

The reflexive relationship between financial and social exclusion for the selected Central-Eastern European countries

Byambasuren Dorjnyambuu¹

Abstract

This study primarily examines how the risk factors that lead individuals to social exclusion, disadvantage, and deprivation contribute to financial exclusion and vice versa. This causal relationship for financial and social exclusion is formulated using the simultaneous equations model. Along with the causal relationship, this study identifies the leading personal and environmental determinants for both the probabilities of being unbanked and socially excluded. I use demographic, socioeconomic, and geographic information from the Life in Transition Survey III, conducted in 2016. The study found a reflexive causal relationship between financial and social exclusion in the selected Central-Eastern European countries. Namely, people at risk of social exclusion are more likely to be excluded from access to financial services. On the other hand, those at risk of financial exclusion are more likely to be socially excluded.

KEYWORDS: Financial exclusion; social exclusion; simultaneous equations model; recursive bivariate probit; Central and Eastern Europe.

JEL CLASSIFICATION: D14, G21, G41, I32

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Introduction

Access to financial services is necessary for most individuals in their day-to-day lives. When it comes down to it, having a bank account is essential for paying bills and

¹ PhD candidate, University of Pécs, Faculty of Business and Economics, Pécs Hungary, ca6log@pte.hu; byambasuren81@gmail.com

getting income; it's also frequently required for work and receiving social security benefits. Unexpected expenses can be easily met if people have simple access to savings and low-cost borrowing. Also, mortgages and pensions allow people to buy homes and invest for retirement. Most people take advantage of these services regularly. However, these products are not available to everyone, and 31% of the global population did not have a bank account in 2017 (Demirgüç-Kunt et al., 2018). It severely hinders participation in society today, and relying on less-than-ideal methods of financial access can cost individuals far more than necessary (Caplan et al., 2021). The consequences of financial exclusion are amplified or reinforced for those who are socially excluded or have other vulnerabilities, such as old age, disability, deprivation, or a lack of digital skills.

Financial exclusion has been defined in broad ranges, but it is most commonly characterized as a wide notion representing a lack of access to (Dymski, 2003) and utilization (Anderloni et al., 2007) of various financial services. A set of commonalities among the studies conceptualized financial exclusion from both a process and a consequence perspective. Caplan et al. (2021) review this set of unifying defining features regarding who is most affected, how access is blocked, and the kinds of financial products and services. Although financial exclusion impacts a diverse group of people at different periods of their lives, authors mainly focused on those with low income and little wealth. The blockage of access is abundant in the literature [1] and primarily describes practice and policy blockages stymied due to individual, population, community, or institution-level issues. As for financial products and services, bank account ownership is the most commonly used measure of financial exclusion (Corrado & Corrado, 2015; Myers et al., 2012). Being unbanked (not having a bank account or using a mobile money provider) is the most severe financial exclusion because it is a prerequisite for access to other financial services (savings/credit) and digital payments.

There is also a widespread recognition that financial exclusion is part of a much broader social exclusion (Taket et al., 2009). Social exclusion refers to a complex system of socioeconomic, cultural, and political disparities that jeopardizes human rights and access to essential services and impairs quality of life at the individual, household, and community levels. As a result, financial exclusion was regarded as a component of a more extensive process that hinders full societal participation (Fernández-Olit et al., 2016; Urquijo, 2015). These studies stated that financial exclusion could emerge at the individual or household level, reinforcing social exclusion, poverty, and inequality. Conversely, the question arises as to how and to what extent the risk factors that lead individuals to social exclusion, disadvantage, or deprivation contribute to financial exclusion.

The primary goal of this study is to investigate the causal relationship between financial and social exclusion. The simultaneous equations model is used to formulate the causal interpretation for financial and social exclusion. I use a recursive bivariate probit regression to estimate the simultaneous equations model because both outcome variables are binary. Financial exclusion is measured by whether a person has a bank account. Social exclusion is measured by whether a person experiences at least

one of three conditions: monetary poverty, material and social deprivation, and low work intensity. This analytical framework enables us to define whether two dependent binary variables, unbanked and social exclusion, simultaneously identify each other along with other variables, such as personal and environmental factors. To the best of my knowledge, no previous research has examined this causal relationship, particularly in CEE countries; consequently, this is the contribution of this paper to the existing literature.

The recent literature reviews by Caplan et al. (2021) and Fernández-Olit et al. (2020) highlighted the need to broaden the focus and publication channels in this field because USA- and UK-focused papers primarily dominate the literature. It is unclear if the risk factors leading to financial and social exclusion in advanced economies can also be found in developing countries. This research focuses on CEE nations in this regard, and it employs the Life in Transition Survey (LiTS) III data to assess financial and social exclusion across CEE countries. Although LiTS III includes the eleven CEE nations that are members of the EU, this study includes nine of them [2]: Bulgaria, Czechia, Croatia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia.

The paper is structured as follows. Section 2 discusses the literature and the context of financial and social exclusion, Section 3 establishes this study's conceptual framework and hypothesis, and Section 4 presents the data and variables employed. Sections 5 and 6 discuss estimation strategy and outcomes. The conclusion is provided in the final section.

