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'To my Family. With love and gratitude'

Berkeley, November 2012

Contents

List of Figures

List of Tables

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All errors are my own.

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Abstract

Chapter 1

Could the empires that ruled Eastern Europe for centuries and the formal institutions that they implemented have left an imprint on current formal and informal institutions of modern states? This paper sheds light on the legacy of the administrative system of the Ottoman Empire in contemporary states in the region. I investigate a causal mechanism that led to divergent paths of state building and rule of law, interpreted as attitudes toward corruption. The boundary between the Ottoman Empire and the Austro-Hungarian Empire was set in the Treaty of Karlowitz in 1699, contemporaneous with a fiscal shock and a crucial change in the Ottoman fiscal system. This is identified as the historical treatment effect. First, a theoretical model is constructed, focusing on effects of tax system change, which encouraged uncontrolled predatory behavior and spread of abuse and rent extraction in the Ottoman Empire. Using Geographic Information System methods and regression discontinuity analysis with household survey data I investigate persistence of different attitudes about bribery on both sides of the former border. Findings evidence higher willingness to bribe on the Ottoman hereditary lands. These findings are robust to controls. Last, the persistent effect of weak institutions on growth is estimated using household consumption and light intensity data as proxies for development.

Chapter2

Reforms often occur in waves, seemingly cascading from country to country. We argue that such reform waves can

be driven by informational spillovers: uncertainty about the outcome of reform is reduced by learning from the experience of similar countries. We motivate this hypothesis with a simple theoretical model and then test it empirically. We find evidence of informational spillovers both with respect to both political and economic liberalization. While the previous literature has focused only on economic reform, we find that the spillovers are particularly important for political changes

Chapter 3

A wide literature identifies trust as an important prerequisite for well-functioning markets and overall economic performance. A more recent body of research highlights history as a determinant of trust. Despite the level of attention the topic of trust has enjoyed, the literature highlights important issues with the lack of detail in existing data, collected mostly at the country level. I aim to improve on the coarse resolution offered by existing data with the help of a methodological innovation. This study analyzes the impact of history on generalized trust, using data from an international peer-to-peer hospitality exchange network, CouchSurfing.org. The geographic focus is on Romania, the territory of which was formerly divided between the Habsburg and Ottoman Empires. Previous studies reveal important differences in generalized trust between Romanias previously-Ottoman, provinces of Wallachia and Moldavia, and the formerly-Habsburg province of Transylvania, with the former two lower in generalized trust than the latter. This study uses the local density of CouchSurfing.org membership as a proxy measure for generalized trust. Findings confirm that CouchSurfing membership is higher in Transylvania than elsewhere, thus providing evidence for the validity of using CouchSurfing membership as a proxy for general-

ized trust. Our approach, using spatial regression, yields a basis for extrapolating measures of generalized trust to areas where little survey data exists.

Chapter 4

Some aspects of financial reform positively affect economic growth. The size of credit to the private credit also positively affects economic growth. We argue that these effects might be stronger or weaker depending on countrys historical legacies and its influence on culture and attitudes towards authority, rule of law as well as the importance of financial intermediation. Therefore we test correlation between (indexes of) historical legacies and financial reform indicators (or/and the size of financial system) for a set of transition (emerging) economies that experienced centuries of (different) imperial rule

Chapter 1

The Rule of Karlowitz: Fiscal Change and Institutional Persistence

1.1 Introduction

At the end of the 17th century, the Treaty of Karlowitz drew a line between the Habsburg and Ottoman Empires. At about the same time, the Ottoman Empire adopted a tax farming strategy that created widespread corruption and undermined the rule of law. Could empires that ruled Eastern Europe region for centuries and the formal institutions that they implemented have left an imprint on the current formal and informal institutions of modern states?

In this paper, I analyze the impact of these imperial pre-communist institutions on contemporary formal and informal institutional outcomes in the region. Specifically, I consider the shadow of centuries of dominance of the Habsburg- Prussian monarchy versus the legacy of the Ottoman Empire.

To motivate the argument, a simple theoretical model shows how the fiscal system, based on auction of tax farming rights, encouraged corruption and undermined the certainty of property and contract rights. Next,

GIS data is used to overlay the Karlowitz line on modern boundaries. A first correlation analysis at country level of the effect of the respective imperial legacies on contemporary institutions and therefore on growth motivates the bulk of this research. Therefore, I use a household survey and a question on attitudes about bribing public officials to test for this legacy on the divergent behavior toward rule of law. Geographic Information System data combined with regression discontinuity analysis at the border are evidence of the higher willingness to bribe and therefore a lack of rule of law in the Ottoman hereditary lands. Findings are robust to controls. Last, household consumption and light intensity data are used as proxy for development at the border level to test the divergence among the regions.

I compare modern nations that lay within the Ottoman border in 1699 to those that did not. To show that the imperial legacy persisted after 20th century national boundaries were drawn, I look more closely at countries whose territory was divided between the Ottoman and both Habsburg and Prussian Empires, and also at the nations that constituted the former Yugoslavia. I also consider how long a territory was under Ottoman control and how far it was from the dividing line. I find that a tax system that encouraged corruption and undermined the rule of law has had long-lasting effects on institutions. Institutions are widely recognized as an important factor driving regional growth divergence. This paper investigates this link with respect to the growth and institutional divergence between Central Eastern Europe and Baltic countries (CEEB) and South Eastern Europe states (SEE) by accounting for long term historical legacies which affect final economic performance through the channel of the institutional framework. CEEB and SEE are based on OECD groupings of 16 Central and Eastern European (CEE) countries that were formerly under communist government. The CEE countries may be further divided into CEEB (which includes the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia, Slovenia, and Poland) and SEE (which includes Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Serbia). With the communist collapse in Eastern Europe, the market-oriented transition started off with the implosion of a

fixed political-economic system and institutional framework. That institutional framework had functioned despite its well-known problems. As transition experience has accumulated, it has become clearer that overall economic performance depends not only on the persistent disparity between progress as regards liberalization and privatization, but also on the development of political and economic institutions. At the beginning of the 1990s, economists studying output drops in the economies of the former communist block emphasized the importance of liberalization, macroeconomic stabilization, and privatization (key elements of the so-called Washington Consensus). Therefore, most research from that time focused on macroeconomic indicators and the speed of reforms. Twenty years later, most investigations of transition economies and the latest challenges of the recent financial crisis seem to agree on the importance of regional institutions, and thus institution-building as a fundamental prerequisite for further economic growth and convergence.

There are clearly large and persistent differences in economic development and institutions across Europe. Many SEE countries, not only those with communist legacies, have consistently grown more slowly than other less-developed Eastern European countries. Slovenia, for example, has already overtaken Greece in terms of GDP per capita, this despite having to grapple with the transformation from communism to a market economy and democracy during the last 20 years. The development economics literature strongly suggests that these differences in economic development may have their origins in formal institutions and informal values implanted centuries ago, when parts of Europe were incorporated into various empires. In this paper, I analyze the impact of institutions on growth for a set of 16 Central and Eastern European (CEE) countries, specifically by examining the institutional legacies of the Ottoman, Prussian, and Habsburg Empires. I argue that formal institutions as well as informal norms of behavior imposed in these countries by their respective colonial powers have had a lasting impact on the institutional environment. I find that these institutional legacies continue to drive differences in economic growth between the CEEB and SEE countries to

this day. I further identify governance as a channel of persistence for the imperial historical imprint. To do this, I use the historical border of the Ottoman Empire (Karlowitz, 1699) to divide Eastern Europe into two regions: one region long administered by Ottoman rulers, and another region that was not. Institutional characteristics of the Ottoman Empires local administrative system persist in current data on the behavior of citizens toward public administration in the region (once Rumelia) where that system was in place. The paper is organized in the following sections. Section 2 reviews the related literature. Section 3 introduces the historical narrative.Section 4 develops a simple theoretical model that highlights the mechanism of the fiscal change. Section 5 describes the data and provides the methodological framework. Section 6 contains the main results (with checks for their robustness), and section 7 concludes.

