

# **SOCIO-ECONOMIC DETERMINANTS OF INCOME INEQUALITY IN EUROPE**



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Kristina Velichkovska





*To my family  
For their unconditional love and support.*



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# NOTES BY THE AUTHOR

The motivation behind this book comes from both my academic curiosity and a deep sense of responsibility to understand one of the most pressing issues of our time—income inequality. Over the last four years, I have dedicated myself to examining how this complex phenomenon has unfolded across Europe during some of the most economically challenging years in recent history. From the global financial crisis to the COVID-19 pandemic, this period between 2007 and 2021 has revealed the vulnerabilities and strengths of European economies, with inequality emerging as a central concern.

As I worked on this book, what began as a technical analysis soon became a more personal exploration of how economic forces impact real lives. The research, while grounded in quantitative analysis, made me realize the profound human impact behind the numbers. My aim is for this book to not only contribute to scholarly discussions but also serve as a practical resource for policymakers, economists, and those who strive to create more equitable societies. Through analyzing the interplay of macroeconomic, demographic, and political factors, this work seeks

to provide a deeper understanding of the forces that shape income inequality, particularly in times of crisis.

These four years of research have been both challenging and rewarding, and this book is the culmination of that effort. I am grateful to the mentors and colleagues who supported me along the way, and I dedicate this work to all those who continue to strive for greater economic fairness in the world.

# FOREWORD

Contemporary urban planning aims to achieve the goals of sustainable development, among which the main goal is the mitigation of risks from natural disasters. However, rapid urbanization is pressurizing urban planning, which makes it difficult to implement the principles of sustainable development in urban planning. Many human settlements have developed in territories exposed to one or multiple natural hazards. Earthquakes are considered to be the most devastating natural phenomena especially when they happen in densely populated and vulnerable urban environments.

The research topic of this book, which is based on the author's doctoral dissertation, is the assessment of seismic risk in urban environments as a basis for sustainable urban development. The seismic safety of the built environment relies on the buildings designed and constructed according to valid seismic design codes. However, the urban tissue of cities also consists of buildings built in different periods, before and after the introduction of seismic design codes, and as a result of different types of

reconstructions and adaptations, it has a dynamic character. Buildings constructed before the introduction of seismic design codes have unknown levels of seismic safety, which implies that urban environments are vulnerable to seismic risk.

Also, in this book, through a review of the urban planning practices in some earthquake-prone countries, an introductory analysis was done to define the existing role of urban planning in the mitigation of seismic risk.

A pilot study in the Municipality of Karposh in Skopje was selected with the purpose of defining the level of seismic risk and identifying the urban parameters that have an influence on the seismic risk. Skopje is a territory with relatively high seismicity. The earthquake in 1963 was the greatest natural catastrophe in the history of the city and, at the same time, was the beginning of the construction of modern Skopje.

For the seismic risk assessment of the pilot study in the first place, the components of risk, hazard, exposure, and vulnerability, were defined. The seismic hazard was defined using both deterministic and probabilistic approaches. Seismic hazard information was based on ESHM20 (Danciu et al., 2021). In the deterministic approach, two scenario earthquakes were selected: a Mw 6.6 earthquake at 10 km and an earthquake with Mw 7.1 at a 100 km radius distance from the pilot study area. Within the probabilistic seismic hazard analysis approaches, the intensity of ground shaking was defined for two return periods, 95 and 475 years. The local site conditions of the pilot study area were defined in accordance with data from the soil study

carried out by IZIIS (Dojcinovski et al., 2013) and regional site parameters available in ESRM20 (Crowley et al., 2021).

The exposure model was prepared for two urban scenarios: the existing (scenario 1) and the planned site (scenario 2). The existing site building stock information was based on previous studies carried out by IZIIS (Necevska-Cvetanovska et al., 2013; Apostolska et al., 2018). The planned site was based on the Detailed Urban Plan (Tajfa Plan, 2015). Taxonomy consisting of attributes such as construction period (seismic design code level), material and type of structural systems, the height of the building, plan shape of the building, and position of the building in the urban block was defined for each entity from the exposure models of scenarios 1 and 2.