Literature and context

The authors described various **demand**, **supply**, and **environmental** contributors to financial exclusion. From a demand perspective, studies have identified a wide range of factors. Personal factors such as old age, insufficient education and skills, financial attitude, confidence, poor health, and family breakdown commonly contribute to financial exclusion (Caplan et al., 2021; Németh, Zsótér, et al., 2020; Rhine & Greene, 2013). Also, those at the highest risk of social exclusion, such as unemployment, low income, poor housing, and material and social deprivation, are more vulnerable to financial exclusion. Fernández-Olit et al. (2016) found that people in monetary poverty were 2.8 times more likely to be underbanked [3], and those without a regular source of income were five times more likely to be unbanked than their employed counterparts.

According to the World Bank's 2017 Global Findex Survey (GFS)[4], about 18.5 million (22%) adults in the selected CEE countries remained unbanked in 2017. Poorer adults and adults out of the labor force make up a disproportionate fraction of the unbanked. In CEE countries, on average, 36.4% of adults are out of the labor force, and 28.9% of adults in the poorest 40% of households did not have a bank account at the time of the 2017 GFS (Table A1). The 2017 GFS also asked unbanked adults why they do not have a bank account. The most prevalent two responses in CEE

countries were that they don't have enough money to open an account (46% of unbanked people) and that financial services are expensive (32% of unbanked people). These reasons connect the problem of exclusion to poverty. More precisely, a low or unpredictable income might limit many people's access to financial services and other goods and services. This restricted access contributes to the poverty premium, in which the poor pay a higher price for goods and services. The premium then exacerbates the impacts of social and financial marginalization.

The demand-side financial exclusion was also considered a self-exclusion (Appleyard, 2011; Koku, 2015). Individuals who choose exclusion by remaining unbanked do so for various reasons. Some people may have language, cultural, and religious reasons, while others claim that banks make them feel uneasy or unwelcome or do not trust banks. Some may have indirect access, such as using someone else's bank account (Rojas, 2010).

In terms of supply perspectives, individuals face financial exclusion due to the institutional systems associated with banks. Banks respond to market forces because of their intrinsic character as profit-seeking businesses, and they are traditionally not held accountable for societal imbalances in resources and opportunities (Bernad et al., 2008). Financial exclusion can emerge institutionally in both formal (e.g., physical access difficulties to banks) and informal (e.g., banks charge high and multiple fees, have minimum balance requirements, insufficient communication, and poor service delivery) exclusion among individuals. In addition, Csorba (2020) stressed the importance of the supply side of the financial market - banks, financial institutions, and central banks - in developing financial culture, particularly beliefs and stereotypes.

According to Kearney (2021), 25% of bank branches in Europe will disappear in the next three years since new client behaviors around digital banking have become permanent due to the pandemic. It is a significant rise in bank branches closing across Europe. According to the IMF's 2021 Financial Access Survey, the number of ATMs per 100,000 adults has declined by an average of 4%, and the number of commercial bank branches per 100,000 adults has decreased by an average of 12% in the selected CEE countries over the last five years (Table A1). Although this decline is expected to be offset by the expansion of digital banking, there is a wide variation in the use of digital banking across individual countries. According to EU statistics on ICT usage, the use of internet banking varies among the chosen countries, ranging from 15% (Bulgaria and Romania) to 80% (Latvia) (Table A1). Thus, digital banking made financial services more accessible and convenient for some people, but bank closures and being cut off from digital platforms have negatively affected some people.

Environmental factors resulting from policy, economic, and systemic factors may enable financial institutions to focus on more affluent consumers and less on people with lower incomes, disadvantaged, or excluded from financial services (Appleyard, 2011; Bond & Krishnamurthy, 2004). Caplan et al. (2021) highlight three major factors: globalization, the deregulation of formal financial institutions, and an increase in the proportion of low-income families. Both globalization and deregulation aim to compete for more rich, elite, and profitable clients. As a result, capital flows away

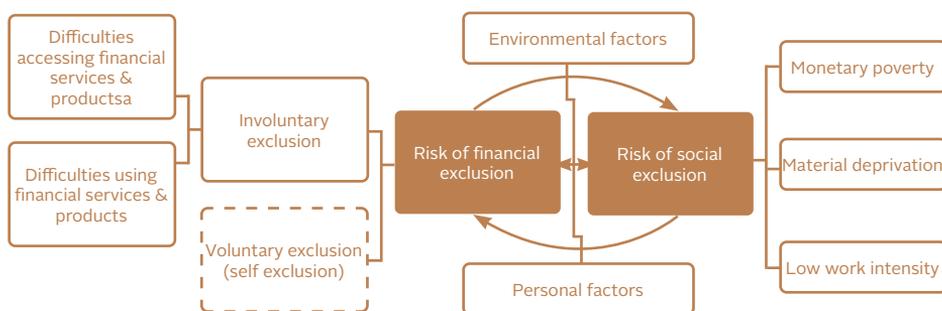
from lower-income communities and individuals and toward more financially sound markets, resulting in financial exclusion. The increasing number of low-income households contributes to financial exclusion, especially in an economic recession. During economic hardship, the segmentation of the disadvantaged is intensified, and conventional banks and other lenders are looking to minimize their losses; they tend to cater to the wealthiest members of society (Leyshon & Thrift, 1995).