1.2 Formal and Informal Institutions: an overview

Several studies in transition have argued that market and state institutions are vital for the CEE transition economies performance, because these institutions provide incentives for investment and innovation, as well as sources of growth. Moreover, in transition countries with strong institutions, the ability of politicians to extract rents has been relatively low. Institution-building for transition economies has been emphasized strongly as crucial for the transition process (Roland, 2000, 2003, 2004, 2009, Polishchuk, 2001, Fischer Sahay 2004). Laeven and Back (2005) identify the dependence on natural resources and the historical experience of countries during socialism as the major determinants of institutional paths.

Institutions can be conceptualized as the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction (Douglas North, 1990). As underlined by Greif (2006), they encompass informal constraints (norms and beliefs) and formal constraints (rules and organizations), which are exogenous to the individ-

ual and which conjointly generate a regularity of behavior. Following the growing body of literature on the so-called New institutional economics, institutions are defined as social arrangements that reduce transaction costs and promote economic growth. The Coase Theorem (Coase 1960) highlights the social efficiency of economic institutions as crucial to the outcome of negotiations between economic parties because institutions influence the potential for parties to account for externalities. As Williamson (2005) argues, institutions can embody the rules of the game in the economics of governance. Many early scholars like Adam Smith, John Locke, and John Stuart Mill emphasized the importance of economic institutions. More recent scholars, such as Demsetz (1967), De Sotto (2000), and Acemoglu et al. (2002, 2004, 2008) underline the importance of economic institutions in influencing the structure of economic incentives in a society. In The Rise of The Western World: A New Economic History, Douglass North and Robert Thomas argue that factors like innovation, capital accumulation, and education are not causes of growth, so much as they are growth. They further argue that the fundamental explanation for comparative growth is to be found in institutions. Several studies have shown that cross-country differences in output per worker cannot fully be explained by cross-country variation in the stock of physical and human capital, and that these stocks fail to converge over time. Hall and Jones (1999), finding a large amount of variation in the level of the Solow residual across the 127 countries that they considered, suggest that the differences in capital accumulation, productivity, and therefore output per worker are driven by differences in social infrastructure, namely in institutions and government policies. The development of economic institutions depends in part on the distribution of political power in society, which accounts for the distribution of resources and external shocks (Acemoglu et al 2004, 2008). Guiso, Sapienza and Zingales (2008) argue for the impact of culture and the causal impact of socially transmitted norms of behavior on economic outcomes. Roland (2004) highlights the distinction between slow-moving institutions like culture (which includes values, beliefs, and social norms), and fast-moving institutions, which can change more quickly, like political institutions.

Greif (1994) argues: different cultures... generate different sets of beliefs about how people behave and this can alter the set of equilibria for a given specification of institutions. He considers culture in its evolution as closely related to technology and scientific knowledge. As emphasized by Roland (2004), it then becomes crucial to understand the factors that may affect the evolution of cultures over time. Tabellini (2008), explaining divergence on several political, institutional or economic outcomes in regions of Europe, takes culture into account. Considered as individual values the author indicates this as the channel through which history affects institutional outcomes. The author notes observed differences in the functioning of bureaucracies between many countries that have identical laws and incentives, and in many instances similar resources. These differences underline the importance of this historical persistence on policy effectiveness. Rodrik et al (2004) use instrumental variables for institutions and trade to estimate the respective contributions of institutions, geography, and trade for the determination of income levels around the world. They show that the quality of institutions, especially with respect to property rights and the rule of law, matter more than either geography or trade. La Porta et al. (2004) point out the importance of human capital as a basic source for growth controlling for the reverse causality on institution building and the importance of legal origins (2008), and hence of different historical legacies on economic performance. Roland (2004) considers the dynamics of complementarities between political and cultural institutions and the importance of institutional clusters for growth. He also emphasizes the importance of understanding slow moving institutions (Jellema, Roland 2009). Greif (2006) argues that history is a major determinant of the persistence of institutions, as well as a major factor in their endogenous change; he also argues that past institutions affect subsequent institutional development. In addition, a growing body of literature affirms the importance of slow and incremental development of institutions, especially informal institutions (North 1990). Other research has found that distant historical events can play a crucial role in determining institutional or economic performance for example, the effect of colonial legacies on economic performance in less-developed countries

(Brown 1996, Acemoglu et al. 2002, 2005, 2008, Djankov et al. 2003, Engerman et al. 2002). Gorodnichenko and Roland (2011) focus on collectivism and individualism as important aspects of cultural transmission contributing to divergent growth between countries. Fukuyama (2004) argues that the development of formal institutions is strongly affected by cultural factors. Like others, he stresses the role of social virtues and specifically trust in explaining the correlation between a countrys religion and its economic modernization.

The idea that institutions, particularly informal institutions like beliefs and social norms may persist over time is widely accepted in the literature. These informal institutions affect formal institutions that are shown to have a strong effect on growth. Among others are the rule of law and the level of corruption. Social norms and beliefs are often considered direct channels through which historical background and historical legacies persist. But the question of the impact of historical legacies on former transition economies has not gained much attention in the literature, especially with respect to Eastern Europe. One notable exception is the seminal contribution of Dimitrova-Grajzl (2007), which explores the impact of historical legacies on institutional development of Eastern European economies. Other exceptions include recent research by Grosejan on the effect of historical spatial proximity on cultural transmission (2011) and the persistence of former Ottoman institutions on financial sector development today (2011).
A recent working paper by Becker and al. (2011) develops a close argument to this research focusing on Eastern Europe and Ukraine. Their findings shows individuals living on the former Habsbourg territory to have higher levels of trust and lower levels of corruption toward state institutions and officials. In my analysis I use a clear analytical narrative and a simple theoretical model to identify the institutional change that caused the differences found. Based on the institutional change, I can uniquely identify the relevant historical border in contemporary Eastern Europe and use the discontinuity created by this border to identify the predicted differences.

1.3 A History of Eastern Europe

The story of two CEEB countries (Slovenia and the Czech Republic) and two SEE countries (Serbia and Bulgaria) hints that 20th century history is not the sole determinant of institutions in Eastern Europe. As argued by Dimitrova-Grajzl, the fall of the communist legal system was accompanied by a desire to diverge from socialist ideology, and therefore triggered a return to traditions, norms, and rules from earlier history. This hypothesis is motivated by the case study of two sets of countries in which similar socialist economic models were implemented, but that still display large differences in development and institutional performance. As argued by Dimitrova-Grajzl, Serbia and Slovenia were both republics of the FYF, and thus benefited from Titos more independent model of socialism, while in Bulgaria and the Czech Republic a more classical socialist economic model was implemented. Despite this shared experience of Serbia and Slovenia, on the one hand, and Bulgaria and the Czech Republic, on the other, data on growth and other indicators show current similarities between Serbia and Bulgaria, and between Slovenia and the Czech Republic. These similarities are also clearly visible in comparisons of institutional performance.

The experiences of these Eastern European States illustrate the importance of long-term historical legacies. Bulgaria, Serbia, and Slovenia were totally incorporated into the Union of Soviet Socialist Republics, but their current economic development is sharply different from that of all the other formerly communist countries. I argue not only that long term historical legacies of those countries matter but that the legacy of the Ottoman Empire on successor states has a different imprint on todays divergent institutional frameworks (formal and informal) compared to that of successor states with a Habsburg-Prussian legacy.

