<0).

3. Analysis of the research results

Preliminary analysis of time series

A first stage of the preliminary analysis consists in testing the normality of the data distribution. To test the normality of the data distribution, the Jarque-Bera Normality Test (J-B) was used. Analysing the results of the J-B normality test (summarized in Table A1 from the Appendix A), it can be observed that half of the data series related to the credit expansion process variable does not follow a normal distribution, as well as five GDP per capita records. In order to transform the data series, as well as to homogenize all analysed data series, it was decided to apply the logarithm function (natural logarithm) to all the data series proposed for research.

The next step in the preliminary analysis of the time series is testing the stationarity of the data. I decided to use the Augmented Dickey-Fuller (ADF) test. The number of lags was selected according to the Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC). Also, the Phillips-Perron (PP) test was applied to the data series and it showed similar results with those of the ADF test in case of more than 80% of the registrations. The final results of the stationary tests are summarized in Table A2 from the Appendix A.

After analysing the results, I concluded that the vast majority of the data series are stationary at the 1st difference level. These series are non-stationary (called „difference stationary processes") and their trend should be eliminated by calculating the first-order differences (3):

$$y_t^I = \Delta y_t^{(1)} = y_t - y_{t-1} \tag{3}$$

In order to preserve the homogeneity of the data series used, I decided to calculate the first-order difference for all data sets.

The analysis of the interdependence relationship between credit expansion and social welfare through the correlation test

Analysing the co-movement between *credit expansion* (upwards or downwards changes of the first differences values of the total volume of domestic credit to private sector) and *social welfare* (dynamic of the first differences values of the GDP per capita) using cross-correlation analysis (see Table 2), it can be observed that this is very strong and positive in almost all the analysed countries, the values exceeding the threshold of 0.70 (with just few exceptions). In this case one can speak of a dynamics that is almost coordinated (the degree of interdependence between the two variables is very high). On the other hand, in Poland, Czech Republic or United Kingdom the correlation is moderate, the coefficients varying between 0.5 and 0.7, while in Ireland it is very weak, being capped at 0.18 (the lowest coefficient among analysed countries).

Although the results are not uniform in any of the analysed clusters, there seems to be a higher interdependence between the two variables in cluster A and B and a lower one in the cluster C. Regarding the geographical criteria, there is no tendency for any geographic area under consideration.

Table 2. The interdependence between credit expansion and social welfare in the member states of the European Union in period 2001: T1 - 2017: T4

Cluster	Country	Correlation coefficient
Cluster A *GDP per capita > 40.000 EUR*	Austria	0,94914*
	Denmark	0,84879*
	Ireland	0,18478***
	Luxembourg	0,75320*
	The Netherlands	0,94134*
	Sweden	0,96284*
Cluster B *20.000 EUR < GDP per capita < 39.999 EUR*	Belgium	0.94302*
	Cyprus	0,72541*
	Finland	0,94459*
	France	0,87513*
	Italy	0,95669*
	Germany	0,84393*
	Spain	0,79995*
	United Kingdom	0,69034*
Cluster C *GDP per capita < 19.999 EUR*	Bulgaria	0,85857*
	Croatia	0,92866*
	Czech Republic	0,67880*
	Greece	0,83359*
	Hungary	0,91198*
	Poland	0,58710*
	Portugal	0,83928*
	Romania	0,91241*

Note: The table has been processed using Eviews software.
The VAR order was determined using the AIC (Akaike), SC (Schwarz) and HQ (Hannan-Quinn) criteria, the Schwarz criterion having priority
*, ** and *** denote the significance at the levels 1%, 5% and 10%;
Source: Author's elaboration

Although there is strong evidence of short-term co-movement between the credit expansion and social welfare, this does not imply that one variable influences the other. Therefore, further analysis should be employed to establish the causality.

The analysis of the causal relationship between credit expansion and social welfare based on the Granger test

In order to identify the causal relationship between the descriptive variable of the credit expansion process and social welfare, the short-term Granger causality test was used. Analysing the results obtained (see Table 3), one can notice that the credit expansion process, quantified by the variable the total volume of domestic credit to private sector, influences unidirectionally the GDP per capita in 11 of the 22 analysed countries (50%).

