10.14754/CEU.2018.05

ESSAYS ON APPLIED ECONOMICS

by

Vukan Vujić

Submitted to

Central European University

Department of Economics and Business

In partial fulfilment of the requirements for the degree of Doctor of Philosophy

Supervisors: Sergey Lychagin, László Halpern

Budapest, Hungary

2018

10.14754/CEU.2018.05

CENTRAL EUROPEAN UNIVERSITY
DEPARTMENT OF ECONOMICS AND BUSINESS

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Abstract

The thesis consists of three chapters, all single-authored. The first chapter analyses the effects of the European Sovereign Debt Crisis on foreign bank subsidiaries in CESEE. The second chapter examines the impact of refugee influx on the Serbian labour market. The third chapter compares the donation behaviour of foreign and domestic companies in Serbia.

Chapter 1

Based on the unique, hand-collected dataset on the related party transactions of 97 foreign bank subsidiaries in Eastern Europe, I study the relationship between asset growth and the related party funding. To address the endogeneity of the related party funding I use the parent bank exposure to the European Sovereign Debt Crises as an exogenous supply shock. A one percentage point decrease in related party funding is associated with more than one percentage point decrease in assets growth. The multiplier effect is higher for funding in the form of equity than in the form of debt. First-stage regressions document the impact of European Sovereign Debt Crises on the withdrawal of related party funds, providing additional evidence for the role of internal capital markets in the cross-border transmission of financial shocks.

Chapter 2

The paper explores the refugee influx to Serbia during the Yugoslav wars, in order to study the labour market effects of immigration. The refugees were the Serbian minority from Bosnia and Croatia, and shared the same language, culture and previous labour market experience with the domestic population of Serbia. This allows me to control for labour market substitution, which is problematic in studies of migration effects based on flows from developing to developed countries. To address the endogeneity of the location choice, I instrument for refugee influx using the share of pre-war migrants and the distance from the war region as instruments. I find that refugee inflows led to a decrease in the average wage in the municipality, and an increase in the municipal unemployment rate. I also find that the share of refugees in the municipal population positively correlates with the share of the population who commute to work. The estimated effects tend to last for roughly two years following the end of the war.

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Chapter 3

The paper examines a sample of 2,000 Serbian companies during the period from 2010 to 2013 and finds that domestic firms are four percentage points more likely to make a charitable donation than foreign firms. Conditional on donating, foreign firms spend 0.05 percentage points of revenue less on donations than domestic firms. Home country characteristics and management composition are important determinants of donation behaviour. Foreign companies from developing and offshore countries donate less than companies from developed countries. Companies from English common law countries donate less than companies from civil law countries. Last but not least, a higher share of foreign directors is associated with lower donations. These findings suggest that foreign firms are slow in transferring corporate philanthropy practices from their countries of origin.

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Acknowledgements

I would like to mention and express my gratitude to people who significantly helped me on my PhD journey. Without their guidance and support, I would not be able to complete the thesis.

First of all, I would like to thank my main advisor Sergey Lychagin. He was always there to listen and critique ideas of a desperate PhD student—me. Interacting with him, I learned to think critically, sometimes too critically, and triage good projects from a bad ones. He found energy and patience to read my drafts, and even correct mathematical formulas.

Next, I am grateful to my thesis advisor, László Halpern. He understood my position clearly and took more realistic approach in terms of expectations from my thesis. Professor Halpern advised me to apply for a summer research position at the Hungarian National Bank, experience I enjoyed and benefited from. Last but not least, professor Halpern's help was instrumental in finding examiners of my thesis: Giorgio Barba Navaretti, Robert Lieli, and Balázs Muraközy.

I thank the examiners for their time, understanding, and of course, the feedback. Answering examiners' comments made my thesis more robust, revealed certain vulnerabilities in my reasoning, and showed me that doing empirical research is not an easy endeavour.

Staff members of the CEU Department of Economics and Business: Veronika Orosz, Katalin Szimler, and Marta Jombach provided significant help with administrative and organizational issues. Thanks to them I managed to finish all the necessary paperwork smoothly.

It was very useful to work as a research assistant to Miklós Koren, and to Yusaf Akbar. Besides financial compensation, I benefitted from seeing how the research is done and papers are written.

The CEU Department of Economics provided me with supportive and intellectually stimulating atmosphere. I am grateful to Miklós Koren, Ádám Szeidl, Gábor Kézdi, Gábor Békés, Álmos Telegdy, and other members of the Department who provided me with comments during departmental seminars or office hours.

I received substantial input from my fellow PhD students. It was an honour to study with such smart and disciplined colleagues. Of course, PhD left time for some extra-curricular activities. I am glad I had Balint Menyhert and Cornel Todirica to go for a beer with.

Mihail Arandarenko was a very useful contact whenever I needed some help in finding Serbian data.

Last but not least, my mother and grandmother were always there to listen to my problems and provide me with the right advice. I am glad and relieved, that I managed to justify their expectations.

Contents

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Chapter 1

Shock Transmission through Internal Capital Markets: Evidence from Foreign Bank Subsidiaries in Eastern Europe

1.1 Introduction

Banking systems in Central, Eastern and Southeastern Europe (CESEE[1] from here on) are dominated by foreign banks. Foreign banks rely heavily on funding from the parent group. Before the crisis, reliance on funding from abroad was seen as beneficial for economic development because it contributed to fast credit growth. However, with the advent of the 2008 Global Financial Crisis and the subsequent European Sovereign Debt Crisis, the dark side of foreign funding came to the fore. Parent banks were faced with a range of issues: losses on toxic assets, funding problems due to the wholesale market freeze, and regulatory pressures to recapitalize and focus on the home market. Faced with these problems, banks were likely to cut funding to their CESEE subsidiaries. Media commentators such as Krugman, in a 2008 article[2] comparing Eastern Europe in 2008 with Southeast Asia in 1997 further exacerbated the situation by generating additional panic among investors. Fearing large losses in CESEE, investors were reluctant to provide funding to parent banks with exposure to the region.

In spite of the gloomy expectations, CESEE managed to weather the 2008 crisis, a success some credit to the role of the European Union and international financial institutions, De Haas et al. (2015). However, during the European Sovereign Debt Crisis, the EU had to deal with its own problems and was therefore unable to devote as much attention to CESEE[3]. This paper uses the European Sovereign Debt Crisis to study the impact of the parent bank shock on its subsidiaries. In particular, the paper aims to answer two questions. First, is there a relationship between exposure of the bank to the European Sovereign Debt Crisis and deleveraging from CESEE? Second, how did deleveraging impact the asset growth of CESEE subsidiaries?

To answer these two questions, I hand-collect data on related party transactions from 97 subsidiaries operating in CESEE. I observe the exact year-end amounts of equity and debt financing that the subsidiary received from the rest of the group. This represents an improvement, compared with the related literature that examined the role of internal capital markets in transmitting financial shocks from developed economies to Eastern Europe: for example, De Haas and Van Lelyveld (2010), De Haas et al. (2015), Allen et al. (2013). These papers did not observe a flow of funds between parent and subsidiary, so they could provide only indirect evidence for the existence of internal capital markets by correlating shocks to the parent bank with the loan growth of the subsidiary.

[1] IMF definition of CESEE: https://www.imf.org/en/Publications/REO/EU/Issues/2017/01/25/SAFEGUARDING-THE-RECOVERY-AS-THE-GLOBAL-LIQUIDITY-TIDE-RECEDES

[2] https://krugman.blogs.nytimes.com/2008/10/31/eastern-europe-2008-southeast-asia-1997/

[3] https://www.ft.com/content/6a22d214-1530-11e1-855a-00144feabdc0

I estimate the relationship between parent funding and subsidiary growth using OLS and IV estimation, both in a post-crisis cross section and in a yearly panel with pre-crisis period included. As an instrument for parent funding in the IV estimation I use parent bank exposure to the European Sovereign Debt crisis. In particular, I measure the exposure to the crisis as the share of sovereign exposure to Greece, Ireland, Portugal, and Spain (GIPS countries) in the Tier I capital of the bank. As a robustness check, I also use the change in the CDS spreads of the home country sovereign as an instrument for the parent funding. Instrumenting for parent funding with crisis exposure disentangles the effect of the change in supply of funding from the effect of the change in the demand for funding. That is, instrumenting ensures that the effect on the subsidiary growth comes from change in funding and not from the change in the credit demand.

Besides total funding, the study separately examines the effects of equity and non-equity funding. Decomposition is important because equity funding is more stable than non-equity funding. Moreover, increases in equity lead to the relaxation of regulatory capital constraints and enable lending growth.

Subsidiary growth is defined as the growth of non-related party assets, such that the assets due from related parties are excluded from the measure of subsidiary growth. Not doing so, as with studies that use loan growth as a dependent variable, can bias the results, because the dependent variable includes both loans to external parties and loans to the rest of the group. One can therefore confound the effects of returning funds to the parent with the increase in lending to domestic economy.

The findings of the paper are threefold. First, the paper identifies a positive relationship between a parent's exposure to the crisis and the withdrawal of internal funding. Parent banks with higher exposure to GIPS countries withdrew more funds from their subsidiaries during the period from 2010 to 2011 than banks with less GIPS exposure. However, the effect is non-linear, since Scandinavian banks deleveraged from the Baltic countries despite having almost no GIPS exposure. Second, in response to the decrease in internal funding, the subsidiaries reduced their asset growth. The subsidiaries were unable to compensate for internal with external funding and consequently had to decrease the amount of funds they provided to their clients. Third, as expected, equity funding has much higher multiplier effects on asset growth than debt funding, because of its impact on regulatory capital constraints.

The findings remain unchanged in a panel specification, and when using sovereign CDS spread as a measure of parent bank shock. The inclusion of the pre-crisis period shows that results were driven by the crisis, not by differential trends in the pre-crisis period[4].

The rest of the paper is organised as follows. Section 1.2 provides an overview of the relevant theoretical and empirical literature. Section 1.3 describes the role of foreign banks and the crisis in CESEE. In Sections 1.4 and 1.5, I present the data and estimation strategy. Section 1.6 discusses the findings and robustness checks. The paper concludes, in Section 1.7, by acknowledging the limitations of the study and discussing the relevant policy implications.

[4] Section A.3 presents the results of testing the assumption of parallel pre-crisis trends.

1.2 Literature Review

1.2.1 Theoretical Foundations

To produce the empirical research in this paper I draw on the theoretical background from two areas: the adjustment of banks to the balance sheet shocks and the functioning of bank internal capital markets.

Cetorelli and Goldberg (2011) illustrate bank adjustment to balance sheet shock using a T-account similar to the one presented on Figure 1.1. The banks' balance sheet consists of assets in form of cash, loans, fixed assets such as office buildings etc. on the left side of the T-account, and shareholder's equity and liabilities in form of deposits and borrowings on the right side of the T-account. The accounting identity states that the bank's assets are equal to the sum of the equity and liabilities, i.e. that each dollar of assets needs to be funded by one dollar of equity or liabilities. As its name suggests, accounting identity represents identity and always holds. For example, if a client of the bank withdraws his deposit, the liabilities of a bank decrease. The assets of the bank also decrease, because the client is paid out in cash, reducing the amount of cash on the balance sheet. The accounting identity continues to hold, because the assets and the liabilities have been reduced by the same amount.

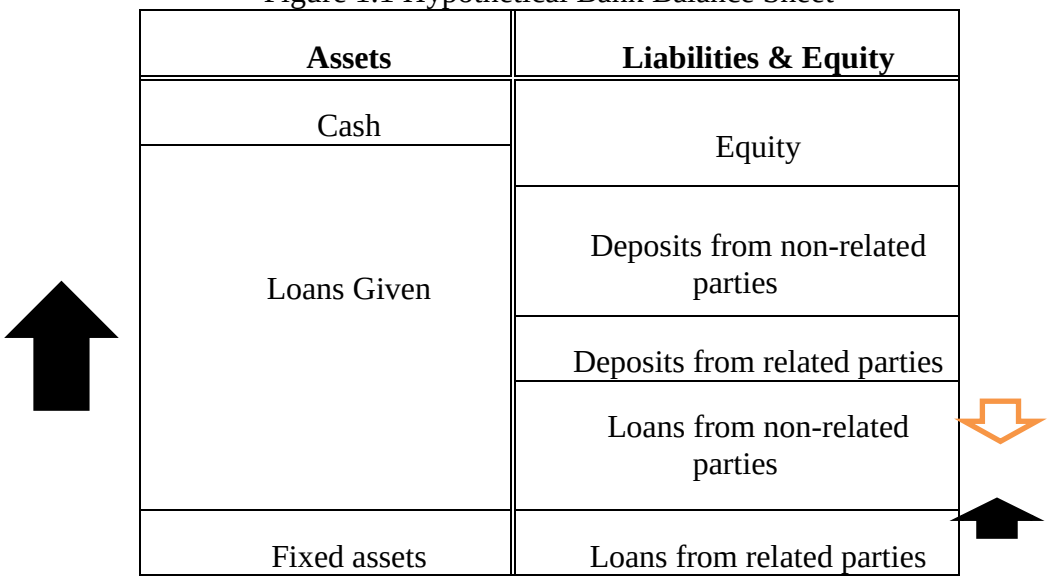
The hypothesis I test in this paper follows the following logic: the European Sovereign Debt Crisis leads to losses on the sovereign bond holdings of the parent bank. The losses reduce the parent bank equity below the regulatory minimum. The parent bank has two options to restore its capital ratio. First, it could increase the equity, or second, it could reduce assets, i.e. deleverage. In this paper I assume that part of the adjustment to the Sovereign Debt Crisis occurred by deleveraging — reducing exposure to the international subsidiaries. The deleveraging can take two forms. First, in the form of debt: by not renewing loans or even borrowing from CESEE subsidiaries. Second, in the form of equity: by not recapitalizing the subsidiaries or making them pay out bigger dividends. Faced with the decrease in parent funding, the subsidiary needs to adjust its balance sheet and restore its accounting identity. The adjustment can occur by either reducing assets, for example by decreasing lending activity, or by increasing the liabilities, for example by borrowing from non-related parties. In this paper I test whether subsidiaries adjusted to a decrease in related party funding by reducing its assets.

Bruno and Shin (2013) follow similar reasoning when modelling transmission of shocks in global banking. Their model incorporates a realistic institutional setting, with global banks that borrow from money markets and regional banks that borrow from global banks. International capital flows are driven by the demand pull factor in form of the interest rate differential and the supply push factor in the form of the leverage of global banks. The more leverage the global bank can take the more funding it can provide to its subsidiaries. Authors are able to obtain closed form solutions and predict the capital flows based on the regulatory limits on the leverage ratio.

The second related strand of literature, the internal capital markets literature, examines how a parent bank allocates internal funds between subsidiaries. De Haas and Van Lelyveld (2010) rely on a model from Morgan et al. (2004), which is the extension of Holmstrom and Tirole's (1997) model and identify *support* and *substitution* effects which guide the allocation of funds in internal capital markets. The *support* effect occurs when parents provide funds to their international

subsidiary, after subsidiary is hit by negative subsidiary specific funding shock. An example of such a shock might be a negative news article in the host country that leads to the withdrawal of deposits from the subsidiary. The *substitution* effect is the result of the parent bank maximizing its overall group profits and directing the funds from subsidiaries with less profitable projects to subsidiaries that can achieve the highest return on internal funds. Hence, if one subsidiary is hit by negative profitability shock, the parent bank will redirect the funds from that subsidiary to the rest of the group. In the language of De Haas and Van Lelyveld's model, the European Sovereign Debt Crisis can be interpreted as an event where a parent bank is hit by a negative funding shock and the subsidiaries provide the necessary support. To account for the mechanism of the substitution effect and control for the pecking order of fund withdrawal, I include a rich set of subsidiary characteristics in the regression model.

Figure 1.1 Hypothetical Bank Balance Sheet



Note: The Figure illustrates that a drop in loans from related parties will result in the reduction of the loans given, unless it is compensated by an increase in loans from non-related parties. (Arrow pointing up means decrease, and arrow pointing down represents an increase).

1.2.2 Related Empirical Studies

Early empirical studies provided indirect evidence for the existence of the internal capital markets by correlating parent level shocks with the subsidiary level outcomes. Houston et al. (1997; 1998) find that the lending of the subsidiaries belonging to the bank holding company is more sensitive to the cash flow and capital position of the holding company than to the subsidiary's own cash flow and capital position. Additionally, in their 1998 paper, the authors find that the loan growth at the state level has higher correlation with the loan growth of subsidiaries of a holding company than with the loan growth of the independent banks. The authors interpret the higher sensitivity to local demand conditions as the ability to rely on a parent's funding to quickly capture the profit opportunities.

Peek and Rosengreen (1997, 2000) use the Japanese asset price bubble as a negative shock to the parent bank and find a negative correlation between the capital ratio of the parent and the lending activity of Japanese bank branches in the U.S. In their (2000) paper, the authors show that the decrease in lending by Japanese bank branches had a negative impact on construction activity in the U.S. market. Hence, the authors established the connection between financial shocks transmitted through internal capital markets and the negative impact on real economic activity.

De Haas and van Lelyveld (2010) use an extensive sample of 45 multinational banks from 18 home countries with 194 subsidiaries across 46 host countries. The authors find a positive correlation between the financial strength of the parent and the lending growth of the subsidiary. Subsidiaries reduce lending during episodes of financial crises in the parent bank's home country because they cannot rely on the parent's funding. On the other hand, during episodes of the host country's financial crises, domestic banks curtail their lending, while foreign subsidiaries do not. The authors explain this finding by foreign subsidiaries' reliance on funding from the parent bank. In their (2014) paper, De Haas and van Lelyveld apply a similar methodology to the episode of the Great Recession, showing that foreign subsidiaries of the crisis-hit parents reduced their lending more than domestic banks.

The limitation of the studies mentioned above is that they do not observe the flows of intra-group funds within the bank holding group. The first paper to address this limitation, but on a macro, country, level was by Cetorelli and Goldberg (2011). Using BIS data on cross-border loans, the paper finds that the developed countries affected by the 2007-2009 financial crisis significantly reduced their cross-border lending to emerging markets. Cetorelli and Goldberg (2012a) use regulatory data submitted by foreign branches operating in the U.S. and find that, in the post-Lehman period, parent banks with a higher degree of pre-crisis assets backed commercial paper (ABCP) exposure withdrew more funds from their branches than banks that were less exposed to ABCP. Withdrawal of the funds had negative effects on the branch lending, since branches could not fully substitute internal with external funds. Cetorelli and Goldberg (2012b) analyse the liquidity management of global U.S. banks and find that, during the recent Great Recession, banks redistributed the funds from subsidiaries that are less dependent on parent funding to subsidiaries that represent the bank's core markets.

Disentangling the effects of the decrease in supply of funding from the effects of the decrease in the demand for funding is a key issue. Aiyar (2012) examines the impact of a decrease in foreign liabilities on the lending of UK banks during the Great Recession. Using a sectoral composition of bank lending, Aiyar is able to control for demand effects and confirm that withdrawal of funds caused a decrease in lending, and not the other way round: i.e. that the drop in demand for loans led to the withdrawal of funds. Schnabl (2012) combines Peruvian loan level and bank level data, which enables him to compare changes in lending to the same firm of the banks with different levels of the exposure to the shock. He finds that international lenders hit by the1998 Russian default reduced their exposure to Peru, and that Peruvian banks that relied on foreign funding reduced their lending more than domestically funded banks.

All in all, the previous literature finds that internal capital markets transmit the shocks from the home to host economies. Faced with the withdrawal of parent funding, an international subsidiary is not able to fully compensate internal with external funds, so it reduces lending to

domestic firms. As a reaction to reduced lending, domestic firms reduce their investments and the shock then spills over from the financial to the real-world sector.

This paper differentiates itself from the rest of the literature in several ways. First, I examine the effect of both debt and equity financing received from the internal capital markets. This represents an improvement in relation to correlation-based studies that do not observe internal capital market transactions, as well as in relation to studies that examine only internal debt financing. It is important to distinguish between equity and debt funding because of their different implications for financial stability and the growth of the subsidiary. Equity has longer maturity and represents a more stable source of funding than debt. Forbes and Warnock (2012) find that most episodes of extreme capital flight throughout the world are led by debt rather than by equity flows. Increase in equity relaxes regulatory lending limits and enables growth of the subsidiary. While Allen et al. (2013) use similar data to my own study, their sample is smaller and they do not conduct quantitative analysis.

I pay particular attention to the definition of the dependent variable *change in non-related party assets*. The variable is a comprehensive measure of a subsidiary's activity that, in addition to loan growth, contains changes in security holdings and other balance sheet assets. Hence, *change in non-related party assets* captures not only the financing banks provide to clients in the form of lending, but also financing in the form of securities. *Change in non-related party assets* excludes assets due from the related parties. Most of the relevant empirical studies use total loan growth as the main dependent variable, running the risk of confounding increase in lending to internal and to external parties.

Finally, a main characteristic of the study is the geographical focus on the CESEE countries, transition economies characterized by a high share of foreign bank involvement. The study is among the first to provide direct evidence for the functioning of internal capital markets in the CESEE region.

1.3 Foreign Banks in CESEE and European Sovereign Debt Crisis

Foreign banks play a dominant role in the banking sectors of the CESEE countries. In 2009, the share of foreign-owned bank assets was above 50% across the region, with the maximum reached in Estonia, where 99% of the assets were foreign-owned[5]. In the beginning, most of the foreign banks entered the market through privatisation of the state-owned banks, but eventually the CESEE market became so attractive that banks started opening green-field subsidiaries and branches. The attractiveness of CESEE markets lay in their proximity to Western Europe, the high interest rate differential, and the relatively low leverage of firms and households that promised great potential for lending growth. The entry of foreign banks was substantially facilitated by the approaching of the region towards EU membership and the adoption of EU legislation that promotes cross-border banking. The CESEE countries became such an important part of the strategy of six big players: Austrian Raiffeisen and Erste, Intesa Sanpaolo and

[5] Claessens and Horen (2014) present comprehensive dataset on foreign bank ownership around the world.

UniCredit from Italy, the French Société Générale, and Belgian KBC, that Bonin and Louie (2016) consider CESEE as a "second home market" for these banks.

Because of the limited deposit base and underdeveloped debt markets, foreign subsidiaries relied heavily on intra-group funding to finance their growth. De Haas and Naaborg (2006) provide an excellent overview of the functioning of internal capital markets, based on interviews with bank managers within CESEE. The parent banks would obtain cheap wholesale funding in their home market and then transfer it to the subsidiary in the form of debt or equity. Because wholesale funding was available in hard currency and there were no developed swap markets for CESEE currencies, most of the transferred funds would stay in the foreign currency denomination. Transfer of debt financing was usually done by a centralised treasury function that allocated funds based on planned asset growth and targeted returns on economic capital. In determining how much equity funding to provide, the parent banks relied on meeting the regulatory capital requirements that would allow the subsidiary to meet the planned asset growth. Other factors parent banks considered when deciding how much equity to provide to a subsidiary were tax legislation and regulatory limits on large exposures. Because of low income tax in the region, there was a strong incentive to retain the profits and not transfer them abroad. De Haas and Naaborg provide examples where parent banks provided direct cross-border loans to large corporate clients in order to bypass the large exposure limits of the subsidiary, but also to provide cheaper loans and win the client.

The model of intra-group banking was fraught with supervisory control and governance issues. Allen et al. (2013) argue that there were no right incentives in place for information sharing between the home and the host country regulators. According to the Basel Committee, home country regulators are in charge of supervising the banking group as a whole, while host country regulators supervise the activities of the subsidiary (Allen et al. (2013)). The Basel principles also encourage cooperation between supervisors in different jurisdictions (BCBS (2010)). However, Pistor (2010) conjectures that the home country regulators have little incentive to deal with the specific issues of the host country, while host country regulators have neither an overview of the whole banking group, nor the leverage to block the withdrawing of funds from the host country. To make the things worse for the host country, most of the subsidiaries had very weak corporate governance and a low level of autonomy. Allen et al. (2013) document low shares of independent supervisory board members with the relevant financial expertise, and a high share of directors who hold positions with the parent bank. Encouragingly, the managers interviewed by De Haas and Naaborg expressed the strong commitment of the parent banks to the region and the readiness of the parent to take the lender of last resort role in the case of urgency.

Despite these governance issues, the banking systems of CESEE countries turned out to be resilient during the 2008 global financial crisis, an outcome that Bonin et al. (2014) ascribe to "rapid progress in institutional development and regulatory capabilities". The Vienna Initiative (De Haas et al. (2015) also made a significant contribution to financial stability in the region. The initiative was a joint effort of the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), the European Commission, the International Monetary Fund, and the World Bank Group (WB), with the aim of safeguarding financial stability in emerging Europe. In February 2009, within the "Joint IFI Action Plan in support of banking systems and lending to the real economy in Central and Eastern Europe", the EBRD, EIB, and

WB committed a package of EUR 24.5 billion to support banks that promised to keep their CESEE exposure and to recapitalise their subsidiaries (De Haas et al. (2015)). The action plan covered five countries: Bosnia-Herzegovina, Hungary, Latvia, Serbia, and Romania, and the amount of the package reached EUR 33.2 billion at its end in February 2011.

Epstein (2014) challenges the conventional wisdom on the beneficial role of the Vienna Initiative. She argues that the initiative was the result of the banks' self-interest, that banks had no plans to leave profitable CESEE markets in the first place, but rather that they wanted to use the Vienna Initiative to calm the investors and to ease their own funding problems. Epstein supports her arguments with the fact that it was the banks who initiated a coordinated approach to the crisis in emerging Europe by sending a letter to the European Commission in November 2008. Moreover, the Initiative had a voluntary character and the banks retained the autonomy to select subsidiaries to which they wanted to keep their exposure.

The next challenge for banking in CESEE was the European Sovereign Debt Crisis. The crisis was provoked by the weak fiscal position of GIPS countries, Lane (2012), which led to investor doubts about the debt repayment capacity of the sovereigns. The European Sovereign Debt Crisis started in October 2009 after the Greek government announced a revised budget deficit forecast of 12.7 percent of GDP. The announcement resonated with investors, who reassessed the prices of European Sovereign bonds, leading to an increase in spreads (Figure 2 in Lane's paper).

The situation escalated into a full-blown European Sovereign Debt Crisis that severely limited the parent banks' ability to support CESEE subsidiaries. First, the banks had difficulties in attracting wholesale funding due to the increase in counterparty risk and the decrease in sovereign bond prices that could serve as collateral, Chernenko and Sunderam (2014). Second, losses on sovereign bonds had a negative impact on bank equity. To meet the regulatory requirements and to pass the stress tests organised by the European Banking Authority[6] the banks had to either deleverage or recapitalize. Last but not least, some banks received state aid on condition that they focused on the home market and withdrew from non-core markets, Epstein (2013).

In this paper, I document the impact of the European Sovereign Debt Crisis on the internal capital markets for the sample of banking groups active in the CESEE region. The next section describes the sample and the process of data collection.

1.4 Data Description

The data for this study was gathered from several sources. The primary and most important source is subsidiaries' annual reports. Besides providing information on a subsidiary's financial position and performance, the reports provide an overview of the transactions between a subsidiary and the parent group. I complement this data with two measures of the shock to the parent bank. First, GIPS exposure, taken from the EBA stress test results. Second, sovereign CDS spreads from S&P Capital IQ.

[6] http://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing

The information from subsidiaries' annual reports covers the period from 2006 to 2012, and contains information on 97 international subsidiaries, operating in 18 countries and belonging to 26 different banking groups. Table 1.13 in the Appendix presents an overview of the banks included in the analysis. Italian UniCredit is the most represented group in the sample, with 11 subsidiaries, followed by Austrian Raiffeisen and Erste, with 10 and 9 subsidiaries, respectively. Greece is the country where most parent banks are located (four) but each of these parent banks has only three or four subsidiaries located in Balkan countries. Regional concentration is also pronounced for Scandinavian banks: they mostly do business in the Baltic countries.

The novelty of the dataset is the detailed information on intra-group transactions between the subsidiary and the rest of the group. This information is not available in standardised databases such as Bankscope, therefore gathering this information manually required significant data collection effort. I classify all the transactions between a subsidiary and the parent into two main groups: *equity funding* and *non-equity funding*. As its name suggests, e*quity funding* relates to a parent providing and receiving funding through equity transactions: share issues, dividends paid, and share repurchases. *Non-equity funding* mostly relates to debt financing: it measures the change in a net liability position that the subsidiary has towards the rest of the group. If a subsidiary increased its liabilities towards the parent it means that it received *non-equity funding*. On the other hand, if a subsidiary increased its claims towards the parent it means that the subsidiary provided *non-equity funding*, therefore the *non-equity funding* is negative.

Figure 1.2 illustrates the calculation of *non-equity funding* for the Romanian subsidiary of UniCredit at the end of 2012. At that point, UniCredit Romania had assets due from the rest of the group for the amount of 257 million RON. The assets consisted of deposits, loans given, and other receivables. At the same time, UniCredit Romania owed 11 billion RON to the rest of the group. These related party liabilities took the form of deposits and loans received subordinated loans, and other payables. Hence, in 2012, UniCredit Romania had net related party liabilities for the amount of 10.7 billion RON, the difference between 11 billion RON in liabilities and 257 million RON in assets. The difference between 10.7 billion RON of net related party liabilities at the end of year, and 10.6 billion RON of net related party liabilities at the end of year is equal to 0.1 billion RON, representing the *non-equity funding* that the subsidiary received from the rest of the group in 2012.

The reason for differentiating between *equity funding* and *non-equity funding* lies in the different implications for the maturity risk and regulatory capital ratios. Equity is the most stable source of funding. It does not have a fixed maturity date and cannot be withdrawn easily: the dividends can be paid out only on certain dates, and only if the bank has made profits. Equity provides a buffer that protects the bank in the case of losses or the sudden withdrawal of deposits. For this reason, regulators prescribe the minimum capital amount that a bank should hold against a given amount of bank assets. An increase in equity leads to a decrease in regulatory constraints, enabling the bank to expand its lending.

Figure 1.2 Illustration of Non-equity funding Calculation

The following transactions were carried out with UniCredit Italiano S.p.A, UniCredit Bank Austria AG and its subsidiaries:

(RON)

	31 DECEMBER 2012	31 DECEMBER 2011
Derivative assets at fair value through profit and loss	27,295,492	33,210,703
Current accounts and deposits to banks	189,721,240	627,699,734
Loans to customers	27,632,921	22,983,107
Other assets	13,263,837	20,796,322
Total assets	257,913,490	704,689,866
Derivative liabilities at fair value through profit and loss	130,454,608	99,832,352
Derivatives used for hedging	94,235,076	58,812,857
Current accounts	96,377,729	96,829,119
Deposits attracted	2,562,769,544	3,084,839,289
Loans received	7,557,103,200	7,500,461,670
Subordinated liabilities	598,474,296	498,124,892
Other liabilities	28,707,574	14,767,868
Total liabilities	11,068,122,027	11,353,668,047

related party assets

related party liabilities

Note: The figure presents the related party transactions section from the UniCredit Romania financial statements.
Source: UniCredit Romania website, http://unicredit-tiriac.ro/data/files/Raport%20Anual%202012.pdf

The main outcome I am interested in is c*hange in non-related party assets:*

$$change\ in\ NRP\ assets_t = \frac{(assets_t - RP\ assets_t) - (assets_{t-1} - RP\ assets_{t-1})}{assets_{t-1}} \quad (1)$$

To calculate this variable, I first define non-related party assets as the difference between total assets and related party assets, and then calculate *change in non-related party assets* as the difference between non-related party assets in the two time periods. As subsidiaries differ in size, I standardise the *change in non-related party assets* by division with the assets at the start of the period. *Change in non-related party assets* measures funding that a subsidiary provides to external parties: other banks, government, firms, and households. Funding is usually provided in the form of loans, but it might also include purchases of debt securities, stocks, or other assets. It is important to distinguish related party assets from total assets, in order not to confuse funding provided to the parent group with funding provided to the external parties.

In order to make *change in non-related party assets* and related party funding measures *non-equity funding, equity funding, and total funding* comparable across countries, I convert all the financial indicators to EUR for each year. Brown and De Haas (2012) show a high level of foreign currency debt in CESEEE countries, so looking at the growth in domestic currency confounds the effects of the asset growth and exchange rate changes. For example, in a year when domestic currency depreciates, the domestic currency value of foreign currency denominated loans will increase, because the same foreign currency amount is now translated using the higher exchange rate. Consequently, even if there is no change in lending during the year, the balance sheet value of foreign currency loans will change because of the exchange rate movements. In a similar vein, to make asset growth and funding measures comparable across subsidiaries of different size, I scale the variables with a lagged value of assets.

Regression analysis controls for the financial position of the subsidiary using ROA ($Net\ income/Assets$) which measures profitability, Liquidity ($Cash\ and\ balances\ with\ central\ bank/Assets$), Solvency ($Equity/Assets$), and Riskiness ($Allowance\ for\ loan\ losses/Assets$). The values of these variables are taken from the annual reports of the subsidiaries.

I complement the subsidiary level data with the parent banks' sovereign exposures to GIPS countries, obtained from the 2011 EBA stress tests results[7]. I calculate the GIPS exposure by summing the sovereign exposures of the parent bank toward Greece, Ireland, Portugal, and Spain, and then scale the sum with the Tier 1 capital of the bank. In addition to GIPS exposure, I also use the change in the CDS spreads of the home country sovereigns as a measure of the stress to the parent bank. The data on CDS spreads comes from the S&P Capital IQ platform.

Table 1.1 presents the summary statistics. The structure of the table reflects two estimation approaches I follow: 2009-2011 cumulative cross-section, and 2007-2012 yearly panel. In the cumulative cross-section approach, I am interested in cumulative changes in the 2009-2011 post-crisis period, so I calculate a cumulative change by either deducing 2009 year-end values from 2011 year-end values for stock variables, for example non-related party assets, or I sum 2010 and 2011 values for the flow variables, for example equity funding. Before taking the difference or sum I convert all year-end values to EUR. To account for different subsidiary size, I divide the variables by the 2009 year-end value of the assets in the case of the cross section and the lagged value of assets in the case of the panel specification.