The fall of the Berlin Wall in 1989 inaugurated fundamental economic and political changes in Eastern Europe. Transition refers to the process through which open market oriented economies were established in these countries. According to the EBRD (1994) transition from a com-

mand to a market economy is the movement towards a new system for the generation and allocation of resources. It involves also changing and creating the institutional framework. A strong majority of international institutions and economists agree that certain features of market economies must be established in any successful transition. These key features include: private enterprises; competitive markets; sound institutions (financial and otherwise) to serve as a basis for commercial transactions; and the fiscal and monetary policies required to create and maintain macroeconomic stability. In the early part of the transition process, macroeconomic stabilization, price liberation, extensive privatization, and other reforms were emphasized as necessary for integrating countries in transition with the world economy. Twenty years after the start of transition, the CEEB and SEE countries appear to have diverged, both in terms of growth measured by GDP per capita and in terms of the Human Development Index. A major impediment to accurately assessing the influence of institutions on economic performance during transition is the difficulty of identifying theoretically sound measures of institutional performance that are relevant for growth (Coricelli et al. 2002). Campos (1999) uses the concept of governance, as developed in the World Bank Governance Indicators (WGI), to put forward a set of indicators for different institutional dimensions of governance for the transition countries. This concept of governance includes the functioning of civil society and of institutional performance that are relevant for growth (Coricelli et al. 2002). Campos (1999) uses the concept of governance, as developed in the World Bank Governance Indicators (WGI), to put forward a set of indicators for different institutional dimensions of governance for the transition countries. This concept of governance includes the functioning of civil society.

Good governance requires an efficient, well-functioning bureaucracy, capable of adjusting to changing social needs. For good governance, the legal framework must also be appropriate to the circumstances and must command broad consensus. Civil society should be strong, to encourage participation in public affairs. Improving the quality of governance and institutions has been a key point on the integration agenda of the Eu-

ropean Union, as well as for SEE countries integrating into the world economy. Formal institutions seem to be weaker in the SEE region than in other Eastern European countries: corruption seems higher, while the rule of law, political voice, accountability, political stability, and government effectiveness all appear to be weaker. Western Balkan countries appear to have the weakest institutions, given the prevalence of corruption and lack of rule of law, among other things. The EU accession process is claimed to have a positive effect on the institutional framework, since the required institutional reforms are so rigorous. On the other hand progress on a set of institutions is required for a definitive and positive outcome of the process, highlighting a countrys specific domestic peculiarities. Thus it is important to consider the historical legacies of countries and regions.

1.3.1 A Tale of Two Legacies

Before the common experiences of two world wars and half a century under communist rule, Central Eastern Europe (comprising Central Europe, the Baltics, and South Eastern Europe) was broken into three and ruled for centuries by the Prussian, Habsburg, and Ottoman Empires. In addition, the Russian Empire ruled over the Baltic countries and part of Poland from the end of the eighteenth century to the beginning of the twentieth century.

The aim of this paper is not to define all distinct features of each empire with historical precision, but to explore the cultural and institutional imprint of the Ottoman legacy in South Eastern Europe. However, this section provides an overview of the relevant history of these empires, starting with the fifteenth century and finishing with the disaggregation of the Habsburg and Ottoman Empires in the early twentieth century. Although Russian legacies are taken into account in the methodological analysis, the main characteristics of this empire are not discussed in this section. This is because this research focuses on the institutional and cultural legacies of the other empires, especially with respect to their administrative systems, and on the effect of a former border of the Ottoman

Empire, making the Russian legacy less relevant.

The Ottoman Empire and the Habsburg, Russian, and Prussian empires engaged in a long series of wars for control of Central and Eastern Europe. The Treaty of Karlowitz in 1699 set a boundary between the Habsburg and Ottoman Empire. The land that the Ottomans ceded to the Habsburgs included much of modern Hungary. I have used Geographic Inforation System to overlay the Karlowitz line over modern European boundaries. The line roughly divides CEEB from SEE countries, and a few SEE countries in particular, Serbia and Romania straddle that line. In other words, certain modern states contain both historically Ottoman and historically Habsburg-Prussian territory. The Karlowitz boundary sheds light on the legacy of the Ottoman Empire that persists despite the shared 20th century experience of modern states.

After 1699, the area of Europe still within Ottoman control, called Rumelia by the Turks, was roughly equivalent to the Balkans. With this huge expansion at the turn of the eighteenth century, the Habsburg Empire began its ascension, while the Ottoman Empire began its internal administrative, social, and economic decline in the region and elsewhere.

Not long before the Treaty of Karlowitz, a change in the tax system was introduced in the Ottoman Empire: the tax farming. The novelty was the way the tax rights were assigned. An auction system granted the land to the highest bidder. The government start granting property rights through a bidding process that lead to immediate cash revenues. The right to the tax farm was acquired upon winning the auction, including the right to subcontract the revenue collection to smaller tax farmers. Few years before the treaty was signed the life leases of tax farming malikane substituted the short term tax farming.

As well as the ayans (local lords), local committees were appointed to maintain district level registers. With time their power became uncontrolled and a source of conflict with the central government, as well as a source of exploitation of the local population considering that usurers and tax-farmers were also members of these committees. Tax farmers started collecting other taxes illegally from peasants and increasing their power over their consolidated cifliks. The government lost further con-

trol over the locals granted with autonomy in controlling their districts. The ayan hierarchies started exploiting furthermore their power as landholders, leasees, local reallocation committees and as recruitment agents for war needs. The system was so lucrative that even during the 20th century in Bosnia the word malikane (life lease) was used as a synonym for easy money (Inalcik 1994). The system created great opportunities for rent extraction for the agents and at different times also collusion between them. The era of the rise of ayans in Rumelia had only started. The two centuries that followed saw an increasing level of abuse towards the local population, corruption, and increasing bribery and distrust.

Furthermore, as Balla and Johnson (2009) argue, the highly decentralised tax system lead to manipulation of the rules of the game by the Sultan, and property rights became increasingly uncertain. In 1714, the Sultan retracted contracts in most provinces. He reinstated them in 1717 at prices nearly 50 percent above the original bids. This policy lead to a cycle of disrespect for the law: the ayans began to ignore the law and transmitted tax farms from one generation to the next did not even give the collected excise to the central government. State revenues fell even further and provinces started experiencing the rise of a class of exbandits that took hold of some territories and administered them in full autonomy from Istanbul.

The rule of law is a measure of governance. In both empires, the rule of law was in the hands of the Sovereign (Habsburgs) or the Sultan (Ottomans). The principle of the Circle of Equity was as important for the Sultan as the respect of Courts and their jurisdiction was for the Sovereign prince. However, Rulers of contemporary Eastern Europe north of the Danube and Sava, whether they were Prussians, Hungarians, or Habsburgs, shared an important common trait: their strong ties with the (local) nobility. The nobles maintained their privileged status and their influence through wars, changes of power and princes, unions of kingdoms (i.e Austro Hungary) and fights for national identity. Even after the Russian occupation in Latvia and Estonia, the Prussian nobility still had control of all the lands and the administrative system. The noble class in these regions had a similar influence on their supreme rulers

as that of the parliamentary system in the western monarchies. As the tax farming system was eroding the rule of law in the Ottoman Empire, the rule of law was being strengthened under state institutions in the Austro-Hungarian and Prussian empires.

In contrast, the Ottoman Empire based its administrative system on the Devishmire practice: recruiting young slaves and training them as bureaucrats and solders (Jannisaries). The structure and goals of the empire were predicated on continued conquest (Fleischer, 1986) but no one had any right or could exercise any authority over the land and peasantry without a mandate from the Sultan (Inalcik 1973). The sipahis military were granted land and tax collection rights in payment for their service to the Sultan. None of these practices built institutions based on predictable rules.

While the end of the 17th century marked a discontinuity for lands within the Ottoman Empire, the empires north of the Karlowitz line continued a process of building strong state institutions. In the same period, arts were sponsored widely in the Habsburg empire by the aristocracy, the dynasty and the counter-reformatory church with a great influx of German culture into Bohemian lands (Kann, 1974). Challenged by the Turkish wars the need to have tight relationships with the nobility became even more important for the Habsburgs. With the treaty of Karlowitz, the Habsburgs regained Hungary (including Transylvania). After initial struggles and revolts, the Hungarian nobles recognised the importance of the alliance, and the Habsburg Empire became the Austro-Hungarian Empire. The era of Joseph II and Maria Theresa are remembered for the great conquests and spirit of reform in continuity with the process of state building of a power now called the Austro-Hungarian Empire.