Income disparity and geography are also factors contributing to financial exclusion. Demirguc-Kunt & Klapper (2012) demonstrated that the variation in the use of formal accounts is related to the country's income disparity. They found a somewhat strong association between account penetration and the Gini coefficient, used to measure income inequality. Within particular countries, the usage of financial services is frequently uneven: densely populated metropolitan areas have a far higher density of retail access points and use of financial services than rural areas. Being close to a retail access point remains critical for individuals, especially the poor, who are less mobile and have less access to new developments like mobile money (World Bank, 2014).

Conceptual framework and hypothesis

Financial exclusion is seen as a symptom of and a contributor to disadvantage, poverty, and social exclusion, but the relationship can also be reversed. This research aims to investigate the circular relationship between the risk of financial exclusion and the risk of social exclusion. Following the model by Fernández-Olit et al.(2016), the conceptual framework of this study is described as follows:

Figure 1. Conceptual framework: the relationship between financial and social exclusion



Source: Own elaboration based on Fernández-Olit et al.(2016)

In this framework, the causal relationship between financial and social exclusion is integrated with individual and environmental factors that can amplify the relationship.

Financial exclusion. It is essential to distinguish between voluntary and involuntary financial exclusion. Following the literature, some individuals are excluded voluntarily from financial services, and they do not pose a problem for policymakers because their nonuse is caused by a lack of demand (World Bank, 2014). Thus, this study will focus on involuntary financial exclusion rather than voluntary exclusion. This category can be classified into difficulties accessing and using financial services and products. Individuals who are unbanked in financial institutions due to insufficient income or excessive loan risk are the most common example of financial exclusion caused by obstacles in using financial services and products.

Social exclusion. A household's income does not solely determine poverty and social exclusion; it can also be caused by joblessness, low work intensity, employment status, or other socioeconomic factors. Eurostat combines three independent measures to calculate the number or share of people at risk of poverty or social exclusion. It covers those people who are involved in at least one of these three situations: (i) monetary poverty, (ii) material and social deprivation, and (iii) very low work intensity. This study attempts to calculate the approximation of these variables using their definitions derived from the European Strategy 2020 [5].

Personal factors include gender, age, education attainment, poor health, household size, household income, and unemployment. The literature shows that financial and social exclusion impacts some individuals more than others. People with low income, low levels of educational attainment, health problems, unemployed, and older are more likely to not have a bank account and be socially excluded than other groups. In addition to these personal variables, distrust of financial institutions and a lack of home Internet access are considered when estimating financial exclusion. In the same way, when figuring out social exclusion, the number of children under the age of six, the mother's low level of education, and the lack of social life are also taken into account in addition to the personal variables.

Based on the literature, *environmental factors* include geography, regional income inequality, and country dummies. It can be expected that people living in socially impoverished areas, areas with higher levels of disparity, and rural areas are more likely to be financially and socially excluded. Furthermore, the country dummies capture institutional and market differences within nations by reflecting disparities in financial sector sophistication and functional differences originating from country-specific socioeconomic circumstances (Corrado & Corrado, 2015).

The literature and conceptual framework lead to the hypotheses below:

Hypothesis 1a: Individuals are more likely to be financially excluded if they are at risk of poverty or social exclusion.

Hypothesis 1b: In contrast, individuals are more likely to be socially excluded if they are financially excluded.

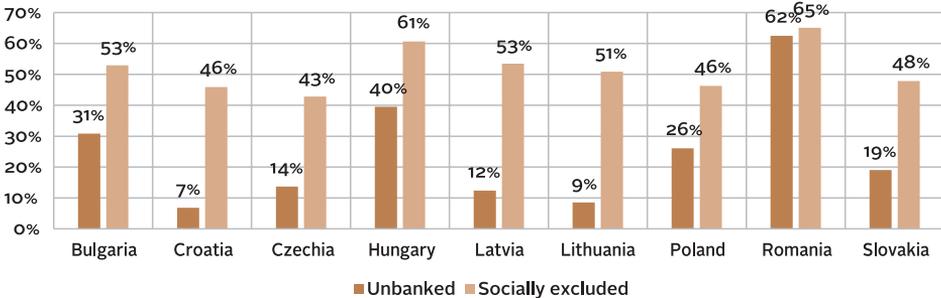
Data and variables

This paper uses data from LiTS III [6], covering 34 transition countries jointly conducted by the European Bank for Reconstruction and Development (EBRD) and the World Bank (WB) in 2016. The LiTS is a household and attitudinal survey that collects data on respondents' socioeconomic situation and asks about their perceptions of various economic, political, and social issues. This paper includes the nine CEE countries that are members of the European Union (EU): Bulgaria, Czechia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia. 10,477 households are included in the sample, and around 1,160 households are covered in each country (Table 1).

