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Business Equity and Wealth Inequality in Central and Eastern Europe

Edison Jakurti¹ 

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Abstract

This paper analyzes the contribution of business equity, housing wealth and the rest of net wealth, to wealth inequality in eight post-socialist countries. Using the third wave of Household Finance and Consumption Survey, we decompose wealth inequality by factor components and use bootstrapping to provide statistical inference. We find that business equity, accounting for over 50% of within-country inequality in most cases, significantly surpasses the contribution of housing wealth. We extend our analysis through a novel simulation approach, employing counterfactual scenarios, to assess variations in between-country inequality. We find that the greatest reduction in the wealth inequality between these countries would occur if business equity were distributed more equally.

Keywords Business equity · Wealth inequality · Factor decomposition · Simulation analysis · Central and Eastern Europe (CEE)

JEL Classification G51 · D31 · D33 · D63 · P36

Introduction

Wealth and income inequality are inherent features of capitalism, but their growing magnitudes in the recent decades have propelled the research interest in the field. While growing economic inequality was perceived as an inevitable and temporary feature of an industrializing and developing economy, best exemplified by the Kuznets curve, inequality in developed economies seemed to have passed the trough and is on the rise again. Piketty's *Capital in the Twenty-First Century* shows such a phenomenon in several countries.

Besides documenting the trends, the quests for finding explanations for such disparities have resulted in a set of potential answers, including the ownership of

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business equity (Azpitarte 2008; Bezrukovs 2013; Sierminska and Medgyesi 2013; Lindner 2015; Neves-Costa and Pérez-Duarte 2019; Bartels and Schröder 2020). Yet, the private ownership of capital and the free pursuit of entrepreneurial activities are features of the capitalist system, which was not always everywhere the case. For a good part of the twentieth century, many Central and Eastern European countries were governed by the socialist system with minimal to almost nonexistent private ownership. With all the immense political and economic deficiencies and countless flaws, for both ideological and pragmatic reasons, the system produced less wealth and income inequality than in other European countries (Milanovic 1998). The fall of the Berlin Wall and the Soviet Union marked the end of that era, and the wind of change across these countries spurred a political and economic transition. A crucial process that enabled the transfer of ownership from public to private was the process of privatization, often accompanied by corruption and unequal opportunities (Roland 2018).

Given the historical context of these systemic transitions, we ask the question: what role does business equity play in explaining wealth inequality within and between post-socialist countries in Central and Eastern Europe? Using the third wave of the Household Finance and Consumption Survey (HFCS), we conduct a decomposition by factor components of wealth inequality, measured by the coefficient of variation (CV), as proposed by Shorrocks (1982), and a simulation analysis using a counterfactual, similar to Pfeffer and Waitkus (2021), for eight post-socialist countries, including Estonia, Croatia, Hungary, Lithuania, Latvia, Poland, Slovenia, and Slovakia. Because Pfeffer and Waitkus (2021) and Brzeziński and Sałach (2021) find the ownership of housing wealth to be the most important determinant in explaining within-country and between-country inequality, we compare business equity with housing wealth and the rest of net wealth.

We find that business equity is the single most important asset in explaining over 50% of wealth inequality measured by CV in Croatia, Estonia, Hungary, Latvia, and Slovenia. Poland is the only country where housing wealth is the most important factor accounting for over 60% of wealth inequality. Yet, even in Lithuania and Slovakia where business equity does not exceed the 50% threshold, its contribution to inequality is greater than that of housing wealth. We bootstrap the confidence intervals and find these results to be statistically significant at the 5% level.

Moreover, through the simulation analysis, where we use Slovakia as a counterfactual, since it has the lowest wealth inequality within this pool of countries, we find that within-asset inequality, rather than portfolio composition or correlation of assets with total net wealth, is the most important determinant in explaining inequality between these countries. In other words, if assets in other countries were distributed as they are in Slovakia, the overall wealth inequality would lower by an average of 32%. And the inequality that plays the most important role among assets is that of business equity which, if it were distributed in the rest of the countries as it is in Slovakia, could reduce the overall wealth inequality by an average of 22%. We contribute to the literature on determinants of wealth inequality by providing new empirical evidence that is different from Pfeffer and Waitkus (2021) and Brzeziński and Sałach (2021) because (a) we account for the fact that negative values can make the Gini coefficient lose its attribute to measure inequality therefore we use CV; (b)



because of (a), we use a different decomposition method; and (c) we account for business equity in post-socialist countries, which is either overlooked or omitted in earlier works.

The rest of this paper is organized as follows. Section 2 provides the background and motivation for studying the role of business equity in the context of post-socialist countries. Section 3 explains the data we use in our analysis. Section 4 outlines the methodologies we use to decompose wealth inequality and simulate the results using a counterfactual. Section 5 presents the results from the decomposition by factor components and the simulation analyses. Section 6 discusses the meaning of these results and the differences to results found in similar studies, and Section 7 concludes this work.

Background and Motivation

Among various drivers that may explain wealth inequality and concentration, self-employment business equity¹ as a proxy for entrepreneurship has seized the attention of a number of studies. Quadrini (1999) pioneered the study of the relationship between entrepreneurship and wealth concentration. He finds that entrepreneurship explains high wealth concentration through high saving rates and is associated with higher probability for upward social mobility. Besides finding consistent results with the previous study, Quadrini (2000) finds that 34% of wealth concentration in the USA, estimated by the Gini coefficient, can be attributed to the wealth of entrepreneurs. Further, he finds that the wealth of top 1% jumps from 4.2%, when the model consists of workers only (i.e., non-entrepreneurs), to 24.9%, when entrepreneurs enter the model.

Gentry and Hubbard (2004) also find that entrepreneurs own a significant portion of total wealth and income and their share increases along the distribution. Cagetti and De Nardi (2006) show that 54% of households in the top 1% of wealth distribution in the USA are self-employed business owners. Consistent with previous studies, they show that, albeit the higher returns, due to borrowing constraints, entrepreneurs have to save in order to expand their firms. As a result, their wealth accumulates and can be transferred to their offspring; henceforth, contributing to wealth inequality beyond one's lifecycle. Further, De Nardi et al. (2007) find that around 30% of households in the top decile of wealth distribution in the USA consists of entrepreneurs. Lastly, De Nardi and Fella (2017) review the earlier findings concluding that "entrepreneurial activity is an important force driving wealth concentration" (p. 281).

The analysis of household portfolio composition has been a key approach for estimating the contribution of specific factor components to wealth inequality. Indeed, most of the aforementioned works on the role of business equity are conducted by utilizing datasets that contain information regarding households' assets, liabilities, income, pension, and demographic characteristics (e.g., Survey

¹ We refer to this as business equity throughout the paper.



of Consumer Finance (SCF) or the Panel Study of Income Dynamics (PSID) for the US). Household portfolio composition analyses have been done using both cross-sectional (Wolff 1983) and longitudinal data (Wolff 1994, 2016; Kuhn et al. 2020). A recurring finding is that heterogeneity in household portfolio composition is an important determinant of wealth inequality since there are certain asset classes, owned by fewer households, which contribute more to the overall wealth inequality.

A confluence of the role of business equity and household portfolio composition has often been established in decomposition analyses. Using Spanish Survey of Household Finances of 2002, Azpitarte (2008) concludes that self-employment business equity plays an important role in explaining wealth inequality in Spain. Sierminska and Medgyesi (2013) use the first wave of HFCS to conduct a factor decomposition analysis and find that self-employment business assets have a considerable impact on net wealth inequality. Bezrukovs (2013) also uses the first wave of HFCS and, while the aim of the study is to investigate the role of housing in wealth inequality, it concludes that the marginal contribution of business assets to wealth inequality is the highest. Similar to Bezrukovs (2013) and Sierminska and Medgyesi (2013), but employing additional decomposition techniques too, Lindner (2015) finds that, relative to other assets (i.e., households' main residence, other real assets, safe financial assets, risky financial assets, other financial assets), self-employment business assets tend to be one of the main contributors to gross wealth inequality in the euro area.

While Lindner (2015) uses the first wave of HFCS, Neves-Costa and Pérez-Duarte (2019) use both the first and second to estimate the marginal contribution, and a similar structure of asset-type decomposition, and reach similar conclusions: self-employment business wealth has a disequalizing effect in all Eurozone countries. Further, Bartels and Schröder (2020) use the German Socio-Economic Panel (SOEP v.35) and find that business wealth is the most important factor accounting for 50% of wealth inequality in Germany. This is consistent with what Lindner (2015) finds for Germany when using the same decomposition technique but a different dataset. Overall, these studies consistently show that business equity plays an important role albeit most of them focus on the role that housing wealth plays in explaining wealth inequality within or between countries (Bezrukovs 2013; Sierminska and Medgyesi 2013; Neves-Costa and Pérez-Duarte 2019; Pfeffer and Waitkus 2021).

Studying the role of business equity in explaining wealth inequality in post-socialist countries is compelling for several reasons. A crucial incentive for pursuing entrepreneurial activities and a core driver of capital accumulation is private ownership. However, for a good part of the twentieth century, private ownership was minimal in most of socialist Eastern and Central Europe. State ownership of the means of production, in various forms, instead was rather the norm of socialist regimes. Milanovic (1998) notes that the socialist states, on average, employed 90% of the labor force, which was significantly higher compared to the average of 21% found among members of the Organization for Economic Co-operation and Development (OECD). Today, a number of post-socialist republics, including Estonia, Croatia, Hungary, Lithuania, Latvia, Poland, Slovenia, and Slovakia, have joined the market economies of the European Union (EU). However, due to their socialist past and the



transitional period, there are a number of reasons that make these countries a compelling set for analyzing the role of business equity on wealth inequality.

First, the socialist structure of ownership, be it state, social, or collective, did not allow for private accumulation of wealth, which in turn could exacerbate wealth inequality. Unfortunately, to the best of our knowledge, reliable and comprehensive data on wealth distribution for that period are not available. Nevertheless, Milanovic (1998) elaborates how private wealth accumulation was both ideologically and pragmatically unacceptable in these regimes. On the ideological level, he notes how socialists thought of private wealth as a tool that could be used by individuals to own the means of production, which in turn would be used to hire labor, and produce the conditions for exploitation by capitalists. On the pragmatic level, he points to the fear that the regimes had of the liberty that wealth could bring to the rich; hence, they might not be obedient to the “rules of the game.” In such circumstances, besides in the area of agriculture, which Milanovic (1998) emphasizes to have had some importance as a private sector income in Yugoslavia (in this case, Croatia and Slovenia), Poland, and Hungary, entrepreneurship was minimal in other areas.