The Habsburg-Prussian legacy is mixed. Peasant revolts during the late fifteenth and the sixteenth centuries were common to both empires. However,the Prussians left an imprint on culture and state building that extended beyond the Baltic region and Poland. German law cities spread throughout the northern half of Central Eastern Europe, reaching as far as Hungary and Bohemia (todays Czech Republic, Slovakia, and Slove-

nia). Those German law cities are argued to be the basis of the Habsburg rule (Magocsi 1993). The Habsburgs joined their forces with the Hungarians to become Austro-Hungary in the late nineteenth century, a union that lasted until the end of World War I (1918). The legacies of the Habsburg and Prussian Empires differed from that of the Ottoman Empire in many key ways, especially with respect to the spread of education, the written press, the expansion of trade, and the effect of the Protestant reformation. The spread of Protestantism was associated with disapproval of corruption and had a positive effect on social capital (Putnam 1993; Fukuyama 1995; La Porta et al. 1997). Furthermore, the Habsburgs abolished serfdom, reformed the tax system, and starting in 1785 increased peasants rights. The condition of the peasantry was nevertheless the same. In contrast, serfdom survived almost until almost the decline of the Empire itself in the European territories ruled by the Ottomans. In addition, the Weberian public administration of the Habsburg European regions is thought to have had a higher quality of public bureaucracy that led to better interactions between citizens and the government (Becker et al 2011).

1.3.2 The Fiscal Divide

Despite the differences before the wars of the second half of the seventeenth century and specifically the Treaty of Karlowitz (1699), both empires were engaged a continuous and ongoing process of building an administrative and fiscal system and faced similar struggles, while imposing tax burdens on the local population. After the treaty, the Habsburg monarchy (later on becoming Austro-Hungarian Empire) continued the process of building strong state institutions and tight relationship with the nobility of the hereditary lands. In contrast, the drastic changes in fiscal policy implemented by the Ottoman Empire with the tax farm reform of late 17th century irreversibly changed the future of administrative and state building in the region.

Notwithstanding the problems that the Ottoman regime in Eastern Europe had, several historians argue that the real effect of decline started

after the war ended in 1699. After the Karlowitz treaty, other wars and treaties followed with borders being redesigned on each side of the Danube-Sava rivers. The Ottomans first lost and then regained territories. There where no substantial change to the borders assigned from the treaty of Karlowitz in Rumelia until the beginning of 20th century when the Austro Hungarian empire annexes part of contemporary Bosnia Herzegovina.

But an the important change in the region was the one on the Fiscal system of the Ottoman Empire in the late seventeenth century.

In the centuries before the Treaty of Karlowitz was signed the Ottoman fiscal sytem shared common aspects with other ruling monarchies (France among others). The dominant fiscal system was the Timar system: Timar holders were selected among the military class and leased taxation rights given as salaries for their regular military services. Several authors evidence that most taxes collected were in kind and regulated by law from the Sultan himself. In order to prevent abuses, specific laws would determine the time and amount to be collected. The Central Government had in place a system of control and law enforcement through local law enforcement agents (Metin and al.

Faced with increasing war costs,and proliferation of tax exemption (vakif) as argued by Inalcik, the Empire experience great cash constraints and a fiscal shock. Therefore the the availability of liquid funds became the priority. The tax system gradually convert toward auctioning of property rights for the highest price. The $Iltizam$ (short term tax faming) system is introduced and around 1694 is further converted into the $Malicane$ system (life term lease).

Different scholars would argue that this change created a system of abuse, corruption and the exploitation of the population by rapacious tax-farmers. Further we try to uncover the reasons that lead to this outcome.

In a comparative study of the evolution of the Ottoman and French fiscal systems, Balla and Johnson (2009) argue that, uncertainty with regard to these tax farming contract was prevalent. As the authors would cite 'only in 1714, the sultan retracted contracts and re auctioned them

in 1717 at prices nearly 50 percent above the original bids' and that ' whenever a better bid was made, the tax farmer either paid the difference or lost his right to collect'. Further more the establishment of the 'tax farming' ' altered the governments relationship with local law enforcement agents and reduced the effectiveness of control mechanisms' as argued by Cosgel and al. (2011). The power of control over the farming lands was often delegate to local lords from the bidders for even shorter amount of time. The combination of these factors and the great necessity to pay the loans contracted for paying the highest price of the auction lead to what is described as period of great abuse corruption and demolition of 'the circle of equity' in the ottoman Empire. Fleet (2003)and others would describe the rise of tax farming system as the quintessential expression of the Ottoman decline.

I argue that this fiscal change and the tax farming institution with its auction system of land ownership marked the great divide in the building of state and administrative systems and therefore people's attitude toward the rule of law in the regions governed from the Ottoman Empire. This fiscal policy that lead to further uncertainty and exploitation by the beginning of eighteenth century and left an imprint of double agent principal problems in the administrative and governance sector in the areas ruled by the Ottomans after the Treaty of Karlowitz: the interactions between the State and ayans and between ayans and peasants. This legacy of distrust of public offices or local administration and corruption for personal gain is the institutional imprint of long term history reflected by present indicators of governance and norms of behavior of the local population of these regions. The roving bandit type of rule in the region left an imprint that persisted despite the wars and decades of imposed communist regime.

1.4 Fiscal systems and rent extraction

In this section a simplified theoretical model sheds light on the incentives for investment in the future and extractive behavior of state administra-

tors before and after the change in the Ottoman administrative and fiscal system.

I consider the empire (or kingdom) as split up into different regions. Before the reform each region was assigned to a member of nobility or timariot (from the military class) who collected taxes for the ruler (Emperor or Sultan). The ruler decides the total rent that could be extracted from each region and how much the lord (timariot) that levied the taxes for him could keep.

Each region has production capacity equal to $Y_t = AK_t$ where A is the common technology and K_t the capital stock or production capacity (including institutional and administrative system).
The ruler can than assign this production to investment I_t to increase future production capacity, or toward the rents extracted by himself and the lord R_t.

As the Ruler (or his heir) is going to be in place for a longer period of time, he cares about the rent in the future R_2 while he has a discount rate β. His instantaneous utility is defined as $V_t = ln(R_t)$.
Capital depreciates at rate δ such that the capital in the future (period 2) is equal to $K_2 = (1-\delta) K_1 + I_1$.

The maximization problem of the Ruler (prince/sultan) then becomes

$$\begin{aligned} \max_{R_1,R_2} \pi(R_1,R_2) \quad &: \quad \pi = \ln(R_1) + \beta \ln(R_2) \\ st. \quad AK_t \quad &= \quad R_t + I_t = \\ K_2 \quad &= \quad (1-\delta) K_1 + I_1. \end{aligned}$$

Note that there is no reason to invest in period 2 so that $I_2 = 0$, the rent in period 2 is then AK_2. Substitution of the constraints into the goal function yields:

$$\max_{R_1} \pi(R_1) = \ln(R_1) + \beta \ln(A[(1-\delta) K_1 + AK_1 - R_1])$$

The objective function is concave in R_1 and has a unique maximum de-

fined by the first order condition:

$$\begin{aligned}
\frac{\partial \pi}{\partial R_1} &= \frac{1}{R_1} - \frac{\beta A}{A\left[(1-\delta)K_1 + AK_1 - R_1\right]} = 0 \\
\beta A R_1 &= A\left[(1-\delta)K_1 + AK_1 - R_1\right] \\
(1+\beta) A R_1 &= A\left[(1-\delta)K_1 + AK_1\right] \\
R_1 &= \frac{(1-\delta)K_1 + AK_1}{1+\beta}
\end{aligned}$$

The rent extracted in the first period is smaller than production capacity iff

$$1 - \delta < A\beta$$

That is, if, relative to $1-\delta$, the technology is productive enough or the value assigned to the future future high enough, positive investment in the future is optimal.