In the years 2010 and 2011, the subsidiaries relied heavily on related party funding: the average share of net related party liabilities in the assets of the subsidiary equalled 18%. Despite the crisis, *total funding* was marginally positive, with the mean equal to 0.04% of 2009 assets, driven by the inflow of *equity funding* equal to 1.7% and the withdrawal of *non-equity funding* in the amount of 1.66%. On average, subsidiaries expanded their non-related party balance sheet by 8% in 2011, when compared with 2009: a growth rate that is much smaller than in the pre-crisis period, but still positive. *GIPS exposure* varies substantially between the parent groups. The Scandinavian banks have virtually no sovereign exposure to GIPS countries, while banking groups from Greece and other GIPS countries have *GIPS exposure* that exceeds the amount of their Tier 1 capital. The same holds for changes in the sovereign CDS spreads (Table 1.6). The credit quality of sovereigns from northern Europe was almost unaffected by the crisis.

Because of the inclusion of the pre-crisis years, yearly changes in *Panel* pane of

Table 1.1 look more favourable, namely higher *change in non-related party assets* and positive related party funding. The panel is balanced and contains data on 71 subsidiaries in a six-year period. The lower number of observations compared with the cross-section is due to missing data, later entry into the domestic market, and mergers, most notably the merger between UniCredit and HVB.

[7] http://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing/2011/results

Table 1.1 Summary Statistics

	Mean	SD	Min	Max	Median	Count
Assets (EUR 000's)	4,830,000	6,690,000	107,000	32,900,000	2,040,000	291
Net Related Party Liabilities (EUR 000's)	607,000	1,110,000	-1,030,000	7,230,000	162,000	291
Net Related Party Liabilities (% of Assets)	18.14	17.24	-27.96	64.45	15.59	291
Cross Section (% of 2009 Assets)						
Change in Non-Related Party Assets	7.55	23.46	-61.78	82.09	5.71	97
Total Funding	0.04	16.20	-39.00	64.81	-1.59	97
Equity Funding	1.70	4.16	-4.87	21.98	0.00	97
Non-Equity Funding	-1.66	14.88	-35.54	46.48	-2.04	97
External Funding	9.22	15.43	-29.29	62.09	8.11	97
GIPS Exposure	42.85	76.30	0.00	270.50	7.68	97
Δ(log(CDS))	1.60	0.98	0.25	3.65	1.50	96
ROA	-0.07	1.77	-5.83	2.17	0.51	97
Liquidity	11.62	7.93	1.23	34.28	10.74	97
Solvency	12.69	7.12	5.13	69.50	11.52	97
Riskiness	5.07	3.40	0.39	17.75	4.16	97
Panel (% of Lagged Assets)						
Change in Non-Related Party Assets	9.06	18.67	-54.91	104.42	5.50	426
Total Funding	2.19	13.25	-72.73	81.25	-0.28	426
Equity Funding	0.89	3.17	-3.80	27.38	0.00	426
Non-Equity Funding	1.30	12.25	-72.43	65.75	-0.27	426
GIPS Exposure	40.21	75.73	0.00	270.50	7.50	426
ROA	0.68	1.75	-9.68	4.14	1.03	426
Liquidity	12.28	10.33	0.27	55.18	9.30	426
Solvency	11.38	4.83	2.63	35.99	10.30	426
Riskiness	3.51	2.72	0.09	15.10	2.75	426

Note: This table presents summary statistics of the variables from cross-sectional and panel estimation. The unit of measurement is % of assets, except for the first two rows, which are in EUR 000's. Net related party liabilities are calculated as the difference between related party liabilities and related party assets. *Change in non-related party assets* is defined as: $\frac{Non-related\ party\ assets_{2011}-Non-related\ party\ assets_{2009}}{Assets_{2009}}$ in the cross-section and as $\frac{Non-related\ party\ assets_{t}-Non-related\ party\ assets_{t-1}}{Assets_{t}}$ in the yearly panel. *Total funding* is the sum of *Equity* and *Non-equity funding*. In the cross-section Equity funding is calculated as: $\frac{Share\ Issues_{2011}+Share\ Issues_{2010}-Dividends\ Paid_{2011}-Dividends\ Paid_{2010}}{Assets_{2009}}$, and in panel as $\frac{Share\ issues_{t}-Dividends\ paid_{t}}{Assets_{t-1}}$. Similarly, Non-equity funding is $\frac{Net\ related\ party\ liabilities_{2011}-Net\ related\ party\ liabilities_{2009}}{Assets_{2009}}$ in cross-section and $\frac{Net\ related\ party\ liabilities_{t}-Net\ related\ party\ liabilities_{t-1}}{Assets_{t-1}}$. *GIPS exposure* is calculated by dividing the parent bank's sovereign exposure to the stressed countries (Greece, Ireland, Portugal, Spain) in 2010 by core Tier 1 capital of the parent bank in 2010. Δ(log(CDS)) is the difference between the log sovereign CDS spread in the crisis and the pre-crisis periods. *ROA* is $Net\ income/Assets$, *Liquidity* is $Cash\ and\ cash\ equivalents/Assets$, *Solvency* is $Equity/Assets$, and *Riskiness* is defined as $Allowance\ for\ loan\ losses/Assets$. The cross-sectional estimation uses the 2009-2011 period average of these indicators, while the panel estimation uses the lagged values of these indicators.

1.5 Estimation Strategy

I use two approaches to investigate the relationship between the related party funding and the asset growth of the subsidiary: cross-section and panel. As its name suggests, in the cross-section approach I look at cumulative changes in a two-year period, 2009-2011, therefore each subsidiary represents one observation. In the panel approach I look at yearly changes of a balanced panel, with six observations for each bank during the period 2007 to 2012.

1.5.1 Cross-Sectional Estimation Approach

The first estimation approach relies on a cross-sectional variation, where I regress the *change in non-related party assets* on a measure of related party funding and controls:

$$\Delta\, Non - Related\ Party\ Assets_{i,11-09} = \alpha_{cs} + \beta_{cs} * \ funding_{i,11-09} + controls_i + c_j + \varepsilon_i, \qquad (2)$$

where $\Delta\, Non - Related\ Party\ Assets_{i,11-09}$ stands for change in non-related party assets of subsidiary i between 2011 and 2009:

$$\frac{Non-related\ party\ assets_{2011} - Non-related\ party\ assets_{2009}}{Assets_{2009}},$$

and $funding_{i,11-09}$ represents one of the measures of related party funding: equity funding:

$$\frac{Share\ issues_{2011} + Share\ issues_{2010} - Dividends\ paid_{2011} - Dividends\ paid_{2010}}{Assets_{2009}},$$

non-equity funding:

$$\frac{Net\ related\ party\ liabilities_{2011} - Net\ related\ party\ liabilities_{2009}}{Assets_{2009}},$$

or total funding, defined as the sum of equity and non-equity funding. Controls include ROA, Liquidity, Solvency, and Riskiness, each averaged in the period from 2009 to 2011:

$$\frac{control_{2009} + control_{2010} + control_{2011}}{3}.$$

Control variables account for the differences in the economic positions of subsidiaries. The economic position impacts the ability of a subsidiary to lend, but it also influences the parent funding decision. As discussed in the theory section, parents have incentives to relocate funds from less profitable to more profitable subsidiaries, but also to provide liquidity to subsidiaries undergoing negative liquidity shock.

Specification (1) also includes host country fixed effects, c_j. The rationale behind the inclusion of the country fixed effects is to control for the loan demand. With the inclusion of fixed effects, one compares the asset growth of subsidiaries operating in the same country, and therefore facing the same economic and regulatory environments. As long as the changes in the country environment impact all the subsidiaries in the same way, there is no reason to be

concerned that the results are driven by some other factor such as change in the loan demand or change in the regulation, and not by the change in the internal funding.

In most cases it is reasonable to assume that foreign banks are impacted in the same way by the economic and regulatory changes of the home country. All foreign banks shared the same business model of borrowing from abroad to finance the credit growth of domestic customers. Hence, they catered to the same market segments and faced similar loan demand. Moreover, they are impacted by changes in the regulation in the same way, as they have to fulfil the same regulatory requirements. One example of a regulatory action that is bank-specific was the Vienna Initiative, briefly discussed in section 1.3. However, participation in the Initiative was not obligatory and the banks could choose whether they wanted to participate, and if so in which country. The voluntary character of the Initiative alleviates concern that the Initiative might confound the results: participation was voluntary and banks decided to which countries they want to keep their exposure. Hence, any change in internal funding is the result of a decision made by bank management, not the regulators.

Equation 1 is agnostic about the direction of causation. Subsidiaries might grow faster because they receive parent funding, or perhaps the parents provide funding to the subsidiaries with the biggest growth potential. In the latter case, the subsidiary would grow quickly even without parent funding. To address this endogeneity issue, and to disentangle the effect of the subsidiaries' demand for funding from the parents' supply, I use the instrumental variable approach and an instrument for related party funding with *GIPS exposure*.

GIPS exposure represents a good instrument for two reasons. First, it is correlated with intra-group funding, because parent banks that experience higher sovereign losses are less able to support their subsidiaries and need to withdraw funds from foreign subsidiaries in order to cover losses at home. Second, the decision of the parent bank to invest in the sovereign debt of GIPS countries before the crisis is unrelated to the post-crisis asset growth of the subsidiaries. Specifically, the crisis originated in the U.S. and spread from there to the rest of the world. CESEE countries played no role in triggering the crisis.

On the other hand, if there is a strong market discipline in CESEE countries *GIPS exposure* might be correlated with the asset growth of the subsidiary, not only through the internal funding channel but also through the external funding channel. Allen et al. (2014) use the parent's reliance on interbank borrowing as a measure of shock and find evidence for market monitoring in the host countries: the subsidiaries of the affected parent have difficulties in attracting new deposits. A similar situation might occur for *GIPS exposure*: external parties might find the subsidiary of the affected parent risky and avoid doing business with it. I explore this alternative channel in Appendix section A.2.

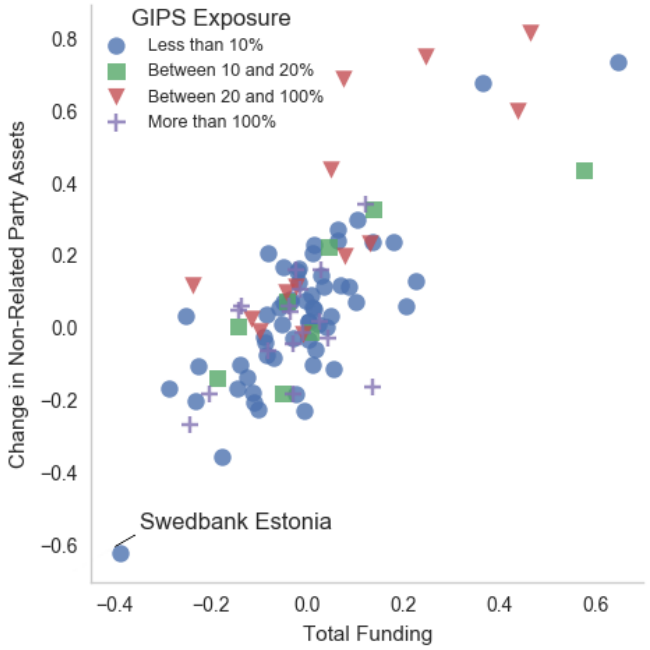
In addition to *GIPS exposure*, I also report results using the changes in sovereign CDS spreads as an instrument, in section A.1 in the Appendix. Both *GIPS exposure* and CDS spreads are good predictors of related funding withdrawal, Table 1.4 and Table 1.7.

Previous literature: Allen et al. (2013) and De Haas and Van Lelyveld (2014) take another approach in controlling for demand conditions. They use domestic banks as a reference against which to benchmark the lending of the foreign banks. The authors interpret the decrease in the

loan growth compared with the domestic banks as evidence of foreign banks' funding problems. In this paper I do not take this approach, for several reasons. The first and the main reason is that I am examining internal funding, which is not available for domestic banks since they are not part of the international group. Second, it is likely that foreign and domestic banks have different client bases. Because of better access to fx funding, foreign banks have a comparative advantage in providing foreign currency loans, so a large share of their client base is customers that borrow in hard currency. However, after the crisis, demand for fx loans collapsed due to sharp currency depreciation and increased regulatory scrutiny. Hence, it is likely that after the crisis foreign banks faced lower demand for loans than domestic banks, due to the sharp drop in demand for fx loans. Last but not least, in many countries the government stepped in and provided direct funding support for the domestic banks. Hence, by comparing the credit growth of foreign and domestic banks, one would not be able to determine what part of the difference is due to the funding problems of foreign banks, what part is due to the funding problem of domestic banks, and what part is driven by the differences in the demand for loans that the two groups of banks face.

Figure 1.3 illustrates the mechanics behind the cross-sectional estimation approach. The figure shows that there is a positive relationship between funding and change in assets: subsidiaries that received more related party funding had higher balance sheet growth. The figure also shows that subsidiaries marked with a cross, those whose parent bank has GIPS exposure higher than Tier 1 capital, tend to be to the left of other markers. This indicates that these subsidiaries received less funding during the period 2010-2011 when compared with subsidiaries whose parents had less GIPS exposure. Nevertheless, the relationship between GIPS exposure and *total funding* is not perfectly linear. For example, despite not having any GIPS exposure, Swedbank significantly reduced funding to its subsidiaries in the Baltic countries. To test the non-linear relationship between GIPS exposure and funding I also estimate a regression specification that allows for a non-linear relationship between GIPS exposure and funding, by including a squared GIPS exposure term as well as a linear one.

Figure 1.3 Total funding, Change in Non-Related Party Assets, and GIPS Exposure



Source: Author's calculation based on Annual Financial Statements and EBA Stress Test Results

1.5.2 Panel Estimation Approach

The panel approach uses variation in both cross-section and time series dimension to establish the relationship between related party funding and *change in non-related party assets*. Specifically, I estimate the fixed effects regression of the form:

$$\Delta\, Non-rel.party\ assets_{i,t} = \alpha_p + \beta_p * funding_{i,t} + controls_{i,t-1} + \gamma_i + \mu_t + \varepsilon_{it}, \quad (3)$$

where the dependent variable is the yearly *Change in non-related party assets* of subsidiary i in year t: $\frac{Non-related\ party\ assets_t - Non-related\ party\ assets_{t-1}}{Assets_{t-1}}$, and $funding_{i,t}$ presents one of the measures of related party funding: *Equity funding*: $\frac{Share\ issues_t - Dividends\ paid_t}{Assets_{t-1}}$, *Non-equity funding*: $\frac{Net\ related\ party\ Liabilities_t - Net\ related\ party\ liabilities_{t-1}}{Assets_{t-1}}$, or *Total funding* defined as a sum of *Equity* and *Non-equity funding*. Controls include lagged values of *ROA*, *Liquidity*, *Solvency*, and *Riskiness*, hence $control_{t-1}$. Specification includes subsidiary fixed effects, γ_i, and year fixed effects, μ_t.

The panel spans six years, from 2007 to 2012, and includes three years pre and three years post the European Sovereign Debt Crisis period. I explore the timing of the crisis in order to modify the instrument *GIPS exposure*, by interacting it with a *post* dummy that takes a value of 0 for the pre-crisis years 2007, 2008, and 2009, and a value of 1 in the years 2010, 2011 and 2012, when the European Sovereign Debt Crisis escalated. The first stage equation in the panel specification takes the form:

$$funding_{i,t} = \alpha_{fs} + \beta_{fs} * GIPS * post + controls_{i,t-1} + \gamma_i + \mu_t + \varepsilon_{it}. \quad (4)$$

If there is a negative relationship between GIPS exposure and internal funding, the coefficient β_{fs} is expected to be negative. A negative coefficient indicates that the parent banks with more GIPS sovereign exposure provided less funding to their subsidiaries in the post-crisis periods than the parent banks that were less exposed to GIPS sovereigns.

1.6 Discussion of the Results

1.6.1 Cross-Sectional Results

Table 1.2 reports the cross-sectional estimates. The OLS pane reports the results of the OLS estimation, while the IV pane reports the results of the IV estimation with *GIPS exposure* as an instrument for internal funding. The variable of the interest in the specification (1) is *total funding*, in specification (2) *equity funding*, and in specification (3) *non-equity funding*.

The main finding of the cross-sectional analysis is that there is a strong positive association between *change in non-related party assets* and the related party funding. The estimates are positive, greater than one, and statistically significant in every specification. Estimates greater than one imply that there is a multiplier effect, so that for one percentage point increase in funding, measured as a share in 2009 assets, subsidiaries grow their non-related party assets by more than one percentage point in the two-year period 2010-2011. In the OLS specification, estimates range from around 1.2 for *total* and *non-equity funding* to 2.7 for *equity funding*. Higher coefficient on *equity funding* than the coefficient on *non-equity funding* is consistent with expectations. Increase in equity enables faster asset growth by relaxing regulatory constraints. Interestingly, th IV estimates are higher than the OLS estimates and equal to 2.5 for *Total funding*, 11 for *Equity funding*, and 3.2 for *Non-equity funding*. The OLS results underestimated the impact of related party funding, which suggests that parents tend to support subsidiaries with lower growth prospects. This finding is also supported by the first stage results, Table 1.4, where lower ROA is associated with more funding from the parent.

Looking at the control variables, the positive coefficient on *ROA* indicates that more profitable subsidiaries grew faster during the period 2009 to 2011. In some specifications, the coefficient on *riskiness* is negative and statistically significant, indicating that bad loans hamper the asset growth of the subsidiaries. The coefficients on *liquidity* and *solvency* are statistically insignificant, so one cannot say anything about a correlation between these and *change in non-related party assets*.

1.6.2 Panel Results

Table 1.3 shows the results of estimating Equation (2) using panel and IV panel estimation with subsidiary fixed effects included. To create an instrument in the IV estimation I interact *GIPS exposure* with the post-crisis dummy. I follow the structure of the OLS results table and report the result for each of the three types of related party funding. To make the results comparable to the OLS results, I multiply the coefficients by two, because the panel is estimated on yearly data, while the cross-section uses a two-year cumulative period.

The results are in accordance with the cross-sectional findings and show a positive relationship between related party funding and Change in non-related party assets. The OLS coefficients are slightly bigger: 1.4, 3.4 and 1.4 on total, equity, and non-equity funding, compared with 1.2, 2.8 and 1.2 in the cross-sectional approach. The IV coefficients: 1.6, 6.1, and 2.1 are lower than 2.4,11, and 3.2 in the cross section. The coefficient on equity funding remained the highest and greater than one, confirming that equity increase has the strongest multiplier effects on the asset growth. As in the cross-section, the IV estimates are higher than the OLS estimates. This indicates that the parent banks played a supportive role and helped slower-growing subsidiaries, as opposed to fuelling the expansion of the fast-growing subsidiaries.

Looking at the coefficients on the control variables, we can see that there is no strong relationship between non-related party assets growth on the one side and subsidiary's profitability and loan quality on the other, although these two controls were significant in the cross-section. Solvent subsidiaries grew their non-related party assets faster, as evidenced by the positive and statistically significant coefficient on lagged *Solvency*. On the other hand, lagged *Liquidity* is associated with slower growth. The explanation behind this result might be that banks hold idle cash when they do not have good investment projects, and hence do not grow their balance sheet.

Table 1.2. Cross-Sectional Results

	Change in non-related party assets					
	OLS			IV		
	(1)	(2)	(3)	(1)	(2)	(3)
Total funding	1.184***			2.451***		
	(0.087)			(0.750)		
Equity funding		2.755***			10.952**	
		(0.807)			(5.026)	
Non-equity funding			1.209***			3.157**
			(0.100)			(1.197)
ROA	3.045***	4.179	0.776	7.585**	20.172*	3.956
	(0.782)	(2.824)	(1.108)	(3.228)	(10.801)	(3.487)
Liquidity	-0.195	0.678	-0.301	-0.904	1.303	-1.540*
	(0.356)	(0.668)	(0.336)	(0.586)	(1.182)	(0.892)
Solvency	-0.297	-0.107	-0.270	-0.580*	-0.328	-0.653
	(0.175)	(0.271)	(0.205)	(0.301)	(0.473)	(0.405)
Riskiness	-1.442	-3.584**	-1.928*	2.212	0.199	2.792
	(0.909)	(1.637)	(1.007)	(2.430)	(2.619)	(3.125)
Constant	0.294***	0.106	0.357***	0.345***	-0.311	0.534***
	(0.088)	(0.134)	(0.092)	(0.099)	(0.274)	(0.183)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	97	97	97	97	97
R-squared	0.798	0.551	0.762	0.401		

Note: This table presents estimates of the relationship between *Change in non-related party assets* and subsidiary funding in a cross-section of 97 subsidiaries during the two-year period 2009 to 2011. The dependent variable is *Change in non-related party assets*: $\frac{Non-related\ party\ assets_{2011}-Non-related\ party\ assets_{2009}}{Assets_{2009}}$. *Total funding* is the sum of *Equity*: $\frac{Share\ issues_{2011}+Share\ issues_{2010}-Dividends\ paid_{2011}-Dividends\ paid_{2010}}{Assets_{2009}}$ and *Non-equity funding*: $\frac{Net\ related\ party\ liabilities_{2011}-Net\ related\ party\ liabilities_{2009}}{Assets_{2009}}$. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are averaged in the period from 2009 to 2011: $\frac{control_{2009}+control_{2010}+control_{2011}}{3}$. Regression is estimated using OLS with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

Table 1.3. Panel Estimates

	Change in Non-Related Party Assets					
	Fixed Effects Estimation			IV Fixed Effects Estimation		
	(1)	(2)	(3)	(4)	(5)	(6)
Total Funding	1.442***			1.579***		
	(0.182)			(0.335)		
Equity Funding		3.442***			6.073***	
		(0.759)			(1.741)	
Non-Equity Funding			1.455***			2.135***
			(0.223)			(0.573)
L.ROA	0.567	1.797	-0.254	0.636	3.293**	-0.298
	(1.038)	(1.254)	(1.151)	(0.980)	(1.384)	(0.998)
L.Liquidity	-0.423	-0.867**	-0.291	-0.411	-1.103***	-0.167
	(0.328)	(0.389)	(0.333)	(0.336)	(0.363)	(0.402)
L.Solvency	0.428	1.919**	-0.039	0.390	2.756***	-0.442
	(0.563)	(0.893)	(0.660)	(0.518)	(1.037)	(0.599)
L.Riskiness	0.458	-0.942	0.232	0.646	-0.502	1.050
	(0.786)	(1.052)	(0.705)	(0.740)	(1.086)	(0.828)
Observations	426	426	426	426	426	426
Subsidiaries	71	71	71	71	71	71
R-squared	0.665	0.511	0.647	0.664	0.483	0.607

Note: This table presents estimates of the relationship between *Change in non-related party assets* and subsidiary funding for each year in a panel of 71 subsidiaries during the period 2007 to 2012. The dependent variable is *Change in non-related party assets*: $\frac{Non-related\ party\ assets_t - Non-related\ party\ assets_{t-1}}{Assets_{t-1}}$. The dependent variable is multiplied by 2, so that the panel estimates are comparable with estimates of the cross-sectional approach. The measures of subsidiary funding are: *Total funding = Equity funding + Non-equity funding* , *Equity funding*: $\frac{Share\ issues_t - Dividends\ paid_t}{Assets_{t-1}}$, and *Non-equity funding*: $\frac{Net\ related\ party\ liabilities_t - Net\ related\ party\ liabilities_{t-1}}{Assets_{t-1}}$. Regression is estimated using fixed effects with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

1.6.3 First Stage Results

The first stage results capture the relationship between *GIPS exposure* and related party funding. Their importance is twofold. First, it validates *GIPS exposure* as a strong instrument for related party funding. Second, it is interesting per se to document the impact of the European Sovereign Debt crisis on the funding that parents provide to their subsidiaries. Withdrawal of funding is an important channel of crisis transmission from Western Europe to CESEE.

Table 1.4 shows the results of regressing related party funding on *GIPS exposure*. In specification (1) there is only the linear term, while specification (2) contains *GIPS exposure* and *GIPS exposure* squared. Parents with higher *GIPS exposure* have provided less funding to their subsidiaries during the period 2009 to 2011 than parent banks that were less exposed to GIPS sovereigns. In the linear specification with *Total funding* as the dependent variable the estimated coefficient on *GIPS exposure* is -0.036, which means that for each percentage point increase in *GIPS exposure*, measured as a share in Tier 1 Capital, the subsidiary received 0.036 percentage point less funds in years 2010 and 2011, measured as a share in 2009 assets. The effect is highly economically significant, because the most exposed banks had *GIPS exposure* higher than 100 percent, which is associated with 3.6 percentage points less funding.

Specification (2) in Table 1.4 shows the results after the inclusion of squared *GIPS exposure*, hence allowing for the non-linear relationship between exposure and funding. The coefficients on both the linear and quadratic terms are statistically significant, the linear with a negative sign and the quadratic term with a positive sign. The signs suggest a non-linear relationship between *GIPS exposure* and related party funding, where up to a particular point an increase in *GIPS exposure* is associated with less funding provided during the period 2009 to 2011, and then after the inflection point increase in *GIPS exposure* is associated with an increase in funding. Figure 1.4 in the Appendix shows the marginal effects of *GIPS exposure* on each type of related party funding, based on the coefficients from Table 1.4. The inflection point is at the level of *GIPS exposure* of around 100 percent, and at that point a one percentage point increase in *GIPS exposure* is associated with a 0.15 percentage points decrease in Total funding. The marginal effect of 0.15 is the minimum marginal effect and all other levels of *GIPS exposure* are associated with a lesser drop in funding.

A non-linear relationship between exposure, and a drop in funding can also be observed from Figure 1.3. The relationship is driven by Swedish Swedbank and Hungarian OTP that did not have significant *GIPS exposure* but still deleveraged heavily from the Baltics and from Balkan countries.

The estimates on control variables suggest that less profitable and more risky subsidiaries received less funding in the post-crisis period. However, the specification can only reveal correlations in the data and cannot say much about the causal relationship between funding and control variables. For example, it is impossible to judge whether subsidiaries received fewer funds because they are unprofitable or whether they became unprofitable because they received too much funds and started investing them in less profitable projects.

Table 1.4. Cross-Section, First Stage Results

	Total funding		Equity funding		Non-equity funding	
	(1)	(2)	(1)	(2)	(1)	(2)
GIPS exposure	-0.036**	-0.296***	-0.008*	-0.044**	-0.028*	-0.252***
	(0.017)	(0.105)	(0.004)	(0.020)	(0.015)	(0.093)
GIPS exposure^2		0.107**		0.015**		0.092**
		(0.041)		(0.007)		(0.036)
ROA	-3.652*	-4.852***	-1.966***	-2.133***	-1.686	-2.718
	(1.871)	(1.746)	(0.385)	(0.370)	(1.706)	(1.649)
Liquidity	0.631	0.734	-0.060	-0.046	0.692*	0.780*
	(0.434)	(0.440)	(0.093)	(0.096)	(0.403)	(0.407)
Solvency	0.300	0.445*	0.044	0.064	0.256	0.381**
	(0.224)	(0.225)	(0.064)	(0.067)	(0.176)	(0.176)
Riskiness	-2.932***	-3.878***	-0.472**	-0.604***	-2.459***	-3.274***
	(0.934)	(0.842)	(0.199)	(0.174)	(0.896)	(0.868)
Constant	-0.029	0.016	0.053***	0.060***	-0.082	-0.044
	(0.056)	(0.057)	(0.017)	(0.016)	(0.050)	(0.054)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	97	97	97	97	97
F-statistic excluded instruments	4.42**	5.84***	3.41*	2.62*	3.44*	4.97**
AP Chi-sq	5.97**	16.01***	4.6**	7.18**	4.65**	13.63***

Note: This table presents estimates of the relationship between a parent's *GIPS exposure* and subsidiary funding in a cross-section of 97 subsidiaries during the period 2009 to 2011. The dependent variables are: *Total funding* which is the sum of *Equity*: $\frac{Share\ issues_{2011}+Share\ issues_{2010}-Dividends\ paid_{2011}-Dividends\ paid_{2010}}{Assets_{2009}}$ and *Non-equity funding*: $\frac{Net\ related\ party\ liabilities_{2011}-Net\ related\ party\ liabilities_{2009}}{Assets_{2009}}$. *GIPS exposure* is calculated by dividing sovereign exposure to GIPS countries with Tier 1 capital of the parent bank in 2010. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are averaged in period from 2009 to 2011: $\frac{control_{2009}+control_{2010}+control_{2011}}{3}$. Regression is estimated using OLS with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

Table 1.5. Panel, First Stage Results

	Total funding		Equity funding		Non-equity funding	
	(1)	(2)	(1)	(2)	(1)	(2)
GIPS exposure x Post	-0.054***	-0.234**	-0.014***	-0.040**	-0.040***	-0.194**
	(0.016)	(0.094)	(0.003)	(0.020)	(0.015)	(0.083)
GIPS exposure^2 x Post		0.074**		0.011		0.063**
		(0.033)		(0.007)		(0.029)
L.ROA	-0.554	-0.667	-0.582**	-0.598**	0.028	-0.069
	(0.739)	(0.703)	(0.280)	(0.277)	(0.532)	(0.506)
L.Liquidity	-0.061	-0.081	0.098**	0.095**	-0.159	-0.176
	(0.150)	(0.135)	(0.043)	(0.042)	(0.143)	(0.133)
L.Solvency	0.311	0.127	-0.309***	-0.336***	0.620	0.462
	(0.488)	(0.464)	(0.081)	(0.085)	(0.422)	(0.394)
L.Riskiness	-1.575***	-1.813***	-0.220*	-0.255**	-1.354***	-1.558***
	(0.350)	(0.345)	(0.123)	(0.128)	(0.307)	(0.323)
Observations	426	426	426	426	426	426
Subsidiaries	71	71	71	71	71	71
F-statistic excluded instruments	10.9***	3.89**	17.17***	6.74***	6.83**	2.91*
AP Chi-sq	11.64***	8.33**	18.33***	14.43***	7.29***	6.24**

Note: This table presents the estimates of the relationship between a parent's *GIPS exposure* and subsidiary funding for each year in the panel of 71 subsidiaries during the period 2007 to 2012. The dependent variables are: *Total funding = Equity funding + Non-equity funding*, *Equity funding*= $\frac{Share\ issues_t - Dividends\ paid_t}{Assets_{t-1}}$, and *Non-equity funding*= $\frac{Net\ related\ party\ liabilities_t - Net\ related\ party\ liabilities_{t-1}}{Assets_{t-1}}$. *GIPS exposure* is calculated by dividing sovereign exposure to GIPS countries with Tier 1 capital of the parent bank in 2010. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are lagged by one year: $control_{t-1}$. Regression is estimated using fixed effects with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

Table 1.5 shows the results of estimating Equation (3), i.e. the first stage of the panel specification. Specification (1) includes only the linear term, while specification (2) adds an additional squared term. Compared with the pre-crisis period, parents with higher GIPS exposure provided less funding to their subsidiaries than parents with lower GIPS exposure. The statistically significant and positive squared term suggests the existence of a non-linear relationship between exposure and Total and Non-equity funding. Interestingly, the squared term is not significant in the Equity funding specification, suggesting a linear relationship between GIPS exposure and a change in equity of the subsidiary between the post and pre-crisis periods.

1.7 Conclusion

The paper investigated the impact of the European Sovereign Debt crisis on foreign bank subsidiaries in CESEE. The main results of the paper are as follows. First, parent banks with sovereign exposure to GIPS countries reduced funding to their subsidiaries and contributed to transmitting the crisis from Western Europe to CESEE. A one percentage point increase in GIPS exposure, measured as a share of Tier 1 capital of the parent bank, is associated with 0.04 percentage point decrease in internal funding, measured as a share of the 2009 assets of the subsidiary. Next, in response to the withdrawal of internal funds subsidiaries had to shrink their balance sheet. One percentage point of withdrawn internal funding, measured as a share of the 2009 assets, is associated with a 1.2 point decrease in non-related party assets, measured as a share of the 2009 assets in the OLS specification and a 2.4 percentage point decrease in the IV specification. Finally, equity funding has a higher multiplier effect on the growth of the subsidiary than non-equity funding. The estimated coefficients on equity funding are 2.8 in the OLS and 11 in the IV specification, which is much higher than the estimate of 1.2 and 3.2 on the non-equity funding.

The findings of the paper are subject to several limitations that should be taken into account when interpreting the results. First, the analysis uses year-end information on the internal capital market transactions and ignores the transactions that occur throughout the year. A year-end snapshot might not be representative of the true situation. For example, year-end values overestimate internal funding if the parent provides funds to the subsidiary at the end of December and then immediately withdraws them at the beginning of January. Next, the analysis does not account for any off-balance sheet transactions such as guarantees and certain types of derivatives. These transactions also represent exposure to the subsidiary and might impact its financial position. Finally, if there are big differences in the subsidiaries' business models, the impact of regulatory and the changes in the economic environment might not impact all the subsidiaries operating in one country in a same way, so country fixed effects might not be enough to control for demand effects. For example, in 2011 Hungary passed a law that severely restricts household foreign currency borrowing. If Erste gave out more fx loans than Intesa, it is likely that the regulation would have higher impact on Erste than on Intesa.

The study encompasses times that were not by any means usual on credit markets. On the funding side, interbank and short-term wholesale funding froze, and banks faced difficulties in rolling over their obligations. On the demand side, loan demand plummeted as firms and households were heavily deleveraging. Last but not least, the Government stepped in with regulatory changes and rescue programmes. Hence, these were unusual times and the findings of the study might not apply in a more normal setting. In normal market conditions, the coefficients on changes in internal funding should be smaller in magnitude, as it is easier for subsidiaries to substitute internal with external funding.

The results have important policy implications in the area of cross-border banking supervision. Host country regulators should be aware of a credit crunch that might ensue when negative liquidity shock hits the parent bank, and the bank reacts by cutting funding to its subsidiaries. To make a financial system resilient to changes in internal funding, regulators have

a myriad of options. Among others, these might include incentivising banks to fund themselves locally, incentivising equity and debt funding with longer maturities, and ring-fencing a subsidiary's assets in times of crisis. However, while each of these measures counters the transmission of negative shocks from abroad, they also limit the benefits of capital inflows in the good times. Hence, to come up with the best supervisory setting, one should weigh up the benefits of credit growth financed from abroad in good times against the credit squeeze in times when foreign funding dries up.