With the fall of the Berlin Wall and the Soviet Union, a wind of change across Europe spurred the political and economic transition, which had already started even before in some of these countries.² An initial economic characteristic of this process was a major fall in output. Milanovic (1998) estimates that, between 1987 and 1995, the real per capita GDP of the given set of countries ranged from the lowest of – 12% (Poland) to the highest of – 66% (Lithuania).³ Further he notes how, by 1996, only Slovenia and Slovakia had single digit inflation rates, while the rest where in the double digits.⁴

During this period, a crucial process that shaped the transformation of the type of ownership was privatization.⁵ While it took place in different forms and paces, the overall process had common characteristics. Roland (2018) describes the dialectics of political power and wealth that have reshaped one another through the process of privatization. He notes that, initially, it was state insiders and would-be-oligarchs that, through corruptive means, managed to appropriate the state-owned assets and became wealthy very fast; then, in turn, they used this economic power to shape the political institutions (pp. 597–598).

Such a process of transfer of ownership can be best seen in the limited wealth data that currently exist for the given pool of countries. Figure 1 shows the weighted average of the share of private wealth in total wealth between 1995 and 2021, and

² Roland (2018) emphasizes the free elections in Poland as an early event of transition that preceded the fall of the Berlin Wall.

³ For Estonia, Lithuania, Latvia, and Slovakia, the base year is 1988. For Hungary, Poland, Slovenia, and Slovakia, the last year is 1993. For Estonia and Lithuania, the last year is 1994. There is information for Croatia.

⁴ Croatia is not included.

⁵ Combining data from Estrin et al. (2009) and EBRD (2010) shows how the private sector share of Gross Domestic Product (GDP) changed from 1990 to 2010: from 10 to 80% in Estonia, from 25 to 80% in Hungary, from 10 to 75% in Lithuania, and from 10 to 70% in Latvia, from 30 to 75% in Poland, from 15 to 70% in Slovenia, from 10 to 80% in Slovakia.



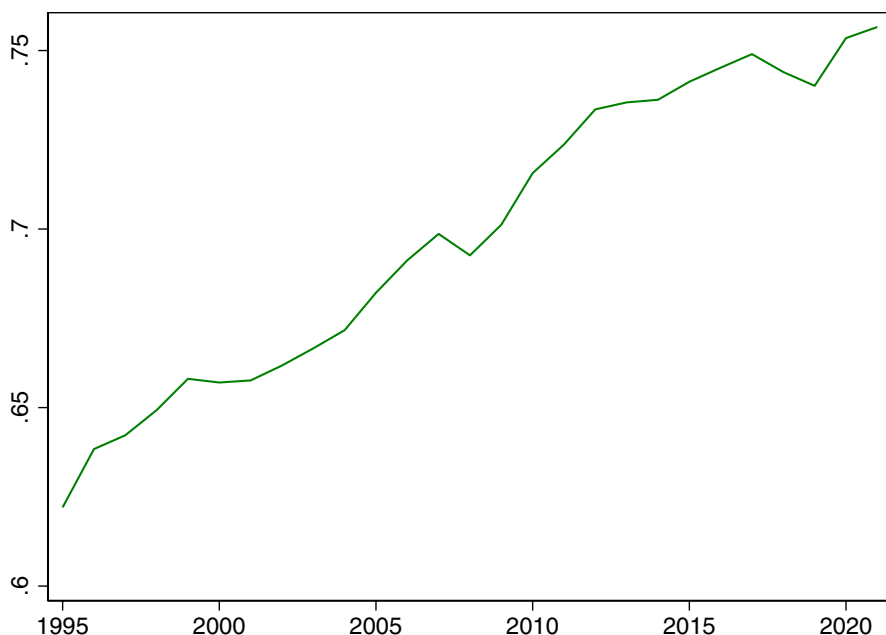


Fig. 1 Average share of private wealth in total net wealth in Central and Eastern Europe 1995–2021. *Notes:* The average shares of private net wealth in total wealth (private plus public) are weighted by respective total wealth. It includes data from Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. *Source:* Own calculations using data from World Inequality Database

Fig. 3 shows the share of private wealth in total wealth for the same period for individual countries. In the given period, the share of private wealth increased by over 13 percentage points, which was more than double of the growth in the rest of Euro area.⁶

One should note though that by 1995, most of these countries had six or more years that had started major structural reforms.⁷ Due to data unavailability, we are unable to compare these changes with the period before 1995, but the overall transition can be noted. The European Bank for Reconstruction and Development (EBRD) monitored this process and developed a transition score to assess the progress in six areas, including large-scale privatization, small-scale privatization, governance and enterprise restructuring, price liberalization, trade and foreign exchange system, and competition policy. EBRD assessed each area with a score ranging from 1, indicating the lack of transition from centrally planned economies, to 4 and above, indicating a situation comparable to that of industrialized market economies. Figure 2 shows average EBRD score of the transition in 1989, 1995, 2000, 2005, 2010, and 2014, which is the last year with the available

⁶ Own calculation using data from the World Inequality Database.

⁷ In some of these countries, certain reforms had already started before 1990s. Hoen (1996) describes some of the reforms in Hungary, Poland, and former Czechoslovakia.



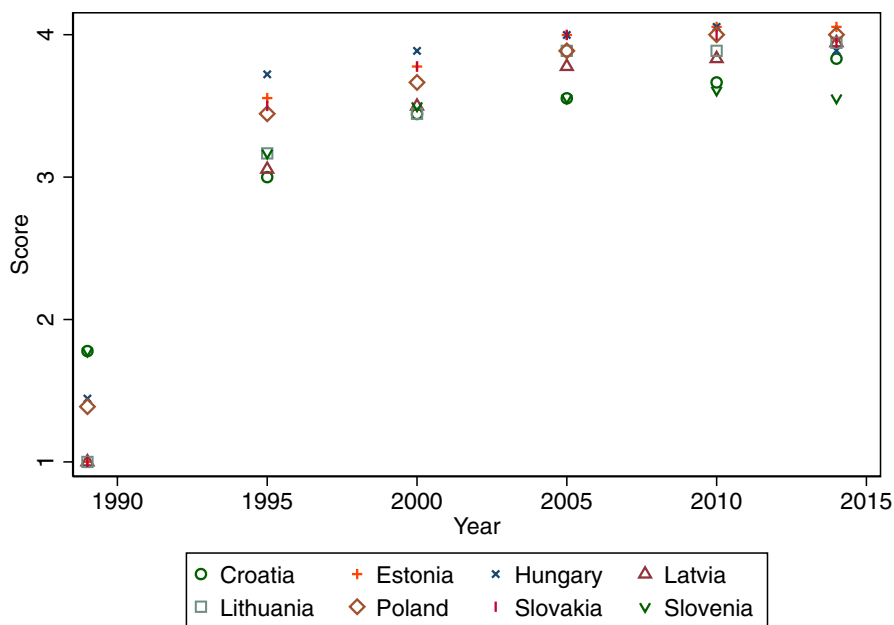


Fig. 2 The average EBRD transition score 1989–2014. *Notes:* EBRD rounds scores to integers and uses signs (+) and (–) to indicate gradation within the integer. We use the simple average of scores from all six areas: including large-scale privatization, small-scale privatization, governance and enterprise restructuring, price liberalization, trade and foreign exchange system, and competition policy. *Source:* Own calculations using data from EBRD (2023)

data. In 1995, the average score of all these countries was around 3.3, indicating that they had already conducted major reforms in the transition from socialism to capitalism. Thus, one might expect that the share of private wealth in 2017, which is the survey year of the HFCS, compared to 1989 increased much more than what we can see in Fig. 1.

Indeed, privatization enabled the transfer of capital in private hands and as noted by Kalecki, “the most important prerequisite for becoming an entrepreneur is the ownership of capital” (pp. 94–95, 2013). Estrin and Mickiewicz (2011) discuss the immense opportunities that this transition of ownership has had on entrepreneurship, but they also discuss the challenges of entrepreneurship in transition economies. While this private capital could now be used to generate income for some, the deindustrialization, as the other facet of privatization, left many jobless. Mitra and Yemtsov (2006) recognize the role of self-employment as a safety net in such circumstances. While there have been several studies showing both that economic inequality has been increasing ever since the beginning of the transition (Mitra and Yemtsov 2006; Leitner and Holzner 2008; Novokmet 2017) and that privatization has played a role (Milanovic 1998; Ivaschenko 2002; Ivanova 2007; Guriev and Rachinsky 2006; Estrin et al. 2009; Milanovic and Ersado 2012), there have not been many attempts to decompose wealth inequality and understand the role of business equity.



Our main contribution to the literature of wealth inequality is to provide new empirical evidence on determinants of wealth inequality within and between post-socialist countries. Our scope is comparable to Brzeziński and Sałach (2021) that ask a similar question but conclude that housing ownership is key in explaining wealth inequality between post-socialist Central and Eastern European countries. Our approach is comparable to Pfeffer and Waitkus (2021) yet results are different because they too find housing wealth to be the most important asset in explaining differences in wealth inequality between developed countries.

We provide the first decomposition by factor components of wealth inequality measured by CV, along with statistical inference through bootstrapping, in eight post-socialist countries from Central and Eastern Europe, where we show that business equity plays a more important role in within-country inequality than housing wealth. Moreover, we extend on a novel simulation analysis presented by Pfeffer and Waitkus (2021) and show the relevance of business equity in explaining between-country inequality too. Our findings could serve as a stepping stone for future methodological research, which aims to explore the impact of heterogeneity of inequality indices on the sensitivity of results. Our result could also inform policy regarding the regulation of certain asset classes, such as business equity, in order to mitigate wealth inequality.

Data

We use the third wave of HFCS to decompose wealth inequality measured by CV in all available post-socialist, Central and Eastern European countries. The HFCS is managed by the European Central Bank and contains household-level data on assets, liabilities, gross income, consumption, and other finance-related information for a number of European countries.⁸ The third wave is mostly conducted in 2017 and includes 18 countries in the euro area along with Hungary and Poland. Since the regional and institutional focus of this paper is on post-socialist countries of Central and Eastern Europe, this wave is the most suitable given that it contains the highest number of countries that fulfill the criteria, including Estonia, Croatia, Hungary, Lithuania, Latvia, Poland, Slovenia, and Slovakia. The unit of observation of our analysis is the household defined by the HFCS as “a person living alone or a group of people who live together in the same private dwelling and share expenditures, including the joint provision of living essential” (HFCN 2020, p. 73).

A drawback of using HFCS data in inequality studies is that, as documented by Vermeulen (2018) and other similar studies, it is characterized by differential nonresponse (i.e., response inequality across distribution with a downward bias at the top) and underreporting (i.e., aggregate wealth totals found in this survey data is below the aggregate level of wealth reported in national accounts). Brzeziński et al. (2020) follow a similar approach by correcting the underrepresentation of the wealthiest using national rich lists from Estonia, Hungary, Latvia, Poland, and Slovakia. They

⁸ See ECB (2020).



find that such a correction yields higher levels of wealth inequality, which are comparable to other countries that have been market economies for much longer.