After the auctioning of tax farming rights was adopted in the 17th century, regions did not change, so the production capacity is still $Y_t = AK_t$.

But the sultan decided that the rent could be extracted by the one paying the highest bid while the taxes where established in terms of a lump sum per year. The bidders know that the benefits will accrue in the period defined by the property rights over the auction.[1] Assume that the local lords have the same utility function as the ruler $U = ln(c_t)$. Where c_t is the amount of money they manage to extract for themselves. Local lords that do not manage to procure a region can extract no money so have a utility of 0.

Every period all lords sent in a bid, b^i for the regions they want to levy taxes on. The maximum rent that can be extracted for a region is again it's total production.

Backward induction leads to full rent extraction in the final period. Then the bidders will be willing to bid up to AK_2 in period 2, leading to full Bertrand-like price competition. As long as there are at least 2 lords

[1] from 1 year to 20 years life time lease assuming an average age at the time of the auction and life expectations

bidding on each region (and they don't collude) the ruler will extract all rents of the second period. Knowing that none of the rents in the second period will acrue to them, none of the lords has any incentive to invest in period 1. During period 1 bidding again all lords will have the incentive to bid up to the maximum production capacity, and also this period bidding results in Bertrand competition. Such that in equilibrium:

$$b_t^i = AK_t, \quad I_1 = 0, \quad K_2 = (1-\delta)K_1$$

The model suggests that the fiscal change in the Ottoman empire at the end of the 17th century leads to a lack of incentives to invest in constructing a functioning state and rule of law. If this empire left a lasting imprint on the culture and development of these areas, the effects of this lack of investment should still be visible in the current time.

Proposition1: The Ottoman side of the Karlowitz border shows lower levels of corruption and lack of rule of law.

Proposition2: The Ottoman side of the Karlowitz border shows lower level of development.

To highlight the distortive effects of the fiscal change uncertainty, risk aversion and credit constraints are not considered in this simplified model. The model also exclude the possibility of selections effects which would have aggravated the predatory behavior.[2]

1.5 Data and Methodology

The data used in this study are collected mainly from two sets of sources: first, traditional economic data such as institutional data from the World Bank, the EBRD, and a few indexes used mainly as covariates in the transition literature; second, atlases and other historical sources integrated with GIS for a multidisciplinary narrative analysis approach.

[2]considering different utility functions the local lord willing to extract the highest rent will also bid the highest price

The methodology follows a cross-country analysis with an IV approach, an analytical narrative approach, and a regression discontinuity analysis with household data. Finally, light intensity data is used as proxy for development around the historical boundaries delimited by the Karlowitz Treaty

The country-level institutional data are collected from the World Governance Indicators created by Kauffman et al. for 1996 to 2008. Data on GDP per capita is taken from the World Bank indicators. Sources of other control variables come from both the EBRD and the World Bank over the years 1989 to 2008.

I argue that while these indicators are usually mentioned for their measurement problems, they add value to the analysis because they capture many of the formal and informal institutional features that affect quality of governance.

The Life in Transition data are collected from the EBRD in 2006 in the 29 transition economies: 1000 interviews divided into 20 primary statistic units PSU per country. For the purpose of this study, only data from CEE countries is analyzed. Households are geocoded on the basis of the information provided about their latitude and longitude.

To analyze the quality of governance in these CEE countries, I will focus on the responses to the following survey question: "In your opinion, how often is it necessary for people like you to have to make unofficial payments/gifts in these situations?" Households are asked to reply to this question in regards to various scenarios that involve dealing with public officials: interacting with traffic police; requesting official documents (e.g. passport, visa, birth or marriage certificate, land registration, etc.); interacting with the police in relation to other matters; going to court for a civil matter; receiving medical treatment in the public health system; receiving public higher education (university, college); requesting unemployment benefits; and requesting other social benefits. The answers (outcomes) use a five-point scale, with 1 meaning "Never" and 5 meaning "Always". Observations (responses) and means for households at various distances on either side of the reconstructed Karlowitz border are described in table 6.

1.5.1 Cross-Country Analysis

Like Beck and Laeven (2005), I examine the importance of institution building for growth during transition, with a focus on the sixteen Eastern European economies. I argue that formal and informal contemporary institutions in these countries reflect the legacies of the empires that ruled the region for centuries. These institutional legacies may account for a substantial portion of the divergence that is currently visible between the South Eastern European countries and those of the Central and Baltic region.

Data for the cross-country analysis comes from the World Bank Indicators. I follow the authors' analysis combined with the approach used by Accemoglu et al. (2001) investigating the colonial origins of comparative development.

I construct a panel dataset over the years 1989-2008 for the 29 transition countries The cutoff year allows me to account for results not affected by the subsequent financial crisis.

The focus of the analysis investigating the persistence of historical legacies focuses especially on the following countries: Albania, Bosnia Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Poland, Slovenia, Slovakia, Serbia. I use the former Soviet Union countries as a control while trying to increase the power of the estimations.

All of these countries were under communist governments, but only some of them were actually incorporated into the Soviet Union. Thus, the former Soviet Union countries shared a more homogeneous history. This homogeneity means that different attitudes toward bribery reflect something other than Soviet-era history. Similarly, the nations that once formed Yugoslavia were a single country for most of the 20th century, yet still exhibit differences based on their relationship to the Karlowitz line. This region, even though shaped by continuous wars between Empires, clearly claims an impact of two main different legacies: the Ottoman Empire and what is here defined as the combined Austro Hungarian-Prussian legacy.

I use an Instrumental Variable approach following the path dependence legacy on shaping institutions and arguing that the time spent under a specific Empire captures the exogenous component of institutions and with the exclusion restriction that history affects growth only through the institutional channel.

Furthermore the main interest is on the role of Ottoman legacy being the dominant power for centuries in the South Eastern European region.

In this part of the analysis I use country level data on GDPpc from the World Bank Indicators, World Governance indicators for the institutional variables, covariates used in the transition literature as well as Magocsi Historical Altlas of East Central Europe and other historical literature for the construction of the Instrumental Variable.

It is recognized that the Kaufaman et al governance indicators have their limits, but what is interesting for this part of the study is that they allow the capture of the first inclusive aspect of informal institutions into the formal ones. These indicators are highly correlated with each other. While in the second part this study focus mainly on attitudes towards corruption, data and channels of persistence, for this part all the WGI are taken into account as they capture different aspects of the corruption, (especially at administrative level) intended as formal and informal institutions. Summary statistics demonstrate that the indexes with higher values correspond to better institutional performance (i.e. lower levels of i.e. corruption) (to be discussed) (Appendix to be added for the WGI..)