Table 1 describes all the variables used in this study with sample averages. As previously stated, being unbanked is used as a measure of financial exclusion in this study because it is required for access to other financial services, including digital payments. Hence, *unbanked* measures if a respondent does not have a bank account. Around 24% of respondents did not have a bank account in the sample. Croatia (7%) and Lithuania (9%) have the lowest levels of banking exclusion, whereas Romania (62%) has the highest level of banking exclusion, followed by Hungary (40%) (Figure 2).

A respondent is considered socially excluded if he/she is in at least one of the following three situations: monetary poverty, material deprivation, or very low labor intensity. Around 52% of respondents faced the risk of poverty or social exclusion in the sample. Compared to the unbanked, the average share of respondents at risk of social exclusion is considerable for all countries, ranging from 43% of respondents in Czechia to 65% in Romania (Figure 2). In the selected countries, very low work intensity was the most common type of social exclusion, with 38.6% of respondents having a low work intensity. 27.2% were materially deprived, and 12.7% were at risk of monetary poverty. In the selected CEE nations, around 6% of respondents at risk of social exclusion lived simultaneously in families confronting all three poverty and social exclusion risks.

Figure 2. The proportion of respondents without a bank account and at risk of social exclusion across countries



Source: LiTS III (2016), EBRD and WB

When the unbanked are compared to the socially excluded, 78% of the unbanked are at risk of social exclusion, whereas 37% of those at risk of social exclusion are unbanked.

Table 1. List of variables and sample averages

Name of variable	Notation	Description	Sample average (N=10,477)
Financial exclusion	<i>Unbanked</i>	a dummy variable equals one if a respondent does not have a bank account.	0.241
Social exclusion	<i>SE</i>	a dummy variable that equals one if a respondent is involved in at least one of these three situations: (i) monetary poverty. (ii) material deprivation. and (iii) very low work intensity.	0.520
<i>Personal factors</i>			
Female	<i>female</i>	a dummy variable equals one if a respondent is female.	0.580
Age	<i>age</i>	A respondent's age is measured in years.	53.072
Education		A respondent's highest level of education is measured using the following three dummy variables:	
Lower	<i>loweduc</i>	a dummy variable equals one if a respondent's highest level of education is lower secondary and below.	0.311
Middle	<i>mideduc</i>	a dummy variable equals one if a respondent's highest level of education is upper secondary and post-secondary. non-tertiary.	0.471
Higher	<i>higheduc</i>	a dummy variable equals one if a respondent's highest level of education is tertiary education and above; used as a reference category	0.218
Poor health	<i>phealth</i>	a dummy variable equals one if a respondent rated her/his overall health as poor or very poor.	0.157
Household size	<i>hsize</i>	the number of people in a private household	2.225
Log (household income)	<i>loginc</i>	the logarithm of monthly net household income	6.269
<i>Variables included in the unbanked equation</i>			
Unemployed	<i>unemp</i>	a dummy variable equals one if a respondent is unemployed.	0.113
Lack of trust in financial institutions	<i>distrust</i>	a dummy variable equals one if a respondent distrusts banks and financial institutions	0.325
No internet access at home	<i>nointernet</i>	a dummy variable equals one if a respondent doesn't have access to the Internet at home.	0.359

Name of variable	Notation	Description	Sample average (N=10.477)
<i>Variables included in the social exclusion equation</i>			
Number of children under the age of six	<i>kids6</i>	the number of children under the age of six in the household	0.126
Mother's low level of education	<i>mloweduc</i>	a dummy variable equals one if a respondent's mother's highest level of education is lower secondary and below.	0.647
Lack of personal ties	<i>lsfriend</i>	a dummy variable equals one if a respondent meets up with friends or relatives less than once a month.	0.173
<i>Environmental factors</i>			
Rural	<i>rural</i>	a dummy variable equals one if a respondent lives in rural areas	0.420
Inequality	<i>Gini</i>	Gini indices calculated at the regional level (NUTS3) on equivalized household income	0.436
Country dummies		Sample size	
Bulgaria	<i>Bulgaria</i>	a dummy variable equals one if a respondent in Bulgaria	1128
Czechia	<i>Czechia</i>	a dummy variable equals one if a respondent in Czechia	1160
Croatia	<i>Croatia</i>	a dummy variable equals one if a respondent in Croatia	1141
Latvia	<i>Latvia</i>	a dummy variable equals one if a respondent in Latvia	1317
Lithuania	<i>Lithuania</i>	a dummy variable equals one if a respondent in Lithuania	1331
Hungary	<i>Hungary</i>	a dummy variable equals one if a respondent in Hungary	1126
Poland	<i>Poland</i>	a dummy variable equals one if a respondent in Poland	890
Romania	<i>Romania</i>	a dummy variable equals one if a respondent in Romania	1197
Slovakia	<i>Slovakia</i>	a dummy variable equals one if a respondent in Slovakia	1087