Yet, besides concerns regarding data quality of the national rankings of the wealthiest which are usually collected and estimated by journalists using unstandardized methods, such an approach can have severe implications in the case of a decomposition by factor components. Usually, these lists do not provide information on specific asset classes but rather estimates for the overall net wealth. One might use the data to adjust the overall net wealth which leads to higher wealth inequality while there is no information regarding the share or the value of different asset classes. Because the share of each asset and the correlation to the overall net wealth play a crucial role in the factor decomposition analysis, one might artificially deflate the contribution of each component to wealth inequality. Thus, we refrain from employing such a correction as in Brzeziński et al. (2020) and recognize this data limitation.

Defining Main Components

While there are different definitions of wealth which go beyond the scope of this paper, the one used here is that of net wealth which is constructed by subtracting total household liabilities from the total household assets, which are comprised of real and financial assets. Real assets include household's main residence, other real estate property, household's vehicles, valuables, and self-employment business. Financial assets include deposits, total mutual funds, bonds, non-self-employment private businesses, publicly traded shares, managed accounts, money owed to households, other assets, and voluntary pensions/whole life insurances. Public and occupational pensions are excluded from total assets. Henceforth, unless stated otherwise in the paper, wealth and net wealth are used interchangeably and the concept of wealth inequality is confined to that of net wealth inequality.

We define business equity as the net value of business at which households are willing to sell. These are self-employment businesses where households have a member that has an active role in running the business. Because other works that are comparable in terms of methodology, such as Pfeffer and Waitkus (2021), or region, such as Brzeziński and Sałach (2021), find housing wealth to be the most important asset that explains differences in wealth inequality between countries in general (Pfeffer and Waitkus 2021) or in post-socialist countries in Central and Eastern Europe specifically (Brzeziński and Sałach 2021), we include housing wealth as a separate component to compare with the role of business equity. Housing wealth is defined as the current value of household's main residence at which the owner is willing to sell it. The third component is the residual of net wealth after subtracting business equity and housing wealth. We call this component "rest of net wealth."

Table 1 shows some descriptive statistics for net wealth, business equity, housing wealth and the rest of net wealth. There is some notable variation in the average value of net wealth with Latvia having the lowest value of €43,042 and Slovenia having the highest value of €144,321. Similar variations are found in the value of business equity. The average value of business equity in Estonia is €235,475, which



is the highest in this pool of Central and Eastern European countries, while the lowest is €34,787 in Latvia. However, ownership of business equity is the highest in Poland with around 20.4% of population owning business equity, while the lowest is in Lithuania where only around 3.9% of the population are business equity owners. While there is less variation in the average values of housing wealth, which ranges from €49,153 in Hungary to €122,015 in Slovenia, ownership rates are much higher than those of business equity. They range from around 72.7% in Latvia to around 92.2% in Lithuania. This reaffirms that housing wealth is a much more widely owned asset than business equity. When business equity and housing wealth are subtracted from the overall net wealth, the average value of the rest of net wealth ranges from €14,742 in Latvia to €32,377 in Slovenia.

We use the Gini coefficient and the CV to measure the level of wealth inequality.⁹ As shown in Table 1, wealth is most unevenly distributed in Estonia, while Slovakia has the lowest wealth inequality. Another important observation is that, in all countries, business equity is more unequally distributed, and the housing wealth is more equally distributed, than the overall net wealth. This, combined with the fact that a smaller share of population owns business equity than housing wealth, indicates that business equity might have a disequalizing effect, while housing wealth might have an equalizing effect.

The third important observation is that the Gini coefficients of the rest of net wealth exceed 1 in all countries but Hungary and Slovenia. This is due to many negative values of the rest of net wealth, in which case Gini can still be defined but it loses its attribute as a measure of inequality bounded between 0 and 1. For this reason, for example, Lindner (2015) justifies the choice of decomposing gross instead of net wealth. Manero (2017) provides a detailed explanation of the issues that arise when using the method proposed by Lerman and Yitzhaki (1985), to decompose the Gini coefficient, in the presence of negative values. While Pfeffer and Waitkus (2021) use this method, they decompose total instead of net wealth, hence overcoming such an issue. On the other hand, as long as the average value is positive, the CV does not have such issues. Thus, we decompose the CV as we explain in the next section.

Methodology

Decomposition by Factor Components

We use the decomposition by factor components proposed by Shorrocks (1982) to estimate the contribution of business equity, housing wealth, and rest of net wealth to wealth inequality.¹⁰ Besides being one of the widely-used methods, it can be used for different inequality measures, providing that they fulfill six assumptions outlined by the author. This is in particular important because net wealth can

⁹ To estimate the Gini coefficients, we use the *sgini* package in Stata developed by Van Kerm (2009).

¹⁰ We use the *ineqfac* package in Stata developed by Jenkins (1999).



Table 1 Descriptive statistics. *Source:* Own calculations using HFCS (2020)

Country	Net wealth			Business equity			Housing wealth			Rest of net wealth			Survey year			
	Mean	Gini	CV	Mean	Own	Gini	CV	Mean	Own	Gini	CV	Mean		Gini	CV	N
Croatia	106,638	0.6062	2.7070	209,015	0.0462	0.8899	4.6115	94,335	0.8534	0.4884	1.8207	16,476	1.1028	4.1102	1,357	2017
Estonia	111,896	0.7093	3.3148	235,475	0.1176	0.8894	3.8492	73,629	0.7530	0.4860	1.0615	28,763	1.0842	3.6918	2,679	2017
Hungary	73,010	0.6489	2.9561	61,938	0.1327	0.8973	5.9608	49,153	0.8397	0.4418	1.0832	23,516	0.9927	4.3875	5,968	2017
Latvia	43,042	0.6792	3.1320	34,787	0.0645	0.9166	11.1708	35,851	0.7268	0.4960	1.2560	14,742	1.1602	4.6490	1,249	2017
Lithuania	84,259	0.5892	1.8647	232,269	0.0387	0.7881	1.9636	61,741	0.9316	0.4707	1.3718	17,769	1.1124	3.8836	1,664	2017/18
Poland	95,538	0.5669	1.8918	58,749	0.2035	0.6025	2.1349	83,175	0.7928	0.4280	1.6306	17,641	1.0354	3.2556	5,858	2016
Slovakia	103,479	0.5403	1.6650	77,838	0.1500	0.8461	2.9240	82,814	0.8882	0.3767	0.8051	18,248	1.2494	4.2759	2,179	2017
Slovenia	144,321	0.5940	2.1389	138,417	0.1365	0.8836	3.7234	122,015	0.7626	0.3965	1.1478	32,377	0.9374	2.7882	2,014	2017

Notes: All mean values are in 2017 euros. Mean values, Gini coefficients and coefficients of variation (CV) of business equity and housing wealth are conditional on households owning these assets. Own denotes the share of population that owns business equity or housing wealth. With the exception of sample size and survey year, results are derived using five imputates and household weights.



include non-positive values, hence not all inequality indices can be defined (e.g., Theil index) or maintain their attributes for measuring inequality (e.g., Gini coefficient), as shown in the previous section. An inequality measure that can be defined for non-positive values and that can be decomposed using the method proposed by Shorrocks (1982) is the CV defined as

$$CV(W) = \frac{\sigma(W)}{\mu(W)} \quad (1)$$

where σ is the standard deviation and μ is the mean of net wealth W .

The main aim of this method is to estimate the contribution of a particular factor component to inequality. It is often used to decompose income inequality but the same principles apply for decomposing wealth inequality. Shorrocks (1982) shows that the proportional contribution of factor component k to income or wealth inequality measured by CV is given by

$$s_k(CV) = \frac{cov(X^k, W)}{\sigma^2(W)} \quad (2)$$

which is the ratio of covariance between the wealth of factor component, X^k , and overall net wealth, W , and the variance of wealth, σ^2 . As a result, the sum of relative contributions to inequality from each factor k equals 1, $\sum_{k=1}^K s_k = 1$.

Equation 2 can be rewritten as

$$s_k(CV) = \frac{cov(X^k, W)}{\sigma^2(W)} = \frac{\pi_k \rho_k CV_k}{CV(W)} \quad (3)$$

where π_k is the share of factor k in total net wealth, ρ_k is the correlation coefficient between factor k and total net wealth, and CV_k is the “within-inequality” of factor k . The product of these three parameters in the numerator represents the absolute contribution of factor k to the overall wealth inequality. The rewriting makes this method easily comparable to the one proposed by Lerman and Yitzhaki (1985), which Pfeffer and Waitkus (2021) use for their simulation analysis.

Bootstrapping

Besides the fact that the decomposition methods do not provide a causal but a rather statistical relationship, a further shortcoming of the presented model is that it lacks statistical inference. Mills and Zandvakili (1997) were first to suggest the bootstrap method for constructing confidence intervals and estimating the statistical significance of the inequality indices. The bootstrap method allows for estimating standard errors, confidence intervals, and p-values, from the distribution of a drawn sample. Biewen (2002) extends their work by showing that bootstrapping is suitable in the case of source decomposition, which is the type of our decomposition method.

Because the distribution of wealth is skewed, we use bias-corrected bootstrap confidence intervals. We draw 1000 random samples with replacement, which HFCS provides, where the sampling units of each random sample are equal to the



number of units in the original dataset, with the latter having the same probability of being drawn. Let \hat{s} denote the estimated proportional contribution to inequality, $i = 1, 2, 3, \dots, B$ represent the bootstrap samples (in our case, $B = 1000$), and \hat{s}_i represent the estimated coefficient from a particular sample i , then we construct the bootstrapped standard errors as: $\hat{se} = \{\frac{1}{999} \sum_{i=1}^{1000} (\hat{s}_i - \bar{s})^2\}$, where $\bar{s} = \frac{1}{999} \sum_{i=1}^{1000} \hat{s}_i$. The bias is then given by

$$\widehat{bias} = \bar{s} - \hat{s} \quad (4)$$

We follow a similar approach to Karlsson (2009) to show how we construct bias-corrected bootstrap confidence intervals. Using the percentile method, a $100(1 - 2\alpha)\%$ bootstrapped confidence interval for the estimated proportional contribution to inequality \hat{s} of a particular factor k is given by

$$[\hat{s}_{k(\alpha(B+1))}^*, \hat{s}_{k((1-\alpha)(B+1))}^*] \quad (5)$$

where $\hat{s}_{k(i)}^*$ denotes the i^{th} order of the B bootstrapped replicates $\hat{s}_1^* \leq \dots \leq \hat{s}_B^*$.