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Appendix

A.1 Sovereign CDS Spreads as Instrument

This section reports the cross-sectional estimates derived using the change in the sovereign spreads as an instrument for internal funding. Sovereign spreads are a more comprehensive measure of liquidity shock than GIPS exposure because they take into account credit conditions in each home country. GIPS exposure accounts only for credit conditions in Greece, Ireland, Portugal, and Spain: countries that were first hit by the crisis. Hence, GIPS might underestimate a shock to, for example, an Italian bank. An Italian bank with no GIPS exposure would be counted as non-treated by the sovereign crisis, despite the fact that the crisis quickly spilled over to Italy, as evidenced by the increase in the Italy sovereign CDS spread.

A sovereign CDS spread of the home country represents a better instrument than a CDS spread of the parent bank because of the better balance between the instrument strength and exogeneity. While bank CDS are a stronger instrument than sovereign CDS, it is likely that they are not exogenous to the conditions of CESEE subsidiaries. If CESEE subsidiaries represent an important share of the group assets, changes in the credit health of CESEE subsidiaries will be reflected in the CDS spread of the parent bank. On the other hand, sovereign spreads are less influenced by CESEE conditions, given the small size of CESEE economies. At the same time, sovereign spreads are strong predictors of parent bank credit quality. Acharya et al. (2014) discuss and document the damaging effect of sovereign credit risk on bank solvency. Rising sovereign CDS spreads increase the losses on the sovereign bond holdings of the banks, and increased losses lead to the deterioration of the bank's solvency.

I measure the change in sovereign CDS spreads as the difference in the logarithm of the average 5-year mid quote of the CDS spread at the year-end in the crisis years: 2009, 2010, and 2011, and the pre-crisis years: 2006, 2007, and 2008:

$$\Delta spread_i = \log\left(\frac{\sum_{t=2009}^{2011} spread_{it}}{3}\right) - \log\left(\frac{\sum_{t=2006}^{2008} spread_{it}}{3}\right), \quad (5)$$

where i represents the home country of the parent bank.

Table 1.6 provides an overview of changes in the sovereign spreads. As expected, the price of protection for Greece skyrocketed during the crisis years: the CDS spread increased from an average 87.43 bps to 3,365 bps. After Greece, Portugal and Hungary have seen the highest increase in spreads. On the other hand, Sweden and Norway have remained unaffected through the crisis, with only a 10 bps increase in the CDS spread.

Table 1.6 Change in Sovereign Spreads of Home Countries

	CDS Spread (pre-crisis)	CDS Spread (post-crisis)	Log Change
Austria	48.07	123.28	0.94
Belgium	30.80	194.27	1.84
France	22.20	118.86	1.68
Germany	18.53	62.28	1.21
Greece	87.43	3,365.41	3.65
Hungary	164.90	415.59	0.92
Italy	62.07	277.30	1.50
Netherlands	32.07	70.72	0.79
Norway	20.47	28.64	0.34
Portugal	40.03	581.60	2.68
Slovenia	44.43	182.58	1.41
Sweden	43.33	55.82	0.25

Note: This table presents the changes in the average end-of-year sovereign CDS spreads in the crisis year: 2009, 2010, and 2011 and the pre-crisis years: 2006, 2007, 2008. *Log Change* is defined as $\log(CDS_{post})$-$\log(CDS_{pre})$. Logarithmic transformation was needed to bring the measures closer and suitable for use in regressions. CDS spreads for Cyprus were not available on the S&P Capital IQ platform in 2011, so the subsidiary of Marfin bank has been dropped from the sample.

Table 1.7 shows the results of the cross-sectional IV estimation with the CDS spread as an instrument, while Table 1.7 shows the first stage. The first stage results confirm a negative correlation between changes in the CDS spreads and internal funding. Banks from countries with deteriorating credit conditions provided less funding to their subsidiaries than banks from countries unaffected by the sovereign crisis. The magnitude of the estimate is economically significant. Going from the CDS spread change of Germany, 1.21, to that of Greece, 3.65, is associated with an 11 percentage point decrease in internal funding.

The second stage estimates are in line with those presented in section 1.6.1 with GIPS as an instrument. The estimate on *total funding* is 2.1, slightly lower than the 2.4 GIPS estimate. The coefficient on *equity funding* is equal to 12.7, which is higher than 10.9, the estimate when using GIPS as an instrument. Hence, instrumenting with a sovereign CDS spread leads to a higher multiplier on *equity funding*. Finally, the estimate on *non-equity funding* is slightly lower: 2.5 versus 3.1 on *GIPS*, but nevertheless greater than 1, indicating that providing internal funding has multiplier effects: one percentage point increase in internal funding leads to more than one percentage point increase in the assets of the subsidiary.

Table 1.7 Sovereign CDS Spreads and Internal Funding

	Total Funding	Equity Funding	Non-Equity Funding
	(1)	(2)	(3)
CDS	-0.046**	-0.008**	-0.039**
	(0.018)	(0.004)	(0.016)
ROA	-4.143**	-2.040***	-2.103
	(1.745)	(0.383)	(1.613)
Liquidity	0.644	-0.061	0.705*
	(0.445)	(0.098)	(0.411)
Solvency	0.425*	0.059	0.365**
	(0.224)	(0.067)	(0.172)
Riskiness	-3.232***	-0.519***	-2.713***
	(0.863)	(0.184)	(0.862)
Constant	0.043	0.064***	-0.022
	(0.060)	(0.017)	(0.058)
Country Dummies	Yes	Yes	Yes
Observations	96	96	96
F-statistic excluded instruments	7.88***	6.49***	6.11***
AP Chi-sq	10.7***	8.81***	8.29***

Note: This table presents the relationship between change in the sovereign spreads of the home countries and funding measures: *Total funding* which is the sum of *Equity*: $\frac{Share\ issues_{2011}+Share\ issues_{2010}-Dividends\ paid_{2011}-Dividends\ paid_{2010}}{Assets_{2009}}$ and *Non-equity funding*: $\frac{Net\ related\ party\ liabilities_{2011}-Net\ related\ party\ liabilities_{2009}}{Assets_{2009}}$. Change in spread is calculated as: $\Delta spread_i = \log(\frac{\sum_{t=2009}^{2011} spread_t}{3}) - \log(\frac{\sum_{t=2006}^{2008} spread_t}{3})$. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are averaged in period from 2009 to 2011: $\frac{control_{2009}+control_{2010}+control_{2011}}{3}$. Regression is the first stage of IV estimation, presented in Table 1.8 with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

Table 1.8 IV Estimates, Cross-Section, CDS Instrument

	Change in non-related party assets		
	(1)	(2)	(3)
Total Funding	2.074***		
	(0.533)		
Equity Funding		12.711**	
		(5.174)	
Non-Equity Funding			2.479***
			(0.770)
ROA	6.209**	23.545**	2.828
	(2.533)	(10.850)	(2.411)
Liquidity	-0.707	1.407	-1.120*
	(0.468)	(1.405)	(0.616)
Solvency	-0.492*	-0.367	-0.517
	(0.256)	(0.529)	(0.306)
Riskiness	1.132	1.023	1.153
	(1.870)	(3.163)	(2.087)
Constant	0.331***	-0.398	0.473***
	(0.088)	(0.324)	(0.137)
Country Dummies	Yes	Yes	Yes
Observations	96	96	96
R-squared	0.602		0.418

Note: This table presents IV estimates of the relationship between *Change in non-related party assets* and subsidiary funding in a cross-section of 96 subsidiaries during the two-year period 2009 to 2011. Dependent variable is *Change in non-related party assets*: $\frac{Non-related\ party\ assets_{2011}-Non-related\ party\ assets_{2009}}{Assets_{2009}}$. *Total funding* is the sum of *Equity*: $\frac{Share\ issues_{2011}+Share\ issues_{2010}-Dividends\ paid_{2011}-Dividends\ paid_{2010}}{Assets_{2009}}$ and *Non-equity funding*: $\frac{Net\ related\ party\ liabilities_{2011}-Net\ related\ party\ liabilities_{2009}}{Assets_{2009}}$. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are averaged in the period from 2009 to 2011: $\frac{control_{2009}+control_{2010}+control_{2011}}{3}$. Regression is estimated using IV with change in sovereign CDS spread as an instrument and robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

A.2 External Funding

This section investigates the role of external funding, defined as the difference between total liabilities and liabilities from related parties. Table 1.9 shows that there is a strong positive correlation between changes in external liabilities and changes in non-related party assets, both in the OLS and the IV specification with GIPS exposure as an instrument. The more external funding the subsidiary has the more loans it can extend to firms and households. Conversely, if there is a decrease in external funding, the subsidiary needs to cut its asset base.

The assumption of this paper is that negative shock to the parent bank leads to a decrease in internal funding to the subsidiary, which then leads to a decrease in the asset growth of the subsidiary. Hence, parent shock->internal funding->asset growth. However, this mechanism does not take external funding into account. Depositors use all available information to choose where to place the funds: the mechanism of market discipline. Shock to the parent bank and decrease in internal funding are definitely important factors and can influence the depositor's decision. Depositors might be more likely to deposit savings with the subsidiary when the parent bank does the same, or to withdraw their savings in case the parent bank withdraws internal funds. Hence the causation would go: parent shock->internal funding->external funding->asset growth. Depositors can decide to remove the funds even if there is no withdrawal of internal funding. If a depositor learns about the crisis in the home country of the bank, he might perceive the subsidiary as risky because it cannot rely on the parent's help. As a result, he decides to withdraw the funds from the subsidiary and place them with a safer bank, no matter whether the parent bank withdrew the funding or not. Hence the causation would go: parent shock->external funding->asset growth.

In both cases, there is a correlation between parent shock and external funding. In one case the correlation is indirect: parent shock is correlated with internal funding, and internal funding is correlated with external funding. Hence, this case suggests that the regressions presented in this paper overestimate the effect of internal funding on asset growth because they also include the effects due to external funding. In the other case there is a direct correlation between the shock to the parent bank and external funding. This case would indicate that there might even be no effect of changes in internal funding and that all the effects come from changes in external funding. To investigate these two cases, I examine the relationship between external funding and internal funding, Table 1.10, as well as the correlation between external funding and the shock to the parent bank, Table 1.11. However, since shock to the parent bank and the change in internal funding occur simultaneously it is impossible to disentangle what share of external funding change is due to the parent shock and what share is due to the change in internal funding. That is, it is impossible to construct a counterfactual where there would be a shock to the parent bank but no change in the internal funding.

Table 1.10 shows a strong positive correlation between internal and external funding. The coefficients are positive and statistically significant in both the OLS and the IV specification. The only exception is the coefficient on *non-equity funding* in the IV specification, which is only marginally statistically significant. The coefficient is highest on *equity funding*: 1.9 in OLS and much higher 7.4 in IV specification with GIPS exposure as an instrument. However, it is difficult to establish the direction of causation. One direction is that the increase in deposits from non-related parties leads parent to pay in more equity capital so that subsidiary can satisfy regulatory

ratios. Other direction is that the external parties increase their deposits with the subsidiary after seeing that the parent has paid in more equity. Moreover, maybe third factor drives changes in both internal and external funding. For example, economic conditions in home and host country might impact the behaviour of both parent and the external parties.

Table 1.9 Changes in External Funding and Asset Growth

	Change in Non-Related Party Assets	
	OLS	IV
	(1)	(2)
External Funding	1.179***	1.464***
	(0.114)	(0.257)
ROA	-1.710	-1.834
	(1.604)	(1.514)
Liquidity	0.666*	0.714**
	(0.350)	(0.321)
Solvency	0.237	0.303**
	(0.146)	(0.128)
Riskiness	-1.986*	-1.294
	(0.992)	(0.988)
Constant	-0.151**	-0.247***
	(0.064)	(0.074)
Country Dummies	Yes	Yes
Observations	97	97
R-squared	0.795	0.775

Note: This table presents estimates of the relationship between *Change in non-related party assets* and external funding in a cross-section of 97 subsidiaries during the two-year period 2009 to 2011. The dependent variable is *Change in non-related party assets*: $\frac{Non-related\ party\ assets_{2011}-Non-related\ party\ assets_{2009}}{Assets_{2009}}$.*External Funding* is calculated as: $\frac{(liabilities_{2011}-related\ party\ liabilitis_{2011})-(liabilities_{2009}-related\ party\ liabilitis_{2009})}{Assets_{2009}}$. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are averaged in period from 2009 to 2011: $\frac{control_{2009}+control_{2010}+control_{2011}}{3}$. Regression is estimated using OLS with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

As expected, Table 1.11 confirms the negative relationship between shocks to the parent bank, as measured by change in the CDS spread, column (1), and GIPS exposure, column (2), and external funding. Change from the CDS spread of Germany, 1.21, to the one of Greece, 3.65, is associated with a 15 percentage points decrease in internal funding. In a similar vein, increasing GIPS exposure from zero to 100 percent of the Tier I capital is associated with 6 percentage points decrease in internal funding. The relationship is expected because there is a strong positive correlation between changes in external and internal funding, Table 1.10, as well as strong correlation between shocks to the parent and internal funding. Unfortunately, the paper cannot answer the question of whether the correlation between the shock and external funding is

only indirect through internal funding, or is also direct through the mechanism of the market discipline.

Table 1.10 Internal Funding and Change in External Funding

	Change in External Funding					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Total Funding	0.281***			1.674**		
	(0.095)			(0.796)		
Equity Funding		1.923***			7.483**	
		(0.412)			(3.607)	
Non-Equity Funding			0.209**			2.157*
			(0.100)			(1.197)
ROA	1.443	4.187***	0.776	6.435*	15.035*	3.956
	(0.958)	(0.929)	(1.108)	(3.486)	(7.523)	(3.487)
Liquidity	-0.326	-0.022	-0.301	-1.105*	0.403	-1.540*
	(0.327)	(0.368)	(0.336)	(0.620)	(0.791)	(0.892)
Solvency	-0.292	-0.281	-0.270	-0.603*	-0.431	-0.653
	(0.189)	(0.176)	(0.205)	(0.322)	(0.329)	(0.405)
Riskiness	-1.622	-1.546	-1.928*	2.395	1.020	2.792
	(0.949)	(0.908)	(1.007)	(2.568)	(1.937)	(3.125)
Constant	0.349***	0.240***	0.357***	0.404***	-0.043	0.534***
	(0.089)	(0.079)	(0.092)	(0.105)	(0.195)	(0.183)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	97	97	97	97	97
R-squared	0.473	0.540	0.449			

Note: This table presents estimates of the relationship between external and internal funding of the subsidiary in a cross-section of 96 subsidiaries during the two-year period 2009 to 2011. The dependent variable is the change in external funding, measured as: $\frac{(liabilities_{2011}-related\ party\ liabilitis_{2011})-(liabilities_{2009}-related\ party\ liabilitis_{2009})}{Assets_{2009}}$. *Total funding* is the sum of *Equity*: $\frac{Share\ issues_{2011}+Share\ issues_{2010}-Dividends\ paid_{2011}-Dividends\ paid_{2010}}{Assets_{2009}}$ and *Non-equity funding*: $\frac{Net\ related\ party\ liabilities_{2011}-Net\ related\ party\ liabilities_{2009}}{Assets_{2009}}$. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are averaged during the period from 2009 to 2011: $\frac{control_{2009}+control_{2010}+control_{2011}}{3}$. The regression is estimated using OLS, left pane, and IV with GIPS exposure as an instrument, right pane. Robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

Table 1.11 Crisis Exposure and External Liabilities

	External Liabilities	
	(1)	(2)
CDS	-0.057***	
	(0.019)	
GIPS Exposure		-0.060**
		(0.023)
ROA	-0.282	0.320
	(0.994)	(1.011)
Liquidity	-0.077	-0.048
	(0.294)	(0.308)
Solvency	0.023	-0.101
	(0.208)	(0.212)
Riskiness	-2.859**	-2.513**
	(1.027)	(0.987)
Constant	-0.095	0.356***
	(0.069)	(0.089)
Country Dummies	Yes	Yes
Observations	96	97
R-squared	0.512	0.496

Note: This table presents the relationship between the change in external funding measured as: $\frac{(liabilities_{2011} - related\ party\ liabilitis_{2011}) - (liabilities_{2009} - related\ party\ liabilitis_{2009})}{Assets_{2009}}$ on the one side, and change in the sovereign spreads of the home countries: $\Delta spread_i = \log(\frac{\sum_{t=2009}^{2011} spread_t}{3}) - \log(\frac{\sum_{t=2006}^{2008} spread_t}{3})$ and GIPS exposure on the other. *ROA*, *Liquidity*, *Solvency*, and *Riskiness* are averaged in period from 2009 to 2011: $\frac{control_{2009} + control_{2010} + control_{2011}}{3}$. The regression is estimated with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

A.3 GIPS Exposure and Funding Trends

The IV approach in the panel specification relied on the assumption that the parent banks with higher GIPS exposure provided less funding to their subsidiaries in the post-crisis period than the parent banks with smaller GIPS exposure. This assumption is confirmed by the first stage results, Table 1.5. In this section I expand on this result and look at the relationship between GIPS exposure and internal funding for each year in the sample. Looking at each year in the sample tests the parallel trends assumption: that the internal funding patterns of the affected and unaffected banks were the same before the crisis period, but then started to diverge during the crisis. Violation of the parallel trends assumption would cast doubt on the estimation approach in this paper. It would imply that the change in internal funding might not be due to the parent

exposure to the crisis, but to some other factors which had already led to an internal funding differences in the pre-crisis years.

To test the parallel trends assumption, I run regression of the form:

$$funding_{i,t} = \alpha + \sum_t \beta_t * GIPS * year_t + controls_{i,t-1} + \gamma_i + \mu_t + \varepsilon_{it}, \quad (6)$$

A similar specification to Equation 3, except that instead of interaction between GIPS exposure and *post* dummy there is an interaction between GIPS exposure and the yearly dummies. Year 2009 represents the reference year and the dummy for 2009 is dropped, to prevent collinearity.

Table 1.12 presents the results of estimating Equation (6). *Total funding* and *non-equity funding* – the first and third columns of Table 1.12– follow the same pattern: the interaction effects in years 2007 and 2008 are statistically insignificant, indicating that there was no relationship between GIPS exposure on the one side and *total funding* and *non-equity funding* on the other side in the pre-crisis period. The interaction term is negative and statistically significant in 2010, implying that the banks with higher GIPS exposure provided less funding to their subsidiaries in the first year of the European Sovereign Debt Crisis.

The second column of Table 1.12 shows estimates from the specification with *equity funding* as the dependent variable. The interaction terms are positive and statistically significant in years 2007 and 2008 and then turn negative but statistically insignificant in the crisis years. Hence, banks with different levels of *GIPS exposure* had different pre-crisis trends in *equity funding:* affected banks provided more funding to their subsidiaries. The result is primarily driven by the late entry of Greek banks into the Balkan countries. Greek banks have high *GIPS* exposure and they had to provide capital to their newly-founded subsidiaries in 2007 and 2008. Nevertheless, the result confirms the detrimental effect of the crisis. The coefficients on year dummies turn negative in the post-crisis period, implying that during the crisis period, affected banks provided less internal funding than unaffected banks.

Table 1.12 Funding Trends and GIPS exposure

	Total funding	Equity funding	Non-equity funding
GIPS exposure x 2007	0.064	0.026**	0.038
	(0.066)	(0.011)	(0.059)
GIPS exposure x 2008	-0.035	0.007**	-0.042
	(0.026)	(0.003)	(0.027)
GIPS exposure x 2010	-0.044**	-0.002	-0.042**
	(0.019)	(0.003)	(0.020)
GIPS exposure x 2011	-0.043	-0.004	-0.039
	(0.033)	(0.003)	(0.033)
GIPS exposure x 2012	-0.047	-0.004	-0.043
	(0.030)	(0.004)	(0.027)
L.ROA	-0.609	-0.615**	0.006
	(0.750)	(0.287)	(0.528)
L.Liquidity	-0.048	0.097**	-0.145
	(0.138)	(0.041)	(0.131)
L.Solvency	0.419	-0.265***	0.684*
	(0.365)	(0.057)	(0.339)
L.Riskiness	-1.666***	-0.261**	-1.405***
	(0.350)	(0.123)	(0.298)
Year FE	Yes	Yes	Yes
Observations	426	426	426
Subsidiaries	71	71	71
R-squared	0.294	0.387	0.267

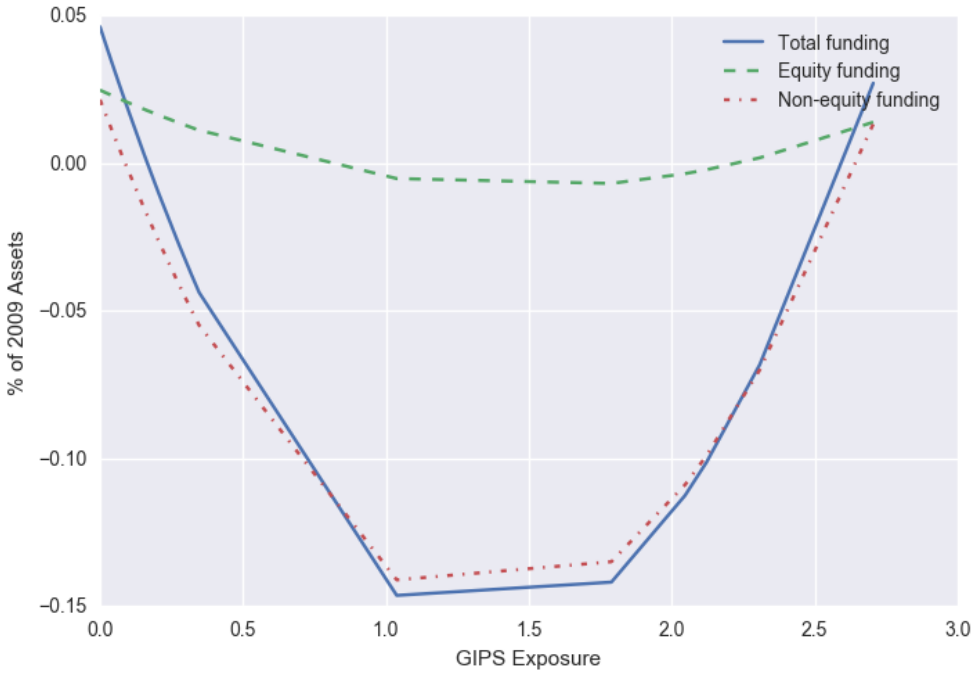
Note: This table presents the estimates of the relationship between GIPS exposure and subsidiary funding for each year in the panel of 71 subsidiaries during the period 2007 to 2012. The dependent variables are *Total funding* = *Equity funding* + *Non-equity funding* , *Equity funding*: $\frac{Share\ Issues_t - Dividends\ Paid_t}{Assets_{t-1}}$, and *Non-equity funding*: $\frac{Net\ related\ party\ liabilities_t - Net\ related\ party\ liabilities_{t-1}}{Assets_{t-1}}$. The regression is estimated using fixed effects with robust standard errors clustered on the parent bank level. , *** p<0.01, ** p<0.05, * p<0.1.

A.4 Additional Tables and Graphs

Table 1.13 Overview of Banking Groups and Host Countries

Banking group	Home country	No. of subsidiaries	Host countries
Alpha Bank	Greece	4	AL, MK, RS, UA
BNP Paribas	France	2	PL , RS
Banco Comercial Portugues	Portugal	1	PL
Banco Popolare	Italy	1	HR
BayernLB Group	Germany	2	BG, HU
Commerzbank	Germany	1	PL
CreditAgricole	France	4	AL, BG, RO, RS
DNB Bank	Norway	2	LV, LT
EFG	Greece	4	BG, RO, RS, UA
Erste	Austria	9	BA, HR, CZ, ME, RO, RS, SK, SI, UA
ING	Netherlands	1	PL
Intesa Sanpaolo	Italy	9	AL, BA, HR, HU, RO, RS, SK, SI, UA
KBC	Belgium	3	CZ, PL, RS
Marfin Popular Bank	Cyprus	1	RS
NBG	Greece	4	BG, MK, RO, RS
Nordea	Sweden	1	PL
NLB	Slovenia	3	BA, MK, RS
OTP	Hungary	7	BG, HR, ME, RO, RS, SK, UA
PiraeusBank	Greece	3	AL, BG, RS
Rabobank	Netherlands	1	PL
Raiffeisen	Austria	10	AL, BA, BG, HR, CZ, HU, KS, RO, SK, SI
SEB Group	Sweden	2	EE, LV
Société Générale	France	8	AL, BG, CZ, MK, ME, RO, RS, SI
Swedbank	Sweden	3	EE, LV, LT
UniCredit	Italy	11	BA, BG, HR, CZ, LV, PL, RO, RS, SK, SI, UA

Figure 1.4 Marginal Effects of GIPS exposure on Funding



Source: Author's calculation based on Annual Financial Statements and EBA Stress Test Results

Chapter 2

Labour Market Effects of Immigration: Evidence from Yugoslav War Refugees in Serbia

2.1 Introduction

Contrary to popular belief, the empirical literature has found only limited negative effects of immigration (Card (1990), Hunt (1992), and Carrington and de Lima (1996) among others). One of the reasons for the lack of a negative effect might be the imperfect substitutability between immigrant and native labour in the local labour markets. The imperfect substitutability is a consequence of various linguistic, cultural and administrative barriers that prevent the immigrants from directly competing for the same jobs with natives.

This paper tackles the issue of the imperfect substitutability between immigrant and native labour by examining the arrival of refugees in Serbia during the Bosnian and Croatian War. According to the UNHCR (The UN Refugee Agency) refugee census, in 1996, one year after the wars ended, Serbia[8] was hosting 537,937 refugees, which represented 7% of its domestic population. The refugee population consisted mostly of Serbians who lived in Bosnia and Croatia during the onset of the war. Besides nationality, the refugees also shared the same language and culture and were even living in the same large country: Yugoslavia, along with the natives. Hence, refugees shared many important characteristics with the domestic population and were likely to compete for the same jobs with natives.

The analysis uses change in the municipal[9] labour market indicators with respect to the pre-war period as the dependent variable and correlates that with the inter-municipal variation in the number of refugees received. My main outcome variable of interest is the average municipality wage; however, I also examine municipal unemployment, employment, and the migration rate, to shed light on other possible mechanisms of labour market adjustment.

Although immigration was motivated by political and not economic reasons, the location choice of refugees was not random. Refugees tended to settle in municipalities closer to the Croatian and the Bosnian border, supposedly in order to visit or return to their previous home more easily. Municipalities with a higher share of people born in Bosnia and Croatia were also attracting higher inflows of refugees, as the pre-war migrants were likely to be friends and relatives of refugees and could provide help and housing. To account for these two settlement patterns, I employ an instrumental variable estimation with the share of pre-war migrants and distance from war region as instruments. Both of these instruments are strong determinants of the location choice of refugees.

[8] Most of the analysis in this paper excludes the province of Kosovo due to the low reliability of the statistical data related to the boycott of most of the censuses by the local Albanian population.

[9] An administrative unit that usually consists of a town and neighbouring villages that gravitate towards it. In the case of Belgrade, municipalities are different parts of the city.

My paper is closely related to the natural experiment literature that exploits sudden inflows of immigrants triggered by political shocks and occurring within short periods of time. The study of the Cuban 'Mariel boatlift' by Card (1990) is, perhaps, the best-known example of this literature. Other examples include Hunt (1992), who examined the impact of French repatriates from Algeria, Carrington, de Lima (1996), who studied the effects of Portuguese 'retornados' from Angola and Mozambique, and Friedberg (2001), who analysed Israeli immigration from the Soviet Union. Common to all studies is that they find no or only minor negative effects of migration on the labour market outcomes of natives.

Compared with examples of migration analysed in previous studies of the natural experiment literature, refugees that came to Serbia are better substitutes for the domicile population. The refugees who came to Serbia are of the same ethnicity, language and culture as the domicile population. Furthermore, before the war Bosnia, Croatia, and Serbia were part of the same country, Yugoslavia, so refugees used to live and work in a country with almost the same level of technological and institutional development like domicile population. This makes them better substitutes for the domicile population than migrants studied previously: Cubans, French people from Algeria, the Portuguese from Angola and Mozambique, and Jews from the Soviet Union.

The similarity between immigrants and the host population is important. If immigrants have different skills from the natives, they do not compete for the same jobs and might even be complementary factors in production. This lack of similarity may explain why the previous studies fail to find any significant negative labour market effects of migration.

Besides the similarities with the native population, there are other characteristics of the Serbian labour market and refugee movements that make this setting a good natural experiment. First, the inter-municipality migration of workers in Serbia is quite limited, due to small wage differentials for similar jobs, the shortage of affordable housing, and reliance on kinship and social networks, Arandarenko and Jovičić (2007). Hence, it is unlikely that the labour market adjustment occurred through natives migrating from municipalities with a higher share of refugees to those with a lower share, which might potentially confound the estimates. Moreover, once settled in the new municipality, the refugees were also quite immobile. This is confirmed by Vujadinovic et al. (2011) who show that the spatial distribution of the refugees did not change substantially during the period 1996-2009. Last but not least, the choice of destination municipality was not primarily based on expected employment opportunities, as is the case with economic migrants, but rather on the proximity to the municipality of origin and availability of social and kinship networks. Specifically, refugees tended to settle closer to the border, so that they could easily visit or return to their homes; they also tended to settle in municipalities where they had friends and relatives. Thus, geographic distance from the conflict zone and share of pre-war migrants from Bosnia and Croatia can be used as valid instruments to identify the effects of refugee inflows on wages.

My main finding is that municipalities with higher refugee influx experienced a greater decrease in the average wage. The estimates range from -0.4 to -0.8 in the OLS specifications and from -0.6 to -1.2 in the IV estimation, implying that a ten percentage point increase in the share of refugees in the municipality is associated with, at most, a 12% decrease in the average wage of the municipality. Although the conflict started in 1991 and finished in 1995, the negative effect is statistically significant only in the years 1994, 1995, and 1996, implying that the effects of the

shock were temporary and that the labour market managed to adjust quickly. The average municipality wage includes the wages of both natives and refugees, but it is quite unlikely that the aggregate drop occurs only through the drop in refugee wages. No effect on the wages of the natives implies that the refugee wages need to drop by 20% to produce a 1 percentage point increase in refugee share, which represents a quite high and unlikely drop.

Besides wages, refugee inflows are associated with increases in the municipal unemployment rate. A refugee influx of 10% of the municipality population is associated with an increase in unemployment rate ranging between 1 to 2 percentage points. Municipalities that received more refugees relative to the local population are also associated with a higher percentage of natives who commute to work. In order to test the results, I conducted various robustness checks, including matching and synthetic control methods, dropping the top and bottom parts of the sample, and using the real wage as a dependent variable. These tests had no significant impact on the findings.

The rest of the paper is organised as follows. In the next section, I review the theoretical and empirical work related to the effects of immigration on local labour markets. Then, I provide historical background on the Yugoslav wars and the arrival of refugees. In Section 2.5, I describe the data, and in Section 2.6 I sketch out my empirical strategy and present my empirical findings and robustness checks. Finally, in the Conclusion section I discuss the policy implications and limitations of the study.

2.2 Literature Review

2.2.1 Theory[10]

Theoretical predictions of the labour market effects of immigration hinge heavily on the models and assumptions used. The primary and the most important group of assumptions relates to the degree of substitutability between native and migrant labour. In general, an inflow of migrants is predicted to decrease the returns to perfect substitutes in production, i.e. the wages of the natives that compete for the same jobs as migrants, increase the returns to complementary factors of production: returns to capital owners, and has ambiguous effects on imperfect substitutes in production: wages of natives who have different skills from migrants, Friedberg and Hunt (1995). For example, low-skilled migration is predicted to increase the supply of low-skilled labour and bring down the wages of low-skilled natives because employers substitute expensive low-skilled natives with cheaper low-skilled migrants. However, the effect on the high-skilled natives is ambiguous. Employers have incentives to substitute high-skilled labour with low-skilled labour that became cheaper after the arrival of immigrants, the effect of substitution, but on the other hand they need to hire more high-skilled labour to accommodate the increase in the scale of production that ensued after the supply of low-skilled labour increased: the effect of scale. Hence, if the effect of scale is greater than effect of substitution, the wages of imperfect substitutes will increase, and conversely, they will decrease if the effect of substitution is greater than the effect of scale.

[10] Friedberg and Hunt (1995), Dustmann et al. (2008), Borjas (2009), and Bodvarsson et al. (2013) present more extensive literature reviews. This section draws heavily on these.

Some of the influential papers that build models of heterogeneous native and migrant labour are Johnson (1980), Borjas (1995), and Ottaviano and Peri (2012). The papers differ in their definitions of skill groups, whether based on education and/or experience, and how they model substitutability between natives and migrants. The novelty of the Ottaviano and Peri (2012) model is a nested CES specification that allows for imperfect substitutability between migrant and domestic labour, even within the same skill group, where a skill group is defined as a combination of education and experience level. In the model, the effect of migration on a native wage for each group is calculated as a sum of own group and cross-group effects.

In the long run, the effects of immigration on the wages of natives are predicted to be smaller, or even non-existent. The supply of capital is elastic in the long run, so adjustment can occur through an increase in capital stock. Besides the accumulation of capital, the long run also allows for the adoption of more migrant-skill intensive technology (Lewis (2004)), or alternatively, for the natives to upgrade their skills and change their occupation in order not to compete for the same jobs with immigrants (Foged and Peri (2016)).

The next important assumption relates to the openness of the economy. In an open economy, in the long run, wages are predicted to return to their previous levels because of adjustment occurring through trade or the movement of factors of production. In the Heckscher-Ohlin model adjustment occurs through trade. The destination country starts producing and exporting more labour intensive product, so that the increase in labour supply is matched with an increase in labour demand, because of increased production. As a result of the production increase, factor prices stay the same. Nevertheless, Heckscher-Ohlin type models are not particularly suitable for studying immigration, because if factor price equalization holds and factor compensation is the same in all countries there are no incentives for labour to migrate in the first place. Hacking of the model, like the introduction of the non-traded sector, as in Cortes (2008) breaks the "factor-price insensitivity" of the Heckscher-Ohlin model. Besides trade, alternative adjustment channels in the open economy model are through capital inflows or labour outflows. Migration increases return to capital, which makes the economy attractive for foreign investors who invest their capital until factor price equalization is restored again. In a similar vein, migration decreases the return to labour, so that labour has incentives to move abroad, which leads to higher wages for those who stay.