Table 3. The Granger-type short-term causality relationship between credit expansion and social welfare in the member states of the European Union in period 2001: T1 - 2017: T4

Cluster	Country	Type of relationship	Number of lags	F-statistic
Cluster A *GDP per capita > 40.000 EUR*	Austria	CR⇳GDPC	-	-
	Denmark	CR⇳GDPC	-	-
	Ireland	CR⇨GDPC	3	3,54057**
	Luxembourg	CR⇳GDPC	-	-
	The Netherlands	CR⇨GDPC	1	6,35987**
	Sweden	CR⇳GDPC	-	-
Cluster B *20.000 EUR < GDP per capita < 39.999 EUR*	Belgium	CR⇨GDPC	6	2,21606***
	Cyprus	CR⇳GDPC	-	-
	Finland	CR⇨GDPC	1	8,89703*
	France	CR⇨GDPC	2	3,03109***
	Italy	CR⇨GDPC	1	5,38141**
	Germany	CR⇨GDPC	2	4,67890**
	Spain	CR⇨GDPC	1	2,71070***
	United Kingdom	CR⇳GDPC	-	-
Cluster C *GDP per capita < 19.999 EUR*	Bulgaria	CR⇳GDPC	-	-
	Croatia	CR⇨GDPC	3	3,22145**
	Czech Republic	CR⇳GDPC	-	-
	Greece	CR⇳GDPC	-	-
	Hungary	CR⇳GDPC	-	-
	Poland	CR⇨GDPC	4	2,88074**
	Portugal	CR⇳GDPC	-	-
	Romania	CR⇨GDPC	4	3,60336**

Note: The table has been processed using Eviews software.
The VAR order was determined using the AIC (Akaike), SC (Schwarz) and HQ (Hannan-Quinn) criteria, the Schwarz criterion having priority
⇨ - unidirectional relationship;
⇳ - no relationship;
*, ** and *** denote the significance at the levels 1%, 5% and 10%;
Source: Author's elaboration

Cluster A is characterized by a large number of countries where GDP per capita does not react to changes in the credit process (4 countries of 6). Most of the countries seem to be very prudential in terms of borrowing and does not provide a link between social welfare and the banks' main activity. The only countries from cluster A in which the credit expansion process influences social welfare are Ireland and the Netherlands. It is worth mentioning that both countries are from Western Europe. Social welfare in the Netherlands responds in less than a quarter to market credit fluctuations, while in Ireland it takes up to three quarters.

As it can be observed, the cluster B is the most sensitive to fluctuations in the total volume of domestic credit to private sector. The only countries that do not react to variation of the crediting are Cyprus and United Kingdom. Another interesting observation is related to the reaction speed of social welfare to the credit expansion process: while in Finland, France, Italy, Germany and Spain the reaction speed varies from 1 to 2 quarters, while in Belgium it is limited to 6 quarters.

The countries from Cluster C, like cluster A, seem to be very prudential in terms of crediting and there is not a link between social welfare and credit expansion. On the one hand, there are countries like

Bulgaria, Czech Republic, Greece, Hungary and Portugal, where the GDP per capita does not react to the fluctuations registered in the crediting, and, on the other hand, there are Croatia, Poland and Romania where social welfare changes as a result of the credit variation (from 3 to 4 quarters).

Analysing the geographical areas, it is worth highlighting that the social welfare is more sensitive to credit expansion in western countries, while Southern Europe seems to be more prudential. A possible explanation can be linked to the recent financial crisis experience: countries that experienced a hard period of recession and crisis are motivated to avoid the credit spiralling.

The analysis of the impact of the credit expansion process on social welfare on medium and long term using the multiple linear regression model

To determine the impact of the credit expansion on social welfare on medium and long term, I decided to build a multiple linear regression model. Analysing the results of this model for the cluster A (see Table 4), one can find that for most of the countries the coefficient of the independent credit-related variable (β_1) is positive and strong or very strong ($0{,}629 < \beta_1 < 1{,}022$), excepting Ireland. Like previous analysis revealed (simple correlation analysis), Ireland's case differs substantially from that of other countries: the variation of the social welfare is explained by the variation of the crediting just in proportion of 8%. This could be explained by the changes occurred in the Ireland's lending behaviour after the recent financial crisis. It can be assumed that Ireland has become more cautious since the crediting was one of the main factors behind the crisis (it should be remembered that Ireland was part of the PIIGS group of states).