According to the construction period, the building stock was classified into three periods: prior to 1964 (no seismic design codes were applied), between 1964 and 1981 (designed according to the first seismic design code), and after 1981 (designed according to the current seismic design code). Regarding the material and type of structural systems, there are buildings with reinforced concrete moment frame structures, reinforced concrete infilled frame structures, reinforced concrete dual frame-wall system structures, confined masonry structures, and unreinforced masonry structures. In both scenarios, there are buildings with mixed structural systems, which are the result of structural interventions made on existing buildings, such as expanding the floor area and adding stories. The structural interventions in some buildings were made by using expansion joints, while in others, the

structural interventions were applied directly to the original structure.

The vulnerability model was formulated by selecting existing vulnerability curves from the ESRM20 (Crowley et al., 2021) in accordance with the taxonomy of the entities present in the exposure models for scenarios 1 and 2.

The seismic risk assessment for the two urban scenarios of the pilot study was done by using the program Open Quake Engine 3.13 (GEM, 2022). Based on the approach of analyzing seismic hazard, deterministic and probabilistic, the Scenario earthquake and Classical Probabilistic calculators were used. The results obtained from seismic risk assessment were presented for different damage levels in correlation with taxonomy, construction period, and selected urban planning parameters. Also, damage distribution maps were generated in QGIS 3.14 (QGIS team, 2020). The probability of economic and life losses obtained from the Classical Probabilistic calculator was analyzed as well. As was expected, in general terms, the greatest damage appears at buildings with masonry structures constructed before the introduction of the first seismic design codes of 1964, and this type of structure is mostly present in the exposure model of urban scenario 1.

Based on the conducted research, the following general conclusions can be made:

- In urban planning, seismic hazards are taken into account, but seismic risks are not considered.
- Some urban planning parameters, such as the height of the building, position in the urban block, plan

shape, and occupancy type, create a base for the formulation of irregular architectural configurations. If the seismic risk is not considered the noncritical use of these urban parameters can give way to increased damage when an earthquake hits.

- In urban plans aiming at the existing urban settlements, urban parameters that control the growth of the built environment do not clearly define the status of the existing buildings from the construction aspect. Whether the increased floor area means demolishing the existing and rebuilding a new building, or the existing building remains as it is and additional floor area and stories are added to is not stated in the urban plan. Allowing the addition of floor areas and stories to existing buildings creates mixed structures with unknown levels of seismic safety.
- In the existing National practice and regulations of urban planning, there is no methodology that treats seismic risk in existing urban districts.
- In this research, based on the doctoral dissertation of the author, in accordance with the newest research in the world, a methodology for seismic risk assessment and defining the role and importance of selected urban parameters in the structural response of buildings was successfully implemented on the pilot study, the urban settlement in the Municipality of Karposh.

The methodology for seismic risk assessment and defining the role of selected urban parameters in the structural response of buildings conducted in the doctoral dissertation

can be used as an instrument for urban planners in the preparation of urban plans and at the same time support the city authorities in the processes of decision making and building seismically safe and sustainable urban environments.

Kristina Velichkovska



# INTRODUCTION

“Inequality is not an inevitable  
consequence of economic growth,  
but rather a choice we make as a society.”  
-Simon Kuznets

For over 30 years, income inequality has kept rising in many countries worldwide. This fact has compelled numerous scholars to explore the phenomenon, its causes, and its consequences. The potential impact on society is another reason people are interested in the degree and trajectory of income inequality. According to Pickett and Wilkinson (2009), there is evidence to support the claim that a number of social issues, including drug usage, crime, and poor health, are positively correlated with rising income inequality. Therefore, it's critical to learn more about the factors contributing to the rise in income disparity. At the 2011 World Economic Forum in Davos, the problem of wealth inequality was referred to as the “most serious challenge for the world.” (Eklil, 2011), which just once again confirms that further research into the