Source: LiTS III (2016), EBRD and WB

Estimation strategy

The simultaneous equations model (SEM) is used to construct the causal relationship between financial and social exclusion since each equation in this system should have a *ceteris paribus*, causal interpretation. Thus, I assume that financial exclusion and social exclusion are jointly determined by

$$\text{unbanked} = \beta_{10} + \alpha_1 SE + x_1 \beta_1 + x_e \beta_{1e} + u_1 \quad (1)$$

$$SE = \beta_{20} + \alpha_2 \text{unbanked} + x_2 \beta_2 + x_e \beta_{2e} + u_2 \quad (2)$$

where *unbanked* and *SE* are the endogenous variables, and u_1 and u_2 are the structural error terms. The variable x_1 is a vector of exogenous variables in the first equation: $x_1 = (\text{female}, \text{age}, \text{agesq}, \text{loweduc}, \text{mideduc}, \text{phealth}, \text{hhsz}, \text{loginc}, \text{unemp}, \text{nointernet}, \text{distrust})$. Similarly, x_2 is a vector of exogenous variables in the second equation: $x_2 = (\text{female}, \text{age}, \text{agesq}, \text{loweduc}, \text{mideduc}, \text{phealth}, \text{hhsz}, \text{loginc}, \text{kids6}, \text{mloweduc}, \text{lsfriend})$. Eight exogenous variables are the same, and the rest are different in x_1 and x_2 , which allows us to impose exclusion restrictions on the model. x_e is a set of exogenous variables related to environmental factors (*rural*, *Gini*, and *country dummies*), the same for the two equations. Both equations are identified using the rank condition for structural equation identification [7].

It is instructive to demonstrate that an explanatory variable determined simultaneously with the dependent variable is often correlated with the error term, resulting in bias and inconsistency. If we plug the right-hand side of equation (1) in for *unbanked* in equation (2), we get the following reduced form:

$$SE = \pi_{21} x_1 + \pi_{22} x_2 + \pi_{2e} x_e + \varepsilon_2 \quad (3)$$

where,

$$\pi_{21} = \frac{\alpha_2 \beta_1}{1 - \alpha_2 \alpha_1}, \pi_{22} = \frac{\beta_2}{1 - \alpha_2 \alpha_1}, \pi_{2e} = \frac{\alpha_2 \beta_{1e} + \beta_{2e}}{1 - \alpha_2 \alpha_1}, \varepsilon_2 = \frac{\alpha_2 u_1 + u_2}{1 - \alpha_2 \alpha_1}, \alpha_2 \alpha_1 \neq 1$$

Because x_1 and x_e are assumed to be uncorrelated with u_1 , the question is whether *SE* and u_1 are also uncorrelated. According to the reduced form, *SE* and u_1 are correlated if and only if ε_2 and u_1 are correlated. However, ε_2 is a linear function of u_1 and u_2 . When u_1 and u_2 are assumed to be uncorrelated, then ε_2 and u_1 are uncorrelated whenever $\alpha_2 = 0$. Namely, (i) if $\alpha_2 = 0$, *SE* is not simultaneously identified with *unbanked*; and (ii) if $\text{corr}(u_1, u_2) = 0$, there are no omitted variables or measurement error in u_1 that are correlated with *SE*.

The recursive bivariate probit (RBP) regression is used since both outcome variables, *unbanked* and *SE*, are binary variables. The RBP is a two-probit equation system that allows correlated error terms and the binary dependent choice in one equation to be an endogenous regressor in the other (Filippini et al., 2018). Because a probit model's estimation parameters have no apparent economic interpretation, average marginal effects are derived to determine the relevance and importance of variables. It's possible to estimate marginal effects for each category independently due to the binary nature of the outcome variables. To better understand and interpret the empirical findings, I compute the average marginal effects of the predictors on the probability of being financially and socially excluded, which is $Pr(\text{unbanked} = 1, SE = 1)$.

The primary interest is to define the magnitude of the marginal effects of x_1 (or x_2), x_e , and *SE* on *unbanked*. These exogenous variables affect the outcome variable through different channels. Namely, a change in x_1 and x_e has a direct effect on the *un-*

banked, while a change in x_2 has an indirect effect on the *unbanked* through a change in the endogenous variable *SE*. Furthermore, because the endogenous explanatory variable *SE* is binary, its direct marginal impact on the *unbanked* can be stated as the average treatment effect (ATE) of social exclusion on the financial exclusion [8]:

$$ATE(SE) = \Phi(\alpha_1 + x_1\beta_1 + x_2\beta_{1e}) - \Phi(\alpha_1 + x_1\beta_1 + x_2\beta_{1e})$$

In addition, standard errors are determined using the delta techniques to determine statistical inference on the accuracy and significance of the average marginal effects.

Empirical result

I use Coban Mustafa's *rbiprobit* [9] STATA command to estimate the recursive bivariate probit model using full information maximum likelihood, in which equation (2) is incorporated into the right-hand side of the equation for *unbanked* as the observed realization *SE*. This procedure is also applied to the equation for *SE*. The model estimation results with diagnostic tests are shown in Table 2.

The two equations' Wald test of exogeneity ($H_0: \rho = 0, p\text{-value} < 0,001$) suggests the error terms in the structural equation and the reduced-form equation for the endogeneity are correlated. Namely, the statistically significant $\text{atanh } \rho$ in both equations indicates the significant correlation between u_1 and u_2 , implying that *SE* and u_1 are correlated in equation (1) and *unbanked* and u_2 are correlated in equation (2). Also, the estimated coefficients of endogenous variables in two equations are statistically significant ($\alpha_1 \neq 0, \alpha_2 \neq 0$). Therefore, it can be concluded that two dependent variables, financial and social exclusion, simultaneously identify each other. It implies that investigating them separately using a single probit model or OLS estimation results in simultaneity bias.