Considering the above, the credit expansion process has a strong and very strong positive impact on social welfare in EU countries with a GDP per capita of over 40.000 EUR.

Table 4. The results of multiple linear regression for countries from cluster A

Stat	Independent variables	Coefficient	Robust standard error	R^2
Austria	*CR*[1)]	0,85548*	0,04448	0,90767*
	Crisis[2)]	-0,01159**	0,00651	
	C[3)]	0,00185***	0,00172	
Denmark	*CR*	0,84187*	0,06018	0,72050*
	Crisis	-0,00087***	0,00931	
	C	-0,00214***	0,00260	
Ireland	*CR*	0,07748***	0,13860	0,75275**
	Crisis	-0,03390**	0,01432	
	C	0,01507***	0,00776	
Luxembourg	*CR*	0,62914*	0,11896	0,57344*
	Crisis	0,01299***	0,01037	
	C	-0,00397***	0,00505	
	CR	0,89860*	0,04035	0,88620*

The Netherlands	*Crisis*	-0,00106***	0,00463	
	C	0,00019***	0,00182	
Sweden	*CR*	1,02151*	0,02619	0,92743*
	Crisis	-0,00464***	0,00873	
	C	-0,00748*	0,00259	

Note: The table has been processed using Eviews software. The regression was estimated using first differences series of data.
[1)] The total volume of domestic credit to private sector;
[2)] Dummy variable (0 - no crisis, 1 - there is crisis);
[3)] Constant;
Number of estimations: 67 after adjustments;
The Jarque-Bera normality test showed that residuals follow a normal distribution for each regression;
*, ** and *** denote the significance at the levels 1%, 5% and 10%;
Source: Author's elaboration

The coefficient of the dummy variable (β_2) is negative for almost all countries with the GDP per capita above 40.000 EUR, this meaning that the financial crisis had a negative effect on social welfare in most of the countries from cluster A. However, the social welfare in Luxembourg had a positive reaction to the financial crisis, but this reaction was almost unnoticeable (the value of the β_2 is very close to 1%).

The value of R^2 indicates whether the regression model is well-specified. Analysing its results, I found that at least 57% of the total variation of the dependent variable is due to the independent variables (0,573 <R2 <0,927).

Analysing the results for the cluster B (see Table 5), one can observe that the coefficient of the independent credit-related variable (β_1) is positive and very strong in the cases of Finland, Italy, France and Belgium (0,892 <β_1 <1,164) and positive and strong for Spain, Cyprus, Germany and United Kingdom (0,515 <β_1 <0,637). This means that the variation of the social welfare in cluster B is explained by the variation of the crediting in proportion from 52% (United Kingdom) to 116% (Finland).

Table 5. The results of multiple linear regression for countries from cluster B

Stat	**Independent variables**	**Coefficient**	**Robust standard error**	**R^2**
Belgium	*CR[1)]*	0,89250*	0,05969	0,89329*
	Crisis[2)]	0,01133**	0,00677	
	C[3)]	-0,00204***	0,00304	
Cyprus	*CR*	0,63336*	0,14460	0,54002*
	Crisis	-0,01702***	0,01216	
	C	-0,00105***	0,00400	
Finland	*CR*	1,16429*	0,05175	0,89225*
	Crisis	-0,00021***	0,00665	
	C	-0,01230*	0,00336	
France	*CR*	0,92605*	0,06129	0,76599*
	Crisis	-0,00112***	0,00446	
	C	-0,00463*	0,00169	
Italy	*CR*	1,01960*	0,04435	0,91760*
	Crisis	-0,01076***	0,00842	
	C	-0,00411***	0,00310	
	CR	0,61800*	0,10207	0,71222*