Let $z_0 = \Phi^{-1}(P(\hat{s}_i \leq \hat{s}))$ where Φ is the standard cumulative distribution function and $P(\hat{s}_i \leq \hat{s})$ is the proportion of the elements in the bootstrap sample that are less than or equal to the estimated proportional contribution to inequality. Then the 95% bootstrapped bias-corrected confidence interval is given by

$$[\hat{s}_{k(p1(B+1))}^*, \hat{s}_{k(p2(B+1))}^*] \quad (6)$$

where $p1 = \Phi(2z_0 + Z_\alpha)$ and $p2 = \Phi(2z_0 + Z_{1-\alpha})$.

Simulation Analysis Using a Counterfactual

The decomposition by factor components shows the variation in contribution by different assets *within* each country, but it lacks information regarding variations in inequality *between* countries. Following Pfeffer and Waitkus (2021), we conduct a simulation analysis using a counterfactual to estimate the differences in wealth inequality between countries. Basically, we impose the parameter of one country to the rest of them while holding the rest of parameters constant. After the simulation, we calculate the change between the simulated and the observed values of the CV.

Because wealth inequality is the lowest in Slovakia, we use it as our counterfactual and conduct two simulations. First, we fix the shares, π , of all factor components, k i.e., business equity, housing wealth, and the rest of net wealth, to those of Slovakia, and allow for the correlation, ρ , and within-inequality, CV_k , to be as observed in each country. Let c denote Slovakia, then for all components k in any other country j , the simulated CV, denoted by \widehat{CV} , can be defined as

$$\widehat{CV}_j = \sum_{k=1}^K \pi_{k,c} \rho_{k,j} CV_{k,j} \quad (7)$$



In other words, we ask: what would wealth inequality be in each of the seven countries if households in these countries had the same portfolio composition as households in Slovakia?

Next, we fix the correlation coefficients of all components to those of Slovakia, while allowing for the share and within CV to be as observed in each country, expressed as

$$\widehat{CV}_j = \sum_{k=1}^K \pi_{k,j} \rho_{k,c} CV_{k,j} \quad (8)$$

Here we ask: what would wealth inequality be in each of the seven countries if in all of them the correlation between each factor component and the overall net wealth were the same as in Slovakia?

And, lastly, we fix the within CV of all factor components (i.e., business equity, housing wealth, and the rest of net wealth) to those of Slovakia, while allowing for the shares and correlation coefficients to be as observed in each country, expressed as

$$\widehat{CV}_j = \sum_{k=1}^K \pi_{k,j} \rho_{k,j} CV_{k,c} \quad (9)$$

Here we ask: what would wealth inequality be in each of the seven countries if the within-asset inequality were the same as the within-asset inequality in Slovakia?

This simulation answers some important questions regarding differences in wealth inequality, but it lacks information regarding the role of each specific factor component. Pfeffer and Waitkus (2021) fix the within-inequality measure of each component, while allowing for all parameters to be different. We extend their method by fixing separately each parameter (i.e., share, correlation coefficient, and CV) of only one factor component (e.g., business equity) to that of Slovakia, while allowing for all other parameters to be different. Let e denote business equity, then the \widehat{CV} is defined as

$$\widehat{CV}_j = \pi_{e,c} \rho_{e,j} CV_{e,j} + \sum_{k \neq e}^K \pi_{k,j} \rho_{k,j} CV_{k,j} \quad (10)$$

where, for all the other seven countries, we fix only the share of business equity to the share of business equity in Slovakia, $\pi_{e,c}$, while allowing for all parameters of other components to be different (including the correlation coefficient and the CV of business equity). Next, in Eq. 11, we fix the correlation coefficient and, in Eq. 12, the CV of business equity, respectively, while allowing for the rest of parameters to be different, expressed as

$$\widehat{CV}_j = \pi_{e,j} \rho_{e,c} CV_{e,j} + \sum_{k \neq e}^K \pi_{k,j} \rho_{k,j} CV_{k,j} \quad (11)$$

$$\widehat{CV}_j = \pi_{e,j} \rho_{e,j} CV_{e,c} + \sum_{k \neq e}^K \pi_{k,j} \rho_{k,j} CV_{k,j} \quad (12)$$



We conduct this simulation for each parameter of each factor component (i.e., business equity, housing wealth, and the rest of net wealth) separately. This way we can see not only which component plays the most important role in explaining the differences in wealth inequality between countries but also whether its share in net wealth, its correlation with the overall net wealth, or its own distribution, contributes the most to between-country inequality. Lastly, we calculate the change between the simulated and the observed overall wealth inequality defined as

$$\Delta CV_j = \frac{\widehat{CV}_j - CV_j}{CV_j} \quad (13)$$

which gives the magnitude of change in inequality if the observed reality were to be replaced by a simulated setting.

Results

Decomposition by Factor Component

We conduct a decomposition of wealth inequality by factor components to estimate the role that each asset class plays in explaining within-inequality in each Central and Eastern European country included in the HFCS. Table 2 shows the results from this analysis where we estimate the role of three factor components: business equity, housing wealth, and the rest of net wealth. While business equity is our main component of interest, we include housing wealth for comparison purposes given that other studies find it to be central in explaining wealth inequality. Column (1) shows each components' share of net wealth. Column (2) shows the correlation between that component and net wealth. Column (3) shows the within-inequality of each component measured the CV. Column (4) shows the proportional contribution of that component to the overall wealth inequality, which is the main coefficient of interest. Below each coefficient, we show bootstrapped, bias-corrected confidence intervals at 95%, which allow for determining the statistical significance of the results.

The first and most important finding is that, in almost all countries, business equity plays a crucial role in explaining wealth inequality measured by the CV. In five out of eight, business equity is the single most important component that contributes to wealth inequality. Specifically, business equity contributes to 79.2% of wealth inequality in Estonia, 57.7% in Latvia, 57.3% in Croatia, 54.6% in Slovenia, and 51.7% in Hungary. In Lithuania, business equity contributes to 44.1% of wealth inequality, while in Slovakia its contribution is 43.1%. Poland is the only country where business equity has a lesser role in contributing to wealth inequality, since it accounts for only 18.1%, while the latter contributes 61.8%. A potential explanation for such a difference is that Poland is the country with the highest share of households that own business equity—not only in Central and Eastern Europe, but in all countries included in the HFCS. While the average for the euro area is 10.7%, in Poland, 20.4% of households own business equity. In all cases, main results are statistically significant at the 5% level.



Table 2 Factor decomposition of CV. *Source:* Own calculations using HFCS (2020)

Component	Share	Correlation	CV	Proportional contribution
	(1)	(2)	(3)	(4)
<i>Croatia</i>				
Business equity	0.0906 [.0234; .2203]	0.7811 [.1759; .9431]	21.9364 [17.3171; 31.9061]	0.5732** [.0214; .8641]
Housing wealth	0.7549 [.6537; .8254]	0.6287 [.3591; .9390]	2.0148 [1.2259; 2.8703]	0.3532** [.1003; .8751]
Rest of NW	0.1545 [.1173; .1944]	0.3134 [.1781; .5529]	4.1102 [3.3610; 5.2180]	0.0735** [.0239; .2735]
<i>Estonia</i>				
Business equity	0.2473 [.1584; .3491]	0.9183 [.8143; .9614]	11.5572 [9.6945; 14.3781]	0.7919** [.5525; .9016]
Housing wealth	0.4956 [.4304; .5633]	0.3796 [.2475; .5580]	1.3510 [1.2861; 1.4402]	0.077** [.0371; .1745]
Rest of NW	0.2571 [.2173; .2925]	0.4557 [.2964; .6595]	3.6918 [3.3222; 4.3131]	0.1311** [.0592; .2805]
<i>Hungary</i>				
Business equity	0.1126 [.0815; .1558]	0.8201 [.6986; .9212]	16.5617 [13.9975; 21.0234]	0.5173** [.3618; .6467]
Housing wealth	0.5653 [.5298; .5876]	0.5204 [.4159; .5854]	1.2603 [1.1449; 1.3433]	.1254** [0.0702; .1647]
Rest of NW	0.3221 [.3040; .3543]	0.7473 [.6670; .8035]	4.3875 [3.6929; 5.1305]	0.3572** [.2658; .4961]
<i>Latvia</i>				
Business equity	0.0522 [.0322; .0766]	0.7846 [.5924; .8831]	44.1550 [20.4257; 69.0921]	.5769** [.2678; .7528]
Housing wealth	0.6053 [.5338; .6688]	0.4089 [.2889; .5633]	1.5964 [1.4044; 1.8781]	0.1261** [.0673; .2286]
Rest of NW	0.3425 [.2791; .4161]	0.5840 [.4274; .7853]	4.6490 [3.9831; 5.9759]	0.2969** [.1522; .5587]
<i>Lithuania</i>				
Business equity	0.1064 [.0507; .1772]	0.7006 [.5249; .8030]	11.1612 [8.3944; 16.1124]	.4414** [.2517; .5907]
Housing wealth	0.6827 [.5973; .7569]	0.6134 [.4931; .7464]	1.4473 [1.2116; 1.7207]	0.3261** [.2111; .4837]
Rest of NW	0.211 [.1525; .2819]	0.5282 [.3879; .6592]	3.8836 [3.4849; 4.5422]	0.2325** [.1333; .3707]
<i>Poland</i>				
Business equity	0.1251 [.1086; .1438]	0.5347 [.4802; .5821]	5.1299 [3.6903; 6.3292]	.1814** [.1139; .2610]
Housing wealth	0.6902 [.6694; .7095]	0.8901 [.8413; .9272]	1.9015 [1.8186; 1.9934]	0.6175** [.5471; .6757]



Table 2 (continued)

Component	Share	Correlation	CV	Proportional contribution
	(1)	(2)	(3)	(4)
Rest of NW	0.1846 [.1693; .2004]	0.6329 [.5482; .7048]	3.2556 [2.9304; 3.6579]	.2011** [.1660; .2416]
<i>Slovenia</i>				
Business equity	0.1308 [.1122; .2228]	0.8557 [.8312; .9556]	10.3895 [8.1330; 11.4255]	0.5429** [.5120; .7058]
Housing wealth	0.6448 [.5716; .6671]	0.7482 [.6611; .9107]	1.4283 [1.3612; 2.5499]	0.3229** [.2172; .3528]
Rest of NW	0.2244 [.2036; .2526]	0.4569 [.2456; .5077]	2.7882 [2.6184; 3.4032]	0.1342** [.0395; .1650]
<i>Slovakia</i>				
Business equity	0.1128 [.0747; .1605]	0.8030 [.6802; .8724]	7.9212 [6.7122; 10.2494]	0.4306** [.2945; .5611]
Housing wealth	0.7109 [.6558; .7574]	0.5409 [.4165; .6869]	0.9252 [.8350; 1.0121]	0.215** [.1249; .3532]
Rest of NW	0.1764 [.1508; .2054]	0.7797 [.6424; .8915]	4.2759 [3.2188; 5.6213]	0.3544** [.2405; .4782]

Notes: All households included. Non-positive values included. Results are derived using five implicates and household weights. Bias-corrected bootstrap 95% confidence intervals from 1000 replicates are shown in parentheses below. Significance levels shown only for column (4), which is the main coefficient of interest, where ** denotes significance at the 5 percent level.