While partial equilibrium models account only for the effect of immigration on the labour supply, general equilibrium models also account for the effect of immigration on product demand. Greenwood and Hunt (1984) study agglomeration economies of immigration using the example of U.S. cities. Hercowitz and Yashiv (2002) build an open economy model where immigrants enter the goods market before the labour market and argue that differential entry into labour and goods markets can explain the time lag between the arrival of the immigrants to Israel and the fall in wages of the natives. Bodvarsson et al. (2008) develop a general equilibrium model, where the effect of immigration is the sum of two shocks. The first shock is on product demand, and this exerts a positive influence on the wages of the natives. The other shock is the input substitution effect, and this negatively impacts the wages of the native. The authors test their model on the Mariel boatlift data and find that an increase in product demand, and consequently labour demand, can explain the absence of the negative effects of Cuban migration in Card's (1990) paper.

In Section 2.3, I present a stylized model that will frame my empirical analysis. In developing the model, I rely heavily on the discussion of modelling approaches in Bodvarsson and van der Berg (2013). The model is similar to the models by Cortes (2008), and Ottaviano and Peri (2005) in that it uses the CES production function to model heterogeneous labour. However, my model is much simpler than theirs, because it assumes closed economy, fixed capital stock, and only one skill group. Because of the CES production function, the effect of immigration is primarily driven by the elasticity of substitution between immigrants and natives.

2.2.2 Empirical studies

Because of important policy implications, immigration has been the subject of numerous empirical studies. The main goal of the studies was to estimate the elasticity of domestic wage to immigrant inflows. Although these studies differ in their research setting and empirical approach, most of them find the effects of immigration close to zero or a slight negative effect.

Bodvarsson and van der Berg (2013) classify all empirical studies of immigration effects into two groups: those applying the production function method and those using spatial correlation. The production function approach is pioneered by Grossman (1982) and is structural in nature. It consists of estimating a production function that takes native and immigrant labour as inputs and then calculates the elasticity of the native wage to an increase in immigrant labour. Studies based on this approach find only modest effects of immigration, predominantly due to the small substitutability of migrant and native labour, arising from the differences in skill sets between the two groups.

The spatial correlation method compares regions and/or population groups that had big immigrant inflows with a counterfactual, a control group that consists of the regions less exposed to immigration. Finding a good control group is a major difficulty: each local labour market comes with its own economic trends, so there is a risk of spurious correlation: confounding the effect of immigration with the effects of other economic factors. Treated and control regions are compared before and after the immigration wave, in order to eliminate unobserved region-specific factors that might affect wages. Example of studies based on the spatial correlation method are LaLonde and Topel (1991) and Altonji and Card (1991). Both papers look at the effects of immigration to the US between 1970 and 1980 on the wages of past immigrants and low-skilled natives, the population that should be most affected by immigrant inflow. One drawback of LaLonde and Topel's study is that it does not control for immigrants' choice of destination, which might bias the results if immigrants tend to settle in regions with high expected wage growth. Altonji and Card (1991) try to addresses the issue of the destination endogeneity by instrumenting immigrant inflows with the size of the previous immigrant population. Pischke and Velling (1997) apply a similar methodology to the case of Germany, but instead of using past immigration as an instrument for destination choice, they use the past labour market outcomes at the destination. This identification strategy assumes that immigrants base their location choice on the past rather than the expected labour market conditions in the destination municipality. Borjas (2003) and Ottaviano and Peri (2008) further contribute to the literature by paying more attention to properly defining segments of the native population, cells

based on skills and experience that compete for the same jobs with the migrants and that are most likely to be affected by immigration.

Another strand of literature attempts to solve the problem of endogenous location choice by using "natural experiments"— significant and sudden inflows of immigrants, mostly driven by political, rather than economic factors. Card (1990) is the first and the best recognized study of this type. Card analysed the impact of the 'Mariel boatlift', the event dating back to 1980, when the Cuban regime allowed emigration from the port of Mariel. Within a few months, around 125,000 of mostly low-skilled Cubans migrated to the U.S and the majority of them settled permanently in Miami, the major U.S. city that is closest to Cuba. The study finds that the inflow of unskilled Cubans had no effect on the wages of non-Cuban workers and a very small negative effect on the wages of Cuban workers in Miami. According to Card, the lack of a strong negative effect is attributed to the introduction of more low skill-intensive technologies in Miami. This study has raised significant controversies and has been ferociously challenged by Borjas (2003 and 2015). Borjas claims that there is a significant negative impact on low-skilled natives who are the closest substitutes in production to Cuban migrants, and that the result is sensitive to the choice of the municipality used as a control group.

Additional examples of the natural experiment studies include Hunt (1992), who examined the impact of French repatriates from Algeria, Carrington and de Lima (1996) who studied the effects of Portuguese retornados from Angola and Mozambique, Friedberg (2001) who analysed Israeli immigration from the Soviet Union, and Angrist and Kugler (2003) who examined the arrival of Yugoslav war refugees to Western Europe. Common to all studies is that they find only minor or no negative effects of migration on the labour market outcomes of the natives.

Other related studies that look at the migration provoked by war include Kondylis (2010), Braun and Mahmoud (2014), and Tumen (2016). Kondylis (2010) looks at displacement effects in Bosnia and finds that, compared with people who stayed in the same municipality, displaced males have a higher probability of being unemployed, while displaced women are more likely to leave the labour force. Braun and Mahmoud (2014) analyse the arrival of German expellees to West Germany after World War II and find significant, non-linear effects on the employment of natives in labour market segments with a high inflow of expellees who were direct competitors in the labour market. Tumen (2016) uses data on Syrian refugees in Turkey and finds that an inflow of refugees led to small losses in employment, a decrease in consumer prices through lower labour costs in the informal sector, and increased rents due to higher demand for houses in safer neighbourhoods.

There is also substantial empirical literature that searches for the alternative adjustment mechanisms that can explain the lack of negative effects on native wages. Blanchard et al. (1992) find that most of the non-wage adjustment is through movement of labour, rather than through job creation or job migration. Borjas et al (1996) show that the negative effect of immigration increases as the area under study increases, e.g. if one looks at state instead of city level and warn that: "If native migration responses are sufficiently large over the relevant period, comparisons of small areas will mask the true effect of immigrants on native wages.". Borjas et al. (1997) find that the location decisions of the natives respond to migration flows, showing that there has been less native migration to California since the influx of immigrants started. Card (2001) in turn

finds only modest evidence in support of labour market adjustment occurring through internal migration.

2.3 Simple Model of the Impact of Refugees on Wages

To frame the empirical analysis that follows, I present a simple model of an economy[11] populated by natives and migrants. The aim of the model is to highlight the dependence between substitutability of native and migrant labour and the effects of migration on the wages of the natives. I keep the model as simple as possible and adopt the assumptions most appropriate to the economic conditions in Serbia in the 90s. For more complex and realistic general equilibrium models of migration I refer the interested reader to Ottaviano and Peri (2012) and Bodvarsson et al. (2008).

Each municipality is a closed economy consisting of one sector.[12] There are three agents in the economy: natives, migrants, and firms. Each native is endowed with one unit of labour, $l_{N0} = 1$ and one unit of capital, $k_{N0} = 1$. Natives are maximizing consumption:

$$max_{(l_N, k_N)}\, c_N \tag{7}$$

subject to the budget constraint:

$$c_N = w_N * l_N + r * k_N \tag{8}$$

and resource constraints for labour and capital:

$$l_N \leq l_{N0} \tag{9}$$

$$k_N \leq k_{N0} \tag{10}$$

From the above maximization problem, it is clear that the natives will decide to offer their whole endowment of labour and capital in order to maximize consumption, hence $l_n = l_{N0} = 1$ and $k_N = k_0 = 1$. If there are N natives living in the economy, the total amount of labour supplied will be N and the total amount of capital supplied will also be N.

The assumption of an inelastic labour supply is appropriate for Serbia for two main reasons. First, there is low availability of part-time opportunities so most of the workers work full-time. Second, wages in Serbia are low, sometimes even beyond subsistence level, which forces workers to take additional jobs: the practice of moonlighting (Reilly and Krstic, 2003). Hence,

[11] Since the level of observation in the empirical section is the average municipal wage, one can think about the economy as if it were one municipality.

[12] The closed economy assumption is justified by the fact that Serbia was under economic sanctions during most of the 1990s. The sanctions, however, did not preclude cross-municipality trade flows, but I assume these trade flows away to keep the model simple.

the assumption of supplying all labour one has is appropriate for Serbia. The assumption of the fixed supply of capital is justified in the short run — for example Ottaviano and Peri (2008) cite a capital convergence rate to optimal capital labour ratio of 10-20% per year. However, Serbia was undergoing economic sanctions in the 1990s, so accumulation of capital was probably even slower because of the limited amount of foreign investments.

Similarly to natives, migrants maximize their utility that depends only on the migrant labour input:

$$max_{(l_M)} \; c_M \tag{11}$$

subject to the budget and resource constraints:

$$c_M = w_M * l_M \tag{12}$$

$$l_M \leq l_{M0}. \tag{13}$$

Hence, I assume that migrants do not bring any capital with them, which is a reasonable assumption for refugees that fled their homes. The solution to the maximization problem above is that the refugees supply all their labour endowment. Consequently, the total amount of migrant labour equals the number of migrants, M.

Firms maximize profits by choosing an optimal amount of labour, native and migrant, and capital inputs:

$$\max(M, N, K)\, AL^{\alpha}K^{1-\alpha} - w_N N - w_M M - rK \tag{14}$$

where labour, L, is the CES aggregate of native and migrant labor:

$$L = [N^{\rho} + M^{\rho}]^{\frac{1}{\rho}}, \tag{15}$$

with $\rho = \frac{\sigma-1}{\sigma} < 1$ and σ>0 representing the elasticity of substitution.[13] I assume that the price of the final good is equal to 1 and hence represents the numeraire.

An assumption of CES aggregate is common in models of heterogeneous labour input, Cortes (2008) and Ottaviano and Peri (2005 and 2012), because it allows for convenient estimation of factor price elasticities. However, the models by Cortes and Ottaviano and Peri are much more complicated than my own model, since they allow for substitutability between native and migrant labour for each level of skills and experience. In my model there is basically only one skill level.

[13] If σ is greater than 1 it means that natives and migrants are substitutes in the production function, while if σ is between 0 and 1, natives and migrants are complementary production factors.

Assuming perfect competition in the market for final good, solution of the profit maximization problem of the firm is to choose the amount of inputs where marginal cost equals marginal product. Therefore, the wages of natives and migrants are equal to their respective marginal products:

$$w_N = \frac{\partial \pi}{\partial N} = A\alpha[N^\rho + M^\rho]^{\frac{\alpha-\rho}{\rho}} K^{1-\alpha} N^{\rho-1} \quad (16)$$

$$w_M = \frac{\partial \pi}{\partial M} = A\alpha[N^\rho + M^\rho]^{\frac{\alpha-\rho}{\rho}} K^{1-\alpha} M^{\rho-1}. \quad (17)$$

The average wage in the municipality is a weighted average of w_N and w_M with weights equal to the respective employment shares:

$$w = \frac{N}{M+N} w_N + \frac{M}{M+N} w_M = \frac{1}{1+\gamma} w_N + \frac{\gamma}{1+\gamma} w_M, \quad (18)$$

where γ represents the ratio of migrants and native population in the local labour force, $\frac{M}{N}$. The elasticity of the average municipality wage with respect to migrant population can be expressed as:

$$\frac{\partial w/w}{\partial M/M} = \frac{1}{1+\gamma} \frac{\partial w_N/w_N}{\partial M/M} + \frac{\gamma}{1+\gamma} \frac{\partial w_M/w_M}{\partial M/M}, \quad (19)$$

which, after some algebraic manipulation, simplifies to:

$$\frac{\partial w/w}{\partial M/M} = \frac{1}{1+\gamma} s_M \left(1 - \frac{\rho}{\alpha}\right) + \frac{\gamma}{1+\gamma} \left[s_M \left(1 - \frac{\rho}{\alpha}\right) + \rho - 1\right]. \quad (20)$$

In the above expression, s_M represents the production share of migrant income: $\frac{M * w_M}{Y}$.

Equation (14) implies that the inflow of migrants leads to a decrease in native wages if $1 - \frac{\rho}{\alpha} < 0$ which is equivalent to the elasticity of substitution, σ, being greater than $1/(1-\alpha)$. Hence, as natives and migrants become more substitutable, the same percentage increase in migrant population leads to a higher decrease in the wage of natives. Similarly, migrant wages drop with an increase in migrant population and do so more sharply as the share of migrants

grows.[14] The peculiarity of the refugee inflows to Serbia is the similarity of refugees to the host population in terms of skills, language, and culture. Similarity enables easy substitution of domestic with migrant labour, so it is reasonable to expect σ values greater than 1 and a significant drop in wages as a result of refugee inflows. In other natural experiment settings, for example the Mariel boatlift, immigrants were different from natives in terms of skills, language, and culture, which might explain the lack of strong negative effects on the wages of the natives.

Although the model presented in this section is based on very simplistic assumptions, it would require significant tinkering to overthrow the main result: that as the substitutability between migrants and natives increases, the effect on wages becomes more negative. Some ways to overthrow the result would be to assume: highly elastic supply of labour, highly elastic supplies of capital, or rapid technological change. The supply of labour could be elastic if there is strong migration abroad, or if natives have a high reservation wage so they decide not to work rather than to work for a lower wage. In this case, the market would adjust through the labour supply, which would remain the same compared with the pre-migration level, and there would be no effect on wages. An increase in capital stock can also accommodate an increase in labour supply and prevent a decrease in wages. Capital stock can be increased in the model by allowing foreign direct investments, or assuming that refugees brought capital with them. Finally, assuming a change to more labour-intensive technology can increase the marginal product of labour and dampen the negative effects on wages. However, as already discussed in this section, each of these three assumptions are not realistic for Serbia in the 1990s.

2.4 Yugoslav Wars and the Arrival of Refugees to Serbia

Serbia was the largest of the six constituent republics of the former Socialist Federal Republic of Yugoslavia (SFRY). Other constituent republics were Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Slovenia. Additionally, Serbia contained two autonomous provinces, Kosovo and Vojvodina, characterized by specific historical conditions and a significant minority population. The borders of the republics in SFRY were not based on ethnic identification and there was a large minority population in most of the states. The most important minority in Croatia was Serbians, while Bosnia, besides the Serbians, had a large Croatian minority.

Despite various political attempts to keep the country united, it began disintegrating in the early 1990s. Disintegration was not peaceful and was marked by a series of armed conflicts[15], known as the Yugoslav wars and described as Europe's deadliest conflicts since World War II. The first conflict occurred in Slovenia in 1991 after it declared independence and lasted only 10 days. It was followed by the wars in Croatia (1991-1995) and in Bosnia (1992-1995). All the conflicts were characterized by immense human and material destruction, as well as large

[14] As ρ is always smaller than 1 and s_M is always positive, it follows that if condition: $1 - \frac{\rho}{\alpha} < 0$ holds, an increase in the migrant population leads to a decrease in the elasticity of the migrant wage, while increases in σ, i.e. natives and migrants becoming closer substitutes into production, leads to an increase in the elasticity of the migrant wage.

[15] For a more detailed account of the wars in ex-Yugoslavia please refer to Glenny (1996) or Silber (1997).

movements of refugees. Naturally, the majority of the war affected Serbians living in Croatia and Bosnians moved to Serbia, while part moved to Western Europe, North America, or Australia.

The exact number of refugees who settled in Serbia is difficult to estimate (see Vujadinovic et al., (2011). First, the vast majority (estimated at around 73%) of refugees did not register upon coming to Serbia because they were staying with friends or family and not in refugee camps. Second, for some of them, Serbia was only a temporary stop on the way to Western Europe or other developed countries. Finally, even when the Serbian Commissariat for Refugees (SCR), the United Nations High Commissariat for Refugees (UNHCR), or national and international NGOs started conducting refugee censuses, their numbers did not match due to differences in methodology and definitions.

Table 2.1 presents a breakdown of refugee arrivals to Serbia by calendar year according to the 1996 joint UNHCR and SCR refugee census data. According to this census, there were 597,549 forced migrants in Central Serbia and Vojvodina, 518,840 of whom had obtained formal refugee status[16]. The years with the largest refugee inflows were 1992 and 1995. In the second half of 1995 the Republic of Serbian Krajina fell, a self-proclaimed state that encompassed southern regions of Croatia with a sizeable Serb population. In a period of just a few months, 193,359 refugees arrived in Serbia, which represents 66% of the total number of refugees who came from Croatia. The refugees who came in this wave brought very few personal belongings as they had to flee their homes in only a couple of hours in front of advancing Croatian troops. Another year with significant inflows was 1992, the year when 96,123 people fled Bosnia and 23,890 fled Croatia at the onset of the war.

Figure 2.1 shows the spatial distribution of the refugee influx. Refugees tended to settle in the municipalities close to the Croatian and Bosnian borders. The location choice may be explained by the intention to save on transportation costs in the case of returning home permanently, or occasionally in order to visit family and property that remained in the country of origin. The municipality that received the highest absolute number of refugees was Novi Sad (46,169 persons), the administrative and economic centre of Vojvodina. Other municipalities with large inflows were Novi Beograd (28, 551), part of the capital city Belgrade, and Loznica (26,379), located close to the Bosnian border. Municipalities with the highest refugee influx relative to the domestic population were Inđija, Stara Pazova, and Sremski Karlovci, all with an influx close to 33% of the domestic population. Municipalities in south-eastern Serbia had almost no inflows of refugees. For example, just 58 refugees moved to Trgovište, which represents less than 1% of the local population.

[16] According to Kokotović (2013) the war-affected population without formal refugee status consists primarily of former Yugoslavian People's Army or Federal Administration personnel that were located in the war-affected areas at the start of the conflict. These persons already had Serbian citizenship so they were not eligible to apply for refugee status.

Table 2.1. Refugees by Country of Origin and Year of Arrival

Year of Arrival	Croatia	Bosnia and Herzegovina	Other republics of former Yugoslavia	Total	Total (%)
Before 1992	32,957	7,424	5,199	45,580	8
1992	23,890	96,123	1,642	121,655	23
1993	9,829	19,072	603	29,504	5
1994	6,675	15,079	489	22,243	4
First half of 1995	9,849	11,370	346	21,565	4
Second half of 1995	193,359	52,756	3,674	249,789	46
First half of 1996	14,108	31,150	2,343	47,601	8
Total	290,667	232,974	14,296	537,937	100

Source: Commissariat for Refugees (2008) based on the 1996 refugee census.
Note: This Table presents a breakdown of refugee inflow to Serbia by year of arrival and country of origin. Data in the table includes 19,097 refugees that settled in southern province of Kosovo so the number does not match the 518,840 refugees used in the empirical analysis. Municipalities in Kosovo were excluded from regression analysis in this paper because there is no reliable municipal statistical data on Kosovo as the local Albanian population boycotted population censuses and other statistical surveys.

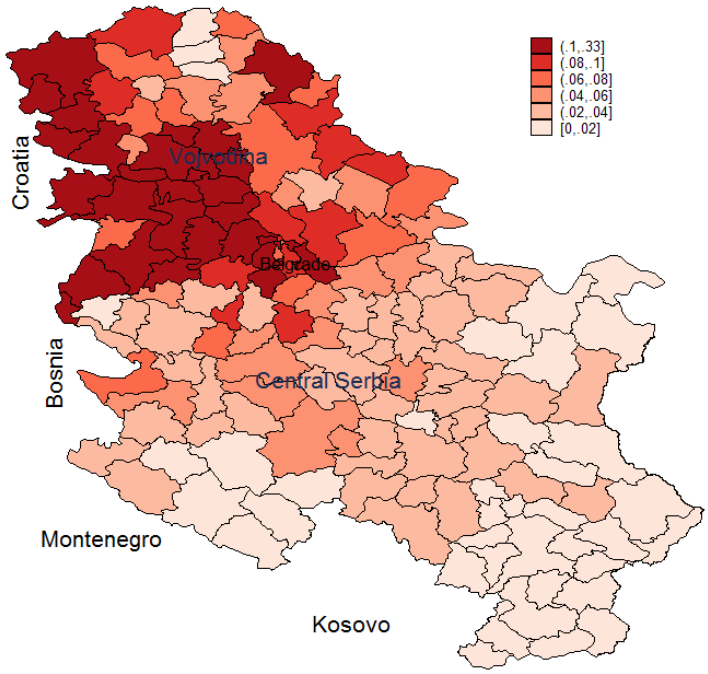
Besides the distance to the location of origin, the refugees' destination choices strongly correlate with the presence of the pre-war migrants from Croatia and Bosnia[17]. I define pre-war migrants as persons who were born in Bosnia or Croatia but resided in the municipality in 1990, year before the war broke out. The literature has shown (e.g. Yap (1977)) that personal contacts and immigrant networks are significant determinants of the destination choice because they decrease the economic and psychological costs of moving. Hence, refugees tended to settle in locations where they had friends or relatives who resided in Serbia and who could provide accommodation and help.

The population census from 2002, seven years after the wars ended, allows for comparison of the socio-economic characteristics and labour market outcomes of the native population and the refugees who stayed in Serbia. Table 2.2 shows that the refugees had higher education levels than the locals: 45% of them finished high school, compared with 36% for the native population, and 11.3% of refugees finished higher education, compared with 7.6% of the local population. The refugees were also younger on average and had a higher proportion of females among them: 53.9% compared to 51.5% for the locals. Age, education, and gender differences can be explained by the decision of older people not to flee their homes and to stay in Croatia and Bosnia, and by the higher probability of males to be killed during the war. The refugees fared worse in the labour market than the locals. The average activity rate among the refugees across municipalities was 49.8% compared to 53% for the locals, while the employment rate was 31.8%, significantly lower than 42.5% for the local population. Looking at the sectoral distribution of the

[17] Pearson coefficient of correlation between share of refugees and share of past migrants is 0.54.

employment, only 5.5% of refugees were employed in the agricultural sector, compared with 12.5% for the local population. The difference can be explained by the lack of ownership of agricultural land among refugees.

Figure 2.1 Territorial Distribution of Refugees, % of Domicile Population



Source: Author's calculations based on 1996 refugee census and 1991 population census

Lower employment and activity rates show that refugees faced difficulties with integrating in the Serbian labour market, despite sharing the same language and cultural background as the natives. The labour market underperformance is partially driven by the lower participation of refugees in the agricultural sector, which is quite big in Serbia and dominated by small family farms. Another important factor is probably the lack of social connections, which are valuable when looking for employment.

In the 90s, Serbia witnessed a period of unprecedented economic and political turbulence: the start of the transition process, wars in the neighbouring countries, an economic embargo by the UN, and hyperinflation. I provide a more detailed summary of the economic and labour market trends in Serbia in Section B.2 in the Appendix.

2.5 Data Sources and Descriptive Statistics

Several groups of variables represent the input for the empirical analysis. First, the data on refugees: the main variables of interest. Second, the data on wages: the main outcome variable. Besides wages, I study the impact of refugee influx on other economic outcomes: unemployment,

employment, migration, and commuting to work. To account for inter-municipal differences in economic structure and trends regressions I include a rich set of municipality level controls. Last but not least, I use instrumental variables to address the endogeneity of the location choice. In the sections that follow, I describe the data sources and present summary statistics for each of these groups of variables.

2.5.1 Refugees

Estimates of the refugee population are available from three different sources. The first estimate comes from the 1996 refugee census, organised jointly by the Serbian Commissariat for Refugees (SCR) and the United Nations High Commissariat for Refugees (UNHCR), UNHCR 1996 further in the text. The drawback of the UNHCR 1996 data is that it reports only the total number of refugees per municipality, and has no detailed information on demographic or socio-economic characteristics. The second source of refugee data stems from the registration of refugees on arrival to the municipality and was published by the Statistical Office of the Republic of Serbia (SORS) in a statistical yearbook for 1997. Besides the total refugee population as of 31st December 1995, this data contains a decomposition by refugee gender and age, as well as a breakdown if registration occurred before July 31st of 1995, the date when the final military operations that led to the massive exodus of the remaining Serb population started, or afterwards. My third source of refugee data is the 2002 and 2011 population censuses which included questions18 specifically designed to capture the refugee population. The population census data is much richer and contains a breakdown by gender, education, age, and employment status of refugees. In the analysis of the population census data, I use only population members older than 15 years, because this is the population that can participate in the labour market.

Because of its timing and methodology, I find UNHCR 1996 the best measure of the refugee population and use this value in the main regression specifications. SORS 1995 surveyed refugees upon arrival to the municipality, and hence estimated a higher refugee population than UNHCR 1996 because some refugees stayed only temporarily in Serbia before migrating to Western Europe and other recipient countries. On the other hand, population censuses in 2002 and 2011 estimated a lower refugee population than UNHCR 1996 because a certain share of refugees returned home, emigrated abroad, or was not captured as a refugee in the census. However, all three measures of the refugee population are highly correlated, as evidenced by the regression results using SORS 1995, Census 2002, and Census 2011 reported in the robustness check section 2.6.3.1 of the paper.

[18] For example: “Where were you residing in 1991?” or “In what capacity are you residing in Serbia?”

Table 2.2. Socioeconomic Characteristics of Refugees and Natives

	Refugees						Natives					
	Count	Mean	St. Dev.	Min	Median	Max	Count	Mean	St. Dev.	Min	Median	Max
Population 15+	159	2,100	3,922	25	680	33,507	159	36,789	37,488	2,256	21,257	216,950
Active (%)	159	50	8	8	51	74	159	53	5	33	53	78
Employed (%)	159	32	8	4	32	61	159	42	6	25	42	74
Agriculture workers (%)	156	5	5	0	4	42	159	13	10	0	10	56
Commuters (%)	157	7	4	1	6	23	159	10	5	1	9	31
Education												
Primary (%)	159	44	11	15	45	85	159	56	13	15	58	83
Secondary (%)	159	45	7	13	46	59	159	36	9	15	36	56
Higher (%)	159	11	6	2	10	37	159	8	6	2	6	41
Age distribution												
15-24 (%)	159	18	3	7	18	30	159	15	2	8	15	27
25-34 (%)	159	18	4	4	17	33	159	15	2	9	15	21
35-49 (%)	159	29	3	12	29	37	159	25	2	17	26	31
50-64 (%)	159	21	3	11	21	33	159	24	2	17	24	27
65+ (%)	159	13	4	4	13	44	159	21	5	10	20	37
Unknown (%)	146	1	2	0	1	18	159	1	0	0	1	3
Gender distribution												
Female (%)	159	54	5	47	53	85	159	52	1	49	52	57
Male (%)	159	46	5	15	47	53	159	48	1	43	48	51

Source: Author's calculations based on the 2002 population census data (Statistical Office of the Republic of Serbia).

Note: Unit of observation is a municipality; there were 159 municipalities in Serbia in 1991. The refugee census from 1996 does not report the socio-economic characteristics of refugees, so I rely on the 2002 population census as the data source. The benefit of using the 2002 census is that it excludes refugees who only stayed short-term in Serbia. All percentage shares are with respect to population older than 15 years.

I scale the number of refugees with the total 1991 municipality population: $\frac{refugees_{census}}{population_{1991}}$, and plug in this ratio as a measure of refugee shock in the regression equations. Table 2.3 presents summary statistics of the refugee shock. The average size of the shock across all municipalities is 7%, but there is a great variation, as some municipalities received almost no refugees, while in others' shock is greater than 30% of the domestic population. As discussed in the previous paragraph, later censuses report a lower refugee population.

Table 2.3. Descriptive Statistics (Census Numbers of Refugees/Municipality Population in 1991)

Variable	Mean	Median	Standard Deviation	Min	Max	Number of Observations
SORS 1995	0.07	0.04	0.08	0.00	0.52	158
UNHCR 1996	0.07	0.04	0.07	0.00	0.33	159
Census 2002	0.04	0.02	0.04	0.00	0.22	159
Census 2011	0.03	0.01	0.04	0.00	0.19	159

Source: Author's calculation based on refugee census data from Serbian Commissariat for Refugees (SCR) and Statistical Office of the Republic of Serbia (SORS).
Note: The unit of observation is a municipality.

2.5.2 Wages

The data on wages is taken from the publication: "Zarade u Republici Srbiji 1965-2005" (Wages in the Republic of Serbia 1965-2005) published by the Statistical Office of the Republic of Serbia. Wages are municipality-level average and are net of taxes and contributions. Wage data was collected during regular statistical establishment surveys. Until 1994, only socially owned[19] enterprises were included in these surveys, and after 1994 other forms of property were also introduced, e.g. government and private firms.

As in most other small developing countries, the Serbian Statistical Office does not publish price indices at municipality or county level. However, in its Yearbooks Statistical Office does publish prices of some products at the county level and I use these prices to deflate the nominal wages. I construct price indices at the county level[20] by looking at changes in prices of bread, beer, and men's shoes with 1991 as the base year. I derive the price index as a simple average of the change in prices of three products, and then use this index to deflate the nominal wage. For instance, if in 1991 the prices of bread, beer, and men's shoes were 1, 2, and 5, and in 1992 they increased to 1.5, 2.5, and 6 respectively, the price index is equal to (1.5/1 + 2.5/2 +6/5)/3=1.32

[19] A peculiarity of the Yugoslavian model of socialism is that firms were neither state-owned nor private, but "socially" owned and self-managed by the workers.
[20] I mapped all municipalities to 14 regions for which there was an available price series.

and I would divide the 1992 nominal wage by this amount in order to come up with an estimate of the municipality level real wage in 1992.

Table 2.4 shows descriptive statistics of nominal and real wages. By looking at the table we see that nominal wages increased quite rapidly during the inflationary period and then dropped after the currency reform at the end of 1993. On the other hand, real wages were almost in freefall until 1994[21] when they started recovering, but even in 1998 they were still less than half of 1990 values. There is high dispersion in average wages of Serbian municipalities. Employees in the richest municipalities earn several times more than their counterparts in the poorest municipalities.

Appendix section B.2 provides an overview of the Serbian labour market institutions and the wage setting process. Although there are opposing opinions, it seems that workers lost many of the powers they had in the socialist era. The biggest influence of the wage setting process in the state-owned sector was the ruling party.

2.5.3 Controls and Instruments

The control variables relate to the pre-arrival economic and social characteristics of the municipalities and are taken from the 1991 edition of the Statistical Yearbook or from the 1991 Census Book, both published by the Statistical Office of the Republic of Serbia. Controls include share of industrial, agricultural, and private sector workers in the total number of workers in the municipality, share of college graduates in the active population, share of agricultural area in the total area of the municipality, and population density (thousands of persons per km^2). Instruments include share of pre-war migrants from Bosnia and Croatia, taken from the 1991 population census and driving distance from Knin[22] which is taken from the ViaMichelin[23] website and represents the driving time it takes to reach a certain municipality in Serbia by driving a car from Knin.

[21] In February 1994, the currency reform exchange rate between RSD and DEM was 1-1, but then already in March RSD started depreciating. Hence, the nominal wage of 154 RSD was equal to around 100 DEM in 1994. http://www.nbs.rs/internet/latinica/80/kursevi/trzis_kurs_94_95.pdf

[22] Knin used to be the capital of Republic of Srpska Krajina, a self-proclaimed Serbian state in Croatia, and it is also close to areas in Bosnia where a significant Serbian population used to live before the war.

[23] http://www.viamichelin.com/

Table 2.4. Descriptive Statistics, Nominal and Real Wages

Variable	Year	Mean	Median	Standard Deviation	Minimum	Maximum	Number of Observations
Nominal Wage	1990	3,628	3,534	774	1,282	5,789	159
	1991	7,519	7,304	1,656	4,620	13,178	159
	1992	36,620	37,021	7,418	17,006	65,865	159
	1993	49	49	11	12	104	159
	1994	154	153	33	93	288	159
	1995	310	302	70	159	590	159
	1996	583	566	151	252	1,089	159
	1997	676	642	240	266	1,560	159
	1998	893	818	335	342	2,282	159
Real Wage (1991 base prices)	1990	7,555	7,423	1,870	2,763	15,223	159
	1991	7,519	7,304	1,656	4,620	13,178	159
	1992	3,851	3,848	828	1,949	6,721	159
	1993	871	792	213	180	1,690	159
	1994	2,570	2,470	663	1,369	5,444	159
	1995	3,385	3,284	786	1,626	6,302	159
	1996	3,108	2,932	840	1,386	5,921	159
	1997	3,104	2,798	1,198	1,167	7,757	159
	1998	3,453	3,180	1,406	1,297	9,673	159

Source: Wages in the Republic of Serbia 1965-2005 and author's calculations of real wages based on price data published in Statistical Yearbooks.

Notes: Wages are in Serbian Dinars. Due to the unavailability of price indices at the municipality level from official sources I used changes in prices of certain products reported in Statistical Yearbooks to deflate nominal wages. In order to break the hyperinflation, Serbia introduced the currency board in 1994, that set the value of the dinar equal to the Deutsche Mark. This explains the sharp drop in nominal wages in 1993.

Table 2.5 presents descriptive statistics of control and instrumental variables. Serbian municipalities had a high share of industrial workers, 44% on average, which is typical for the socialist countries of that time. Despite its socialist orientation, there still existed a limited private sector: every tenth employee was working in the private sector. The Yugoslav Government allowed registration of private companies with up to 10 workers. Private companies were mostly in trade, artisan, or agricultural sectors. The maximum share of pre-war migrants is high, at 26%; this could be partly explained by post WWII migration, when Serbs from Bosnia and Croatia replaced expelled Germans.