A recursive bivariate probit regression results confirm the causal relationship between financial and social exclusion. Namely, people at risk of poverty or social exclusion are more likely to be excluded from access to financial services. On the other hand, those at risk of financial exclusion are more likely to be socially excluded. Holding all other variables constant, the risk of being socially excluded increases the probability of being unbanked by 13.8%, whereas not having a bank account raises the probability of being socially excluded by 18.1% in the selected CEE countries. The lower usage of formal financial services by people at high risk of social exclusion can be explained by their low labor intensity. This is because, compared to monetary and material deprivation, the proportion of people in the sample with low labor intensity is high for both the unbanked and those at risk of social exclusion.

Table 2. Recursive bivariate probit model for financial and social exclusion: Coefficient estimates and average marginal effects

Variables	Unbanked		SE	
	Coefficient estimates	Average marginal effect	Coefficient estimates	Average marginal effect
SE	0.647*** (0.131)	0.138*** (0.029)		
Unbanked			0.730*** (0.113)	0.181*** (0.030)
female	-0.070** (0.033)	-0.009** (0.004)	0.124*** (0.031)	-0.002 (0.005)
Age	-0.045*** (0.005)	-0.006*** (0.001)	-0.037*** (0.007)	-0.008*** (0.001)
Age²	0.0005*** (0.00005)	0.0001*** (0.00001)	0.001*** (0.0001)	0.0001*** (0.00001)
loweduc	0.585*** (0.062)	0.074*** (0.008)	0.072 (0.057)	0.102*** (0.009)
mideduc	0.254*** (0.054)	0.032*** (0.007)	0.084** (0.042)	0.046*** (0.008)
phealth	0.249** (0.042)	0.032*** (0.005)	0.373*** (0.056)	0.058*** (0.007)
hysize	0.072*** (0.017)	0.009** (0.002)	0.170*** (0.018)	0.023*** (0.002)
loginc	-0.308*** (0.037)	-0.039*** (0.004)	-1.208*** (0.044)	-0.116*** (0.005)
unemp	0.401*** (0.049)	0.051*** (0.006)		
distrust	0.208*** (0.034)	0.026*** (0.004)		
nointernet	0.398*** (0.043)	0.050*** (0.005)		
kids6			0.253*** (0.043)	0.011*** (0.002)
mloweduc			0.141*** (0.037)	0.006*** (0.002)
lsfriend			0.082* (0.043)	0.004* (0.002)
rural	0.176*** (0.034)	0.022*** (0.004)	0.044 (0.034)	0.030*** (0.005)
gini	-0.414 0.488	-0.052 (0.062)	-0.611 (0.452)	-0.075 (0.075)
Bulgaria	1.043*** (0.085)	0.132*** (0.011)	0.731*** (0.083)	0.220*** (0.012)

Variables	Unbanked		SE	
	Coefficient estimates	Average marginal effect	Coefficient estimates	Average marginal effect
Czechia	0.668*** (0.086)	0.085*** (0.011)	1.492*** (0.096)	0.208*** (0.015)
Latvia	0.548*** (0.087)	0.070*** (0.011)	1.673*** (0.091)	0.196*** (0.014)
Lithuania	-0.155 (0.103)	-0.020 (0.013)		
Croatia			1.497*** (0.091)	0.111*** (0.016)
Hungary	1.319*** (0.082)	0.167*** (0.010)	1.312*** (0.096)	0.299*** 0.013
Poland	1.228*** (0.089)	0.156*** (0.011)	1.392*** (0.099)	0.282*** (0.014)
Romania	1.891*** (0.087)	0.240*** (0.010)	0.738*** (0.101)	0.354*** (0.011)
Slovakia	0.733*** (0.085)	0.093*** (0.010)	1.399*** (0.095)	0.217*** (0.015)
constant	0.125 (0.364)		5.875*** (0.347)	
atanh ρ	-0.241*** (0.083)		-0.313*** (0.07)	
Obs	10 476		10 476	
Wald for exogeneity	8.462***		20.081***	
AIC	20 914.8		16 570.7	
BIC	21 110.7		16 897.3	
Log-likelihood	-10 430.4		-8240.4	

*** p<0.001, ** p<0.01, * p<0.05

Note: In the MLE, ρ is not directly estimated, but $\text{atanh } \rho = 0.5 \ln((1 + \rho) / (1 - \rho))$ is applied

Personal factors, particularly *low education* and *household income*, are important determinants for financial and social exclusion in the selected CEE countries. *Female gender*, *age*, and *household income* are all significant factors that lower the probability of being unbanked and socially excluded. In contrast, all other personal variables increase the probability of being unbanked and socially excluded. Women are slightly less likely to be unbanked and socially excluded than men. A U-shaped curve can depict the relationship between age and financial and social exclusion. The negative estimate of age and positive estimate of age² show that being unbanked and socially excluded decreases at a young age and increases later in life. Several factors can account for this outcome. The most pertinent explanation is that older people are more likely to be affected by the technological divide, making them less likely to use electronic payment cards or rely on someone else for their banking.