The second important finding is that, in every case, the contribution of business equity to inequality is much higher than its share of net wealth. For example, Latvia is an extreme case. While business equity constitutes for only 5.2% of net wealth, it contributes to 57.7% of wealth inequality there. In other words, its contribution to inequality is 11 times its share. Even in Poland, where the contribution was lowest, it is still around 1.5 times its share. Similar results are found in other countries as well: the contribution of business equity to inequality is more than 6 times higher in Croatia, around 5 times higher in Hungary, around 4 times higher in Slovenia and Slovakia, and around 3 times higher in Estonia.

The third important finding is that business equity constitutes for a much lower share of net wealth but a much more important role for explaining wealth inequality than housing wealth. Poland is the only country where housing wealth is the single most important contributor to wealth inequality constituting for 61.8%. Even in Lithuania and Slovenia where the contribution of business equity does not exceed 50%, the contribution of housing wealth to wealth inequality is still lower than that of business equity.



Simulation Analysis Using a Counterfactual

In order to understand the between-inequality differences among these countries, we conduct a simulation analysis as described in Sect. 4.3. Table 3 shows the results of the simulation analysis using Slovakia as a counterfactual, given that it has the lowest level of wealth inequality measured by the CV. Column (1) shows the observed values of the CV of net wealth for each country. Column (2) shows the simulated CV of net wealth when the shares of each asset (i.e., portfolio composition) of Slovakia are imposed on other countries, but the correlation coefficients and the coefficient of variation of each asset are held constant. Column (4) shows the simulated CV of net wealth when the correlation coefficients of each asset to net wealth of Slovakia are imposed on the rest of the countries, while the portfolio composition and the within-inequality of each asset are held constant. Column (6) shows the simulated CV of net wealth when the CV of each asset (i.e., within-asset inequality) in Slovakia is imposed on other countries, while the portfolio composition and the correlation coefficients are held constant.

Columns (3), (5), and (7) show the change between the simulated CV in columns (2), (4), and (6), respectively, and the observed CV in column (1). In all countries but Estonia the largest reduction in inequality takes place when we impose the within-asset inequality of Slovakia, while allowing for portfolio composition and correlation coefficients to be constant. When we impose Slovakia's within-asset inequality on other countries, the overall wealth inequality reduces, on average, by 32%. Imposing Slovakia's portfolio composition or the correlation of each asset with total net wealth, it increases the overall wealth inequality, on

Table 3 Simulation analysis using Slovakia as a counterfactual. *Source:* Own calculations using HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Slovakia		Correlation = Slovakia		CV = Slovakia	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Croatia	2.7076	3.0605	0.1303	2.9137	0.0761	1.2067	− 0.5543
Estonia	3.3113	1.8585	− 0.4387	3.3973	0.0260	2.4739	− 0.2529
Hungary	2.9562	2.5767	− 0.1284	2.9847	0.0096	2.0329	− 0.3123
Latvia	3.1334	4.8508	0.5481	3.6150	0.1537	1.4087	− 0.5504
Lithuania	1.8709	1.8750	0.0022	2.1270	0.1369	1.4545	− 0.2226
Poland	1.8917	1.8761	− 0.0082	1.6938	− 0.1046	1.5978	− 0.1553
Slovakia	1.6614	1.6614	0.0000	1.6614	0.0000	1.6614	0.0000
Slovenia	2.1378	1.9873	− 0.0704	2.0772	− 0.0283	1.7713	− 0.1714

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Slovakia. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Slovakia.



average, by 0.5% and 4%, respectively. In other words, it is within-asset inequality rather than portfolio composition or the correlation of each asset with total net wealth that explains most of the difference in wealth inequality between these countries.

Because we find that within-asset inequality accounts for most of wealth inequality between countries, we want to know which factor component plays the most important role. We repeat the same simulation as in Table 3, but for each factor component separately. In other words, we follow the same steps for business equity, while keeping all parameters of housing wealth and rest of net wealth constant. Next, we repeat the steps for housing wealth, while keeping all parameters of business equity and rest of net wealth constant. And, finally, we do the same simulation analysis for the rest of net wealth, while keeping all parameters of business equity and housing wealth constant.

Table 4 shows the results of the simulation analysis for each factor component using Slovakia as a counterfactual. Each column in Table 4 shows the results following the same procedures as for the results shown in respective column in Table 3 but conducting the simulation analysis to each component separately. When we impose Slovakia's inequality of business equity on the rest of the countries, the overall wealth inequality reduces, on average, by 22%. When we do the same for housing wealth and the rest of net wealth, the overall wealth inequality reduces, on average, by 12% and increases, on average, by 2%, respectively. The most important finding here is that, in most cases, it is the distribution of business equity that explains most of wealth inequality between countries. The only exception is Estonia, where the share of business equity accounts for most of wealth inequality. This can be due to the fact that the share of business equity in total net wealth in Estonia is around 25%, which is almost double the share of business equity in Slovenia which ranks second.

Robustness Checks

Besides the fact that Slovakia has the lowest wealth inequality among these countries, its selection is arbitrary. When analyzing wealth inequality in post-socialist countries, Brzeziński and Sałach (2021) follow the same justification for using Slovakia as a counterfactual. Pfeffer and Waitkus (2021) use USA due to its important role in studies that focus on financialization and housing markets, but then check the results using Slovakia because it has the lowest level of wealth inequality. However, Fortin et al. (2011) note that the cross-country comparisons may be sensitive to the reference that is being used. Therefore, both Brzeziński and Sałach (2021) and Pfeffer and Waitkus (2021) use other countries as counterfactuals too.

We follow a similar logic but, instead of using just another country (e.g., the country with the highest wealth inequality), we use each country as a counterfactual for the rest of others. Table 5 shows the results for the rest of simulations, where each column is defined the same as in Table 3. Results are fairly consistent regardless of which country is used as a counterfactual. Within-asset inequality accounts for most of the wealth inequality between countries. Again, the exception is when



Table 4 Simulation analysis for each asset component using Slovakia as a counterfactual. *Source:* Own calculations using HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Slovakia		Correlation = Slovakia		CV = Slovakia	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Croatia	2.7076	3.0880	0.1405	2.7512	0.0161	1.7158	− 0.3663
Estonia	3.3113	1.8838	− 0.4311	2.9817	− 0.0995	2.4856	− 0.2494
Hungary	2.9562	2.9589	0.0009	2.9243	− 0.0108	2.1583	− 0.2699
Latvia	3.1334	5.2329	0.6700	3.1758	0.0135	1.6494	− 0.4736
Lithuania	1.8709	1.9210	0.0267	1.9925	0.0650	1.6294	− 0.1291
Poland	1.8917	1.8579	− 0.0178	2.0639	0.0910	2.0784	0.0987
Slovenia	2.1378	1.9778	− 0.0749	2.0662	− 0.0335	1.8615	− 0.1292
<i>Housing wealth</i>							
Croatia	2.7076	2.6519	− 0.0206	2.5741	− 0.0493	2.1905	− 0.1910
Estonia	3.3113	3.4217	0.0333	3.4193	0.0326	3.2312	− 0.0242
Hungary	2.9562	3.0517	0.0323	2.9708	0.0049	2.8576	− 0.0333
Latvia	3.1334	3.2024	0.0220	3.2610	0.0407	2.9673	− 0.0530
Lithuania	1.8709	1.8959	0.0134	1.7993	− 0.0383	1.6523	− 0.1169
Poland	1.8917	1.9267	0.0185	1.4334	− 0.2423	1.2919	− 0.3171
Slovenia	2.1378	2.2084	0.0330	1.9469	− 0.0893	1.8951	− 0.1135
<i>Rest of net wealth</i>							
Croatia	2.7076	2.7359	0.0104	3.0038	0.1094	2.7157	0.0030
Estonia	3.3113	3.1755	− 0.0410	3.6188	0.0929	3.3797	0.0207
Hungary	2.9562	2.4785	− 0.1616	3.0020	0.0155	2.9294	− 0.0091
Latvia	3.1334	2.6825	− 0.1439	3.4450	0.0994	3.0588	− 0.0238
Lithuania	1.8709	1.7999	− 0.0379	2.0770	0.1102	1.9146	0.0234
Poland	1.8917	1.8748	− 0.0089	1.9799	0.0466	2.0109	0.0630
Slovenia	2.1378	2.0766	− 0.0286	2.3398	0.0945	2.2903	0.0714

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Slovakia. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Slovakia.

we use Estonia as a counterfactual, in which case portfolio composition plays a more important role.

In order to check whether results from Table 4 hold if we use other countries as counterfactuals, we conduct the same simulation by rotating the counterfactual. Table 6–12 show the results where we use each country except Slovakia as a counterfactual. Results are consistent with the main findings in Table 4. Wealth inequality



changes the most when we impose the within-inequality of business equity of one country to the rest of them. This indicates that, except in the case of Estonia, the distribution of business equity accounts for most of the differences in wealth inequality between post-socialist countries in Central and Eastern Europe.

Discussion

Our main findings from the decomposition analysis are that business equity plays the most important role (over 50%) in explaining wealth inequality measured by CV in Croatia, Estonia, Hungary, Latvia, and Slovenia, and that it plays a more important role than housing wealth in all but Poland. It does also play a crucial role in Lithuania and Slovakia (over 40%), but a lesser role in Poland (around 18%). The most important similarity of the decomposition results with previous works is the reconfirmation that business equity plays an important role in explaining wealth inequality within countries (Azpitarte 2008; Bezrukovs 2013; Sierminska and Medgyesi 2013; Lindner 2015; Neves-Costa and Pérez-Duarte 2019; Bartels and Schröder 2020). Further, our main findings from the simulation analyses are that (a) within-asset inequality plays the most important role in explaining wealth inequality between post-socialist countries in Central and Eastern Europe and (b) business equity is the component that accounts for most of between-country inequality.

However, these results are different from Brzeziński and Sałach (2021), who find that homeownership accounts for most of the differences in wealth inequality between Central and Eastern European, post-socialist countries, for a number of reasons. First, Brzeziński and Sałach (2021) conduct a sub-group analysis using an Oaxaca-Blinder decomposition combined with recentered influence function, where the main focus is on characteristics of the population rather than asset components. Second, their analysis lacks any information regarding business equity, such as the share of business equity in net wealth or the portion of population that owns businesses. Third, they use the Gini coefficient without addressing the issue of negative values, which is the main reason to why we use the CV. To avoid this issue, Lindner (2015) and Pfeffer and Waitkus (2021) decompose gross wealth and total wealth, respectively, instead of net wealth. While Gini coefficient is more sensitive to changes in the middle of the distribution, the CV is more sensitive to changes in the top of the distribution. So, the choice of inequality measure may also account for part of the differences between our results.