Table 2.5. Descriptive Statistics, Controls and Instrumental Variables

Variable	Mean	Median	Standard Deviation	Minimum	Maximum	Number of Observations
Vojvodina	0.283	0.000	0.452	0.000	1.000	159
Belgrade	0.101	0.000	0.302	0.000	1.000	159
Share of industrial workers	0.441	0.450	0.133	0.077	0.693	159
Share of agricultural workers	0.093	0.050	0.104	0.000	0.559	159
Share of private sector workers	0.099	0.074	0.087	0.000	0.597	159
Share of population with college degree	0.075	0.061	0.059	0.017	0.400	159
Population density	0.449	0.076	2.257	0.012	23.227	159
Share of agricultural area	0.669	0.661	0.178	0.000	0.925	159
Distance from Knin	8.893	8.730	1.182	6.560	11.710	159
Share of pre-war migrants from Bosnia and Croatia	0.052	0.019	0.067	0.000	0.261	159

Source: Statistical Office of the Republic of Serbia and ViaMichelin.
Notes: Vojvodina and Belgrade are dummy variables equal to 1 for municipalities located in Vojvodina region and Belgrade metropolitan area, share of workers are with respect to the total number of workers in the municipality, population density is in 1000s of persons per km^2, distance from Knin is in hours, and the share of pre-war migrants is with respect to the 1991 total population of the municipality.

2.5.4 Other outcome variables

Besides wages, I explore the effects of refugee influx on the unemployment rate, change in the number of employed, rate of migration abroad, and share of native workers commuting to work. All dependent variables are at the level of the municipality and come from the Statistical Office of the Republic of Serbia: unemployment and employment from the respective Statistical Yearbook, migration abroad from the 1991 and 2002 population censuses, and the share of commuters from the 2002 population census (this indicator was not collected in the census of 1991). Table 2.6 presents descriptive statistics for these variables.

The mean municipal unemployment rate increased throughout the period from 8.1% in 1991 (in 1990 there were no data for Vojvodina so count of observations is lower), to 10.1 % in 1998. On average, the number of employed persons decreased by 1,500. The decrease is partially driven by decrease in population due to aging and strong migration abroad, and partially by the deteriorating economic conditions. The mean share of migrants moving abroad increased from 3.8 % in 1991 to 5.8 % of the municipal population in 2002. The mean commuting rate in 2002

is not particularly high, 7.1%, but there is big variation and the rate reaches 25.1% in certain municipalities.

Table 2.6. Descriptive Statistics, Unemployment, Employment, Emigrants, and Commuters

Variable	Year	Mean	Median	Standard Deviation	Minimum	Maximum	Number of Observations
Unemployment Rate	1990	0.072	0.064	0.041	0.008	0.332	114
	1991	0.081	0.081	0.034	0.008	0.186	159
	1992	0.091	0.088	0.044	0.008	0.393	159
	1993	0.088	0.085	0.04	0.003	0.201	159
	1994	0.091	0.089	0.04	0.006	0.188	159
	1995	0.095	0.091	0.044	0.004	0.215	159
	1996	0.099	0.095	0.047	0.002	0.239	159
	1997	0.093	0.095	0.037	0.008	0.183	158
	1998	0.101	0.104	0.039	0.01	0.208	158
Employment Change	1995	-1,269	-469	2,341	-19,032	684	159
	1997	-1,575	-660	2,845	-21,129	968	159
Population	1991	49,046	30,666	47,238	3,789	265,464	159
	2002	43,880	25,866	44,405	2,532	262,727	159
Share Migrants Abroad	1991	0.038	0.023	0.045	0.003	0.226	159
	2002	0.058	0.039	0.061	0.004	0.334	159
Share Commuters	2002	0.071	0.063	0.044	0.007	0.251	159

Source: Statistical Office of the Republic of Serbia.
Notes: *Unemployment Rate* is defined as number of unemployed in the respective year divided by 1991 municipality population older than 15 years, *Employment change* is difference in the number of employed in the municipality with respect to 1991, *Share Migrants Abroad* is number of persons abroad in the respective year divided by 1991 municipality population, *Share Commuters* is number of natives who commuted to work in 2002 divided by 1991 municipality population.

2.6 Empirical Analysis

2.6.1 Estimation Strategy

To assess the impact of refugee influx on wages I employ several empirical strategies. The main strategy is very similar in nature to the event study methodology and consists of running repeated cross-section regressions of the form:

$$\ln\left(\frac{wage_{it}}{wage_{i1991}}\right) = a_t + b_t \frac{refugees_i}{population_{1991}} + controls_i + u_{it} \quad (21)$$

where t takes the values from 1990 to 1998, with exception of 1991, which represents the reference year, $wage_{it}$ is the average wage of municipality i in year t, $refugees_i$ represents the number of refugees in the municipality i in year 1996 when the UNHCR refugee census took place, and $population_{1991}$ represents the total municipality population as of 1991 census.

Controls include a dummy variable for municipalities located in the Autonomous Province of Vojvodina, a dummy variable for municipalities located in the Belgrade metropolitan area, the share of industrial workers, the share of agricultural workers, the share of private sector workers (all shares are standardized by total number of workers in the municipality), the share of college graduates in the population older than 15 years, population density, and the share of agricultural area in the total area of the municipality. The rationale for including these variables is to control for characteristics of the local labour markets and potential differential wage trends before refugee arrival. The control variables take values as of 1991, the last pre-war year, in order to stay exogenous and exclude the effect of the refugee arrival.

Refugee censuses were organised only after the wars were over, so there is no available data on the number of refugees in the municipality broken down by year of arrival. Hence, there is no time variation in the main variable of interest, $refugees_{i,}$ represents a snapshot of the municipal refugee population according to censuses done after the wars. Lack of time variation prevents the application of a fixed effect panel method. If applicable, the method would address the issue of unobserved heterogeneity between municipalities. Time variation would also allow for better estimation of the timing of the effect: the lag between the arrival of refugees and the effect on the dependent variable.

The unit of observation is a municipality. This choice is dictated by data availability, since I do not have microdata on the wages and other characteristics of refugees and natives. The municipal level data is aggregated and does not allow the separate examining of the impact on different segments of the population. Most notably, the average municipal wage is calculated based on both the wages of the natives and of the refugees, so using the municipal one cannot examine the effect on the wages of the natives separately from the effect on the wages of the refugees. In a similar vein, one does not know if the effect on the wages of highly educated natives with several years of work experience differs from the effect on the low-skilled natives.

The time span I use, from 1990 to 1998, relates to the event study nature of the empirical strategy and includes one year before the war started and several years after the war ended. Year 1991 is excluded, so that the dependent variable is the wage growth between year t and year

1991, which is the year when the breakup of Yugoslavia started. If the hypothesis is correct, the effects of the refugee arrival on wages should be seen only in the years after the war, 1992 on, and there should not be any effect in 1990. The time span till 1998 gives some indication of persistence of the effect and the time it took for labour markets to adjust. Unfortunately, it is not possible to extend the time period further into the future: in 1999 the war in Kosovo started and led to another wave of refugees which can confound the estimates.

An OLS estimation of regression equation (15) might produce biased results if the refugees were selecting destination municipalities based on the anticipated growth in wages. In order to tackle this endogeneity issue, I estimate the same equation using the instrumental variables approach whereby I instrument for refugee inflows with driving time from Knin and the share of past migrants from Croatia and Bosnia. As a robustness check, I also experiment with transforming the share of previous migrants to the shift share instrument, following the approach developed by Bartik (1991) and used by Card (2001).

The instruments are strong and explain the great deal of variation in the refugee influx, Table 2.7. The table presents the results of the first stage of the IV estimation corresponding to rows "IV Nominal Wage" and "Shift Share IV Nominal Wage" in the Table 2.9. The regression diagnostics, F-statistic for excluded instruments and Angrist-Pischke chi-squared have high values of 58.15 and 124.95 showing that the distance to Knin and the share of pre-war migrants are strong instruments for the share of refugees. The same applies for the shift share instrument: the respective F-statistic equals 95 and the Angrist-Pischke chi-squared value is 101.38. All three instruments (driving time, share of previous migrants, and the shift share) are highly statistically significant and have expected signs. Driving time from Knin is negatively associated with the share of refugee population, while the coefficients on pre-war migrants and shift share are positive implying that refugees settled in locations that already had high share of people from Bosnia and Croatia.

Table 2.17 in the Appendix presents estimates from regressing wage growth directly on instruments, both with and without inclusion of controls. The results are consistent with the results from the main specification with share of refugees as the explanatory variable. The estimates are statistically significant in the years 1994, 1995, and 1996, and of expected sign. The coefficient on distance is positive, indicating that wages grew faster in municipalities further from the conflict zone, while the coefficient on the share of pre-war migrants is negative, implying that municipalities with a high share of pre-war migrants had lower wage growth.

Table 2.7. First Stage Estimates

	UNHCR 1996	UNHCR 1996
Distance from Knin	-0.019***	
	(0.004)	
Share of previous migrants from Bosnia and Croatia	0.747***	
	(0.094)	
Shift share instrument		0.788***
		(0.081)
Vojvodina	-0.003	-0.010
	(0.014)	(0.015)
Belgrade	-0.014	-0.001
	(0.015)	(0.015)
Share of industrial workers	-0.025	-0.032
	(0.022)	(0.024)
Share of agricultural workers	-0.092**	-0.087*
	(0.039)	(0.047)
Share of private sector workers	0.100*	0.123**
	(0.055)	(0.062)
Share of population with college degree	-0.037	0.001
	(0.096)	(0.098)
Share of agricultural area	-0.040	-0.002
	(0.031)	(0.028)
Population density	-0.004***	-0.004***
	(0.001)	(0.001)
Constant	-0.019***	0.788***
	(0.004)	(0.081)
Observations	159	159
R-squared	0.741	0.693
F-statistic excluded instruments	58.15	95.00
AP Chi-sq	124.95	101.38

Note: This table reports first stage results from the nominal wages IV specification presented in Table 2.9. A unit of observation is the municipality. The dependent variable is the share of refugees in the domestic population of the municipality according to the UNHCR 1996 census. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

However, there are reasons to worry about the validity of the instruments: their correlation with the wage growth beyond the indirect effect through refugee influx. First, the north-western parts of Serbia tend to be more developed than the southern parts. This is due to historical reasons as the northern parts were part of Austria-Hungary, while the southern parts were part of the Ottoman empire. As the north-western parts are closer to the conflict region, instruments are highly correlated with the level of economic development. The second validity concern relates to the effects of war, which among other things include the loss of the pre-war trading partners: customers and suppliers. It is reasonable to assume that the effects of war on economic activity decrease with distance and that the municipalities close to the Croatian and Bosnian border felt the biggest negative effects. As pre-war migrants tended to settle in the municipalities closer to the border, the pre-war migrants instrument is also subject to the issues of economic legacy and the effects of war that decrease with distance.

To test for the validity of instruments, I estimate the regression with the measure of the municipal economic activity, the employment growth, as the dependent variable and instruments as explanatory variables. The percentage change in employment is a good proxy for the change in the economic activity: Okun's law states that economic growth is accompanied by an increase in employment.

Table 2.8 shows that in 1995 there is no strong negative correlation between instruments and the employment growth with 1991 as the base year. In the year 1997 in the specification with the full set of controls included, the effect on distance from Knin is negative and weakly statistically significant, while the in specification without inclusion of controls, the coefficient on the share of the pre-war migrants is negative and statistically significant. This provides some evidence that municipalities with a higher share of pre-war migrants had lower employment growth during the period 1991-1997 than municipalities with a lower share of pre-war migrants. Hence, regressing employment growth on instrument provides evidence for the validity of instruments seen in 1995 but raises doubts about their validity in 1997 because they are negatively correlated with employment growth, a proxy for economic activity.

Besides the OLS and IV estimations of Equation (15) I estimate the effect of the refugee influx using a matching and synthetic control approach. These two methods rely on a quasi-experimental setting of comparing wages in two groups of municipalities, treated and non-treated, before and after the refugee influx. I include the distance to Knin among the characteristics I match the municipalities on. Inclusion of distance helps alleviate concerns discussed in previous section: correlation of distance and the spatial distribution of the economic activity in Serbia.

Table 2.8 Employment Growth and Instruments

	1995		1997	
	(1)	(2)	(3)	(4)
Distance from Knin	-0.008	-0.003	-0.013*	-0.011
	(0.005)	(0.005)	(0.007)	(0.007)
Share of previous migrants from Bosnia and Croatia	0.086	-0.087	-0.007	-0.289**
	(0.141)	(0.104)	(0.172)	(0.132)
Controls	yes	no	yes	no
Observations	159	159	159	159
R-squared	0.099	0.005	0.188	0.031

Note: This Table reports the estimates from the OLS regression of the percentage change in the employment growth between years 1995 and 1991 as the dependent variable, and instruments: distance from Knin and share of pre-war migrants from Croatia and Bosnia as the main variables of interest. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

2.6.2 Findings

2.6.2.1 OLS

The first two rows of Table 2.9 show the results of estimating equation (15) using the OLS. Except in 1990, there is a negative relationship between the share of refugees in the municipality and the nominal wage growth. However, the estimates are statistically significant only in years 1994 and 1995, and weakly statistically significant in 1996.

The timing of the effect somewhat supports the hypothesis that the effect is coming from the refugee influx. Table 2.1 shows that the years with the biggest refugee arrival were 1992 when 23% of the refugee population arrived and 1995 when 47% of the refugee population arrived. Previous studies, e.g. Hercowitz and Yashiv (2002), show that there is a time lag between the arrival of migrants and the effect on wages. Consequently, the negative coefficient in 1994 can be the result of the 1992 refugee arrival. Moreover, statistically insignificant estimates in years before 1994 also speak in favour of the hypothesis. These are the years when there was no refugee influx, 1990, or the years when refugees started settling. In these years refugees did not actively participate in the labour market, so they could not put negative pressure on wages.

On the other hand, the lack of statistically significant effect in years 1997 and 1998 requires further investigation. The biggest wave of refugee influx is in 1995, so if the negative effect in 1994 is the result of the 1992 influx, one would expect a big negative effect in 1997. How is it possible to explain the lack of negative effect in 1997 and 1998?

One explanation could be that the negative effect in 1994 is not the result of the arrival of refugees but the effect of other economic shocks that happened in the period, such as war in the neighbouring countries, and the start of the transition process. It just happened that refugees settled in the municipalities that had lower wage growth in the years 1994, 1995, and 1996, and this leads to a spurious correlation between wage decrease and refugee influx. In the next section, I partially control for the issue of location bias: selection into municipalities with lower wage growth, by running an IV estimation. Partially, because one can still argue that the instruments are not valid: the instruments might be correlated with wage growth in the municipalities, and this correlation is not solely through correlation with refugee influx. I discuss and test the validity of the instruments in the next sections.

Another explanation for the absence of the effect in 1997 is that the municipal markets became more resilient to the increase in labour supply and were able to adjust quickly to the new arrival of refugees. Refugees started to arrive in 1991, so up to1995 there might have been a change in the technology and economic structure toward more labour intensive production. There was definitely a role played by the State and international donors that provided substantial donations to the refugees and affected municipalities. Donations might have stimulated demand and capital increase which has helped dampen the effect of the labour supply increase.

The estimated negative wage effect is highly economically significant. A ten percentage point increase in the refugee population, measured as a share in the local population of the municipality, is associated with around 6% decrease in the average nominal municipal wage. According to Hamermesh (1993), estimated decrease in wages for 10% increase in number of immigrant workers on the U.S. data is around 3%, which is half of the estimated effect for Serbia. However, the effect is short-lived. In the years after 1996, the effect of refugee inflows decreases in magnitude and ceases to be statistically significant, implying that local economies were quick in adjusting to the labour supply shock.

The OLS estimates based on real wages, presented in the second block of Table 2.9, are in line with the nominal wage estimates. The estimates are statistically significant in the years 1994 and 1995, and weakly significant in 1996 and 1998. In 1994, the effect is slightly smaller in magnitude than in the nominal wage specification, -0.515 versus -0.608, in 1995 the effect is greater in magnitude, -0.84 versus -0.59, while in 1996 the estimate is almost the same, -0.41. Hence, there is some evidence that the arrival of refugees has not only led to a drop in wages, but also put upward pressure on prices in 1995.

Table 2.18 in the Appendix presents the results of regressing change in log nominal and real wage directly on UNHCR 1996 refugee indicator and constant, without any controls included. The results are similar to OLS estimates, a little lower in magnitude, statistically significant in 1994 and 1995, and not statistically significant in 1996.

2.6.2.2 Instrumental Variables

If the location choice of refugees is not random, the refugee share would be correlated with the error term in Equation 15, which would lead to a bias in OLS estimates. For instance, if refugees tended to cluster in municipalities with positive economic trends, one would underestimate the effects of immigration as the regression would assign part of the wage growth due to favourable economic conditions to the arrival of refugees. In order to address this issue, I instrument for refugee population with the driving distance from Knin and with the share of migrants from Croatia and Bosnia that lived in the municipality before the war. The estimation results are presented on the third pane of Table 2.9 for nominal wage and the fourth pane of Table 2.9 for the real wage growth.

The IV estimates are similar to the OLS estimates. The estimated effect is negative, statistically significant in years 1994, 1995, and 1996, while for the other years it is negative, but statistically insignificant at the 5% level. Compared to nominal wage OLS estimates, coefficients from IV estimation tend to be more negative, and hence predict bigger decrease in wages for a refugee inflow of the same magnitude. For example, in 1994, the estimated coefficient on the refugee share decreases from -6.08% using OLS, to -6.68% using IV estimation. This finding is consistent with the hypothesis that immigrants settled in municipalities with positive economic trends which lead to an upward bias in OLS estimates.

In specifications with real wages as the dependent variable, the estimates are statistically significant and negative in 1995, but positive in 1993. This counterintuitive effect most likely comes from the problems of deflating regional prices in a hyperinflationary environment. In the hyperinflationary environment prices change almost every hour so if they are not collected at the exactly same time prices are not comparable across regions. Another explanation for the positive effect might be government action: for example, capping prices or providing subsidized products in the municipalities where the refugees were staying.

The last two panes of Table 2.9 report estimates derived using the "shift-share" instrument. The approach was pioneered by Card (2001) and relies on combining the lagged geographical distribution of immigrants with the inflows at the aggregate level to create an instrument for immigration that is exogenous to the local labour market conditions, Ruist et al. (2017). I derive the shift share instrument by multiplying each municipality's share of pre-war migrants in 1991 with the total number of refugees that came to Serbia. Hence, the shift-share instrument predicts refugee inflows by assuming that the spatial distribution of the new migrants is the same as the spatial distribution of the pre-war migrants. The instrument is similar to the share of pre-war migrants, except that it represents predicted as opposed to the realized value. Shift share estimates are quite close to those using distance and share of pre-war migrants, with statistical significance achieved in the same years.

Table 2.9. Effect of Refugee Influx on Wage Growth, OLS and IV Estimates

Specification	Variable	1990	1992	1993	1994	1995	1996	1997	1998
OLS Nominal Wage	Refugees	0.123	0.023	-0.098	-0.608***	-0.592***	-0.414*	-0.091	-0.133
	Std. Error	(0.253)	(0.132)	(0.128)	(0.156)	(0.195)	(0.245)	(0.318)	(0.302)
	N	159	159	159	159	159	159	159	159
	R2	0.083	0.230	0.048	0.232	0.186	0.144	0.149	0.145
OLS Real Wage	Refugees	0.350*	-0.159	-0.005	-0.515**	-0.839***	-0.410**	-0.229	-0.447
	Std. Error	(0.184)	(0.143)	(0.191)	(0.209)	(0.221)	(0.195)	(0.275)	(0.276)
	N	159	159	159	159	159	159	159	159
	R2	0.054	0.197	0.073	0.213	0.197	0.155	0.204	0.179
IV Nominal Wage	Refugees	-0.587	-0.087	-0.154	-0.668***	-0.834***	-0.628**	-0.318	-0.333
	Std. Error	(0.426)	(0.195)	(0.214)	(0.250)	(0.271)	(0.287)	(0.422)	(0.466)
	N	159	159	159	159	159	159	159	159
	R2	.	0.228	0.047	0.231	0.178	0.139	0.146	0.143
IV Real Wage	Refugees	-0.049	-0.167	0.635**	0.121	-1.118***	-0.416	-0.348	-0.596
	Std. Error	(0.437)	(0.244)	(0.282)	(0.322)	(0.295)	(0.265)	(0.396)	(0.440)
	N	159	159	159	159	159	159	159	159
	R2	0.034	0.197	0.036	0.170	0.188	0.155	0.203	0.178
Shift Share IV Nominal Wage	Refugees	-0.704	-0.042	-0.098	-0.538**	-0.887***	-0.568*	-0.302	-0.409
	Std. Error	(0.467)	(0.155)	(0.184)	(0.246)	(0.274)	(0.292)	(0.448)	(0.504)
	N	159	159	159	159	159	159	159	159
	R2	.	0.230	0.048	0.231	0.174	0.141	0.146	0.141
Shift Share IV Real Wage	Refugees	-0.089	-0.082	0.653**	0.212	-1.053***	-0.367	-0.371	-0.606
	Std. Error	(0.481)	(0.198)	(0.271)	(0.337)	(0.297)	(0.267)	(0.414)	(0.469)
	N	159	159	159	159	159	159	159	159
	R2	0.030	0.197	0.034	0.157	0.192	0.155	0.203	0.178

Note: This table reports estimates of repeated cross section estimation of Equation 15 using both OLS and IV approach. The dependent variables are log differences of average nominal and real municipal wages with 1991 as a reference year. The variable of interest is *Refugees*, measured as the number of refugees according to UNHCR1996 census divided by 1991 municipality population older than 15 years. A unit of observation is the municipality. IV specification uses distance from Knin and share of pre-war migrants from Croatia and Bosnia as instruments. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

In addition to the results presented above I examined if the effect on wages depends on the socio-economic characteristics of the municipality. I examined the heterogeneity of the effect by estimating equation 15 with including the interaction of refugee share and each of the controls listed in section 2.5.3. I included the interaction with control variable one at a time, and estimated both OLS and IV specification[24]. The interaction term was insignificant in all IV equations, implying that effects on wage are the same across the board and do not depend on the economic or demographic characteristics of the municipalities. However, in the OLS specification, several interaction terms were statistically significant, all in the years after 1993. Refugee influx to a municipality with a higher share of agriculture is associated with a lower wage growth than a refugee influx to a municipality with a lower share of agriculture. The finding is similar for municipalities with a higher share of private sector workers, and municipalities located in Vojvodina. On the other hand, the interaction effects for the share of population with a college degree and the share of industrial workers are positive. Hence, given the same refugee influx, municipalities with better educated population and higher share of manufacturing experienced less negative effect compared to municipalities with a less educated population and a higher share of agriculture and service sector.

The reported coefficients in Table 2.9 measure the percentage change in the average municipality wage for a one percentage point increase of a refugee share: $\frac{\partial w/w}{\partial \gamma}$. The coefficients vary from 0.4 to 0.8 in case of the nominal wage growth and from 0.4 to 1.2 in the case of the real wage growth. Because of data limitations –unavailability of separate wage information for refugees and natives — I cannot estimate the effect on the wages of the natives. Assuming as a lower bound of the effect the case when the effect on the wages of the natives is the same as the effect on the wages of the refugees:$\frac{\partial w_N}{w_N} = \frac{\partial w_M}{w_M}$, the expression simplifies to $\frac{\frac{\partial w}{w}}{\partial \gamma} = \frac{\frac{\partial w_N}{w_N}}{\frac{\partial M}{N}} = \frac{\frac{\partial w_N}{w_N}}{\frac{\partial M}{M} * \frac{M}{N}}$ [25], implying that the refugee inflow in size of 10 percentage points of the native population is associated with at most a 8% decrease in nominal wages and a 12% decrease in the real wages of the natives. These estimates are in line with other studies. Hunt (1992) finds that a 1 percentage increase in the repatriate share of the labour force is associated with at most 0.8 percent decrease in regional wage. Using share of previous migrants as instrument, Altonji and Card (1991) find that a 1 percentage point increase in immigrant share leads to a 1.2 percent decrease in wages, which represents one of the strongest negative estimates in the literature. It is quite unlikely that the wages of the natives remained unaffected. Assuming that there is no effect on wages of the natives and using average refugee share of 7% implies that refugee wages need to decrease by 20 percent for a one percentage point increase in refugee share[26]. This effect is quite high, which implies that it is unlikely that there was no effect on native wages but only on the wages of the refugees.

[24] To save space, I do not report the result table in the text. However, results are available upon the request.

[25] Derived by substituting $\frac{\partial w_N}{w_N} = \frac{\partial w_M}{w_M}$ in $\frac{\frac{\partial w}{w}}{\partial \gamma} = \frac{\frac{1}{1+\gamma w_N}\frac{\partial w_N}{\partial \gamma} + \frac{\gamma}{1+\gamma w_M}\frac{\partial w_M}{\partial \gamma}}{\partial \gamma}$ and using the fact that $\partial \gamma = \frac{\partial M}{N}$.

[26] Plugging in $\frac{\partial w_N}{w_N} = 0$ simplifies $\frac{\frac{\partial w}{w}}{\partial \gamma} = \frac{\frac{1}{1+\gamma w_N}\frac{\partial w_N}{\partial \gamma} + \frac{\gamma}{1+\gamma w_M}\frac{\partial w_M}{\partial \gamma}}{\partial \gamma}$ to: $\frac{\frac{\gamma}{1+\gamma w_M}\frac{\partial w_M}{\partial \gamma}}{\frac{\partial M}{N}} = \frac{\frac{1}{1+\gamma w_M}\frac{\partial w_M}{\partial \gamma}}{\frac{\partial M}{M}}$.

2.6.2.3 Matching

In addition to the main empirical approach in this paper, the OLS and IV estimations, in this and the next section I explore methods based on diff-in-diff approach: a matching and synthetic control method. The two methods address the shortcoming of the OLS approach: endogeneity of the location choice of the refugees, and of the IV approach: correlation of the instruments with the outcome variable beyond the indirect effect through the influx of refugees.

Table 2.10 presents the estimates of the average treatment effects on the nominal wage growth from matching top 30 with bottom 30 municipalities sorted by the share of refugees in the population. Municipalities were matched based on distance from Knin, share of industrial workers, share of college graduates, and a Belgrade dummy using the nearest neighbour algorithm. The effects are negative and statistically significant in the years 1995 and 1996. In 1996, the treated municipalities experienced an 11 percentage point lower nominal wage growth, with respect to 1991, than non-treated municipalities. The time pattern of the effect is consistent with the IV results, where the magnitude of the effect is also strongest in 1995.

As average refugee influx in non-treated municipalities is 1.2%, while in treated it is 18.7%, the estimated wage elasticity is between 1 and 1.5: a one percentage point decrease in wages for each one percentage point increase in the share of refugees. This estimate is higher than the OLS and IV estimates.

Table 2.10 Average Treatment Effects, Nominal Wage Growth

	1990	1992	1993	1994	1995	1996	1997	1998
ATE	-0.092	-0.051	-0.040	-0.053	-0.184***	-0.116**	-0.034	-0.081
	(0.105)	(0.050)	(0.036)	(0.063)	(0.059)	(0.052)	(0.090)	(0.100)
Observations	60	60	60	60	60	60	60	60

Note: This Table reports the estimates of the average treatment effects derived from matching top 30 and bottom 30 municipalities sorted by the share of refugees in the domestic population of the municipality. Matching is done using nearest neighbor algorithm with Mahalanobis distance metric. Matching was done on: distance from Knin, share of industrial workers, share of population with college degree, and Belgrade dummy. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

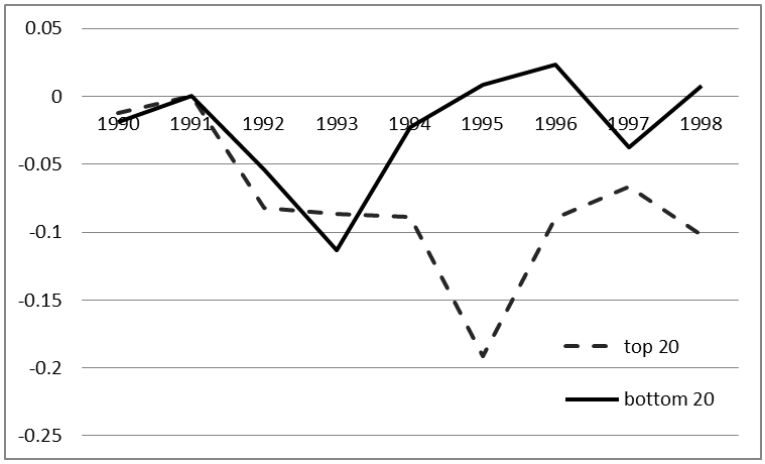
2.6.2.4 Synthetic Control Method

The synthetic control method, as described in Abadie et al (2010), is the other estimation method I investigated. The peculiarity of this method is the construction of a counterfactual for the treated observation as a weighted average of several control observations. The effect is then calculated as the difference between the outcomes for the treated observations and outcomes for the counterfactual: the synthetic control.

To implement this method, I ordered all the municipalities by the size of refugee inflows and selected the bottom twenty and top twenty municipalities in treated groups. The control group was composed of eighty-four municipalities which had refugee inflow of less than four percentage points. Then I compared the estimated average effects for the bottom twenty and top twenty municipalities.

Figure 2.2 presents the estimated average effects for the 20 municipalities with the highest and lowest refugee influx. We see that the average effect for the top 20 municipalities is below the average effect for the bottom 20 municipalities indicating that the wage growth is lower in municipalities with higher refugee share. Two lines begin to diverge in 1994 and the gap reaches minimum in 1995 which is consistent with the main OLS and IV findings. Before 1994 the average effects for the two groups of municipalities are quite close indicating no differences in wage growth. In 1997 and 1998, the average effect on top 20 municipalities is still below the average effect for the bottom 20 municipalities, suggesting that the labour market did not fully adjust.

Figure 2.2 Average Effects from Synthetic Control Method

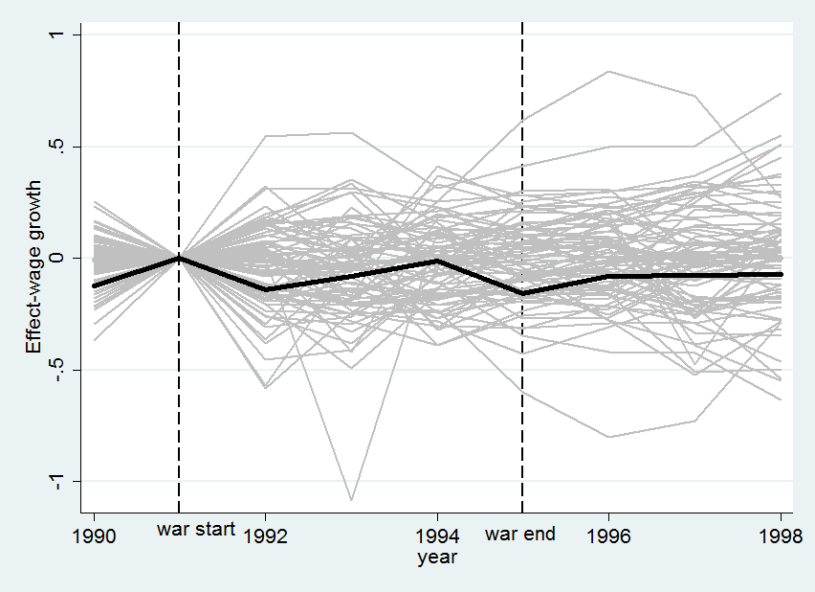


The synthetic control method does not directly provide the statistical significance of the estimates. To go around this issue, I focus on Inđija, the municipality with the highest refugee influx, and run synthetic control method, comparing the estimated effect for Inđija with the estimated effect for the 84 municipalities from the control group. Comparison with placebo municipalities presents a method of deriving the distribution of the standard error, and provides an insight into the significance of the estimated effect.

Figure 2.3 presents the estimates. Two vertical dashed lines mark the years when war started and war ended, hence period during which refugees were coming to Serbia. Grey lines present the estimated effects for placebo municipalities, while the thick bold line is the estimated effect for Inđija. The estimate for Inđija is in the bottom decile of the estimated effects distribution implying that Inđija has experienced lower wage growth than the better part of the placebo

municipalities. This leads to the conclusion that wage growth in Inđija was significantly lower than in non-treated municipalities. Furthermore, the difference between the bold line and the grey lines above it increases in the war years, providing support for the hypothesis that refugee influx drives the divergence in municipal wage growth trends.

Figure 2.3 Synthetic Control Estimates in Inđija and non-treated Municipalities



Note: Inđiija is the municipality with the highest refugee inflow (33%), non-treated municipalities are 84 municipalities with the refugee inflow of less than 4%.

2.6.2.5 Effects of Migration on other Labour Market Outcomes

In this section, I look at the effects of the refugee influx on other labour market outcomes: namely unemployment rate, employment, migration abroad, and commuting to work in another municipality. Besides interest in the outcomes themselves, examining these outcomes can shed light on the non-wage adjustment in the labour market. For example, an increase in unemployment would imply that part of the labour market adjustment was through quantity, unemployment, and not through price, wage.