Germany	*Crisis*	0,00072***	0,00880	
	C	0,00580*	0,00144	
Spain	*CR*	0,63733*	0,07666	0,64010*
	Crisis	-0,00213***	0,00829	
	C	0,00059***	0,00435	
United Kingdom	*CR*	0,51511*	0,10525	0,52602*
	Crisis	-0,02217**	0,01244	
	C	0,00276***	0,00341	

Note: The table has been processed using Eviews software.
[1)] The total volume of domestic credit to private sector;
[2)] Dummy variable (0 - no crisis, 1 - there is crisis);
[3)] Constant;
Number of estimations: 67 after adjustments;
The Jarque-Bera normality test showed that residuals follow a normal distribution for each regression;
*, ** and *** denote the significance at the levels 1%, 5% and 10%;
Source: Author's elaboration

As it was observed in the case of cluster A, the coefficient of the dummy variable (β_2) is also negative for almost all countries with the GDP per capita between 20.000 EUR and 39.999 EUR, this meaning that the financial crisis had a negative effect on social welfare in most of the countries from cluster B. However, the social welfare in Belgium and Germany had a positive reaction to the financial crisis, even this reaction was almost unnoticeable ($\beta_2 < 0,015$).

In another train of thoughts, analysing the values of R^2, one can see that at least 53% of the total variation of the dependent variable is due to the independent variables ($0,526 < R^2 < 0,918$), this fact indicating that the regression model is well-specified.

The impact of the credit expansion on social welfare in the EU countries with a GDP per capita under 19.999 EUR does not differ significantly from the EU countries with higher GDP (see Table 6). It is positive in all the analysed countries, but very strong in the cases of Romania, Bulgaria, Croatia, Greece, Hungary and Portugal ($0,796 < \beta_1 < 0,970$), strong for Czech Republic ($\beta_1 = 0,538$) and moderate in Poland ($\beta_1 = 0,404$). On the other hand, the financial crisis had a negative impact on social welfare in all the countries from cluster C, even the values of the dummy variable coefficient are close to zero.

Table 6. The results of multiple linear regression for countries from cluster C

Stat	**Independent variables**	**Coefficient**	**Robust standard error**	**R^2**
Bulgaria	*CR[1)]*	0,93915*	0,06232	0,73715*
	Crisis[2)]	-0,00011***	0,02024	
	C[3)]	-0,01468***	0,01151	
Croatia	*CR*	0,92015*	0,05602	0,86275*
	Crisis	-0,00584***	0,00781	
	C	-0,00409***	0,00472	
Czech Republic	*CR*	0,53836**	0,23238	0,46751*
	Crisis	-0,01974***	0,02410	
	C	0,00702***	0,01113	
	CR	0,89073*	0,07495	0,70409*

Stat	Independent variables	Coefficient	Robust standard error	R^2
Greece	*Crisis*	-0,02342***	0,02976	
	C	-0,00596***	0,00476	
Hungary	*CR*	0,82513*	0,07007	0,83773*
	Crisis	-0,02495***	0,02147	
	C	0,00577***	0,00637	
Poland	*CR*	0,40432**	0,17224	0,34985*
	Crisis	-0,02044***	0,02818	
	C	0,00758***	0,01181	
Portugal	*CR*	0,79638*	0,08535	0,70529*
	Crisis	-0,00428***	0,00834	
	C	0,00313***	0,00383	
Romania	*CR*	0,96995*	0,04638	0,83258*
	Crisis	-0,00582***	0,02388	
	C	-0,01289***	0,01408	

Note: The table has been processed using Eviews software.
[1)] The total volume of domestic credit to private sector;
[2)] Dummy variable (0 - no crisis, 1 - there is crisis);
[3)] Constant;
Number of estimations: 67 after adjustments;
The Jarque-Bera normality test showed that residuals follow a normal distribution for each regression;
*, ** and *** denote the significance at the levels 1%, 5% and 10%;
Source: Author's elaboration

Analysing the values of R^2, I noticed that at least 35% of the total variation of the dependent variable is due to the independent variables ($0,350 < R^2 < 0,863$), this fact indicating that the regression model is pretty well-specified.