Because we use a similar simulation methodology, we can contrast our results from the simulation analysis to those from Pfeffer and Waitkus (2021), who find that housing equity accounts for most differences in wealth inequality between developed countries. The most notable difference is that we decompose the net wealth measured by the CV using Shorrocks (1982), while Pfeffer and Waitkus (2021) decompose total wealth measured by the Gini coefficient using Lerman and Yitzhaki (1985). When we replicate results using Lerman and Yitzhaki (1985), because of many negative values in the rest of net wealth, we obtain Gini coefficients that exceed 1 confirming that our choice of inequality measure is



more suitable in case of negative values. Further, while decomposing *total* wealth is still informative, studies of wealth inequality are primarily concerned with developments in *net* wealth.

While looking at the big picture, one might ask: why does business equity play such an important role in explaining wealth inequality within and between these post-socialist countries? One potential explanation can be found in the variation of privatization and deregulation reforms which mark the transition of ownership from state to private. Radić et al. (2021) show the many forms that privatization could be done and the different implications that each might have in the social and economic mechanisms that arise in the aftermath. Roland (2018) describes how certain managers, and individuals with inside information from state institutions, managed more easily to appropriate business assets, hence becoming wealthy and influential in the process. When analyzing the high levels of wealth inequality in Baltic states (Estonia, Latvia, and Lithuania), Brzeziński and Sałach (2022) emphasize that privatization there took place in a swift and radical form. Brzeziński and Sałach (2021) point out to the more egalitarian spread of privatization of houses in Poland as a reason for lower overall wealth inequality.

Another potential explanation for differences can be found in the differences in qualities of institutions. Roland (2018) describes how in many post-socialist countries, bad institutions and kleptocratic states arose in the post-reform era. Popov (2000) suggests that many disparities in the drastic fall of output in transition economies could be explained by the institutional collapse at the beginning of transition. Despite disagreements regarding the mechanisms, both Piketty (2015) and Acemoglu and Robinson (2015) emphasize the importance that institutions play in mitigating economic inequality.

Differences in timing and the pace of the reforms may be another reason. Some reforms started earlier in Yugoslavia, part of which were Croatia and Slovenia, as can be seen in the EBRD score in 1989 in Fig. 2, where these two countries rank the highest, and their levels of inequality are lower compared to Baltic states, for example. While the differences in the pace of reforms could play a role, Hoen (1996) notes that it is important to avoid simplistic frameworks, such as "shock therapy" versus "gradualism", when trying to understand the disparities in the processes and results of the transition. Further research is needed to investigate the degree to which differences in policy choice during the transition have affected today's levels of wealth inequality in these countries.

Conclusion

The increasing interest in studying trends and developments in wealth inequality has produced a vast literature in the recent years. We focus on the role that business equity plays given that some recent works have overlooked its importance. A prerequisite for households to own business equity is private ownership, which was minimal to almost nonexistent in socialist countries in Central and Eastern Europe. Yet, the transition to market economies has created the institutional conditions for households to pursue entrepreneurial activities and own business assets. Given these



major political and economic transformations, these post-socialist countries are a compelling case to analyze.

We conduct a decomposition of wealth inequality by factor components, and a simulation analysis using a counterfactual as in the case of Pfeffer and Waitkus (2021). We find that business equity is the single most important asset for explaining over 50% of wealth inequality measured by CV in Croatia, Estonia, Hungary, Latvia, and Slovenia. Unlike Pfeffer and Waitkus (2021) and Brzeziński and Sałach (2021), we find that business equity rather than housing wealth is the most important asset in explaining between-country inequality. The main reasons for differences may be due to the fact that (a) we use a different measure of inequality (CV instead of Gini coefficient) to account for the fact that negative values can make the Gini coefficient lose its attribute to measure inequality; (b) we use a different decomposition method; and (c) we estimate specifically the role of business equity, which is either overlooked or omitted in these studies.

These results contribute to the literature on determinants of wealth inequality by providing new evidence on the role of business equity in post-socialist countries. From a policy perspective, this is relevant in the context of developing institutions and designing instruments that aim to mitigate the level of wealth inequality. If less inequality is desirable, the regulation of business equity could be a policy option to consider. From a methodological standpoint, future research should explore new paths for overcoming the issues that arise when decomposing an inequality index in the presence of many negative values, and the sensitivity of results to different inequality measures.

Appendix

See Fig. 3, Tables 5, 6, 7, 8, 9, 10, 11 and 12



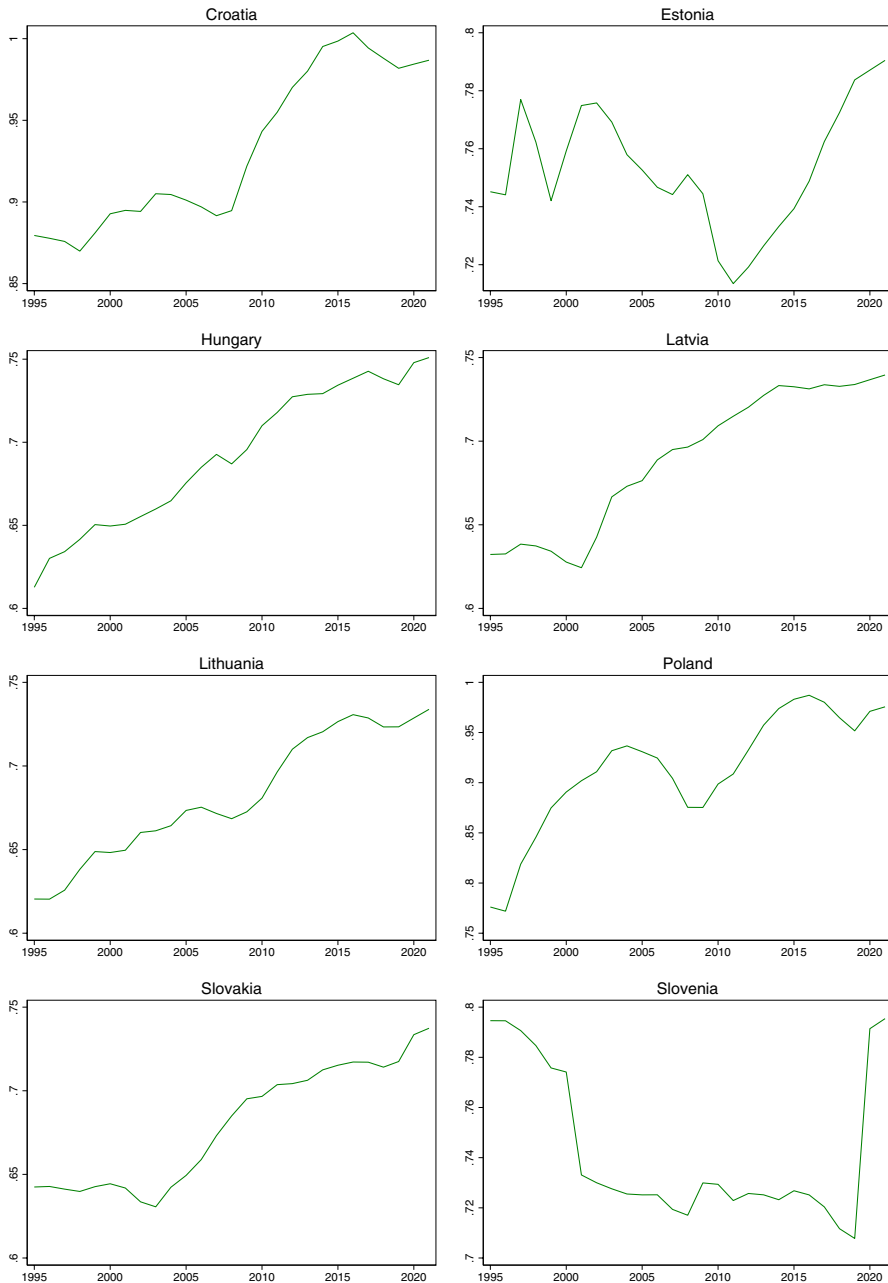


Fig. 3 Share of private wealth in total wealth 1995–2021. *Notes:* Total wealth equals private plus public wealth. *Source:* Own calculations using data from World Inequality Database



Table 5 Simulation analysis using each country as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Estonia		Correlation = Estonia		CV = Estonia	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Croatia	2.7076	5.1963	0.9191	2.6918	− 0.0058	1.6378	− 0.3951
Hungary	2.9562	4.5269	0.5313	2.6269	− 0.1114	2.3533	− 0.2039
Latvia	3.1334	9.5890	2.0602	3.2090	0.0241	1.5462	− 0.5066
Lithuania	1.8709	2.9011	0.5507	1.8390	− 0.0170	1.8387	− 0.0172
Poland	1.8917	2.0469	0.0820	1.3614	− 0.2803	2.0344	0.0754
Slovakia	1.6614	2.6782	0.6120	1.4139	− 0.1489	2.0741	0.2484
Slovenia	2.1378	3.0557	0.4294	1.8826	− 0.1194	2.3238	0.0870
		Shares = Poland		Correlation = Poland		CV = Poland	
Croatia	2.7076	3.2556	0.2024	2.8184	0.0409	1.4231	− 0.4744
Estonia	3.3113	1.9922	− 0.3984	2.7249	− 0.1771	1.9041	− 0.4250
Hungary	2.9562	2.7571	− 0.0674	2.5257	− 0.1456	1.8167	− 0.3855
Latvia	3.1334	5.2857	0.6869	3.1003	− 0.0106	1.3319	− 0.5749
Lithuania	1.8709	1.9696	0.0528	2.0331	0.0867	1.5415	− 0.1761
Slovakia	1.6614	1.7566	0.0573	1.5406	− 0.0727	1.6436	− 0.0107
Slovenia	2.1378	2.0849	− 0.0247	1.9424	− 0.0914	1.8253	− 0.1462
		Shares = Croatia		Correlation = Croatia		CV = Croatia	
Estonia	3.3113	1.6086	− 0.5142	2.9509	− 0.1088	5.8423	0.7643
Hungary	2.9562	2.2322	− 0.2449	2.3474	− 0.2059	3.6077	0.2204
Latvia	3.1334	4.0510	0.2928	2.9069	− 0.0723	2.2192	− 0.2918
Lithuania	1.8709	1.6956	− 0.0937	1.8056	− 0.0349	2.9370	0.5698
Poland	1.8917	1.8445	− 0.0249	1.5147	− 0.1993	3.1853	0.6839
Slovakia	1.6614	1.4692	− 0.1157	1.3478	− 0.1887	3.3270	1.0026
Slovenia	2.1378	1.8090	− 0.1538	1.8366	− 0.1409	3.8487	0.8003
		Shares = Hungary		Correlation = Hungary		CV = Hungary	
Croatia	2.7076	3.0603	0.1303	2.8960	0.0696	1.9826	− 0.2678
Estonia	3.3113	2.0268	− 0.3879	3.4017	0.0273	4.5122	0.3627
Latvia	3.1334	5.1444	0.6418	3.5830	0.1435	1.8678	− 0.4039
Lithuania	1.8709	2.0431	0.0920	2.1005	0.1227	2.2513	0.2033
Poland	1.8917	1.9293	0.0199	1.6584	− 0.1233	2.3947	0.2659
Slovakia	1.6614	2.0730	0.2478	1.6387	− 0.0136	2.5882	0.5579
Slovenia	2.1378	2.0155	− 0.0572	2.0613	− 0.0358	2.9115	0.3619
		Shares = Lithuania		Correlation = Lithuania		CV = Lithuania	
Croatia	2.7076	2.9597	0.0931	2.6608	− 0.0173	1.6648	− 0.3851
Estonia	3.3113	1.8343	− 0.4460	2.9144	− 0.1198	3.2619	− 0.0149
Hungary	2.9562	2.5847	− 0.1257	2.4900	− 0.1577	2.3912	− 0.1911