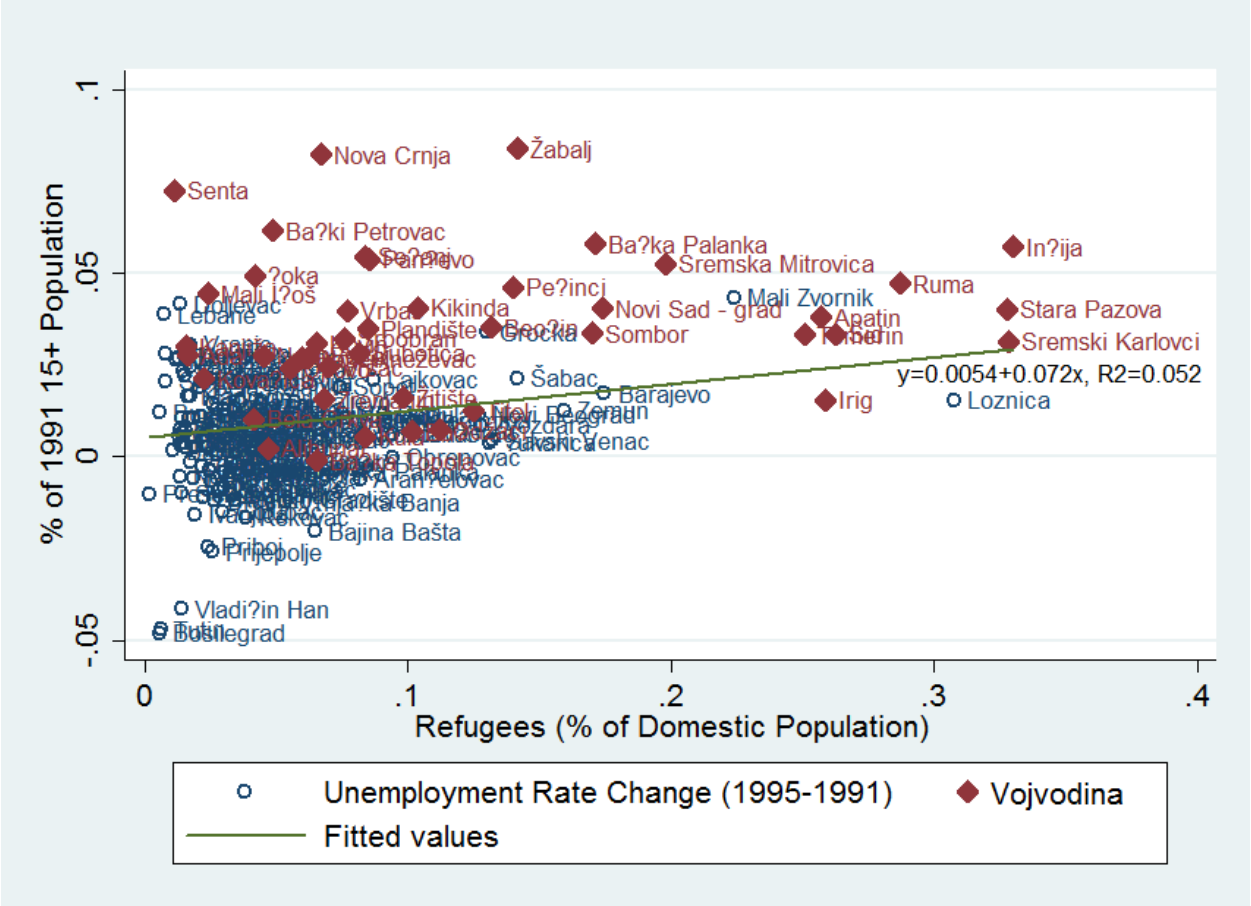
Figure 2.4 shows the scatterplot of a change in unemployment rate[27] between the years 1995 and 1991 and the share of refugees in the municipality. Red markers represent municipalities in Vojvodina, while blue markers represent municipalities in Serbia proper. The scatterplot shows a weak positive relationship between refugee inflows and an increase in municipal unemployment

[27] Change in the number of unemployed between 1991 and 1995 divided by 1991 population older than 15 years.

rate and municipalities with the highest refugee inflows experiencing an above average increase in unemployment.

The regression results presented in Table 2.11 confirm this finding. Estimation of Equation 15 with change in unemployment rate as a dependent variable results in a positive and statistically significant coefficient on refugee share in the years 1994, 1995, and 1996. Hence, growth in unemployment seems to coincide in time with declines in wages documented in Table 7. Estimates range from 0.05 to 0.2 indicating that refugee inflow of 10% of the municipality population is associated with a 0.5 to 2 percentage point increase in the unemployment rate. Interestingly, the coefficient on the share of refugees remains positive, but decreases in magnitude and loses statistical significance in the IV estimation with the Vojvodina dummy included. This finding can be explained by looking at the Figure 2.4 where red squares for Vojvodina municipalities do not exhibit a clear positive association between change in unemployment rate and share of refugees in the municipality.

Figure 2.4 Unemployment Rate Change (1995-1991) and Refugees Influx



Source: Author's calculations based on SORS data.

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Table 2.11. Effects of Refugee Influx on Unemployment, OLS and IV Estimation

Specification	Variable	1990	1992	1993	1994	1995	1996	1997	1998
OLS (no controls)	Refugees	-0.032	0.022	0.101***	0.119***	0.127***	0.154***	0.027	0.024
	Std. Error	(0.023)	(0.020)	(0.016)	(0.020)	(0.020)	(0.022)	(0.024)	(0.022)
	N	114	159	159	159	159	159	158	158
	R2	0.005	0.004	0.205	0.188	0.175	0.153	0.008	0.006
OLS (all controls)	Refugees	-0.028	-0.013	0.030	0.056**	0.046**	0.072**	0.041	0.001
	Std. Error	(0.020)	(0.017)	(0.018)	(0.022)	(0.022)	(0.028)	(0.036)	(0.036)
	N	114	159	159	159	159	159	158	158
	R2	0.020	0.031	0.491	0.379	0.448	0.432	0.092	0.081
OLS (Vojvodina dummy excluded)	Refugees	-0.028	0.013	0.059***	0.082***	0.085***	0.113***	0.031	0.025
	Std. Error	(0.020)	(0.013)	(0.015)	(0.019)	(0.020)	(0.025)	(0.033)	(0.032)
	N	114	159	159	159	159	159	158	158
	R2	0.020	0.016	0.441	0.352	0.397	0.400	0.089	0.061
IV (no controls)	Refugees	0.019	0.013	0.136***	0.158***	0.174***	0.220***	-0.004	0.003
	Std. Error	(0.032)	(0.031)	(0.021)	(0.027)	(0.028)	(0.035)	(0.034)	(0.034)
	N	114	159	159	159	159	159	158	158
	R2		0.003	0.179	0.167	0.152	0.125		0.001
IV (all controls)	Refugees	0.083	-0.056*	0.019	0.057	0.041	0.065	-0.003	-0.055
	Std. Error	(0.106)	(0.032)	(0.031)	(0.038)	(0.038)	(0.046)	(0.052)	(0.054)
	N	114	159	159	159	159	159	158	158
	R2		0.022	0.490	0.379	0.448	0.432	0.080	0.062
IV (Vojvodina dummy excluded)	Refugees	0.083	-0.004	0.066***	0.097***	0.102***	0.129***	-0.006	-0.001
	Std. Error	(0.106)	(0.017)	(0.022)	(0.029)	(0.030)	(0.040)	(0.044)	(0.044)
	N	114	159	159	159	159	159	158	158
	R2		0.014	0.440	0.350	0.395	0.399	0.078	0.056

Note: This Table reports estimates of the effect of refugees on changes in the unemployment rate. *Refugees* are measured as number of refugees based on UNHCR1996 census divided by 1991 municipality population older than 15 years. A unit of observation is the municipality. Unemployment rate is defined as the number of unemployed divided by 1991 municipality population older than 15 years. Specification (no controls) contains only constant, specification (all controls) includes full set of controls, specification (Vojvodina dummy excluded) excludes dummy for Vojvodina. IV estimation uses distance from Knin and share of pre-war migrants from Croatia and Bosnia as instruments. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 2.12 shows the relationship between the change in the number of employed in the municipality and the number of refugees that settled in the municipality. Standard economic theory would predict that the shift to the right of the aggregate labour supply curve leads to lower wages and an increase in employment. However, the results in Table 2.12 do not support the theoretical expectation and find a negative association between the refugee influx and the increase in employment. The OLS coefficient suggests that employment decreased by 87 persons, in 1995 compared to 1991, for each 1000 refugees that came to the municipality. The IV estimate is lower and statistically insignificant, suggesting that refugees have settled in municipalities with negative employment trends.

Table 2.12 Refugee Influx and Change in the Number of the Employed

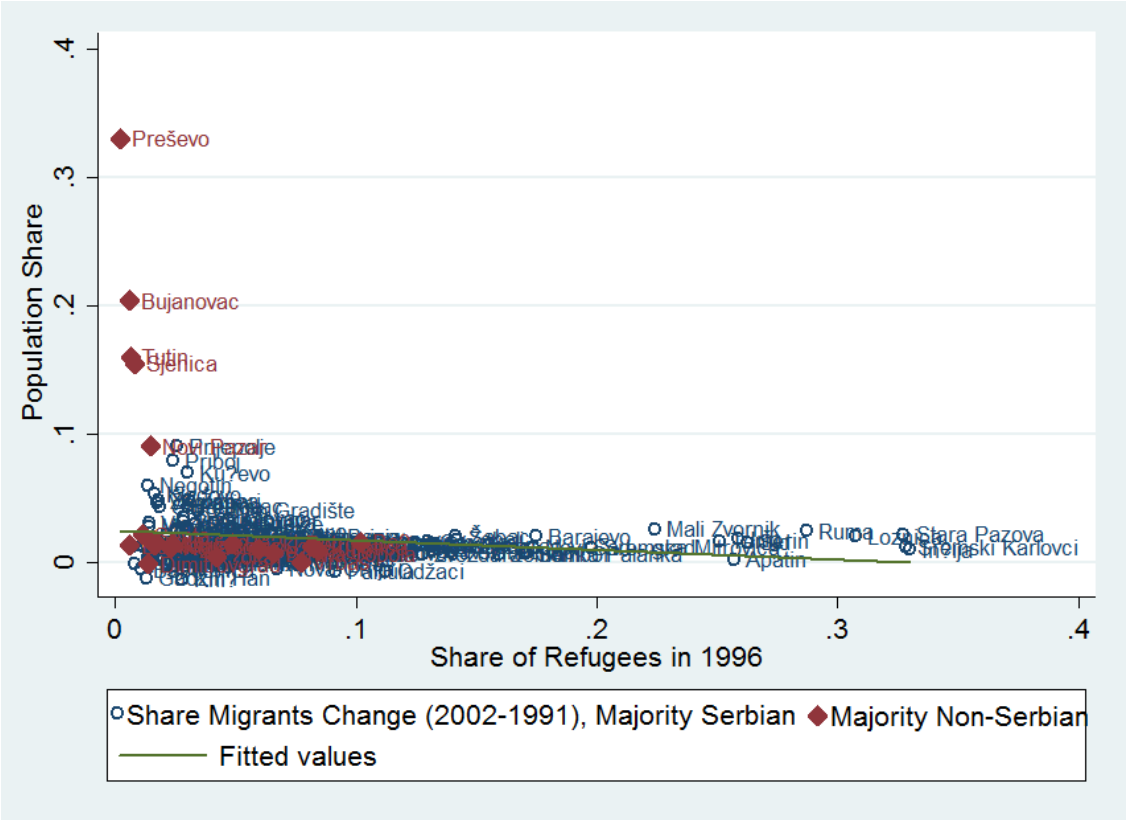
	Δ1995-1991		Δ1997-1991	
	OLS	IV	OLS	IV
Refugees (UNHCR 1996)	-0.087**	-0.024	-0.131**	-0.054
	(0.041)	(0.042)	(0.066)	(0.064)
Controls	yes	yes	yes	yes
Observations	159	159	159	159
R-squared	0.666	0.650	0.635	0.619

Note: This Table reports the estimates of OLS and IV regressions with the change in the total number of the employed in the municipality between years 1995 and 1991, and years 1997 and 1991, as the dependent variable, and share of refugees in the domestic population of the municipality according to UNHCR 1996 census as the main variable of interest. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Another possible channel of labour market adjustment is through the relocation of natives and refugees, either abroad or within Serbia[28]. To examine migration abroad, I look at the change in the share of persons working abroad between the 1991 and 2002 population censuses. Figure 2.5 shows that some municipalities have seen significant increase in migration rates between these years. The increase in migration is not related to the refugee influx, as in some municipalities the share of out-migrants in the population increased by more than fifteen percentage points, despite receiving a negligible number of refugees. These municipalities have a majority Muslim or Albanian population and have had traditionally high migration rates to Western Europe. The migration rates accelerated in the 90s when economic and political conditions deteriorated. Other municipalities with high migration rates are located in Eastern Serbia, which is also a poor region with traditionally high rates of migration abroad. Due to the low association of migration and refugee inflows in these municipalities, I was unable to find any statistically significant effects of refugee inflows on migration abroad when conducting regression analysis (results not presented but available upon request).

[28] In the Appendix section 0 I examine the relationship between refugee influx and population growth in the municipality. Population growth accounts for persons that were not captured in the census because they moved to a different municipality or a different country.

Figure 2.5 Change in Share of Migrants Abroad 2002-1991 and Refugee Influx



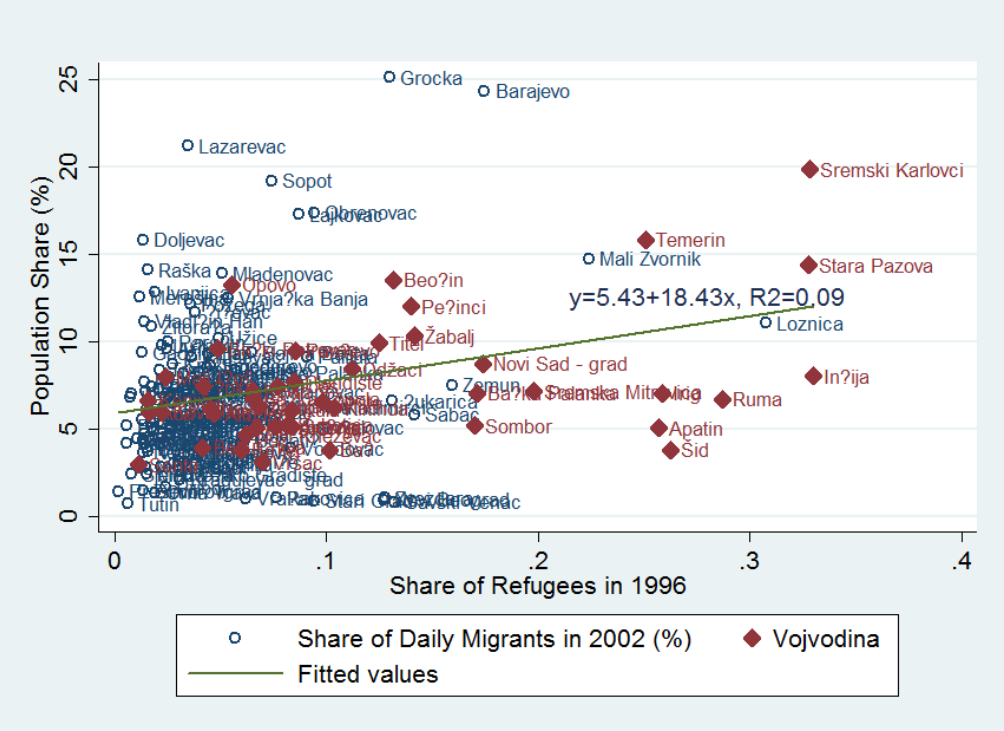
Source: Author's calculations based on SORS data.

Besides migration abroad, relocation of labour may have occurred within the country, from municipalities with a high share of refugees to those with better labour market conditions. To investigate this adjustment mechanism, I use data on the daily commuting of the natives, that is local residents who do not work in their place of residency but commute daily to another municipality or a different place within the same municipality. Because the data on commuters first became available in the 2002 population census, I have to base my analysis on cross-sectional estimates rather than on the comparison of the commuting rates before and after the refugee arrival.

Figure 2.6 shows that the municipalities with a high share of daily native commuters are municipalities located close to bigger cities, basically municipalities that form part of the Belgrade metropolitan area or municipalities close to Novi Sad, for example Sremski Karlovci. On the other hand, more rural municipalities, those that have a higher share of agricultural workers and a lower share of college educated population, have fewer daily commuters, most likely because people work on their estates and do not commute to work in the city. Areas around Belgrade and Novi Sad received many refugees, while rural areas in Serbia proper received fewer refugees, which leads to a positive association between share of refugees and share of natives that commute to work. More precisely, based on the OLS estimation presented in Table 2.13, a ten percentage point increase in the population share of refugees is associated

with a 2 percentage point increase in the share of natives who commute to work. The estimate decreases to 1.4 percentage points after I instrument for refugee share with the distance from Knin and the share of pre-war migrants.

Figure 2.6 Share of Daily Commuters and Refugee Influx



Source: Author's calculations based on SORS data.

Table 2.13. Effects of Refugees on Daily Commuting of Natives

	OLS		IV	
Share refugees (UNHCR 1996)	0.184***	0.202***	0.110**	0.137**
	(0.056)	(0.064)	(0.054)	(0.067)
Vojvodina		0.011		0.017
		(0.010)		(0.012)
Belgrade		0.081***		0.084***
		(0.020)		(0.020)
Share of industrial workers		-0.008		-0.011
		(0.041)		(0.042)
Share of agricultural workers		-0.094*		-0.103**
		(0.050)		(0.051)
Share of private sector workers		0.008		0.012
		(0.036)		(0.038)
Share of population with college degree		-0.537***		-0.527***
		(0.130)		(0.129)
Share of agricultural area		0.001		-0.002
		(0.024)		(0.025)
Population density		0.000		-0.000
		(0.002)		(0.002)
Constant	0.059***	0.098***	0.064***	0.103***
	(0.004)	(0.036)	(0.004)	(0.037)
Observations	159	159	159	159
R-squared	0.089	0.368	0.075	0.361

Note: This table reports the effects of refugee shock on daily migration of natives defined as number of natives that commute to work in 2002 divided by 15+ population of the municipality in 1991. A unit of observation is the municipality. Refugee shock is measured as a number of refugees according to UNHCR 1996 refugee census divided by 15+ population of the municipality in 1991. The IV estimation uses distance from Knin and share of pre-war migrants from Croatia and Bosnia as instruments. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

2.6.3 Robustness Checks

2.6.3.1 Refugee Population from Alternative Censuses

As explained in section 2.5.1, there have been several refugee censuses which differ in their timing and methodology. In this section I report the results of estimating Equation 15 with nominal wage growth as the dependent variable and estimates of the refugee population from SORS 1995, and population censuses from 2002 and 2011 as the explanatory variable. By looking at the results presented in

Table 2.14 we can observe that they follow the same pattern as the results from the UNHCR 1996 census presented in Table 2.9. Estimates are negative and statistically significant in year 1994, 1995, and 1996, and statistically insignificant in other years. Depending on the census, the estimates vary in magnitude. Regressions using later censuses (2011 and 2002) yield estimates that are larger in magnitude. This is because later censuses report a lower number of refugees. The lower number of reported refugees is the result of moving back home, migrating abroad, or being treated as a native instead of as a refugee during the census.

2.6.3.2 Leaving out Municipalities with the Highest and Lowest Refugee Share

This section examines the sensitivity of the results to outlier observations. In order to perform this check, I drop five municipalities which received the highest share of refugees and five municipalities with the lowest share of refugees. Dropping the top and bottom municipalities decreases the sample from 159 to 149. Table 2.15 presents the results of IV estimation of equation (15) on this smaller sample. Compared with the results of the estimation on the full sample, Table 2.9, the estimates become slightly more negative but remain statistically significant in years 1995 and 1996. The result provides support that the findings of this paper are genuine and not driven by a couple of outlier municipalities with high or low stocks of refugees.

Table 2.14. OLS and IV Estimates, Nominal Wage Growth, Additional Refugee Censuses

Specification	Variable	1990	1992	1993	1994	1995	1996	1997	1998
OLS SORS 1995	Refugees	-0.146	-0.089	-0.045	-0.425***	-0.504***	-0.346*	0.044	-0.067
	Std. Error	(0.256)	(0.113)	(0.097)	(0.137)	(0.148)	(0.185)	(0.261)	(0.282)
	N	159	159	159	159	159	159	159	159
	R2	0.082	0.230	0.047	0.223	0.188	0.160	0.156	0.150
IV SORS 1995	Refugees	-0.561	-0.073	-0.132	-0.596**	-0.789***	-0.569**	-0.282	-0.311
	Std. Error	(0.390)	(0.165)	(0.189)	(0.230)	(0.247)	(0.261)	(0.390)	(0.431)
	N	159	159	159	159	159	159	159	159
	R2	0.034	0.229	0.047	0.222	0.179	0.160	0.156	0.149
OLS Census 2002	Refugees	-0.187	-0.011	-0.172	-1.052***	-1.136***	-1.068**	-0.650	-0.593
	Std. Error	(0.308)	(0.217)	(0.234)	(0.305)	(0.335)	(0.423)	(0.596)	(0.597)
	N	159	159	159	159	159	159	159	159
	R2	0.082	0.230	0.047	0.223	0.188	0.160	0.156	0.150
IV Census 2002	Refugees	-1.173	-0.149	-0.273	-1.230**	-1.621***	-1.180**	-0.604	-0.669
	Std. Error	(0.826)	(0.348)	(0.390)	(0.493)	(0.532)	(0.531)	(0.804)	(0.893)
	N	159	159	159	159	159	159	159	159
	R2	0.034	0.229	0.047	0.222	0.179	0.160	0.156	0.149
OLS Census 2011	Refugees	-0.303	-0.098	-0.277	-1.038***	-1.077***	-1.018*	-0.594	-0.656
	Std. Error	(0.326)	(0.234)	(0.253)	(0.339)	(0.399)	(0.553)	(0.696)	(0.665)
	N	159	159	159	159	159	159	159	159
	R2	0.084	0.230	0.048	0.213	0.173	0.150	0.154	0.149
IV Census 2011	Refugees	-1.466	-0.161	-0.307	-1.434**	-1.982***	-1.403**	-0.724	-0.841
	Std. Error	(1.015)	(0.398)	(0.453)	(0.616)	(0.682)	(0.654)	(0.981)	(1.090)
	N	159	159	159	159	159	159	159	159
	R2	0.031	0.230	0.048	0.208	0.148	0.147	0.154	0.149

Note: This Table reports the estimates of repeated OLS and IV cross section regressions for the years 1990-1998. The dependent variable is the difference in the log of average nominal municipal wage with respect to 1991 as a base year. The IV specification uses distance from Knin and share of pre-war migrants from Croatia and Bosnia as instruments. SORS 1995 stands for data from refugee registration upon arrival, while Census 2002 and 2011 stand for the refugee population captured by 2002 and 2011 population census. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 2.15. IV Estimates, Excluding Top 5 and Bottom 5 Municipalities from the Sample

Specification	Variable	1990	1992	1993	1994	1995	1996	1997	1998
SORS 1995	Refugees	-0.748	-0.066	-0.138	-0.519*	-0.836***	-0.607*	-0.351	-0.477
	Std. Error	(0.492)	(0.171)	(0.208)	(0.271)	(0.305)	(0.323)	(0.472)	(0.532)
UNHCR 1996	Refugees	-0.875	-0.084	-0.175	-0.640*	-0.967***	-0.754**	-0.446	-0.576
	Std. Error	(0.582)	(0.225)	(0.253)	(0.327)	(0.353)	(0.377)	(0.553)	(0.624)
Census 2002	Refugees	-1.667	-0.156	-0.326	-1.201*	-1.840***	-1.416**	-0.840	-1.095
	Std. Error	(1.115)	(0.421)	(0.479)	(0.642)	(0.700)	(0.698)	(1.038)	(1.169)
Census 2011	Refugees	-2.123	-0.183	-0.384	-1.453*	-2.329**	-1.716*	-1.024	-1.385
	Std. Error	(1.413)	(0.496)	(0.576)	(0.825)	(0.925)	(0.886)	(1.303)	(1.462)

Note: This table reports the results of estimating equation (15) with the change in nominal wage growth as a dependent variable, after dropping five municipalities with the highest and five municipalities with the lowest share of refugees according to the UNHCR 1996 census. Each column uses a measure of refugee share from a different census. I instrument for refugee share using distance from Knin and share of pre-war migrants from Croatia and Bosnia as instruments. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

2.7 Conclusion

Most studies find minimal impact of immigration on the host labour markets. The main explanation behind the small impact is that migrants and natives have different skills and do not compete directly in the labour market. In this paper I addressed the issues of limited substitutability by examining the influx of refugees to Serbia during Yugoslav wars. Refugees that came to Serbia shared same ethnicity, language, and institutional background as the natives, which made them close competitors in the labour market.

I find a negative relationship between the share of refugees in the municipality and the wage growth. The estimates vary in range from -0.4 to -1.2 depending on the specification, year, and census used to measure the stock of refugees. The effect is in line with other studies that find negative effects, and implies that a ten percentage point increase in the refugee share is associated with a four to twelve percent decrease in the average wage of the municipality. The Effect is present for only couple of years after the conflict and wages return to their previous level in 1997. IV estimates are more negative suggesting that the OLS underestimates the results due to the endogeneity of the location choice. The effect on the real wage is greater in magnitude than the effect on the nominal wage, indicating that refugee influx not only led to a decrease in the nominal wage but also to an increase in consumer prices. By looking at the alternative labour market adjustment mechanisms, I find some evidence for the increase in the unemployment rate, no evidence for the higher share of migration abroad, and a positive association between the share of refugees and the share of natives who commute to work in a 2002 cross section.

The results in this paper are subject to several limitations that mostly stem from limited data availability. First, the study is based on data aggregated at the municipal level, so it is not possible to separately examine the effect on the wages of the natives from the effect on the wages of the refugees. Second, although migration was driven by the war, and thus by political and not economic reasons, there can still be a spurious correlation between refugee influx and wage growth. Refugees tended to locate in the municipalities close to the border, and these municipalities were the ones that suffered most from the negative effects of war: for example, the loss of market access to the municipalities across the border. The fact that Serbia was under UN trade sanctions during the whole of the 1991-1997 period, so the municipalities located on borders with countries which were not in the war also lost market access, partially appeases this concern. Finally, the average wage used in the analysis is calculated based on the wages from the official sector of the economy. However, due to economic sanctions, transition, and other historical reasons, there was and still is a big informal sector in Serbia that employs a significant part of the population. This study cannot say anything about the impact of refugee influx on the labour market indicators in the informal sector.

There are two main takeaways of the paper. The first is that differences in culture and skills cannot explain the limited impact of immigration on native wages. The limited impact might be due to other barriers, such as lack of social capital and access to social networks. In countries like Serbia, social networks are important determinants of labour market outcomes, since most jobs are found through personal contacts. However, the data used in this study is not appropriate to answer this question and the question remains for future research.

Second, the effect of the immigration shock is temporary. The study did not pin down the exact mechanism through which wages returned to the previous level. Possible mechanisms include government policies such as wage and employment increases in the public sector, donations from international donors that stimulate demand in the municipality, the selling of assets that remained in the country of origin and bringing that capital to Serbia. Discovering this adjust mechanism is also an exciting area for future research.

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Appendix

B.1 Refugee Inflow and Native Outflow

In this section I investigate the relationship between refugee influx and change in the domestic labour force of the municipality. I measure the change in the domestic labour force as the difference in the number of natives older than 15 years between the 2002 and 1991 population censuses. Besides the demographic factors, change in the domestic labour force is predominantly driven by migration to or from the municipality. This proxy for migration is broader than the share of workers temporarily working abroad or commuting to work, as examined in Section 2.6.2.5, because it includes persons who moved abroad or to another municipality permanently. Hence, this section comprehensively tests the extent to which native outflows neutralised refugee inflows.

Table 2.16 presents the regression results. The estimated coefficient is -0.2 and weakly statistically significant, implying that for every ten incoming refugees two natives left the municipality. Nevertheless, the effect is much smaller than one, implying that the refugee influx led to an increase in the population and labour supply of the municipalities.

Table 2.16 Changes in Native Population and Refugee Inflows

	Change in Native Population
Refugees	-0.212*
	(0.120)
Constant	-4,368.672***
	(412.925)
Observations	159
R-squared	0.076

Note: This table reports the results of regressing change in the native population of the municipality older than 15 years, between 1991 and 2002, and the number of refugees that came to the municipality, according to the UNHCR 1996 census. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

B.2 Serbian Economy in the Nineties

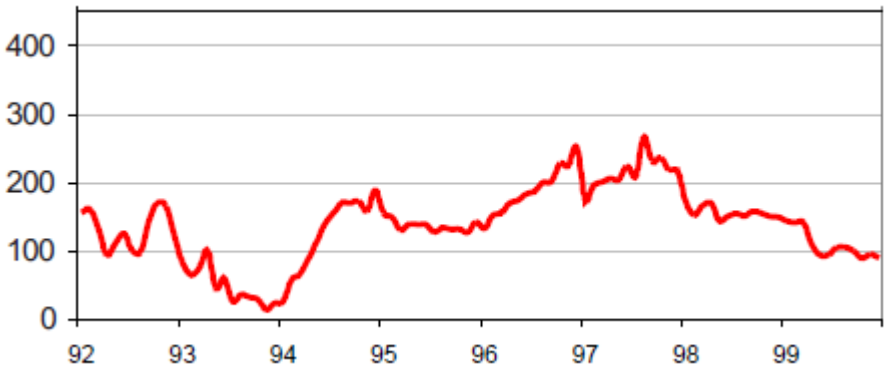
The Serbian economy entered the nineties with relatively better initial economic conditions than other countries of the Soviet bloc. This was because the former Yugoslavia instituted a quite particular economic system that relied to a great extent on firm autonomy and the independent decisions of economic agents. To cite Pejovich (1990): "horizontal relations – contracts between the firms, dominated vertical relations-administrative orders of the state". The main characteristics of the system were social ownership of the means of production and broad formal rights granted to workers. Through their participation in workers' councils, workers could participate in a firm's decision making, and influence management decisions. Private firms

existed, mostly represented in the services and agricultural sectors. However, private firms were allowed to employ only up to ten workers, besides the owner and his family members, so there were no large private firms. The country had a relatively well-developed modern banking system and was integrated into world trade and global financial flows.

Nevertheless, due to political constraints, the onset of the war and economic sanctions, these favourable economic conditions failed to materialise: Serbia became and remained transition laggard. In the four-year period from 1990 to 1993, the country underwent a complete economic collapse. In 1993, GDP was at 40% of its 1990 level and amounted to around 1,500 USD in per capita terms, compared with 2,941 USD in 1989. The country experienced one of the highest hyperinflations ever recorded in monetary history and the number of registered unemployed increased from 486 thousand to 580 thousand persons. This number should be taken with a grain of salt, however: on the one hand, hidden unemployment was widespread, since firms were not allowed to fire employees and an estimated 500 thousand people were on forced leave. On the other hand, many registered unemployed were actually working in the informal sector of the economy. In order to preserve their standard of living, many workers engaged in the practice of moonlighting (Reilly and Krstic, 2003), i.e. having a side job in addition to their official role. Personal consumption dropped substantially, and military consumption was taking up the lion's share of the state budget, leaving little space for expenditure on public services. In 1994, Serbia appointed the reformist National Bank Governor, Dragoslav Avramović, who managed to tackle hyperinflation and institute a stable and convertible currency. The economy began to recover, but the recovery was interrupted by the start of the Kosovo war, beginning with conflicts in the province between rebels and police in 1998, and then, by 1999, NATO intervention in Serbia.

Economic deterioration was followed by unfavourable structural changes within the economy (Palairet, 2001). At its lowest point, industrial production dropped to 30% of its pre-war level. Only agriculture, extractive industries and electricity production managed to preserve production, to some extent, and to increase its share of GDP, while other industries contracted severely (G17 Plus 2000). Economic activity moved to a shadow economy, which is estimated to have generated the equivalent of up to 52.7% of registered social product in 1992. Wages, measured in German DEM at the black market rate, continued to fall up to 1994, when they reached a low of 26 DEM, then peaked in 1998, when the average wage was around 280 DEM (Figure 2.7). This deterioration of economic conditions led to the substantial migration of skilled people to other countries, as well as to a decrease in the birth rate and an increase in the mortality rate.

Figure 2.7 Average Wage in Serbia (DEM)



Source: G17 Plus (2000).

Despite regular attempts, the Government failed to carry out any substantial market reform during the nineties. Privatisation law was passed in 1990, and again in 1991. The law encouraged insider privatisation, through which workers would buy shares and become the new owners of the firm. The privatization process was going quite well, particularly because hyperinflation made share prices a real bargain. Nevertheless, in 1994, one opposition party claimed that privatisation was unjust, because hyperinflation enabled workers to obtain shares for only a fraction of the true company value. In response, the Serbian parliament enacted the so-called "Law on revalorization" of the sale of "socially owned means" during the period from 1990 to 1994. This legislation repriced shares in companies, basically reversing the privatisation process, and diluting private ownership from 43 to a meagre 3 to 5 percent of the total capital (Hadzic 2002). Second privatization law was passed in 1997 but its effects were limited due to voluntary character, as worker councils could decide if the company should enter the privatization or not. In 1997 part of Serbian Telecommunication Company was sold to Greek and Italian investors which represented the biggest privatization in the period and produced significant revenue for the Government. During this period there was certain creation of new private enterprises and the number of SMEs has grown fivefold. However, these were rather small in size, engaged mostly in the service sector, so their share of production amounted to only one third of GDP (Hadzic 2002).

Labour market regulation also remained unreformed. Workers continued to enjoy broad rights inherited from the previous system, but there is a debate within the literature by Arandarenko (2001) and by Stanojevic (2003) concerning the actual strength of the workers' power. Both authors seem to agree that workers enjoyed broad formal rights, in the form of union organisations and workers' councils that encouraged the participation of workers in enterprise decision making. However, while Arandarenko argues that the workers' rights were only formal and decision making was done by politicians or managers, Stanojevic argues that workers' rights and employee activism were true phenomena. Stanojevic provides support for his hypothesis by pointing out the number of strikes that occurred and the active employee participation in the privatisation process. Nevertheless, both authors seem to agree that during

the 90s union power was quite weak, and that unions were "not respected by the Serbian political parties" Stanojevic (2003). Therefore, even though there were legal provisions for centralized collective bargaining and tripartite discussion on pensions, incomes and taxes, their influence was marginal and wage agreements were not enforced in practice.