Overall, on the medium and long term the credit expansion process has a positive effect on social welfare in all the analysed EU countries. However, the credit impact is different from country to country, it fluctuating from very weak (i.e. Ireland) to moderate (i.e. Poland or Czech Republic), strong (i.e. Austria, Belgium or Greece) or even very strong (i.e. Finland, Sweden or Romania). No special trends have been identified among the analysed clusters, that is why I cannot find any links between the level of development of a country and the social welfare reaction to crediting (it cannot be argued that credit influences in a different way the social welfare in countries with a higher GDP compared to countries with a lower level of development). From the geographical perspective, it should be mentioned that the impact of the credit expansion on social welfare on medium and long term is stronger in Northern (i.e. Finland and Sweden) and Eastern Europe (i.e. Romania and Bulgaria) and weaker in Central Europe (i.e. Poland, Czech Republic or Germany).

As one can observe, the financial crisis had a negative but very weak impact on social welfare in almost all the analysed EU countries. The only countries that reacted differently are Belgium, Luxemburg and Germany. It is worth to mention that these countries succeeded to manage the effects of the financial crisis very effectively, embracing a counter-cyclical approach to the economy during the crisis).

Conclusions

Analysing the sample of 22 economies from European Union, I found that, even the degree of short-term interdependence between the first differences values of the total volume of domestic credit to private sector and the GDP per capita is at a very high level in almost all the European countries, the short-term Granger causality test revealed that the credit expansion process influences unidirectionally the GDP per capita in only 11 of the 22 economies. Most of the countries in which the social welfare reacts to changes in the crediting process are those with a GDP per capita between 20.000 EUR and 39.999 EUR (cluster B). The countries that don't fit to this development criteria (clusters A and C) seem to be more prudential and do not link social welfare with credit expansion. From the geographical perspective, it is worth to highlight that on short term the social welfare is more sensitive to credit expansion in western countries, while Southern Europe seems to be more prudential.

On the medium and long term, the multiple linear regression model applied showed that overall, the credit expansion process has a positive effect on social welfare in all the analysed European countries. However, the credit impact is different from country to country, it fluctuating from very weak (i.e. Ireland) to moderate (i.e. Poland or Czech Republic), strong (i.e. Austria, Belgium or Greece) or even very strong (i.e. Finland, Sweden or Romania). No special trends have been identified among the analysed clusters, that is why the I cannot find any links between the level of development of a country and the social welfare reaction to crediting (it cannot be argued that credit influences in a different way the social welfare in countries with a higher GDP compared to countries with a lower level of development). From the geographical perspective, it should be mentioned that the impact of the credit expansion on social welfare on medium and long term is stronger in Northern and Eastern Europe and weaker in Central Europe.

In another train of thoughts, the model revealed that the financial crisis had a negative but very weak impact on social welfare in almost all the analysed EU countries. The only countries that reacted differently are Belgium, Luxemburg and Germany. It is worth to mention that these countries succeeded to manage the effects of the financial crisis very effectively, embracing a counter-cyclical approach to the economy during the crisis).

It should be mentioned that these results are important not just from a theoretical perspective, putting the present study among those that claim that access to credit is felt on social welfare through various socio-economic benefits, but also from a practical point of view, as they can be used for improving the economic policy of a country. Starting from the conclusion that *the crediting has a positive effect on social welfare on medium and long term* in all the analysed European countries, a wise government should create or ensure favourable conditions for crediting the economy. This

means that, on the one hand, the government should provide a less restrictive regulation in order to motivate both domestic and foreign financial institutions to credit the economy, and, on the other hand, the Central Bank should be granted with full independence in terms of using and applying the monetary policy. Moreover, the government can design sectorial crediting mechanisms in order to encourage different sectors of the economy (e.g. agriculture, tourism, the real estate industry), this way improving the economic development of the country and improving the overall welfare.