Table 5 (continued)

		Shares = Lithuania		Correlation = Lithuania		CV = Lithuania	
Latvia	3.1334	4.7046	0.5014	3.0486	− 0.0271	1.5921	− 0.4919
Poland	1.8917	1.8821	− 0.0051	1.5721	− 0.1690	2.0895	0.1045
Slovakia	1.6614	1.7219	0.0364	1.4278	− 0.1406	2.1016	0.2650
Slovenia	2.1378	1.9443	− 0.0905	1.8475	− 0.1358	2.3456	0.0972
		Shares = Latvia		Correlation = Latvia		CV = Latvia	
Croatia	2.7076	2.1023	− 0.2236	2.5521	− 0.0574	4.1075	0.5170
Estonia	3.3113	1.4406	− 0.5649	3.0706	− 0.0727	10.8724	2.2834
Hungary	2.9562	2.2290	− 0.2460	2.5798	− 0.1273	5.6661	0.9167
Lithuania	1.8709	1.6481	− 0.1191	1.8143	− 0.0302	4.4781	1.3936
Poland	1.8917	1.8734	− 0.0097	1.3911	− 0.2646	4.4775	1.3669
Slovakia	1.6614	1.7768	0.0695	1.4105	− 0.1510	5.2528	2.1617
Slovenia	2.1378	1.5473	− 0.2762	1.8082	− 0.1542	6.1889	1.8950
		Shares = Slovenia		Correlation = Slovenia		CV = Slovenia	
Croatia	2.7076	3.3470	0.2361	3.1288	0.1555	1.5481	− 0.4282
Estonia	3.3113	2.0964	− 0.3669	3.3803	0.0208	2.9548	− 0.1077
Hungary	2.9562	2.9352	− 0.0071	2.7745	− 0.0615	2.0507	− 0.3063
Latvia	3.1334	5.5616	0.7749	3.4228	0.0923	1.3367	− 0.5734
Lithuania	1.8709	2.0555	0.0987	2.1299	0.1384	1.6833	− 0.1003
Poland	1.8917	1.9125	0.0110	1.8057	− 0.0455	1.8982	0.0034
Slovakia	1.6614	1.9028	0.1453	1.6013	− 0.0361	1.8738	0.1279

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of the country stated as a counterfactual. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of the country stated as a counterfactual.



Table 6 Simulation analysis for each asset component using Croatia as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Croatia		Correlation = Croatia		CV = Croatia	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Estonia	3.3113	1.6482	− 0.5022	2.9192	− 0.1184	5.6684	0.7118
Hungary	2.9562	2.6574	− 0.1011	2.8835	− 0.0246	3.4525	0.1679
Latvia	3.1334	4.4638	0.4246	3.1254	− 0.0026	2.2234	− 0.2904
Lithuania	1.8709	1.7474	− 0.0660	1.9665	0.0511	2.6741	0.4293
Poland	1.8917	1.7971	− 0.0500	2.0498	0.0836	3.0159	0.5943
Slovakia	1.6614	1.5201	− 0.0850	1.6418	− 0.0118	2.9308	0.7641
Slovenia	2.1378	1.7804	− 0.1672	2.0364	− 0.0474	3.4302	0.6045
<i>Housing wealth</i>							
Estonia	3.3113	3.4443	0.0402	3.4781	0.0504	3.4362	0.0377
Hungary	2.9562	3.0806	0.0421	3.0334	0.0261	3.1782	0.0751
Latvia	3.1334	3.2311	0.0312	3.3458	0.0678	3.2370	0.0330
Lithuania	1.8709	1.9350	0.0343	1.8860	0.0081	2.1086	0.1270
Poland	1.8917	2.0012	0.0579	1.5486	− 0.1814	1.9613	0.0368
Slovakia	1.6614	1.6834	0.0133	1.7191	0.0348	2.0803	0.2522
Slovenia	2.1378	2.2554	0.0550	2.0277	− 0.0515	2.4207	0.1324
<i>Rest of net wealth</i>							
Estonia	3.3113	3.1387	− 0.0521	3.1762	− 0.0408	3.3603	0.0148
Hungary	2.9562	2.4067	− 0.1859	2.3430	− 0.2074	2.8895	− 0.0226
Latvia	3.1334	2.6230	− 0.1629	2.7026	− 0.1375	3.0257	− 0.0344
Lithuania	1.8709	1.7550	− 0.0619	1.6949	− 0.0941	1.8962	0.0135
Poland	1.8917	1.8297	− 0.0328	1.6997	− 0.1015	1.9915	0.0528
Slovakia	1.6614	1.5883	− 0.0439	1.3096	− 0.2117	1.6386	− 0.0137
Slovenia	2.1378	2.0487	− 0.0417	2.0480	− 0.0420	2.2733	0.0634

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Croatia. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Croatia.



Table 7 Simulation analysis for each asset component using Estonia as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Estonia		Correlation = Estonia		CV = Estonia	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Croatia	2.7076	5.3926	0.9916	2.9803	0.1007	1.9731	− 0.2713
Hungary	2.9562	4.7857	0.6189	3.1393	0.0619	2.4941	− 0.1563
Latvia	3.1334	9.8925	2.1571	3.4416	0.0983	1.7984	− 0.4261
Lithuania	1.8709	2.9727	0.5889	2.1294	0.1382	1.9004	0.0158
Poland	1.8917	2.2269	0.1772	2.1379	0.1301	2.3216	0.2273
Slovakia	1.6614	2.5169	0.5150	1.7644	0.0620	1.9907	0.1982
Slovenia	2.1378	3.1735	0.4845	2.2229	0.0398	2.2685	0.0611
<i>Housing wealth</i>							
Croatia	2.7076	2.3792	− 0.1213	2.3288	− 0.1399	2.3926	− 0.1164
Hungary	2.9562	2.9105	− 0.0155	2.8559	− 0.0339	2.9829	0.0090
Latvia	3.1334	3.0618	− 0.0229	3.1051	− 0.0090	3.0727	− 0.0194
Lithuania	1.8709	1.7048	− 0.0888	1.6399	− 0.1235	1.8306	− 0.0216
Poland	1.8917	1.5623	− 0.1741	1.2217	− 0.3542	1.5535	− 0.1788
Slovakia	1.6614	1.5536	− 0.0649	1.5553	− 0.0639	1.8251	0.0986
Slovenia	2.1378	1.9783	− 0.0746	1.7983	− 0.1588	2.1005	− 0.0174
<i>Rest of net wealth</i>							
Croatia	2.7076	2.8398	0.0488	2.7980	0.0334	2.6874	− 0.0075
Hungary	2.9562	2.7431	− 0.0721	2.5441	− 0.1394	2.7888	− 0.0566
Latvia	3.1334	2.9016	− 0.0740	2.9291	− 0.0652	2.9420	− 0.0611
Lithuania	1.8709	1.9655	0.0505	1.8115	− 0.0318	1.8495	− 0.0114
Poland	1.8917	2.0411	0.0790	1.7852	− 0.0563	1.9427	0.0269
Slovakia	1.6614	1.9304	0.1619	1.4170	− 0.1471	1.5810	− 0.0484
Slovenia	2.1378	2.1794	0.0195	2.1370	− 0.0004	2.2304	0.0433

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Estonia. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Estonia.



Table 8 Simulation analysis for each asset component using Hungary as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Hungary		Correlation = Hungary		CV = Hungary	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Croatia	2.7076	3.0846	0.1392	2.7852	0.0286	2.3273	− 0.1405
Estonia	3.3113	1.8817	− 0.4317	3.0306	− 0.0848	4.4478	0.3432
Latvia	3.1334	5.2259	0.6678	3.2153	0.0261	2.0033	− 0.3607
Lithuania	1.8709	1.9194	0.0259	2.0128	0.0759	2.2735	0.2152
Poland	1.8917	1.8574	− 0.0181	2.0748	0.0968	2.6564	0.4042
Slovakia	1.6614	1.6601	− 0.0008	1.6766	0.0092	2.4440	0.4711
Slovenia	2.1378	1.9760	− 0.0757	2.0894	− 0.0226	2.8286	0.3232
<i>Housing wealth</i>							
Croatia	2.7076	2.4675	− 0.0887	2.5429	− 0.0608	2.3496	− 0.1323
Estonia	3.3113	3.3470	0.0108	3.4056	0.0285	3.2942	− 0.0052
Latvia	3.1334	3.1073	− 0.0083	3.2412	0.0344	3.0502	− 0.0265
Lithuania	1.8709	1.7667	− 0.0557	1.7790	− 0.0491	1.7926	− 0.0419
Poland	1.8917	1.6803	− 0.1118	1.4065	− 0.2565	1.4978	− 0.2082
Slovakia	1.6614	1.5885	− 0.0439	1.6479	− 0.0081	1.7902	0.0776
Slovenia	2.1378	2.0528	− 0.0397	1.9280	− 0.0981	2.0567	− 0.0379
<i>Rest of net wealth</i>							
Croatia	2.7076	2.9235	0.0797	2.9832	0.1018	2.7211	0.0050
Estonia	3.3113	3.4206	0.0330	3.5881	0.0836	3.3928	0.0246
Latvia	3.1334	3.0780	− 0.0177	3.3935	0.0830	3.0811	− 0.0167
Lithuania	1.8709	2.0988	0.1218	2.0504	0.0960	1.9271	0.0300
Poland	1.8917	2.1750	0.1498	1.9604	0.0363	2.0239	0.0699
Slovakia	1.6614	2.1471	0.2924	1.6369	− 0.0147	1.6767	0.0092
Slovenia	2.1378	2.2623	0.0582	2.3195	0.0850	2.3018	0.0767

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Hungary. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Hungary.