Instrumental variable: Weighted index for the length of Empire occupation

Following Dimitrova Grajzl's (2007) approach I proxy the impact of the historical legacy by the duration of the Empire hypothesing that the more time a country has spent under the rule of a certain empire the stronger the influence of that empire's culture and institutions is on the country's current culture and institutions

In this study, I try to use an approach closer to that of economic history in order to use historical legacies to predict economic outcomes. I used meticulous research of the specific dates of 'durations of the rule'

of the 'effective legacy in place'. As an example: Transylvania during the years of Ottoman occupancy continued to be ruled by Hungarian princes, at the same time as, as is argued in the historical literature, the Prussian nobility maintained their privileged power over administrative matters in Estonia and Latvia during the first years of Russian imperial rule. To construct Instrumental Variables, I create a weighted index that accounts for the length of a country's legacy counting the period between the beginning of the fifteenth century and the country's proclaimed independence (period 1400-1918). I also take into account that different countries have been ruled by different Empires in different phases during the period as defined. As argued by historians and Dimitrova-Grajzl (2007), the latest centuries should have a more relevant impact of cultural and institutional persistence. The year 1989 is used here as a reference ending year as the year that marks the end of the communist period, the start of the market oriented institutional reforms, and the start year for the dataset used in this study. The 'importance' assigned to each year is equal to the inverse of the distance between 1989 and the year itself. The use of this reference year yields a convenient shape to the importance of the function. The shape is similar to an exponential function, for which we observe a significant increase in importance for years after 1700. This better represents the importance of the governance administrative transformations in the biggest two empires Ottoman and Habsbourg after the beginning of the seventeenth century. The construction of the index is as follows:

Country "s weight of a certain empire is:

$$\sum_{j=t_{i0}}^{t_{in}} 1/(1989-j)$$

where t_{i0} is the first year when the empire's occupation of $country_i$ started at t_{in} is the year when the empire's occupation (or effective ruler supremacy) of $country_i$ ended. I compute indices for each country and each empire by adding the value of each year when the country was under occupation by that empire. As previously mentioned the years

closer to the present are assumed to be more important than earlier years.

The relative weight of each year under the occupation of an Empire is graphically represented in Figure 2.

The main focus of this study is the legacy of Ottoman Empire in South Eastern Europe (specifically the Balkan region) and the consequent impact on present day institutions in the region. Indexes nevertheless are created for the four main legacies evidenced in the literature: Ottoman, Austro-Hungarian (Habsbourg), Prussian, Russian. The Prussian index, named Pru-PL also refers to the Poland-Lithuanian commonwealth. Accounting for all the four legacies helps interpreting the main correlation findings between these one and the institutional variables. Descriptive statistics for these indices are presented in Table 1.

IV discussion

The duration of the Imperial occupation doesn't vary over time for the countries considered therefore the Panel dataset of 20 years data is converted to a Poled OLS. The estimated model is the following

$$\log(Gdppc) = \beta_0 + \beta_1 Instindex + \epsilon \tag{1.1}$$

where the institutional variable is assumed to affect growth through different channels being correlated with unobserved variable, namely included in the error term. The OLS estimations will therefore be biased and inconsistent. The instrument length of historical legacy (empire occupation) is assumed to be correlated with the indexes of institutional quality but not with other omitted variables that might affect growth.

The exclusion restriction being that the IV affects growth only through the channel of institutions that by construction include the informal ones and therefore as a second validity assumption are uncorrelated with the error term in the first equation.

The first assumption of the IV being correlated with the institutional index $Cov(Instindex, Histweight) \neq 0$ is tested with the reduced form equation alias the first stage with the following second equation

$$Instindex = \alpha_0 + \alpha_1 Histweight + u \tag{1.2}$$

where as from Table 4 the $H_0 : \alpha_0 = 0$ is rejected.

Constrained by the small sample, and motivated by an interest specifically for the effect of the Ottoman legacy on the South Eastern region of Eastern Europe, only the Ottoman weight is used as an instrument. The size and significance of the Ottoman weight does not change when the other historical weighted variables are included. The same findings apply to the second stage, even when control variables are added.

Assuming the IV being uncorrelated with the error term $Cov(Histweight, \epsilon) = 0$ therefore lead to

$$\begin{aligned} Cov[\log(Gdppc), Histweight] = \beta_1 Cov(Instindex, Histweight) \\ + Cov(e, Histweight) \end{aligned} \tag{1.3}$$

and the estimate of β_1 being $\hat{\beta}_1$

$$\hat{\beta}_1 = \frac{Cov[\log(Gdppc), Histweight]}{Cov(Instindex, Histweight)} \tag{1.4}$$

The reduced form, the first stage and the instrumented results are represented in Figure 3.

The instrument is negatively correlated with the dependent variable and the instrumented variable. As from the construction of the index lower values of the WGI institutional index indicate lower institutional quality (performance), therefore an increase in the length of the Ottoman occupation decreased the institutional quality i.e. corruption and rule of law. The WGI institutional index once instrumented is highly and negatively correlated with the log of GDP per capita as it decreases with lower values of the institutional index.

Nevertheless in the case on an IV analysis the R^2 cannot be interpreted as the percentage of the variation explained. Other valid-

ity tests are thus taken into consideration. Asymptotic properties of IV(consistency, normality) indicates an analysis of the F statistics on the first-stage to be useful testing for a weak instrument. In both first stage analyses the F-statistic is larger than 30 (First stage results clustered by country). Furthermore a Wu- Hausman test is performed to test for endogeneity and the validity of the IV test versus OLS. Without endogeneity, both OLS and IV are consistent, but IV is inefficient. The Hausman test in this case indicates the OLS to be an inconsistent estimator for this equation, and the IV should therefore be preferred.

This analysis aims to test the importance of institutions for growth, and indicates therefore a different exogenous component of the different institutional (formal and informal) channel then those used in the previous literature. Given the uneasiness that often accompanies an IV analysis, the exclusionary restriction is addressed more in the next sections where the channel of the persistence of historical legacies is identified through the historical narrative and addressed with a household level analysis

1.5.2 Regression discontinuity analysis

Regression discontinuity analysis was first introduced by Thistlethwaite and Campbell in 1960 and in the late 1990s started being used more widely in economics. The basic idea behind the RD design is that assignment to the treatment is determined, either completely or partly, by the value of a predictor being on either side of a threshold (Imbens and Lemieux 2008)

I use Geografic Information System to georeference the household from the LITS household survey. Therefore the historical Karlovitz border is used as an identification strategy for a comparing the 'treatment effect' of the Ottoman legacy in the region with that of the Austro-Hungarian and Prussian former empire. The analysis focuses on the interaction of households with local bureaucrats on both sides of the no longer existent border and their propensity to bribe.

By overlapping today's map of Europe and the one of 1699, I recon-

struct a hypothetical division of countries on one side and the other of the border defined by the former Karlowitz treaty. I use the geo information on latitude and longitude of households to calculate the Euclidian distance in space from the border therefore translated into kilometers.

Both parametric functional form (say, a low-order polynomial) and a non-parametric procedure such as local linear regression "running a regression using only data points "close" to the cutoff " can in different cases lead to biased outcomes and in practice, parametric and non-parametric approaches lead to the computation of the exact same statistic. (Lee and Lemieux 2009). The procedure of regressing the outcome Y on a treatment dummy B as in this case can be interpreted as a parametric or as a (non parametric) local linear regression with a very large bandwidth.

Following Dell's (2010) interpretation I define this RD as a semiparametric analysis being a regression discontinuity approach with outcomes geographically defined (in latitude and longitude).

The first estimated regression is the following

$$y_{i,c} = \phi_c + \alpha B_{i,c} + \epsilon_{i,c} \tag{1.5}$$

with i=1, ..., N as the household index, c=1, ..., C countries index, $y_{i,c}$ index the "outcome variable" from the LITS survey for household i in country c related to the propensity to bribe and $\alpha_{i,c}$ the country-specific fixed effect. $B_{i,c}$ being the 'border' indicator, equal to 1 if the observation lies in an area ruled by the former Ottoman empire and 0 otherwise.