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Appendix A - Testing the normality and stationarity of the variables

Table A1. The results of the Jarque-Bera Normality Test for the analysed variables

Cluster	Country	CR*		GDP per capita	
		J-B test	Prob.	J-B test	Prob.
Cluster A *GDP per capita > 40.000 EUR*	Austria	7,389204	0,0249	3,516687	0,1723
	Denmark	10,45791	0,0054	3,578259	0,1671
	Ireland	4,552435	0,1027	20,52700	0,0000
	Luxembourg	3,000257	0,2231	3,917058	0,1411
	The Netherlands	5,560569	0,0620	4,250730	0,1194
	Sweden	5,876250	0,0430	4,924471	0,0852
Cluster B *20.000 EUR < GDP per capita < 39.999 EUR*	Belgium	5,644527	0,0495	2,340751	0,1103
	Cyprus	8,030678	0,0180	6,559792	0,0376
	Finland	5,364556	0,0684	3,465071	0,1768
	France	5,357585	0,0486	4,336763	0,1144
	Italy	7,822859	0,0200	3,370193	0,1854
	Germany	1,121613	0,1707	4,170675	0,1243
	Spain	4,056282	0,1316	6,124232	0,0468
	United Kingdom	2,999219	0,2232	2,469029	0,1910
Cluster C *GDP per capita < 19.999 EUR*	Bulgaria	7,814948	0,0201	3,229283	0,1990
	Croatia	8,556929	0,0139	4,268727	0,1183
	Czech Republic	6,116184	0,0470	4,743547	0,0433
	Greece	5,700947	0,0578	2,101886	0,3496
	Hungary	1,895736	0,3876	0,663270	0,7177
	Poland	5,875095	0,0530	3,867746	0,1446
	Portugal	3,786513	0,1506	1,579512	0,4540
	Romania	7,077985	0,0290	1,924839	0,3820

Note: The table has been processed using Eviews software.
* The total volume of domestic credit to private sector
Source: Author's elaboration

Table A2. The results of stationarity tests

Cluster	Country	Test	Results	
			CR[1)]	GDPpc[2)]
Cluster A *GDP per capita > 40.000 EUR*	Austria	ADF[3)]	I(1)	I(1)*
		PP[4)]	I(1)	I(1)*
	Denmark	ADF	I(2)	I(1)*
		PP	I(1)	I(1)*
	Ireland	ADF	I(1)**	I(1)
		PP	I(1)	I(1)
	Luxembourg	ADF	I(1)**	I(1)**
		PP	I(1)	I(1)*
	The Netherlands	ADF	I(1)	I(1)
		PP	I(1)*	I(1)*
	Sweden	ADF	I(1)**	I(1)*
		PP	I(1)	I(1)
Cluster B *20.000 EUR < GDP per capita < 39.999 EUR*	Belgium	ADF	I(1)	I(1)*
		PP	I(1)*	I(1)*
	Cyprus	ADF	I(1)	I(2)*
		PP	I(1)	I(1)
	Finland	ADF	I(0)**	I(1)*
		PP	I(0)**	I(1)*
	France	ADF	I(1)	I(2)*
		PP	I(1)	I(1)*
	Italy	ADF	I(1)*	I(1)*
		PP	I(1)*	I(1)*
	Germany	ADF	I(1)*	I(1)*
		PP	I(1)*	I(1)
	Spain	ADF	I(0)*	I(1)
		PP	I(1)	I(1)*
	United Kingdom	ADF	I(1)	I(1)
		PP	I(1)	I(1)
Cluster C *GDP per capita < 19.999 EUR*	Bulgaria	ADF	I(1)*	I(1)
		PP	I(1)*	I(1)
	Croatia	ADF	I(1)*	I(1)*
		PP	I(0)*	I(1)
	Czech Republic	ADF	I(1)**	I(1)*
		PP	I(1)	I(1)
	Greece	ADF	I(1)	I(1)*
		PP	I(0)**	I(0)**
	Hungary	ADF	I(1)	I(1)*
		PP	I(1)**	I(0)**
	Poland	ADF	I(1)	I(1)*
		PP	I(1)	I(1)*
	Portugal	ADF	I(1)*	I(1)**
		PP	I(1)	I(1)*
	Romania	ADF	I(1)*	I(1)**
		PP	I(1)	I(1)

Note: The table has been processed using Eviews software.
[1)] The total volume of domestic credit to private sector
[2)] GDP per capita
[3)] Augmented Dickey-Fuller Test
[4)] Philips-Perron Test
* and ** denote the significance at the levels 5% and 1%;
Source: Author's elaboration