Table 9 Simulation analysis for each asset component using Latvia as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Latvia		Correlation = Latvia		CV = Latvia	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Croatia	2.7076	2.0497	− 0.2430	2.7146	0.0026	4.2800	0.5807
Estonia	3.3113	1.2407	− 0.6253	2.9292	− 0.1154	10.7141	2.2356
Hungary	2.9562	2.1358	− 0.2775	2.8900	− 0.0224	5.5043	0.8619
Lithuania	1.8709	1.4471	− 0.2265	1.9707	0.0533	4.3304	1.3146
Poland	1.8917	1.6917	− 0.1057	2.0521	0.0848	4.5021	1.3799
Slovakia	1.6614	1.2759	− 0.2320	1.6449	− 0.0099	4.9434	1.9755
Slovenia	2.1378	1.4390	− 0.3269	2.0412	− 0.0452	5.9170	1.7678
<i>Housing wealth</i>							
Croatia	2.7076	2.5181	− 0.0700	2.3733	− 0.1235	2.5091	− 0.0733
Estonia	3.3113	3.3675	0.0170	3.3309	0.0059	3.3575	0.0139
Hungary	2.9562	2.9824	0.0089	2.8768	− 0.0269	3.0551	0.0334
Lithuania	1.8709	1.8022	− 0.0367	1.6688	− 0.1080	1.9333	0.0334
Poland	1.8917	1.7480	− 0.0760	1.2602	− 0.3338	1.7043	− 0.0991
Slovakia	1.6614	1.6085	− 0.0318	1.5745	− 0.0523	1.9194	0.1554
Slovenia	2.1378	2.0956	− 0.0197	1.8253	− 0.1462	2.2189	0.0379
<i>Rest of net wealth</i>							
Croatia	2.7076	2.9498	0.0894	2.8795	0.0635	2.7337	0.0096
Estonia	3.3113	3.4550	0.0434	3.4331	0.0368	3.4234	0.0339
Hungary	2.9562	3.0231	0.0226	2.7254	− 0.0781	3.0192	0.0213
Lithuania	1.8709	2.1407	0.1442	1.9166	0.0244	1.9562	0.0456
Poland	1.8917	2.2170	0.1720	1.8623	− 0.0155	2.0545	0.0861
Slovakia	1.6614	2.2151	0.3333	1.5137	− 0.0888	1.7127	0.0309
Slovenia	2.1378	2.2882	0.0704	2.2173	0.0372	2.3286	0.0892

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Latvia. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Latvia.



Table 10 Simulation analysis for each asset component using Lithuania as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Lithuania		Correlation = Lithuania		CV = Lithuania	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Croatia	2.7076	2.9784	0.1000	2.5477	− 0.0591	1.9451	− 0.2816
Estonia	3.3113	1.8159	− 0.4516	2.6891	− 0.1879	3.2214	− 0.0272
Hungary	2.9562	2.8720	− 0.0285	2.7334	− 0.0754	2.4575	− 0.1687
Latvia	3.1334	5.0111	0.5992	2.9398	− 0.0618	1.7821	− 0.4313
Poland	1.8917	1.8404	− 0.0271	1.9982	0.0563	2.2951	0.2133
Slovakia	1.6614	1.6206	− 0.0245	1.5699	− 0.0551	1.9548	0.1766
Slovenia	2.1378	1.9209	− 0.1015	1.9270	− 0.0986	2.2242	0.0404
<i>Housing wealth</i>							
Croatia	2.7076	2.6162	− 0.0338	2.6844	− 0.0086	2.4383	− 0.0995
Estonia	3.3113	3.4072	0.0290	3.4678	0.0473	3.3294	0.0055
Hungary	2.9562	3.0332	0.0260	3.0225	0.0224	3.0112	0.0186
Latvia	3.1334	3.1840	0.0161	3.3310	0.0631	3.0965	− 0.0118
Poland	1.8917	1.8790	− 0.0067	1.5285	− 0.1920	1.6127	− 0.1475
Slovakia	1.6614	1.6472	− 0.0085	1.7090	0.0287	1.8621	0.1208
Slovenia	2.1378	2.1783	0.0189	2.0136	− 0.0581	2.1470	0.0043
<i>Rest of net wealth</i>							
Croatia	2.7076	2.7804	0.0269	2.8440	0.0504	2.6967	− 0.0041
Estonia	3.3113	3.2337	− 0.0234	3.3801	0.0208	3.3338	0.0068
Hungary	2.9562	2.5919	− 0.1232	2.6466	− 0.1047	2.8349	− 0.0410
Latvia	3.1334	2.7764	− 0.1139	3.0446	− 0.0284	2.9803	− 0.0489
Poland	1.8917	1.9461	0.0288	1.8288	− 0.0333	1.9651	0.0388
Slovakia	1.6614	1.7767	0.0694	1.4717	− 0.1142	1.6074	− 0.0325
Slovenia	2.1378	2.1207	− 0.0080	2.1824	0.0209	2.2501	0.0525

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Lithuania. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Lithuania.



Table 11 Simulation analysis for each asset component using Poland as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Poland		Correlation = Poland		CV = Poland	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Croatia	2.7076	3.2988	0.2183	2.2179	− 0.1809	1.5183	− 0.4393
Estonia	3.3113	2.0144	− 0.3917	2.2149	− 0.3311	1.8517	− 0.4408
Hungary	2.9562	3.1260	0.0574	2.4240	− 0.1800	1.9006	− 0.3571
Latvia	3.1334	5.6590	0.8060	2.5574	− 0.1838	1.5351	− 0.5101
Lithuania	1.8709	2.0171	0.0782	1.6739	− 0.1053	1.4213	− 0.2403
Slovakia	1.6614	1.7396	0.0471	1.4216	− 0.1443	1.4085	− 0.1522
Slovenia	2.1378	2.0871	− 0.0237	1.7016	− 0.2041	1.5491	− 0.2754
<i>Housing wealth</i>							
Croatia	2.7076	2.6257	− 0.0303	3.1052	0.1468	2.6539	− 0.0199
Estonia	3.3113	3.4111	0.0301	3.6531	0.1032	3.4149	0.0313
Hungary	2.9562	3.0381	0.0277	3.2196	0.0891	3.1448	0.0638
Latvia	3.1334	3.1889	0.0177	3.5984	0.1484	3.2089	0.0241
Lithuania	1.8709	1.8776	0.0036	2.1443	0.1461	2.0611	0.1017
Slovakia	1.6614	1.6510	− 0.0062	1.8910	0.1382	2.0368	0.2260
Slovenia	2.1378	2.1863	0.0227	2.2685	0.0611	2.3661	0.1068
<i>Rest of net wealth</i>							
Croatia	2.7076	2.7464	0.0143	2.9105	0.0749	2.6663	− 0.0153
Estonia	3.3113	3.1893	− 0.0368	3.4795	0.0508	3.2602	− 0.0154
Hungary	2.9562	2.5054	− 0.1525	2.7945	− 0.0547	2.6838	− 0.0922
Latvia	3.1334	2.7047	− 0.1368	3.2113	0.0248	2.8547	− 0.0889
Lithuania	1.8709	1.8168	− 0.0289	1.9567	0.0459	1.8009	− 0.0374
Slovakia	1.6614	1.6887	0.0165	1.5506	− 0.0666	1.5210	− 0.0845
Slovenia	2.1378	2.0871	− 0.0237	2.2479	0.0515	2.1857	0.0224

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Poland. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Poland.



Table 12 Simulation analysis for each asset component using Slovenia as a counterfactual. *Source:* Own calculations using data from HFCS (2020)

Country	Coefficient of variation						
	Observed	Shares = Slovenia		Correlation = Slovenia		CV = Slovenia	
		Simulated	Change	Simulated	Change	Simulated	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Business equity</i>							
Croatia	2.7076	3.3964	0.2544	2.8559	0.0548	1.8905	− 0.3018
Estonia	3.3113	2.0749	− 0.3734	3.1324	− 0.0540	3.0461	− 0.0801
Hungary	2.9562	3.2034	0.0836	3.0226	0.0225	2.3863	− 0.1928
Latvia	3.1334	5.8565	0.8690	3.2973	0.0523	1.7505	− 0.4413
Lithuania	1.8709	2.0617	0.1020	2.0551	0.0984	1.8134	− 0.0307
Poland	1.8917	1.9073	0.0083	2.0977	0.1089	2.2435	0.1860
Slovakia	1.6614	1.7758	0.0689	1.7084	0.0283	1.8849	0.1346
<i>Housing wealth</i>							
Croatia	2.7076	2.5682	− 0.0515	2.8894	0.0671	2.4293	− 0.1028
Estonia	3.3113	3.3878	0.0231	3.5581	0.0745	3.3258	0.0044
Hungary	2.9562	3.0084	0.0176	3.1185	0.0549	3.0056	0.0167
Poland	1.8917	1.8148	− 0.0406	1.7055	− 0.0984	1.6010	− 0.1537
Latvia	3.1334	3.1592	0.0082	3.4613	0.1046	3.0918	− 0.0133
Lithuania	1.8709	1.8373	− 0.0180	2.0041	0.0712	1.8630	− 0.0043
Slovakia	1.6614	1.6283	− 0.0199	1.7977	0.0821	1.8548	0.1164
<i>Rest of net wealth</i>							
Croatia	2.7076	2.7977	0.0333	2.7988	0.0337	2.6436	− 0.0236
Estonia	3.3113	3.2563	− 0.0166	3.3124	0.0003	3.2054	− 0.0320
Hungary	2.9562	2.6359	− 0.1084	2.5458	− 0.1388	2.5713	− 0.1302
Latvia	3.1334	2.8128	− 0.1023	2.9311	− 0.0646	2.7612	− 0.1188
Lithuania	1.8709	1.8984	0.0147	1.8125	− 0.0312	1.7488	− 0.0653
Poland	1.8917	1.9737	0.0434	1.7859	− 0.0559	1.8371	− 0.0289
Slovakia	1.6614	1.8214	0.0963	1.4179	− 0.1466	1.4567	− 0.1232

Notes: This table shows the observed, the simulated, and the difference between the simulated and the observed values of the coefficient of variation of net wealth in each country and for each component. Column (1) shows the observed values. Columns (2), (4), and (6) show the simulated values when each parameter (shares, correlation coefficients, and coefficient of variation of the factor) are fixed to the respective parameters of Slovenia. Columns (3), (5), and (7) show the percent change between the simulated and the observed coefficient of variation when each parameter is fixed to the respective parameters of Slovenia.

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