In order to test the Karlowitz division effect and control for a discontinuity at the border (i.e. Ottoman/AHP Border/) I avail of GIS constructing a variable $d_{i,c}$ that accounts for the geographical distance between household i and the Karlowitz border and recode it as follows

$$D_{i,c} = \begin{cases} -d_{i,c} & \text{if } i \text{ lies in the former Ottoman region} \\ d_{i,c} & \text{if } i \text{ lies in the former Austro-Hungary Prussian region} \end{cases} \tag{1.6}$$

Therefore households that today live in the areas formerly ruled by the Ottomans after the treaty of Karlowitz will be on the 'negative distance' side of the border and the individuals that live in the areas formerly ruled by the Austro-Hungarians and the Prussians. The value at 0 is the threshold of discontinuity. After reclassifying the variable the RD regression takes the following form

$$y_{i,c} = \phi_c + f(D_{i,c}) + \epsilon_{i,c} \tag{1.7}$$

where $f(.)$ is a flexible function estimated semi-parametrically or approximated by a polynomial or a series of regressions:

$$y_{i,c} = \phi_c + \alpha_1 B_{i,c} + \alpha_2 B_{i,c}^2 + \alpha_3 B_{i,c}^3 + \alpha_4 B_{i,c}^4 + \epsilon_{i,c} \tag{1.8}$$

Representing this graphically I assign each of observations to specific "distance-bins" and record the mean outcome for each distance bin. I plot those bin averages on the y-axis, and the distance for those bins on the x-axis The point at x = 0 is the discontinuity point and as from Fig 5.

1.6 Results

Results in the following section are divided in cross country evidence and Household Ordered Logit Regression Discontinuity analysis. A last section describes results obtained using consumption index and light intensity data as proxy for growth at the Karlowitz border.

1.6.1 Cross Country Evidence

Because there is a high degree of correlation among the World Governance Indicators, corruption and rule of law are used as representative of all WGI in the above discussed graphical part of the analysis (Figure 3). Table 2 shows the correlation between indexes of historical legacies and those of institutional quality. The Ottoman weight is the only

one negatively correlated with the index of institutions. This relationship is used as the first stage regression of the index of corruption (or rule of law) on the weighted variable for the Ottoman persistence in Figure 5. Linear regressions of the institutional quality represented by the corruption index show the Ottoman legacy, proxied by a dummy or by the weighted variable, to enter the regression with a negative sign in all cases. (Table 3) Control variables, added as suggested in the literature, reduce the power of the coefficients and in some cases (column 5, 7 and 9) also the explanatory power of the model. EU accession and initial conditions at the beginning of the communist period are shown to have a positive effect in reducing corruption, thus increasing institutional quality. Interestingly, controlling for the average index of reforms, in the case of the ottoman dummy variable, reduces the power of the model (column 5) but not the size of the coefficient. All variables used to capture the Ottoman legacy are significant at 1% . While these results don't aim to express causality, it is interesting to focus on the magnitude of the coefficient of the historical legacy. The proxy for the historical legacy of the Ottoman Empire is captured in Table 4, first stage IV. A country that spent 500 hundred years under the Ottoman Empire (as in the case of Macedonia weighted value 2.05) experiences an increase of the corruption index of almost 1.08 points compared to a country (like Slovenia) that spent zero years under the same Empire. Interestingly respective indexes of corruption in 2008 are -.110 for Macedonia and .951 for Slovenia. Given that the weighted index is not defined linearly and it gives an (subjectively) increasing weight to the more recent years, it is difficult to interpret differences among countries that spent certain periods under Ottoman rule. It is of interest however to interpret the results with the case of another country, Croatia, that spent almost 150 years before the Karlowitz treaty (1699) under the Ottoman Empire. The legacy of the imperial legacy on the institution index in this case is only - 0.242 points.

Table 4 also presents the second stage results of the IV of the effect of the different institutional indicators on growth expressed in GDP per capita. All coefficients are significant at 1%. Given that the dependent variable is the log of the percentage change in GDP per capita, for a one

unit increase in the corruption index the growth of GDP per capita will increase by 100 times the coefficient. The robustness check (Table 5) with additional variables added at the first stage and the second stage of the IV shows that institution coefficients do not vary significantly. In order to capture the effect of the time spent under the Ottoman Empire on growth through the institution channel, I compare three countries with different lengths of the Ottoman occupation: i.e. Macedonia (1400-1878) weighted index 2.055, Bulgaria (1400-1878) weighted index 1.674, Bosnia and Herzegovina (1472-1878) weighted index 1.534. Multiplying the difference between two pair of indexes (first Bulgaria and Macedonia) with the first stage results and then repeating the operation for the second stage results in the case of the index of corruption the estimated effect will be that of an increase of points 17 of GDP per capita for the country with the shorter Ottoman legacy. While repeating the analysis comparing Bulgaria and Bosnia Herzegovina we notice a lower weight of this difference compared to the previous one. This reflects the structure of the construction of the weighted variable as an index of historical length (legacy) giving more weight to the occupation of the latest years. In this case we will have an increased effect of reduced corruption on GDP per capita of 6 points for the country that has been occupied three quarters of a century later.

1.6.2 Household level Regression Discontinuity findings

Results from table 7, 8, and 9 are interpreted in terms of log-odds ratios being the categorical outcome variable. The analysis is performed for different bandwidths from 200 km (124 miles) to 50 km (31 miles) and different polynomial approximations. Table 7 provides evidence when accounting for all CEE Countries in the accounted radius from the border. Table 8 when the analysis is repeated only for Bosnia Herzegovina, Croatia, Romania, Serbia, and Table 9 shows results from the only within country variation in Romania. In the latter case, due to the lack of observations only Linear interacted polynomial 100 km and 200km from the border is performed. Coefficients show that the probability of bribing

increases discontinuously at the border when crossing to the Ottoman side and are interpreted as a percentage increase in the log odds ratio. This means that if the household interview is on the Ottoman side of the border (Ottoman dummy=1), ceteris paribus, there is an increase on the exponential of the log of the ratios, namely a factor e^{coef}, on the probability of being in a higher category of bribing. For most of the coefficients the propensity increases closer to the border. The analysis shows similar results in the three above cited cases.

I consider the question "In your opinion, how often is it necessary for people like you to have to make unofficial payments/gifts in these situations in the case of Interacting with the road police". In table 7 considering Interacted Linear Polynomial the probability of being in a higher category (willingness to bribe from 1 Never to 5 Always) increases by a factor of 2.48 if 200km from the Ottoman border and 2.88 if only 50 km distant. In Table 8 those figures became 2.627 and 2.36 respectively. A robustness check is performed with a cubic polynomial interaction. Further controls with additional variables as latitude and longitude, education, work status, and age do not change the sign and significance of coefficients in most cases. While the effects can furthermore be identified computing marginal fixed effects it is important to emphasize that the aim of this model is to provide the causal test rather than accurate predictions in magnitudes.

1.6.3 Consumption index and light intensity data as proxy for growth at the border level

In the last part of the analysis consumption and light intensity data are used to test for growth divergence on both sides of the Karlowitz border. Henderson Storeygard and Weil (2009) introduce the use of intensity of night lights, captured from the US Air Force weather satellites as a proxy for economic growth.

The results are mixed but still showing a decrease of consumption and light intensity closer to the Ottoman side especially when considering the analysis within Romania in the last part of the analysis con-

sumption and light intensity data are used to test for growth divergence on both sides of the Karlowitz border. Henderson Storeygard and Weil (2009) introduce the use of intensity of night lights, captured from the US Air Force weather satellites as a proxy for economic growth.

The results are mixed but still showing a decrease of consumption and light intensity closer to the Ottoman side especially when considering the analysis within Romania.

1.7 Conclusions

This study sheds light on the importance of long term historical legacies on institutional divergence in terms of governance (country level and local level) in Central Eastern Europe and the subsequent effect on growth with a specific focus on the main legacy of the Ottoman Empire in South Eastern Europe. The analysis shows the Ottoman imprint (measured according to the duration of the Empire) to be negatively correlated with institutions in the region. This exogenous component of institutions thus has a negative impact on growth in GDP per capita. At the household level a focus on local governance and focusing on the former institutional change on the Ottoman tax system shows the countries once under the Ottoman Empire are more willing to bribe and thus distrust local officials. The analysis provides evidence that this effect can be linked with the long past shared faith over centuries in these countries. Results confirm previous findings in the literature.

Social scientists from different disciplines consider corruption to increase transaction costs especially for the transitional economies, and argue the propensity to bribe local officials and thus distrust of government leads to generalized distrust of people more generally. Generalized trust itself is known to be inimical to economic development. Further work in progress uses social network data as a proxy for trust to analyze the imprint of historical legacies on this other institutional aspect.