Education is a crucial driver of financial and social exclusion in the selected CEE countries. People with lower educational attainment are more likely to be unbanked and socially excluded. Low and middle education levels increase the likelihood of being unbanked by 7.4% and 3.2%, respectively, compared to those with a graduate degree. At the same time, the effects are slightly higher for the likelihood of being socially excluded, at 10.2% for low education and 4.6% for middle education. Individual health status is often regarded as another critical parameter in reinforcing financial and social exclusion. People in poor health increase the likelihood of being unbanked and socially excluded by 3.2% and 5.8%, respectively, when all other variables are held constant.

It stands to reason that higher-income families would have a greater need for financial services and make more desirable customers for banks and other financial institutions. Holding all other variables constant, a 1% rise in (log) household income reduces the likelihood of being unbanked by 3.9%; this effect is nearly three times as strong, 11.6%, for the likelihood of being socially excluded. Low-income people are unbanked for a variety of reasons. Most importantly, low-income people are not an appealing market for most banks and financial service providers since their needs are minimal and generate negligible profits. Therefore, low-income households may be dissuaded from using financial services due to a lack of readily available, low-cost financial services that meet their demands. A rise in household size is positively and significantly linked to the likelihood of being unbanked and vulnerable to social exclusion. While an additional household member raises the likelihood of being unbanked by 0.9%, the effect on the likelihood of being socially excluded is 2.5 times greater (2.3%).

To satisfy the rank condition, unemployment, a lack of trust in financial institutions, and a lack of home Internet access are included in the probability of being unbanked. In contrast, the number of children under the age of six, the mother's low level of education, and a lack of personal ties are included in the probability of being socially excluded. People on fixed-term contracts easily access financial services, but unemployed people struggle to get basic banking services. Thus, unemployment is another contributor to being unbanked; in CEE countries, unemployment increases the likelihood of being unbanked by 5.1% when all other factors are held constant. A lack of trust in financial institutions significantly impacted the choice to remain unbanked in CEE countries. More specifically, mistrust of financial institutions increases the probability of being unbanked by 2.6%. Finally, lack of access to new information technologies, particularly lack of home Internet access, raises banking exclusion by 5%. In this regard, unbanked people cannot reap the expanding benefits of online banking, such as lower transaction costs.

Regarding social exclusion, the number of children under the age of six, the mother's low level of education, and a lack of personal ties-not meeting friends and relatives regularly, are all positive and statistically significant determinants. However, their marginal effects on the likelihood of being socially excluded are minor, ranging from 0.4% to 1.1%.

There are also environmental and spatial effects, demonstrating that access to financial services and the risk of social exclusion are influenced not just by who you are but also by where you reside. People in rural areas are more likely than those in urban areas to be unbanked and socially excluded; living in a rural area increases the probability of being unbanked and socially excluded by 2.2% and 3%, respectively. The non-inclusiveness of rural regions in CEE countries can be explained by numerous competitiveness factors, including low industrial and commercial activity, shortage of jobs, a lower level of average income, and a digital divide between rural and urban areas, which tend to have a high frequency of cash transactions in rural areas (European Commission, 2022).

Croatia and Lithuania were chosen as the reference countries for financial and social exclusion because they have the lowest prevalence rates, respectively. In this regard, the average marginal effects of country dummies are not comparable between financial and social exclusion. All the dummy variables corresponding to the countries (except Lithuania for financial exclusion) are positive and statistically significant for the probabilities of being unbanked and socially excluded, keeping all the variables constant. Romania has the highest marginal effect, which means that residing in Romania increases the likelihood of being unbanked by 24% (compared to Croatia) and the likelihood of being socially excluded by 35% (compared to Lithuania). Hungary and Poland have the subsequent highest marginal effects both for the probabilities of being unbanked and socially excluded. Being in Hungary and Poland increases the probability of being unbanked by 16.7% and 15.6%, respectively, as well as the probability of being socially excluded by 29.9% and 28.2%. On the other hand, Latvia and Czechia have the lowest marginal effects for the unbanked, while Croatia has the lowest marginal effect for social exclusion.

Discussion

This paper demonstrated that financial and social exclusion reinforce one another in CEE countries. People at risk of social exclusion are more likely to be excluded from banking services. In contrast, people at risk of financial exclusion are more likely to be poor and socially excluded. Therefore, this analysis suggests why financial exclusion cannot be considered separately from social exclusion or poverty.

The finding is consistent with previous studies on the impact of social exclusion on financial exclusion. Corrado & Corrado (2015) found a 10% decrease in the likelihood of using a bank account for households with no assets and adverse employment shocks in Eastern European countries [10] during the 2008-2010 economic crisis. They explain the decreased use of formal financial services during the crisis to a lack of access, coverage, and efficacy of social safety nets to protect vulnerable households.