B.3 Additional Tables

Table 2.17. Regressing Wages directly on Instruments

Specification		Variable	1990	1992	1993	1994	1995	1996	1997	1998
Time Knin	Without Controls	Refugees	0.010	0.009	0.005	0.034***	0.035***	0.021**	-0.005	-0.002
		Std. Error	(0.009)	(0.012)	(0.012)	(0.009)	(0.009)	(0.010)	(0.014)	(0.015)
		N	159	159	159	159	159	159	159	159
		R2	0.008	0.006	0.001	0.076	0.074	0.023	0.001	0.000
	With Controls	Refugees	0.011	0.006	0.010	0.033***	0.024*	0.026*	0.012	0.005
		Std. Error	(0.013)	(0.014)	(0.014)	(0.012)	(0.013)	(0.015)	(0.018)	(0.019)
		N	159	159	159	159	159	159	159	159
		R2	0.086	0.232	0.050	0.222	0.160	0.146	0.151	0.144
Previous Migrants	Without Controls	Refugees	-0.461*	0.009	0.076	-0.295*	-0.685***	-0.249	0.225	0.099
		Std. Error	(0.276)	(0.144)	(0.145)	(0.157)	(0.151)	(0.182)	(0.260)	(0.280)
		N	159	159	159	159	159	159	159	159
		R2	0.054	0.000	0.001	0.018	0.093	0.010	0.005	0.001
	With Controls	Refugees	-0.653	-0.039	-0.090	-0.499**	-0.822***	-0.527*	-0.280	-0.379
		Std. Error	(0.410)	(0.144)	(0.170)	(0.235)	(0.246)	(0.275)	(0.414)	(0.462)
		N	159	159	159	159	159	159	159	159
		R2	0.124	0.230	0.047	0.200	0.192	0.143	0.152	0.149

Note: This table reports estimates from regressing nominal wage growth on instruments, driving time from Knin and share of pre-war migrants. Specification "With Controls" includes municipality specific controls described in section 2.5.3, while specification "Without Controls" contains only instrument and constant. A unit of observation is the municipality. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

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Table 2.18. OLS Estimates, Wage Growth without Controls

Specification	Variable	1990	1992	1993	1994	1995	1996	1997	1998
Nominal Wage	Refugees	-0.019	-0.039	0.012	-0.434***	-0.591***	-0.208	0.263	0.152
	Std. Error	(0.173)	(0.140)	(0.138)	(0.125)	(0.143)	(0.171)	(0.226)	(0.225)
	N	159	159	159	159	159	159	159	159
	R2	0.000	0.000	0.000	0.043	0.078	0.008	0.007	0.002
Real Wage	Refugees	0.021	-0.235	-0.076	-0.522***	-0.688***	-0.224	0.284	0.050
	Std. Error	(0.161)	(0.161)	(0.172)	(0.171)	(0.155)	(0.158)	(0.224)	(0.229)
	N	159	159	159	159	159	159	159	159
	R2	0.000	0.009	0.001	0.047	0.084	0.009	0.008	0.000

Note: This table reports OLS estimates from regressing nominal and real wage growth on share of refugees in the population of municipality according to UNHCR 1996 census. Specification contains constant, without any controls included. A unit of observation is the municipality. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

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Chapter 3

Foreign Firms and Corporate Philanthropy: Evidence from Serbia

3.1. Introduction

In May 2014, Serbia was hit by floods that the media described as "the worst natural catastrophe that has ever hit Serbia"[29]. The floods caused substantial material damage, estimated at EUR 1.53 billion – around 5% of the Serbian GDP – and there were 57 deaths registered. Both foreign- and domestic-owned firms responded to the Serbian authorities' plea for help. Companies such as KKR and Coca Cola topped the list of monetary donations, contributing more than EUR 100 thousand. Numerous domestic companies made monetary and/or material donations.

However, flood relief is only one of many examples of corporate philanthropy. Corporations provide much of the social infrastructure and support various charitable causes, including sports, arts and science. Despite its growing importance, corporate philanthropy has been the focus of only a limited number of empirical economics studies.

This paper adds to the literature by exploiting a unique dataset of 2,000 Serbian companies over the period from 2010 to 2013. Unlike companies in other countries, Serbian companies report donations expenses in their financial statements. This provides for better coverage, compared with previous studies which relied on company surveys or aggregated industry data from tax authorities. Besides the unique dataset, the study contributes to the literature by being the first to compare the donation behaviour of foreign and domestic firms using regression analysis. There is only a handful of papers with a similar research question, all using a qualitative approach.

Whether foreign firms donate more than domestic firms is an empirical question. On the one hand, foreign firms have more resources and come from environments with widespread corporate social responsibility practices (CSR in what follows). On the other hand, domestic firms have more personal and emotional connections to their local communities. Moreover, domestic firms are less mobile than foreign firms, so they are more likely to adopt a long-term view and invest in the image of a good corporate citizen. Compared with domestic firms, foreign firms are more mobile and less likely to worry about their long-term image in a particular country.

[29] https://en.wikipedia.org/wiki/2014_Southeast_Europe_floods

The empirical part of the paper is based on the regression analysis, with the donations expenses as a dependent variable. In addition to donations expenses as a share of revenues, I also look at the absolute amount of donations, the probability of making donations, and the donations amount given when making a donation. The main explanatory variable is a foreign ownership dummy. In addition to examining whether foreign firms spend a higher or a lower share of their revenues on charitable donations, when compared with domestic firms, the paper investigates the relationship between the donations expenses of foreign companies and the characteristics of their home country: economic development and legal origins. Last but not least, the paper examines the relationship between donation spending and the share of foreigners within the firm's management.

Understanding the corporate giving patterns of foreign firms is important for several reasons. First, many countries are undergoing periods of fiscal austerity and are cutting their support for social projects. Corporate giving can compensate for the drop in public funding and fill the gap in social infrastructure investment that arises during periods of fiscal austerity. Second, countries often spend significant amounts of money on subsidies to foreign investors. There is a vast amount of literature that calculates the benefits of FDI in terms of higher productivity, employment, and the spillover effects on other firms. However, not many studies looked at how much foreign investors actually "give back" to the community, a factor that should also be taken into account when analysing the returns on public subsidies.

The main finding of the paper is that foreign firms donate less than domestic firms, but that there is significant heterogeneity in the donation expenses of foreign firms, depending on the country of origin and the share of foreigners within the management of the firm. In a regression of donations expenses on foreign ownership dummy, I find that foreign firms donate 0.04 percentage points of revenues, or 300 thousand dinars, less than domestic firms, have a four percentage points lower probability of donating, and also, conditional on their making donations, donate 0.05 percentage points of revenues less. Firms from developing and offshore countries donate less than firms from developed countries. Consistent with Liang and Renneboog (2017), I find that firms from common law countries donate less than firms from civil law countries. Last but not least, there is a negative correlation between the share of foreigners in a firm's management and donations expenses: firms with management comprised only of foreigners on average donate 0.08 percentage points of revenues less than firms with only domestic managers.

The rest of the paper is organised as follows. In Section 3.2 I review relevant theoretical and empirical literature on corporate giving and on CSR in general. Section 3.3 develops the hypothesis that will be tested in the empirical part of the paper. Sections 3.4 and 3.5 present the data and the estimation strategy, after which I present the results in Section 3.6. The paper concludes in Section 3.7.

3.2. Literature Review

Table 3.1 presents an overview of the main motives behind CSR behaviour, as identified by the previous literature[30]. Even though the motives are economic in nature, economists have only recently started to be interested in this topic, so most of the work cited below was carried out by sociologists and business scholars. The papers are predominantly descriptive, based on discovering correlations in the data, or on the qualitative evaluation of interviews with company managers. Nevertheless, the literature has proposed numerous determinants of corporate social responsibility and provided the first empirical evidence to support the proposed hypothesis. In this section, I summarize the literature by going through each determinant in the Table and citing the most relevant papers.

"Doing well by doing good" is one of the main explanations for the existence of corporate philanthropy. This explanation views corporate philanthropy as part of a marketing strategy motivated by a company's self-interest. Stendardi (1992) argues that the U.S. in the 1980's has seen a shift from philanthropic giving to social investing. Companies invest in the image of a socially responsible corporate citizen and reap benefits in the form of increased sales and customer loyalty, employee motivation, and preferential treatment by local and state authorities. The hypothesis is supported by Fry et al. (1982) who find a strong correlation between advertising expenditure and corporate giving, as well as between exposure of the industry to the public contact and corporate giving. The Authors interpret the findings as evidence that firms use charitable giving to promote their brand and products.

An opposite hypothesis is that "doing well enables doing good", which suggests that more profitable companies are more likely to engage in corporate giving. There are three channels through which higher profits lead to higher donations. First, the price of donations is lower for profitable companies than for loss-making ones, since charitable donations are usually tax deductible, Webb (1996). Second, managers often use simple heuristics in terms of percentage of profit when determining how much to give to charity (McElroy and Siegfried (1986)). Finally, profitable companies might feel a moral obligation to give because not doing so might result in a loss of legitimacy within their communities. Seifert et al. (2004) use structural equation modelling on a sample of 157 Fortune 1000 firms and find that firms with higher cash flows donate more. They find that corporate giving has no effects on shareholder returns, which contradicts the "doing well by doing good" hypothesis. Hong et al. (2012) apply two clever identification strategies and find a positive relationship between financial performance and CSR scores. First, they explore the relaxation of financial constraints during the Internet bubble and show that the CSR scores of the firms that became financially unconstrained during the bubble but were constrained before the bubble increased relative to the scores of the firms that were financially unconstrained before the internet bubble started. Second, the authors argue that for financially constrained firms there is a strong correlation between investment and stock price, because constrained firms finance investments by issuing equity. For financially unconstrained firms, the correlation is low, as they can fund investments from internal sources and do not have to issue new equity when an investment opportunity arises. Building on this premise, the authors compare the CSR scores of financially constrained and financially unconstrained firms during

[30] I review CSR literature because it is more comprehensive than corporate giving literature and because the determinants of CSR behavior are also relevant for donation behavior.

idiosyncratic shocks to stock valuations. They find that the CSR scores of financially constrained firms increase more with increases in stock valuation than the CSR scores of financially unconstrained firms. Nevertheless, Hong et al. (2012) do not exclude the possibility that the causation goes other way as well: from social investments to increase in profits and market returns; they propose finding strong instruments for corporate goodness as a direction for the future research.

Several studies identified firm size as an important determinant of corporate giving. Amato & Amato (2007) find a non-linear relationship between firm size and corporate giving, using a sample of 1999 IRS data aggregated across 11 asset size classes and 83 industries. Non-linearity suggests that small firms donate more because they have strong community ties, big firms donate more because they have greater visibility, while medium sized firms are between the two extremes and spend less on charity.

Industry affiliation is the next important determinant of corporate giving (Amato & Amato (2007), Fry et al. (1982), Johnson (1966), McElroy and Siegfried (1986), Cao et al. (2016)). Dependence on consumer sales and intensity of public contact varies between industries; firms that operate in more visible industries are more likely to use charitable giving as a way of improving their social image. Johnson (1966) expects the highest donations spending in intermediate cases when industry is neither perfectly competitive nor monopolized. He argues that in a world of perfect competition, prices are equal to marginal costs, so that any firm making donations will incur losses and will be pushed out of the market. On the other hand, in the case of a monopoly, one firm holds all the market power and does not have any incentives to donate because donation expense would not result in a higher market share. Cao et al. (2016) use CSR shareholder proposals to identify the peer effects of CSR using regression discontinuity design. The Authors find that peers of the firms that marginally adopted the CSR proposal are more likely to adopt CSR practices than peers of the firms that marginally rejected the CSR proposal. The effect is stronger for closer competitors and peers that have financial analyst's coverage.

The findings of agency theory are also useful in predicting the patterns of corporate charitable giving (Barnard (1996), Galaskiewicz (1997), Werbel and Carter (2002), Brown et al. (2006), Cheng et al. (2013), Masulis and Reza (2014)). Based on interviews with CEOs and philanthropic leaders, Galaskiewicz (1997) documents the existence of "old boy" networks between donors and receivers of charitable giving; donations are solicited through personal ties between a firm's CEOs and local philanthropic leaders. Werbel and Carter (2002) provide evidence for the workings of agency theory by finding a strong association between CEO interests and the form of corporate giving: for example, if the CEO is a member of an arts group the corporation is more likely to sponsor the arts. Cheng et al. (2013) and Masulis and Reza (2014) use decrease in marginal tax rate by 2003 tax reform as a natural experiment that increased the price of donations and find a negative relationship between CEO ownership--proxy for lower agency problems-, and corporate charitable giving.

Campbell (2007) emphasises the importance of the institutional setting as a determinant of the social behaviour of corporations. He identifies the five most relevant institutional factors that shape the interaction between a corporation and its stakeholders: "public and private regulation, presence of nongovernmental and other organisations that monitor corporate behavior,

institutionalized norms regarding appropriate corporate behavior, associative behavior among companies themselves, and organized dialogues between companies and their stakeholders".

Liang and Renneboog (2017) analyse the CSR ratings of 25,000 securities of large corporations around the world, identifying strong correlation between a country's legal origins and CSR scores. Companies from civil law countries tend to have a higher CSR score than companies from common law countries, while the CSR score is highest in countries with Scandinavian legal origins. The authors offer several explanations for this pattern: greater societal demand for CSR activities, a high degree of state involvement in business activities, and stricter labour regulations in civil law countries; shareholder over stakeholder primacy in common law countries.

Campbell et al. (2012) is one of the few studies that analyse the CSR behaviour of foreign firms. The authors use examinations of banks for compliance with the Community Reinvestment Act as a proxy for CSR behaviour, correlating this with various measures of distance from the home country. They find that foreign bank affiliates from countries with less cultural, administrative, geographical, and economic distance from the U.S. are more likely to meet the credit needs of lower income areas. Extending credit to low income areas is a proxy for CSR, since it involves doing something over and above what is required by regulations.

Cai et al. (2011) find that firms often mask 'grease payments' (bribes), by recording them under entertainment and travel costs on the balance sheet. I argue that similar logic can be applied to donations spending. For example, the Serbian press[31] wrote about the allegations of corruption within the Foundation of Dragica Nikolić, wife of the former Serbian president. The allegations claimed that certain private firms were asked to make donations to the foundation. Interestingly, as part of response to the allegations, the Foundation invoked donor privacy guaranteed by law, and refused to make public the names of its donors.

Several studies examine the impact of the socialist legacy on corporate philanthropy in Eastern Europe. Koleva et al. (2010) conduct interviews with representatives of 19 companies from the Czech Republic, Slovakia, Romania, and Bulgaria, and question them about their CSR practices. The authors conclude that CSR is not a privilege of developed economies, and that domestic firms still follow CSR practices inherited from the socialist period. Stoian and Zaharia (2012) reach a similar conclusion when surveying the CSR expectations of domestic and foreign company employees in Romania. The authors reject the hypothesis of exogenous spreading of CSR practices through multinationals and through workers who have experience of working for multinationals. On the contrary, they show that domestic workers with socialist experience are those who have high expectations regarding the social involvement of the company. The finding is consistent with Kornai's (1992) description of the paternalistic relations between the state, firms and local communities that existed under socialism. Firms were expected to provide much of the social infrastructure: schools, hospitals, urban housing etc., in return for state support. Nevertheless, both Koleva et al. (2010) and Stoian and Zaharia (2012) point out the break with socialist practices that occurred at the start of the transition. Many firms used the consequent institutional vacuum to engage in short-termism, by exploiting legal and tax loopholes, and not respecting even minimal labour standards.

[31] http://www.politika.rs/sr/clanak/377926/Agencija-za-borbu-protiv-korupcije-proverava-donatore-fondacije-Dragice-Nikolic

Table 3.1 Overview of CSR/Corporate Giving Literature

Determinant	**Finding/Explanation**	**Study**
Marketing intensity of the product	Enlightened self-interest, reinforcing company's social image	Fry et al. (1982), Stendardi (1992)
Profit/Cash Holdings	Firms that do well do good; managers have more resources on their discretion	Galaskiewicz (1997), Seifert et al. (2004), Hong et al. (2012)
Firm size	Larger firms have more resources and higher visibility; smaller firms have more connections with local communities	Amato & Amato (2007)
Industry Affiliation	Dependence on sales to consumers and intensity of public contact; peer effects and CSR as an instrument of non-price competition	Johnson (1966), Fry et al. (1982), McElroy and Siegfried (1986), Amato & Amato (2007), Cao et al. (2016)
Managerial characteristics/Agency theory	In the case of agency issues, managers tend to follow their interests and personal connections when choosing to whom to donate	Barnard (1996), Galaskiewicz (1997), Werbel and Carter (2002), Buchholtz et al. (2004), Brown et al. (2006), Cheng et al. (2013), Masulis and Reza (2014)
Institutional setting	CSR varies between countries; institutions shape the relationship between companies and stakeholders	Campbell (2007)
Legal Origin	Companies from civil law countries tend to have a higher CSR score than companies from common law countries, and the CSR score is the highest in countries with Scandinavian legal origins	Liang and Renneboog (2017)
Tax rate and laws	Price of donations decreases as tax rate increases, because donations are tax-deductible	Cheng et al. (2013), Masulis and Reza (2014)
Distance between home and host country	Increase in distance is associated with less emotional connection to host country, and more uncertain returns on CSR	Campbell et al. (2012)
Corruption	Firms mask corruption payments by falsely recording it under travel and entertainment costs	Cai et al. (2011)

Note: This Table summarizes the main determinants of CSR identified in the literature

This study adds to the literature by using a novel dataset on donations spending in Serbia. The uniqueness of the dataset stems from the fact that donations spending was part of the chart of accounts and reported on the balance sheets of Serbian companies. The coverage of these companies is therefore much better than in related studies based on interviews, aggregated IRS data, or charitable giving reports. This study quantifies the differences between foreign and domestic companies, in contrast with previous studies of corporate giving by foreign companies, which relied on a qualitative approach. In a section that looks at the impact of legal origins, this study differs from Liang and Renneboog (2017) because it uses donations spending as a dependent variable, while Liang and Renneboog (2017) used CSR scores. Last but not least, the study sheds light on the role of foreign managers in corporate giving, a question that has not yet been addressed in the literature.

3.3. Hypothesis Development

There are several arguments that support the hypothesis that domestic firms donate more than foreign firms. First, foreign companies lack social connections and emotional attachment to the local community. Often they are part of a global supply chain, with limited contact with domestic customers. Domestic firms have more ties to the local community, through social networks and the emotional connections of owners or managers. Second, domestic firms are much less mobile than foreign firms. As a result of this lower mobility they are likely to have more long-term orientation and to invest in their social image. Last but not least, Serbia has a strong socialist heritage, within which companies took on many social functions. Due to the slow decay of cultural norms, this heritage is still evident. These arguments lead to the following hypothesis:

Hypothesis 1: Domestic firms donate more than foreign firms.

The level of development of CSR practices varies across countries. Some firms come from countries with low levels of economic development, where CSR practices are just beginning to emerge. Others come from developed countries with a long history of corporate philanthropy. Their parent companies devote substantial resources to CSR activities, so it is reasonable to expect that the parent companies transplant CSR practices into their Serbian subsidiaries. Finally, some foreign firms are registered in offshore countries and represent a legal construction with the main aim of saving on taxes. Based on the above discussion, I develop the following hypothesis:

Hypothesis 2: Foreign firms from developed home countries donate more than firms from developing or offshore countries.

La Porta et al. (1997) and La Porta et al. (1998) initiated an exciting research area concerning the effects of legal arrangements on economic outcomes. This research is based on the claim that legal arrangements are largely pre-determined by a country's legal origin, broadly defined as "highly persistent systems of social control of economic life" (La Porta et al. (2008)). Legal origins are either endogenously developed or, more often, transplanted through colonisation and conquest. Comparative law literature classifies all countries, based on their legal origin, into two large groups: common law and civil law countries. Civil law countries can be further subdivided

into French, German, Scandinavian, and Socialist civil law countries[32]. The main difference between common and civil law origin is that common law relies heavily on market forces, allowing for free contracting and negotiation between economic actors. Disputes are settled ex-post by a judiciary, which relies on decisions from similar cases in the past. On the other hand, civil law is based on ex-ante rules, prescribed by the government. The government attempts to predict potential issues and prescribe optimal solutions in advance. When settling disputes, judges base their decisions on the laws prescribed by the legislator, rather than relying on examples from the past.

Liang and Renneboog (2017) argue that legal origins can explain cross-country variation in CSR practices. Civil law countries have a higher demand for CSR activities, because of the preferences of consumers and citizens for companies to be altruistic and pro-social. The propensity of firms to engage in CSR activities in civil law countries can be either higher or lower than in common law countries. On the one hand, firms in civil law countries tend to adhere closely to the rules, so it is unlikely that they would do something over and above what is required by law. On the other hand, civil law countries offer less legal protection to investors,[33] so managers are more likely to engage in discretionary CSR spending. In common law countries, shareholders are likely to file a suit against them for a breach of fiduciary duty, which limits managers' discretionary spending. In their empirical analysis, Liang and Renneboog (2017) find that legal origins explain the significant part of variation in CSR ratings. Firms from English common law countries have lower CSR scores than firms from civil law countries, while firms from countries with Scandinavian civil law origin have the highest scores.

In order to link the donation behaviour of parent companies with that of subsidiaries, I refer to the work of Burstein and Monge-Naranjo (2009) and Bloom et al. (2012), who showed that multinational firms transplant their management and organisational practices across countries. It is fair to assume that CSR practice can also be transplanted across the subsidiaries of multinational firms, leading to the following hypothesis:

> *Hypothesis 3*: Firms from home countries with civil law legal origins donate more than firms from common law countries.

Management characteristics are an important determinant of corporate practices. For example, Malmendier et al. (2011) find that personal experiences, such as growing up during the Great Depression or serving in the military have significant explanatory power for corporate financing decisions. In the context of charitable giving, Galaskiewicz' (1997) research has shown that most of the giving is done through personal connections of the managers with representatives of the charities. On the one hand, foreign managers — especially those that come from developed countries[34] — are more accustomed to corporate philanthropy practices. On the

[32] There are political entities which represent hybrid or mixed legal systems, most notably: Louisiana, Quebec, Scotland, and South Africa. (Kim, 2009). The entities do not fit neatly in La porta et al.'s classification, and the authors seem oblivious to the issue.

[33] Armour et al. (2009) show empirically that the civil law countries were actually quite quick in catching up with the global standards of shareholder protection.

[34] There is a high correlation between the home country of the firm and the manager's country of origin so it is difficult to disentangle the effects of the two. For that reason, in the empirical analysis I investigate only the effect of foreign managers and do not go into detail by looking at the level of economic development and legal origins of the managers' country of origin.

other hand, compared with foreign managers, domestic managers have more personal contacts and emotional ties to the local community. Assuming that the effect of community attachment is stronger than the effect of previous experience leads to the following hypothesis:

Hypothesis 4: Firms with a higher share of domestic directors donate more than firms with a higher share of foreign directors.

3.4. Data Description

The main source of data used in this study is financial statements available at the website of the Serbian Business Registers Agency[35]. Besides the standard financial information, the statements report a line item called "Expenses for humanitarian, cultural, health, educational, scientific and religious means, for environmental protection and for sports[36]" that I use as a measure of *Donations expense*. This measure is quite broad and encompasses all areas of corporate philanthropy that have an impact on the wellbeing of the local community. The Business Register Agency started publishing financial statements on its website in 2011 but *Donation expense* was part of the chart of accounts only until 2013, which limits the study period to the years from 2010 to 2013. In addition to *Donations expense*, I source *Assets*, *Net income*, and *Cash and cash equivalents* from companies' financial statements. I express all the variables except *Assets* as a share in revenues, while for *Assets* I take a logarithmic transformation.

I complement the financial statements with ownership and management information, also available on the website of Serbian Business Registers Agency[37]. I mark the firm as *Foreign* if legal or natural persons from abroad hold more than a 50% equity stake. As most of the companies are small and unincorporated, they do not have management and supervisory boards, so I use the company's legal representatives ("Zakonski Zastupnici" in Serbian) as a proxy for the management team. Legal representatives are persons who are allowed to sign contracts, financial statements, and represent the company. In most of the cases, the legal representative is the same as the CEO of the company and 90% of the companies in the sample have only one legal representative. I calculate *Share of foreign directors* in the management team by dividing the number of foreign legal representatives by the total number of legal representatives. The website reports only the latest shareholder and management structure, so I use the structure at the time of scraping in 2017. Information from 2017 should represent a good proxy for the structure at a time of the analysis because firm ownership[38] and management structure[39] tend to be stable over time. However, I had to drop 179 firms that went bankrupt from the sample: their current legal representative is a bankruptcy manager, which is clearly different from the management composition at a time of the study.

[35] http://fi.apr.gov.rs/prijemfi/cir/objavljivanje.asp?strsearch

[36] Translated from Serbian: "Rashodi za humanitarne, kulturne, zdravstvene, obrazovne, naučne i verske namene, za zaštitu čovekove sredine i za sportske namene". Example excerpt is shown on Figure 3.1 in the Appendix.

[37] http://pretraga2.apr.gov.rs/ObjedinjenePretrage/Search/Search

[38] According to S&P Capital IQ there were 360 mergers and acquisitions in Serbia's non-financial sector during the period 2010-2016, and many of the companies included in the mergers are not part of the sample.

[39] In their analysis of corruption in CEE firms, Hanousek et al. report an average CEO tenure of 11 years.

I use 2009 GDP per capita PPP (current international $) values from the World Bank's World Development Indicators database[40] to classify all foreign firms into: *Developed*, *Developing*, and *Offshore*. *Developed* firms come from home countries whose GDP exceeds $20,000; home countries of *Developing* firms have GDP under $20,000. A number of firms in the sample have owners that are registered in offshore countries like the British Virgin Islands or Cyprus, so I make a separate category *Offshore* for these firms, independently of their home country's GDP level. In some cases, offshore firms are actually owned by Serbian tycoons and hence are not genuinely foreign.

Similarly, I classify foreign firms into those with *English common law*, *German civil law*, *French civil law*, or *Scandinavian civil law* origin based on their home country and La Porta's et al. (2008) classification.

In addition, I scrape all public procurement contracts available on the Public Procurement Portal[41] of the Serbian Public Procurement Office. I classify a firm as *Procurement dependent* if the total value of completed public procurement contracts in a given year exceeds 10% of the revenues.

Table 3.2 shows summary statistics separately for domestic and foreign owned firms. The sample is an unbalanced panel of 7,300 observations on 2,303 firms and covers the years from 2010 to 2013. Most of the firm year observations are domestic: 6,122; while there are 1,178 observations on the foreign firms. Domestic firms spend on average 0.18% of revenues on charitable donations, which is higher than the average of 0.13% for the foreign firms. To put these percentages into perspective, companies in the sample made average yearly revenue of around 2 billion dinars (1 EUR= around 110 RSD) and made average yearly donations of 2 million dinars. The majority of the foreign firms come from developed countries, 69%; developing countries are represented with 19%, while offshore companies make up 12% of the foreign sample. There is a substantial variation in the GDP levels of the home countries. The poorest home country in the sample is Macedonia, with GDP per capita of around 11, 000 $, while the richest is Luxembourg, with GDP per capita of 80,784 $. Looking at the legal origin distribution, most of the foreign firm years have German civil law origin, 49%, followed by French civil law origin at 32% and English common law at 15%. This distribution is predictable, because Serbia is located close to the EU's southern border and most of the foreign investors come from Continental Europe. As expected, the average share of foreign directors in domestic firms is 2%, which is significantly lower than 38% for the foreign firms. Public procurement is a more important source of revenues for domestic firms, 12% of the firm years, than for foreign firms: only 9% of the foreign firm years had public procurement revenues higher than 10% of total revenues. Surprisingly, domestic firms tend to be more profitable on average, 2.27% profit margin compared to 0.96% for the foreign firms. However, when interpreting this result, one should take into account that the profit margins of the domestic firms exhibit more variation, lower minimum and higher maximum value, so the mean might not be representative statistic for comparing the two distributions. Domestic firms hold less liquidity: their average cash holding is 3.44% of the revenues compared to 4.94% for the foreign firms. Last but not least, foreign firms

[40] Retrieved from http://data.worldbank.org/data-catalog/world-development-indicators .

[41] http://portal.ujn.gov.rs/Izvestaji/IzvestajiVelike.aspx .

are bigger on average but the size distribution for domestic firms has longer tails, with very large and very small firms.

Table 3.3 presents the distribution of donations expense. A substantial number of firm years comes without any donations expense: 40% for the foreign and 34% for the domestic sample. When firms donate, they tend to do so in small amounts: 57% of the foreign sample and 63% of the domestic sample donate less than 1% of their revenues. Interestingly, the percentage of foreign firm years with donations greater than 4% of the revenue is 0.34% which is greater than 0.15% for the domestic firm years.

Comparing the unconditional distributions of the donations expense abstracts from the fact that foreign firms might be different than domestic firms in terms of size, profitability, and other operating characteristics. Foreign firms might donate less because they are less profitable or operate in different industries than domestic firms. To properly control for firm characteristics, I include a rich set of control variables in a regression model. The regression model is presented in the next Section.

3.5. Estimation Strategy

To capture the relationship between foreign ownership and donations expense I estimate the regression of the form:

$$Donations\ expense_{it} = \alpha + \beta * Foreign_i + Controls_{it} + \eta_t + \mu_j + \mu_j * \eta_t + \varepsilon_{it}, \qquad (1)$$

where $Donations\ expense_{it}$ measures charitable contributions (scaled by revenues)[42] of the firm i in the year t. The main variable of interest is $Foreign_i$ which represents the foreign ownership dummy. The positive value of the dummy coefficient indicates that on average foreign firms spend a higher share of their revenues on donations than domestic firms, while a negative value indicates the opposite: that domestic firms donate relatively more than foreign firms. I include a rich set of controls to make sure that the results are driven by a variable of interest and not by omitted variables. The choice of controls is based on the discussion of determinants of corporate donations, which is presented in the Literature Review section and summarized in Table 3.1. Controls include: *Public procurement* dummy for firm years where value of public procurement contracts won exceeds 10% of the yearly revenues, *Profit margin* (net income/revenues) which measures profitability of the company, *Share cash* calculated as the ratio of cash and cash equivalents to revenues that measures available liquidity and resource slack, and *log(Assets)* which represents the logarithm of total assets and proxies for the size and available resources of the company. Specification includes year dummies, η_t, industry dummies on a 2-digit NACE2 code level, μ_j, and their interaction, which controls for differing time trends between industries.

[42] In section 3.6 I also report the results of the regression specification with the absolute amount of donations as the dependent variable.

Table 3.2 Summary Statistics

	Domestic					Foreign				
Variable	Count	Mean	St Dev	Min	Max	Count	Mean	St Dev	Min	Max
Donations Expense (%)	6122	0.18	0.43	0.00	4.99	1178	0.13	0.39	0.00	4.94
Foreign	6122	0.00	0.00	0.00	0.00	1178	1.00	0.00	1.00	1.00
Developed	6122	0.00	0.00	0.00	0.00	1164	0.69	0.46	0.00	1.00
Developing	6122	0.00	0.00	0.00	0.00	1164	0.19	0.39	0.00	1.00
Offshore	6122	0.00	0.00	0.00	0.00	1164	0.12	0.33	0.00	1.00
English common law	6122	0.00	0.00	0.00	0.00	1164	0.15	0.36	0.00	1.00
French civil law	6122	0.00	0.00	0.00	0.00	1164	0.32	0.47	0.00	1.00
German civil law	6122	0.00	0.00	0.00	0.00	1164	0.49	0.50	0.00	1.00
Scandinavian civil law	6122	0.00	0.00	0.00	0.00	1164	0.04	0.19	0.00	1.00
log(GDP)	6122	9.38	0.00	9.38	9.38	1164	10.36	0.42	8.93	11.30
Share foreign directors	5796	0.02	0.13	0.00	1.00	1126	0.38	0.45	0.00	1.00
Public procurement	6122	0.11	0.32	0.00	1.00	1178	0.08	0.27	0.00	1.00
Profit margin (%)	6120	2.27	14.27	-69.84	68.82	1178	0.96	13.50	-69.93	63.15
Share cash (%)	6094	3.44	6.39	0.00	69.74	1177	4.94	8.03	0.00	65.05
log(Assets)	6122	13.25	1.29	7.80	19.95	1178	13.77	1.35	11.41	18.29

Note: The Table presents summary statistics of the variables defined as: *Donations Expense*=Donations Expense$_t$/Revenues$_t$, *Foreign*=dummy variable equal to 1 for firms with more than 50% foreign ownership, *Developed*= dummy variable equal to 1 for companies coming from home countries with 2009 GDP per capita PPP values higher than 20 000 USD, *Developing*= dummy variable equal to 1 for companies coming from home countries that have 2009 GDP per capita PPP values less than 20 000 USD, *Offshore*= dummy variable equal to 1 for firm whose owner comes from Offshore countries (Cyprus, Virgin Islands etc.), *Law Dummies*=1 for companies whose home country has that legal origin, *Foreign Directors Share* = (count(foreign legal representatives)/count(legal representatives), *Public Procurement* = dummy variable equal to 1 when value of public procurement contracts exceeds 10% of firm revenues, *Cash*=Cash and Cash Equivalents$_t$/Revenues$_t$, *Net Income* = Net Income$_t$/Revenues$_t$, *log(Assets)* = log (Total Assets).

Table 3.3 Distribution of Donations Expense

	Foreign		Domestic	
	Count	%	Count	%
Did not donate	472	40.07	2,060	33.65
0-1 (*% of revenues*)	668	56.71	3,818	62.37
1-2 %	26	2.21	161	2.63
2-3 %	8	0.68	48	0.78
3-4 %	0	0.00	26	0.42
4-5 %	4	0.34	9	0.15

Source: Author's calculations based on annual financial statements

Note: This table presents the distribution of the donation expense for foreign and domestic firms separately.

There are two characteristics of foreign companies in Serbia that additionally affect the donations expense: tax incentives and international market orientation. Besides having a corporate tax rate of 15 percent, which is one of the lowest corporate tax rates in Europe, Serbia offers generous tax incentives to new investors. Among other incentives, if an investor makes a minimum investment in property, plant, and equipment of 1 billion dinars, and employs more than 100 new workers, he is eligible for a tax holiday. The amount of tax holiday is equal to the size of the investment and can be used in a period of 10 years. On the one hand, tax subsidies decrease incentives to donate as the amount of donations cannot be deducted from the tax bill. On the other hand, generous subsidies put foreign companies under public scrutiny, which incentivizes them to behave pro-socially in order to avoid negative media coverage. Flood relief data provides support for this hypothesis, since foreign companies such as Yura Shin Won and Johnson Electric, both notorious for the amount of state subsidies they received, top the list of donors.

In a similar vein, the business model of companies like Yura and Johnson relies on hiring cheap labour in Serbia to assemble the imported parts into products that are exported. Hence, these companies have limited contact with domestic suppliers and customers, and lower attachment to the community might decrease their incentives to donate.

I experimented with including a ratio of amortization expense to sales as a proxy for tax shield, and hence the price of donations, and the share of domestic sales as a proxy for intensity of contact with domestic consumers. However, both variables were statistically insignificant with high p-values, suggesting that they are not important determinants of donations expense. Moreover, two variables were collinear with other explanatory variables so I excluded them from the final model.

Agency issues are less relevant for the firms in the sample, and Serbia in general, because most of the companies have concentrated ownership and are not listed on the stock exchange. For this reason, I did not include any additional controls related to agency theory besides cash holdings as a measure of slack resources.

Besides these issues, there can be other firm-specific factors that influence donation behaviour but are not captured by control variables. Examples of such factors include pollution and poor labour relations. Firms that score low in these areas might try to

compensate for them by increasing donations. However, it is reasonable to assume that these factors are orthogonal to variables of interest and do not impact the estimation results.

In specifications where I explore the relationship between economic development of the home country and donations expense, I replace the *Foreign* dummy with *Developed*, *Developing*, and *Offshore* dummies as the main variables of interest. Similarly, I insert *English common law*, and *French*, *German*, and *Scandinavian* civil law dummies when I analyse the effect of legal origins. Last but not least, I replace *Foreign* dummy with *Share foreign directors* in a regression equation that captures the relationship between foreign managers and donations expense.

I estimate regressions using pooled OLS with errors clustered on the firm level as the main estimation method. OLS is a model of choice because the foreign ownership dummy is constant across years so a fixed effects model is not suitable. A random effects model does allow for time invariant explanatory variables, but it assumes strict exogeneity between explanatory variables and idiosyncratic errors, which is quite a strong assumption. Besides handling time-invariant variables, OLS allows for serial correlations in the data and the unobservables by using standard errors clustered at the firm level. In addition to the pooled OLS, I rerun all the regressions using the Poisson model as a robustness check and report the results in Section C.2 in the Appendix. Poisson regression is appropriate for models with non-negative skewed distribution of the dependent variable; by looking at the Table 3.3 we can see that *Donations expense* is such a variable.

As a step further in the analysis, I decompose *Donations expense* in decision to donate, extensive margin, and the amount to donate conditional on making a donation, intensive margin; I explore how foreign ownership affects each of the two margins. I employ a logit model with a dummy variable equal to one if the donation expense is greater than zero as a dependent variable in order to estimate the probability of donating. I use pooled OLS on a sample of firm years where the donation expense is greater than zero, to capture the relationship between foreign ownership and the donated amount. Decomposing donations spend on extensive and intensive margin can shed light on the underlying mechanism that connects foreignness and donations spend. For example, if foreigners have weak ties to the local community they will miss making small donations and donate only when large and visible events occur, such as the flood episode described earlier. That is, they will have a lower probability of donating but when they donate, they would donate higher amounts than domestic firms.

The methodology applied in this paper can only reveal correlations in the data and does not necessarily have a causal interpretation. The ideal thought experiment to find the causal relationship between foreign ownership and donations expense would be to take the sample of firms and randomly assign them foreign or domestic ownership in such a way that only donation behaviour is affected, while the performance of the firm remains the same. In the case of a such random assignment it is very easy to estimate the effect of foreign ownership by simply taking the difference between the average donation expense of the foreign and domestic firms. Unfortunately, foreign ownership cannot be randomly assigned in practice. Most of the foreign firms in the sample were cherry-picked by the foreigners during the privatization process and underwent substantial organisational and performance changes. Comparing donations expenses before and after privatization is also problematic. The comparison would contain not only the effect of ownership but also the effect of performance

change: it would be very difficult, if not impossible, to disentangle the two. Nevertheless, there have been few studies on corporate philanthropy in developing countries, so even descriptive studies like this are useful for providing initial insights into the area.

3.6. Results

In this section, I present and discuss the results of the econometric analysis. The discussion is organised in three main parts. First, I present the results of the estimating Equation (1) using a foreign ownership dummy and dummies for the level of the economic development of the home country. Then I discuss the estimated relationship between legal origins and donations expense. Finally, I show the results with the share of foreign managers as a main variable of interest. Each of the three subsections contains the results of the pooled OLS on the full sample, logit estimates of probability to donate, and pooled OLS results on the sample of firm years when the donations expenses are greater than zero.

3.6.1. Foreign Ownership and Donations Expenses

Table 3.4 shows that foreign ownership is negatively correlated with *Donations expenses*. Estimates from column (1) suggest that foreign firms spend 0.044 percentage points of revenues less on donations than domestic firms. The inclusion of year and industry dummies, column (2), slightly increases the coefficient to -0.043, and the inclusion of a full set of controls in column (3) reduces the coefficient to -0.051. The estimates are statistically significant in all three specifications.

Column (4) of Table 3.4 suggests that the negative effect is driven by firms from developing and offshore countries. Coefficient on *Developed* dummy is statistically insignificant and equal to -0.031, which is smaller in absolute value than coefficients on *Developing*: -0.084 and statistically significant, and *Offshore*: -0.112 and statistically significant. Hence, offshore firms on average donate 0.1 percentage points of revenues less than domestic firms. Bearing in mind that the average firm donates 0.17 percent of revenues, the coefficient is economically significant and represents two thirds of the average donations expense.

Looking at the estimates on control variables, *Public Procurement*, *Profit margin* and *Share cash* are significant determinants of the donations spend, while firm size is not statistically significant. A high share of public procurement revenues is associated with higher donations spending. Firm years with more than 10% of revenues generated by public procurement contracts spend 0.2 percentage points of revenues on donations more than firm years, with less than 10% of revenues generated by public procurement contracts. Unfortunately, the analysis in this paper cannot discover the underlying mechanism behind the relationship between public procurement and donations spend. While the relationship could be the result of bribery, it could also be that there are certain characteristics of public procurement suppliers not included in the regression, which makes suppliers more prone to donate. Discriminating between these two explanations would require much detailed data and additional analysis. Interestingly, companies with higher profit margins donate less than companies with lower profit margin. This finding speaks against the "firms that do well do good" hypothesis in the case of Serbian firms. However, the estimated effect is -0.001, hence close to zero and only marginally statistically significant. The coefficient on cash holdings is

0.003 and statistically significant. Illiquidity is a big issue for firms in Serbia, so it is reasonable to expect that firms do not want to endanger their liquidity position by making donations. As expected, firm size is positively related to donations expense, but the estimate is not statistically significant.

Table 3.5 decomposes donations expenses along the extensive, decision to donate, and intensive, amount to donate conditional on donating, margins. Foreign firms are less likely to donate, and even when they do donate, they donate a smaller percentage of revenues than domestic firms. The estimated marginal effect is -0.04, which means that foreign firms have a 4 percentage point lower probability of donating. After the inclusion of control variables, the estimate decreases to -0.057, implying a 5.7 percentage point difference. In all specifications, the coefficient on the *Foreign* dummy is highly statistically significant. The results for intensive margin are in the magnitude of -0.05 percentage points implying that conditional on donating foreign firms donate 0.05 percentage points of revenues on donations less than domestic firms.

The decomposition on the extensive and intensive margins provide interesting results on the *Developed* dummy. Namely, firms from developed countries are 5 percentage points less likely to make a donation than domestic firms, but for conditional on donating there is no statistically significant difference between their donations expense and donations expense of domestic firms. Firms from developing and offshore countries are both less likely to make donations and donate lower amounts than domestic firms. Hence, it seems that due to weak relations with local communities, firms from developed countries make donations only occasionally, but when they do donate they donate in amounts comparable with those of domestic firms.

Looking at the controls, *Public procurement* is positively associated with both probability to donate and donations amount. Bigger firms are more likely to donate, but conditional on donating, the size of the firm is not an important determinant of the donation amount. The opposite holds for cash holdings, since liquidity is not an important determinant of the decision to donate but it is positively related with the donations amount. Last but not least, profit margin is positively associated with decision to donate and negatively associated with the donation amount. This suggests that firms that do well are more likely to do good, but that they do not do more good.

Table 3.4 Foreign Ownership and Donations Expense

	Donations Expense			
	(1)	(2)	(3)	(4)
Foreign	-0.044**	-0.043**	-0.051**	
	(0.019)	(0.021)	(0.021)	
Developed				-0.031
				(0.027)
Developing				-0.084***
				(0.029)
Offshore				-0.112***
				(0.025)
Public procurement			0.195***	0.194***
			(0.042)	(0.042)
Profit margin			-0.001*	-0.001*
			(0.001)	(0.001)
Share cash			0.003**	0.003**
			(0.001)	(0.001)
log(Assets)			0.007	0.007
			(0.006)	(0.006)
Year-industry dummies	No	Yes	Yes	Yes
Observations	7,300	7,300	7,269	7,255
Groups	2,303	2,303	2,293	2,288
R2	0.001	0.044	0.064	0.065

Note: The Table estimates the relationship between foreign ownership and donations expense. *Donations expense* is measured as percentage of revenues, $Donations_t/Revenues_t$. *Foreign* is a dummy variable equal to 1 for firms with more than 50% foreign ownership. *Developed* is a dummy variable equal to 1 for companies coming from home countries that have 2009 GDP per capita PPP values higher than 20 000 USD, *Developing* is a dummy variable equal to 1 for companies coming from home countries whose 2009 GDP per capita PPP value is less than 20 000 USD, and *Offshore* is a dummy variable equal to 1 for firms that come from offshore countries. Controls consist of dummy for firm years where the values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. The sample period is 2010-2013, pooled OLS estimation with firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 3.5 Foreign Ownership, Extensive and Intensive Margin

	Logit (Extensive Margin)				OLS (Intensive Margin)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Foreign	-0.035***	-0.038***	-0.057***		-0.046*	-0.044*	-0.052**	
	(0.012)	(0.013)	(0.012)		(0.024)	(0.026)	(0.026)	
Developed				-0.048***				-0.029
				(0.015)				(0.033)
Developing				-0.073***				-0.091**
				(0.022)				(0.037)
Offshore				-0.089***				-0.125***
				(0.032)				(0.031)
Public procurement			0.050***	0.050***			0.216***	0.215***
			(0.017)	(0.017)			(0.048)	(0.048)
Profit margin			0.001***	0.001***			-0.002**	-0.002**
			(0.000)	(0.000)			(0.001)	(0.001)
Share cash			0.001	0.001			0.003**	0.003**
			(0.001)	(0.001)			(0.001)	(0.001)
log(Assets)			0.035***	0.035***			-0.000	-0.000
			(0.004)	(0.004)			(0.007)	(0.007)
Year dummies		Yes	Yes	Yes		Yes	Yes	Yes
Industry dummies		Yes	Yes	Yes		Yes	Yes	Yes
Observations	7,300	7,246	7,215	7,201	5,929	5,929	5,912	5,900
Groups	2,303	2,303	2,293	2,288	2,259	2,259	2,249	2,249
R2					0.001	0.052	0.075	0.076

Note: The left pane of the Table shows average marginal effects from the logistic regression with decision to donate as a dependent variable. Right pane shows the results of pooled OLS estimation with *Donations expense* as a dependent variable on a sample of firm years where donations expense is greater than zero. *Donations expense* is measured as a percentage of revenues, $Donations_t/Revenues_t$, *Developed* is a dummy variable equal to 1 for companies coming from home countries that have 2009 GDP per capita PPP values higher than 20 000 USD, *Developing* is a dummy variable equal to 1 for companies coming from home countries whose 2009 GDP per capita PPP value is less than 20 000 USD, and *Offshore* is a dummy variable equal to 1 for firms that come from offshore countries. Controls consist of dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. The sample period is 2010-2013, firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

At the end of the day, it is the absolute, not the relative amount of donations that matters. If foreign firms are larger than domestic firms, even donating a smaller share of revenues might lead to a higher absolute amount of donations.

However, this is not the case. Based on the estimates reported in Table 3.6, foreign companies do not devote higher absolute amounts to donations when compared with domestic companies. After including a full set of controls, specification (2), the estimate is -338 but statistically insignificant. The interpretation of the estimate is that after controlling for the firm and industry characteristics, foreign companies donate 338 thousand dinars less than domestic companies. The estimate is similar in magnitude, and also statistically insignificant in specification (5) which is estimated on the sample that excludes firm years when donations were equal to zero.

Looking at specifications (1) and (5) that do not include any controls, foreign firms on average donate more than domestic firms. The estimate is great in magnitude: more than million dinars, which is half the size of the average donation in the sample, weakly statistically significant on the whole sample and statistically significant for the sample of firm years when donations were greater than zero. However, since these specifications do not include a full set of controls, besides foreignness, the estimate also contains the effects related to other firm and industry characteristics. Similarly to the finding in the previous section, firms from developed countries donate more than firms from emerging and offshore countries, specifications (3) and (6). The coefficient is lowest for offshore countries: -3,240 and statistically significant, suggesting that these firms donate much less than domestic firms.

Table 3.6 Foreign Ownership and Absolute Amount of Donations

	Whole Sample			Intensive Margin		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign	1,249*	-338		1,706**	-313	
	(672)	(718)		(845)	(897)	
Developed			414			529
			(894)			(1,108)
Emerging			-983			-1,118
			(1,080)			(1,426)
Offshore			-3,240***			-3,613***
			(1,030)			(1,217)
Public Procurement		2,525***	2,500***		2,913***	2,889***
		(965)	(952)		(1,087)	(1,072)
Net Income		12	12		11	10
		(13)	(13)		(17)	(17)
Cash		-13	-20		-15	-22
		(17)	(17)		(19)	(19)
log(Assets)		2,533***	2,545***		2,946***	2,959***
		(382)	(384)		(436)	(438)
Year Dummies		Yes	Yes		Yes	Yes
Industry Dummies		Yes	Yes		Yes	Yes
Observations	7,300	7,269	7,255	5,929	5,912	5,900
Groups	2,303	2,293	2,288	2,259	2,249	2,249
R2	0.002	0.164	0.167	0.003	0.187	0.190

Note: The Table estimates the relationship between foreign ownership and the absolute amount of donations expense. *Donations expense* is measured in thousands of dinars. *Foreign* is a dummy variable equal to 1 for firms with more than 50% foreign ownership. *Developed* is a dummy variable equal to 1 for companies coming from home countries that have 2009 GDP per capita PPP values higher than 20 000 USD, *Developing* is a dummy variable equal to 1 for companies coming from home countries whose 2009 GDP per capita PPP value is less than 20 000 USD, and *Offshore* is a dummy variable equal to 1 for firms that come from offshore countries. Controls consist of dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. Sample period is 2010-2013, pooled OLS estimation with firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

3.6.2. Legal Origins and Donations Expense

In Table 3.7 I start the investigation of the relationship between legal origins and donations expense. Column (1) shows that firms from all legal origins except *Scandinavian civil law* tend to spend a lower share of their revenues on donations than domestic firms. Firms from English common law countries spend the least: on average 0.17 percentage points less than domestic firms, while firms from French civil law and German civil law countries spend 0.1 and 0.09 percentage points of revenues on donations less than domestic firms. The estimated coefficient on Scandinavian civil law is -0.08, but it is statistically insignificant.

In Column (2) I keep only the sample of foreign firms and compare the donations expense of firms from common law countries relative to the firms from civil law countries. The estimated coefficient is -0.09 and statistically significant. Findings from Column (1) and Column (2) are consistent with the Liang and Renneboog (2017) findings that the Scandinavian Civil Law countries are associated with the highest CSR scores, Common Law origin with the lowest score, while German and French Civil Law countries are in between.

Table 3.8 decomposes the difference in donations expense due to the lower probability of donating and due to the lower donated amount conditional on donating. I find that there is no statistically significant difference in probability of making a donation between common law and civil law firms, but that conditional on making donation common law firms donate 0.1 percentage points of revenues less than the civil law firms.

Compared to domestic firms, English common law origin and German and French civil law groups are associated with both lower probability of donating and lower donation amount conditional on making a donation. For Scandinavian civil law firms, the effect is the opposite: they are less likely to donate, but when they donate they make more generous donations.

Table 3.7 Legal Origin and Donations Expense

	Donations Expense	
	(1)	(2)
English common law	-0.179***	-0.086***
	(0.045)	(0.033)
French civil law	-0.108**	
	(0.052)	
German civil law	-0.090***	
	(0.030)	
Scandinavian civil law	-0.080	
	(0.109)	
log(GDP)	0.060*	0.086**
	(0.036)	(0.038)
Public procurement	0.195***	0.444***
	(0.042)	(0.168)
Profit margin	-0.001*	0.000
	(0.001)	(0.001)
Share cash	0.003**	-0.002
	(0.001)	(0.002)
log(Assets)	0.007	0.000
	(0.006)	(0.013)
Year-industry dummies	Yes	Yes
Observations	7,255	1,163
Groups	7,255	1,163
R2	0.065	0.197

Note: The Table estimates the relationship between legal origin of the firm's home country and *Donations expense.* Specification (1) compares donations of each legal origin relative to donations of domestic firms. Specification (2) is estimated on a sample of foreign firms only and compares donations expense of firms from common law versus civil law countries. Controls consist of logarithm of the home country per capita GDP, dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. Sample period is 2010-2013, pooled OLS estimation with firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 3.8 Legal Origins, Extensive and Intensive Margin

	Logit (Extensive Margin)		OLS (Intensive Margin)	
	(1)	(2)	(3)	(4)
English common law	-0.081**	-0.018	-0.216***	-0.105**
	(0.039)	(0.035)	(0.055)	(0.043)
French civil law	-0.092***		-0.121*	
	(0.031)		(0.067)	
German civil law	-0.063**		-0.103***	
	(0.027)		(0.038)	
Scandinavian civil law	-0.117*		-0.091	
	(0.064)		(0.124)	
log(GDP)	0.020	0.028	0.076*	0.114**
	(0.026)	(0.030)	(0.045)	(0.051)
Public procurement	0.050***	0.134**	0.216***	0.456**
	(0.017)	(0.066)	(0.048)	(0.184)
Profit margin	0.001***	0.002***	-0.002**	0.000
	(0.000)	(0.001)	(0.001)	(0.001)
Share cash	0.001	0.003	0.003**	-0.003
	(0.001)	(0.002)	(0.001)	(0.002)
log(Assets)	0.035***	0.040***	-0.000	-0.008
	(0.004)	(0.011)	(0.007)	(0.018)
Year Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Observations	7,201	1,124	5,900	908
Groups			2,244	373
R2			0.076	0.230

Note: The left pane of the Table shows average marginal effects from the logistic regression with decision to donate as dependent variable. Right pane shows the results of pooled OLS estimation with *Donations expense* as dependent variable on a sample of firm years where donations expense is greater than zero. Specifications (1) and (3) compare donations of each legal origin relative to donations of domestic firms. Specifications (2) and (4) are estimated on a sample of foreign firms only and compare donations of firms from common law versus civil law countries. Controls consist of logarithm of the home country per capita GDP, dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. Sample period is 2010-2013, firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

3.6.3. Foreign Managers and Donations Expense

Table 3.9 presents the results of the estimated relationship between the presence of foreign managers and *Donations expense*. Column "All" shows the specification with both domestic and foreign firms included. The estimate of -0.08 implies that firms with 100% share of foreign legal representatives spend on average 0.08 percentage points of their revenues on donations less than firms that have 100% share of domestic legal representatives. Column

"Domestic Owned" is estimated on a sample of domestic firms. The estimate remains statistically significant and the magnitude of the effect increases slightly to -0.07. Column "Foreign Owned" presents the results for a sample of foreign non-offshore firms and finds a statistically insignificant estimate of -0.06. The estimated positive relationship between share of domestic legal representatives and donations expense supports the hypothesis of the positive relationship between managers' connections to local communities and charitable giving.

Looking at the probability of donating, Table 3.10, I find that the higher share of foreign legal representatives is associated with lower probability of donating in the entire sample and a sample of foreign firms, but the estimate is statistically insignificant in a sample of domestic firms. Having only foreign legal representatives is associated with 10 percentage points lower probability of donating than having only domestic legal representatives.

Conditional on donating, a higher share of foreign managers is associated with lower donations expense in a whole sample and sample of domestic firms, but the effect is statistically insignificant in a sample of foreign firms. This finding highlights the mechanism of foreignness. Low connections with the community result in low frequency of donations, but when donation does occur it comes to a substantial amount.

Table 3.9 Foreign Managers and Donations Expense

	Donations Expense		
	All	Domestic Owned	Foreign Owned
Share foreign directors	-0.085***	-0.076**	-0.063
	(0.026)	(0.032)	(0.048)
Public procurement	0.200***	0.166***	0.459**
	(0.044)	(0.046)	(0.180)
Profit margin	-0.000	-0.000	0.001
	(0.001)	(0.001)	(0.001)
Share cash	0.003**	0.004**	-0.002
	(0.001)	(0.002)	(0.002)
log(Assets)	0.004	0.004	0.010
	(0.006)	(0.007)	(0.018)
Year-industry dummies	Yes	Yes	Yes
Observations	6,930	5,770	998
Groups	2,154	1,781	321
R2	0.073	0.077	0.205

Note: The Table estimates the relationship between share of foreign directors and donations expense. Specification "All" is estimated using the whole universe of firms, "Domestic Owned" just on a sample of firms that are in majority domestic ownership, while "Foreign Owned" sample includes only foreign owned non-offshore firms. Controls consist of dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. Sample period is 2010-2013, pooled OLS estimation with firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 3.10 Foreign Managers, Extensive and Intensive Margin

	Logit (Extensive Margin)			OLS (Intensive Margin)		
	All	Domestic Owned	Foreign Owned	All	Domestic Owned	Foreign Owned
Share foreign directors	-0.106***	-0.054	-0.108***	-0.088**	-0.085**	-0.060
	(0.017)	(0.037)	(0.027)	(0.035)	(0.037)	(0.068)
Public procurement	0.032*	0.023	0.055	0.227***	0.191***	0.493**
	(0.017)	(0.018)	(0.066)	(0.050)	(0.053)	(0.202)
Profit margin	0.001***	0.002***	0.002**	-0.001	-0.001	0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Share cash	0.001	0.001	0.004	0.003**	0.004**	-0.003
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
log(Assets)	0.035***	0.034***	0.052***	-0.004	-0.004	0.003
	(0.004)	(0.004)	(0.012)	(0.007)	(0.008)	(0.023)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,876	5,691	963	5,655	4,737	787
Groups				2,120	1,751	317
R2				0.083	0.088	0.235

Note: The left pane of the Table shows average marginal effects from the logistic regression with decision to donate as dependent variable. Right pane shows the results of pooled OLS estimation on a sample of firm years where donations expense is greater than zero with donations expense as dependent variable. Main variable of interest is share of foreign legal representatives. Specification "All" is estimated using the whole universe of firms, "Domestic Owned" just on a sample of firms that are in majority domestic ownership, while "Foreign Owned" sample includes only foreign owned non-offshore firms. Controls consist of dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. Sample period is 2010-2013, firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

3.7. Conclusion

Using a unique dataset of foreign and domestic firms, this paper examined the donations behaviour of Serbian firms. The main findings of the paper are that foreign firms donate less than domestic firms (both as a share of revenues and as an absolute amount), have a lower probability of donating, and donate a lower share of revenues conditional on donating. Additionally, the paper finds that foreign firms from developing or offshore home countries donate less than firms from developed countries, that firms from common law home countries donate less than firms from civil law home countries, and that a higher share of foreign directors is associated with lower donations expense. On the other hand, a high share of revenues from public procurement contracts is associated with higher donations expense.

The findings of this paper suggest that policy makers can increase the amount of corporate donations in the economy by encouraging investments from firms coming from civil law countries, Scandinavia in particular, as well as by stimulating the nomination of domestic managers. Although donations represent a minor part of the firms' revenues, at an aggregate

level they can add up to a significant amount, boosting investments in the social infrastructure. This holds especially for post-socialist countries, where governments can devote limited resources to maintaining the social infrastructure previously provided by the state-owned firms.

The results of this paper are subject to several limitations. First, assessing the impact of foreign ownership is close to what Angrist and Pischke (2008) call a fundamentally unidentified question. Ownership is not randomly assigned to firms, so when comparing donations spending of domestic and foreign firms it is impossible to disentangle the effect of ownership from the effect of other firm characteristics, such as profitability, management quality etc. Nevertheless, I partially addressed this limitation by including a rich set of control variables. Other limitations of the study relate to data availability. First, ownership and director information from the period 2010 to 2013 is unavailable, so I proxy for this with 2017 values. Second, non-monetary donations in the form of volunteer hours are not included in the financial statements and hence are not accounted for by this study. Third, financial statements do not contain a more detailed breakdown of donations expense by charitable purpose. It would be interesting to look at the drivers behind different types of charitable giving, for example sports vs. science. Finally, the study focused on corporate donations and completely ignored donations made by individuals. Card et al. (2010) find that cities benefit from hosting corporate headquarters. not because of bigger corporate donations but because the opening of corporate headquarters brings in many high earners who are likely to make donations to the city. A similar mechanism could be at play in Serbia, where foreign investment brings highly compensated foreign managers that make significant individual contributions. However, I do not find any support for this mechanism by looking at the list of individual contributors for flood relief in Serbia.

The strong premise of this paper was that corporate philanthropy is good, but this view is not universally shared. Friedman (1970) and Bénabou and Tirole (2010) argue that the phenomenon of corporate philanthropy is quite blurred, that oftentimes it is not philanthropy but pure self-interest in terms of image building, that it would be better that owners make individual donations instead of firm managers doing it on their behalf, etc. All these are valid arguments in case of developed countries, but are less likely to hold in the case of developing countries. First, the economic system of developing countries is plagued by state and market failures and any attempt by companies to address social issues should be more than welcomed. Second, developing countries are hosts to many multinational companies and it would be illusory to expect that shareholders located thousands of miles away would be sufficiently concerned to donate to the local community. I conclude by citing Andrew Carnegie's "The Gospel of Wealth" article, where he invites rich people to donate money to charitable causes and sees that as a: "true antidote for the temporary unequal distribution of wealth, the reconciliation of the rich and the poor–a reign of harmony–another ideal, differing, indeed, from that of the Communist in requiring only the further evolution of existing conditions, not the total overthrow of our civilization", Carnegie (1889).

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Appendix

C.1 Construction of the Dataset

To construct the sample, I start by taking all the available Serbian company ids from Bureau van Dijk's Amadeus database. The Amadeus database covers around 12,000 Serbian companies of all sizes, which represents quite good coverage given the small size of the Serbian economy. Nevertheless, to increase the size of the sample I scrape the company ids of all manufacturing firms from one Serbian online company directory[43] and combine them with ids from Amadeus. For each company id I scrape the website of the Serbian Business Registers Agency and keep those observations that have donations, for example on Figure 3.1, and ownership information available. To come up with a final sample I drop all outlier observations with suspiciously high donations expense, greater than 5% of the revenues, which is the limit for tax deductibility[44], and clean the sample from outliers based on control variables values. I merge the sample with a public procurement contracts dataset based on company ids, and with GDP and legal origins classification based on the name of the home country. The final sample is an unbalanced panel of 7,300 observations on 2,303 firms, and covers the years from 2010 to 2013.

Figure 3.1 Donations Expense, Excerpt from Financial Statements

12. Kontrolni zbir (od 639 do 649)	650	122.564.435	115.769.629
1. Troškovi goriva i energije	651	794.790	721.274
2. Troškovi zarade i naknade zarada (bruto)	652	3.271.421	2.810.377
3. Troškovi poreza i doprinosa na zarade i naknade zarada na teret poslodavca	653	568.820	489.275
4. Troškovi naknada fizičkim licima (bruto) po osnovu ugovora	654	56.796	72.274
6. Ostali lični rashodi i naknade	656	283.110	422.014
7. Troškovi proizvodnih usluga	657	1.589.545	2.083.610
8. Troškovi zakupnina	658	860.083	768.754
11. Troškovi amortizacije	661	1.200.203	1.571.900
12. Troškovi premija osiguranja	662	63.090	57.071
13. Troškovi platnog prometa	663	222.160	226.210
14. Troškovi članarina	664	14.364	11.740
15. Troškovi poreza	665	166.945	230.356
17. Rashodi kamata	667	114.098	1.426.843
18. Rashodi kamata i deo finansijskih rashoda	668	114.098	1.437.078
19. Rashodi kamata po kreditima od banaka i dfo	669	93.825	1.415.325
20. Rashodi za humanitarne, kulturne, zdravstvene, obrazovne, naučne i verske namene, za zaštitu čovekove sredine i za sportske namene	670	95	0
21. Kontrolni zbir (od 651 do 670)	671	0.413.443	13.744.101
1. Prihodi od prodaje robe	672	72.466.651	66.749.495
6. Prihodi od kamata	677	583.353	132.713
7. Prihodi od kamata po računima i depozitima u bankama i ostalim finansijskim organizacijama	678	41.692	40.605

Source: The Serbian Business Registers Agency
http://fi.apr.gov.rs/prijemfi/cir/Podaci_Komplet_1.asp?strSearch=17569171&kod=40fba2af36a44936388594481d2f1e1696b8798f&godina=2012&pk_zag=556491

[43] http://www.kompanije.net/Srbija/d6_INDUSTRIJA.html

[44] Only couple of observations, all result of a sharp drop in revenues which inflated donations to revenues ratio.

C.2 Results from Poisson Regression

In this section I replicate the results of Tables 3.4, 3.7, and 3.9 using Poisson regression instead of pooled OLS as estimation method. Poisson regression is a suitable method for accommodating dependent variables that follow non-negative, skewed distributions. Table 3.3 shows that *Donations expense* follows such distribution because donations cannot be negative, and most of the probability mass is concentrated around zero.

The results of the Poisson regressions are reported in Tables 3.11, 3.12, and 3.13. Estimates are generally in line with the pooled OLS results. Regarding the *Foreign* dummy, it remained negative, but only weakly statistically significant. The *Developing* dummy also turned from statistically significant to weakly statistically significant, while the results on *Offshore* and *Developed* dummies stayed the same. Except *German civil law* dummy, that is now weakly statistically significant, other civil law dummies lost statistical significance. Estimate on *English common law* dummy remained negative and statistically significant, confirming that firms from these countries spend smaller share of revenues on donations than domestic firms. In the specification that compares common versus civil law firms, Specification (2) in Table 3.12, the estimate on *Common law* remained negative but only weakly statistically significant. Table 3.13 shows that the Poisson regression also found a negative relationship between the share of foreign legal representatives and *Donations expense*. However, the estimate is only weakly statistically significant, and turns insignificant in the sample of foreign non-offshore firms.

Table 3.11 Foreign Ownership and Donations Expense, Poisson Regression

	Donations Expense			
	(1)	(2)	(3)	(4)
Foreign	-0.049	-0.048	-0.057	
	(0.024)*	-0.025	(0.024)*	
Developed				-0.034
				-0.028
Developing				-0.108
				(0.047)*
Offshore				-0.158
				(0.044)**
Public procurement			0.143	0.142
			(0.025)**	(0.024)**
Profit margin			-0.001	-0.001
			(0.001)*	(0.001)*
Share cash			0.002	0.002
			(0.001)**	(0.001)*
log(Assets)			0.006	0.006
			-0.006	-0.006
Year-Industry Dummies		Yes	Yes	Yes
Observations	7,300	7,300	7,269	7,255

Note: The Table shows average marginal effects from the Poisson regression of donations expense on foreign ownership dummy. *Donations expense* is measured as percentage of revenues, $Donations_t/Revenues_t$. *Foreign* is dummy variable equal to 1 for firms with more than 50% foreign ownership. *Developed* is a dummy variable equal to 1 for companies coming from home countries that have 2009 GDP per capita PPP values higher than 20 000 USD, *Developing* is a dummy variable equal to 1 for companies coming from home countries whose 2009 GDP per capita PPP value is less than 20 000 USD, and *Offshore* is a dummy variable equal to 1 for firms that come from offshore countries. Controls consist of dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. Sample period is 2010-2013, firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 3.12 Legal Origin and Donations Expense, Poisson Regression

	Donations Expense	
	(1)	(2)
English common law	-0.246	-0.106
	(0.065)**	(0.045)*
French civil law	-0.13	
	-0.07	
German civil law	-0.107	
	(0.042)*	
Scandinavian civil law	-0.093	
	-0.117	
log(GDP)	0.071	0.078
	-0.043	(0.031)*
Public procurement	0.142	0.205
	(0.024)**	(0.050)**
Profit margin	-0.001	0.001
	(0.001)*	-0.001
Share cash	0.002	-0.002
	(0.001)**	-0.001
log(Assets)	0.006	-0.002
	-0.006	-0.011
Year-industry dummies	Yes	Yes
Observations	7,255	1,163

Note: The Table shows the average marginal effects from the Poisson regression of *Donations expense* on legal origins dummies. Specification (1) compares donations of each legal origin relative to donations of domestic firms. Specification (2) is estimated on a sample of foreign firms only and compares the donations expense of firms from common law versus civil law countries. Controls consist of logarithm of the home country per capita GDP, dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. The sample period is 2010-2013, firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 3.13 Foreign Managers and Donations Expense, Poisson Regression

	Donations Expense		
	All	Domestic Owned	Foreign Owned
Share foreign directors	-0.113	-0.103	-0.076
	(0.042)**	(0.049)*	-0.055
Public procurement	0.139	0.124	0.205
	(0.024)**	(0.028)**	(0.052)**
Profit margin	0	0	0.001
	-0.001	-0.001	-0.001
Share cash	0.002	0.003	-0.001
	(0.001)**	(0.001)**	-0.001
log(Assets)	0.003	0.004	0.005
	-0.006	-0.006	-0.013
Year-industry dummies	Yes	Yes	Yes
Observations	6,930	5,770	998

Note: The Table shows average marginal effects from the Poisson regression of *Donations expense* on share of foreign legal representatives. Specification "All" is estimated using the whole universe of firms, "Domestic Owned" just on a sample of firms that are in majority domestic ownership, while the "Foreign Owned" sample includes only foreign owned non-offshore firms. Controls consist of a dummy for firm years where values of public procurement contracts exceeded 10% of revenues, net income as a share of revenue, cash and cash equivalents as a share of revenue, and firm size measured by logarithm of assets. Sample period is 2010-2013, firm level clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.