This evidence suggests potential policy intervention targets. In most CEE nations, enhancing financial literacy is a common measure to reduce financial vulnerability. In 2017, for example, the Hungarian government implemented a policy to

increase the population's financial awareness. Németh, Vargha, et al. (2020) highlighted that most training undertaken under this policy does not consider the income or social background of the target groups and does not focus on the growth of financially vulnerable groups. Therefore, addressing financial exclusion as a social and economic problem rather than financial literacy or financial services may be the best strategy, particularly for communities at risk of social exclusion or poverty. Aside from providing for the unmet needs of the financially excluded and building their confidence, it is critical to detect and diversify risks, minimize transaction costs, and offer affordable financial services to individuals tailored to their various characteristics such as age, financial situation, etc.

Conclusion

Most people use financial services in their daily lives; in particular, having a bank account precludes access to other financial services and digital payments. These services, however, are not available to everyone, particularly the socially marginalized. Also, discrimination, a lack of financial and digital knowledge, ineffective contract enforcement, a poor information environment, insufficient product features, high prices, and misguided regulations are possible reasons individuals do not have access to financial products and services (World Bank, 2014).

Using the SEM model on the detailed data of the LiTS III, I find evidence of the causal relationship between financial exclusion and social exclusion; those at risk of social exclusion are more likely to be excluded from banking services, and vice versa. Along with the causal relationship, the probabilities of being unbanked and socially excluded depend on some personal and environmental factors. Among personal characteristics, female, age, and household income reduce the likelihood of being unbanked and socially excluded. In contrast, low education, poor health, household size, household income, and unemployment raise the likelihood of being unbanked and socially excluded. The analysis also suggests that people who distrust financial institutions and are not connected to the Internet are more likely to be unbanked, while people with weaker personal ties are more likely to be socially excluded.

There is also a spatial effect, indicating that the likelihood of being unbanked and socially excluded varies on where an individual lives; specifically, individuals living in rural areas in CEE countries are more likely to be unbanked and socially excluded. Furthermore, all dummy country variables positively influence the likelihood of being unbanked and socially excluded; in particular, their average marginal effects are relatively high compared to other variables.

The United Nations' Agenda 2030 for Sustainable Development 2015 stated a worldwide vision of boosting domestic financial institutions' capabilities to promote and enhance everyone's access to banking, insurance, and financial services. In this regard, financial inclusion is a priority for both developed and developing countries. Generally, financial inclusion is accomplished through financial literacy and financial capability on the part of the consumer, as well as access on the part of providers

of financial products, services, and advice. However, this is insufficient; improving financial inclusion demands national and regional strategies, the success of which requires both government assistance and private sector engagement, which will be effective only if the strategy meets the market. ■

Appendix

Table A1. Financial exclusion indicators in the selected CEE countries

Országok	(1)					(2)		(3)
	Individuals without an account, by groups (% age 15+) (2017)					Percentage change in (2017-2021)		Individuals using the Internet for internet banking (% of all individuals aged 16 to 74 (2021))
All	out of the labor force	poorest 40%	rural areas	youth (% ages 15-24)	ATMs per 100,000 adults	Branches of commercial banks per 100,000 adults		
Bulgaria	27.8	48.8	45.5	34.4	56.5	-6	22	15
Czechia	19.0	41.3	29.4	21.1	58.8	5	-19	73
Croatia	13.9	23.2	19.0	11.8	53.1	0	-18	56
Hungary	25.1	43.5	32.3	31.2	39.9	13	47	56
Lithuania	17.1	36.4	22.1	15.2	36.2	-36	-21	72
Latvia	6.8	14.8	11.5	7.8	24.3	-6	-56	80
Poland	13.3	32.9	15.8	13.4	37.4	-7	-23	52
Romania	42.4	52.2	62.2	46.1	48.9	-6	-19	15
Slovakia	15.8	34.6	22.1	16.1	45.4	3	-22	58
CEE: Average	20.1	36.4	28.9	21.9	44.5	-4	-12	53
Euro area	4.7	8.7	6.2	4.5	20.9	-	-	-

Sources: (1) WB 2017 Global Findex Database; (2) IMF 2021 Financial Access Survey; (3) EU Statistics on the ICT usage in households and by individuals.

Notes

1. Koku (2015), Fernández-Olit et al. (2020), Sprague (2015), and Urquijo (2015)
2. Due to their deficient percentage of unbanked people, Estonia and Slovenia are removed from the sample.
3. Possession of a bank account but lack or a limited usage of payment facilities

4. Retrieved September 5, 2022, from <https://globalfindex.worldbank.org>
5. Retrieved September 10, 2020, from [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At_risk_of_poverty_or_social_exclusion_\(AROPE\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At_risk_of_poverty_or_social_exclusion_(AROPE))
6. Retrieved August 8, 2020, from <https://www.ebrd.com/what-we-do/economic-research-and-data/data/lits.html>
7. In a two-equation simultaneous equations model, the first equation is identified if and only if the second equation has at least one exogenous variable (with a nonzero coefficient) that is not included in the first equation (Wooldridge, 2015).
8. represents the univariate standard normal cumulative function
9. For further details, see <https://github.com/cobanomics/rbiprobit>
10. The selected nine CEE countries were covered in their study.

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