Table 1: Summary Statistics. Weighted variables and Institutional Variables

	Obs.	Mean	Std. Dev.	Min.	M
Ottoman weight	16	0.736275	0.769885	0	2.05
Hapsburgs weight	16	0.640799	0.894256	0	2.12
Pru-PL weight	16	0.243439	0.510708	0	1.4
Russian weight	16	0.141376	0.260041	0	0.95
Corruption index	153	0.084694	0.531435	-1.09887	1.0
Rule of law index	153	0.127968	0.606699	-1.26626	1.1
Regol. Quality index	153	0.4812	0.62405	-1.27928	1.4
Gov. Effectivness index	153	0.253552	0.614194	-1.25979	1.1
Political Stability index	153	0.249535	0.664944	-1.9349	1.2
Voice and Account. index	153	0.553881	0.525435	-1.38198	1.2
LogGDPpc	301	9.136845	0.486035	7.109819	10.2

Countries Eastern Europe: Albania, Bosnia Herzegovina, Bulgaria, Croatia, Chezc Republic, Estonia, Latvia, Lithuania, Poland, Slovenia, Slovakia; Serbia. Pru-
Poland-Lithuanian commonwealth. They are jointly accounted a single legacy

Table 2: Correlations among Weighted Variables for Historical legacies and WGI indicators

	Corruption	Rule of law	Regulatory quality	Government effectiveness	Political stability	Voice and accountab.
Corruption index						
Rule of law	0.9283					
Regulatory quality	0.8351	0.8993				
Government eff	0.9012	0.8993	0.871			
Polit stab	0.8485	0.9035	0.9071	0.8887		
Voice and acc.	0.8738	0.9111	-0.7743	0.8887	0.9075	
Ottoman weight	-0.7732	-0.8254	-0.7743	-0.8245	-0.7812	-0.7865
Hapsb weight	0.5245	0.5013	0.3534	0.5155	0.4927	0.4243
Pru-PL weight	0.3342	0.369	0.4191	0.3357	0.2608	0.3645
Russ weight	0.2283	0.3087	0.4348	0.2907	0.3014	0.3443

Table 3: Corruption index from World Governance indicators and Empire Weighted Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Corruption Index					
Ottoman dummy	-.852***		-.469***		-.361***		-.335***		-.374***	
	(.0522)		(.087)		(.084)		(.094)		(.078)	
Ottoman Index		-.528***		-.257***		-.139**		-.157***		-.160***
		(.034)		(.052)		(.060)		(.060)		(.057)
LogGDPpc			.506***	.570***	.416***	.541***	.385***	.412***	.308***	.424***
			(.117)	(.114)	(.119)	(.116)	(.126)	(.137)	(.108)	((.110)
EU					.308***	.298***	.277***	207***	.503***	.485***
					(.048)	(.062)	(.107)	(.064)	(.066)	(.072)
Ebrdavg							.089	.198**		
							(.107)	(.098)		
DeMelo89									.681***	.693***
									(.149)	(.169)
Constant	.435***	.459***	-4.383***	-4.737***	-3.804***	-5.004***	-3.800***	-4.386******	-3.065***	-4.164***
	(.036)	(.037)	(1.119)	(1.082)	(1.125)	(1.118)	(1.179)	(1.216)	(1.007)	(1.029)
Adj. R^2	.623	.573	.708	.690	.754	.729	.757	.738	.785	.756
Number	16	16	16	16	16	16	16	16	16	16

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Corruption index from World Governance indicators and Empire Index

FIRST STAGE						
	(1)	(2)	(3)	(4)	(5)	(6)
	corruptest	rulawest	voiceest	polstabest	goveffest	regqest
Ottoman Index	-528***	-.643***	-.532***	-.670***	-.651***	-.619***
	(.034)	(.034)	(.029)	(.043)	(.037)	(.040)
SECOND STAGE						
					LogGDPpc	
corruptest	.893***					
	(.057)					
rulawest		.733***				
		(.043))				
voiceest			.885***			
			(.052)			
polstabest				.703***		
				(.051)		
goveffest					.724***	
					(.035)	
regqest						.762***
						(.051)
Constant	9.193***	9.175***	8.778***	9.093***	9.085***	8.902***
	(.024)	(.023)	(.035)	(.032)	(.019)	(.033)
Adj. R^2	.632	.653	.559	.544	.781	.515
Number	16	16	16	16	16	16

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Corruption index from World Governance indicators and Empire Index

FIRST STAGE						
	(1)	(2)	(3)	(4)	(5)	(6)
	corruptest	rulawest	voiceest	polstabest	goveffest	regqest
Ottoman Index	-.595***	-.682***	-.543***	-.679***	-.652***	-.574***
	(.039)	(.041)	(.034)	(.047)	(.040)	(.043)
SECOND STAGE						
				LogGDPpc		
corruptest	.847***					
	(.053)					
rulawest		.732***				
		(.043)				
voiceest			.927***			
			(.050)			
polstabest				.742***		
				(.048)		
goveffest					.772***	
					(.037)	
regqest						.878***
						(.055)
L.dmelo89	.135	.450***	.134	.859***	.522***	1.162***
	(.119)	(.125)	(.135)	(.133)	(.098)	(.167)
L.govexp	.011**	.005	.011*	.011**	.003	.006
	(.005)	(.005)	(.005)	(.005)	(.004)	(.006)
ansplan	-.019***	-.013**	-.010	-.007	-.017***	-.030***
	(.006)	(.006)	(.007)	(.007)	(.005)	(.006)
Constant	9.863***	9.595***	8.878***	.306	9.678***	9.854***
	(.272)	(.261)	(.321)	(.048)	(.233)	(.294)
Adj. R^2	.682	.700	.619	.621	.796	.647
Number	16	16	16	16	16	16

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Summary Statistics Household Analysis

	Ottoman		Non Ottoman	
Unofficial Payments For 200km (124 miles)	Obs.	Mean	Obs	Mean
Interact with the road police	6161	1.850	2856	1.442
Request official documents	6165	1.765	2856	1.327
Interact with the police on other matters	6153	1.586	2854	1.253
Go to courts for a civil matter	6153	1.693	2848	1.315
Receive medical treatment in the public health system	6153	2.395	2851	1.960
Receive public education (university, college, vocation	6156	1.740	2857	1.219
Request unemployment benefits	6155	1.547	2852	1.493
Request other social security benefits	6144	1.565	2855	1.236
Unofficial Payments Interacting with the road Police				
100 km (62 miles)	4145	1.843	1338	1.426
75 km (46.6 miles)	3465	1.853	1138	1.408
50km (31 miles)	2406	1.816	940	1.401
20km (12.4 miles)	278	1.92	80	1.5
10km (6miles)	949	1.988	281	1.444
Age of selected respondents (A and B)				
Resp A - 200 km (124miles)	2502	51.4	742	52.4
Resp B - 200 km (124miles)	6179	45.8	2862	50.7
Resp A - 100 km (62 miles)	1756	51.0	389	52.4
Resp B - 100 km (62 miles)	4159	44.4	1340	50.4
10km (6miles)	949	1.988	281	1.444
Education -highest degree				
Education - 200 km (124miles)	6176	3.212	2860	3.32
Education - 100 km (62miles)	4157	3.210	1339	3.33
Education - 75km (46.6 miles)	3477	3.17	1139	3.36
Education - 50km (31 miles)	2417	3.13	939	3.46

Table 7: Unofficial payments- CEE Countries

Interacted Linear Polynomial in distance to Karlovitz boundary								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Road_Police	Off_doc	Oth_Police	Courts	Med_treat	Publ_edu	Unemp_ben	Oth_soc.sec
Border 50km	1.058***	1.826***	1.745***	1.775***	1.230***	1.814***	2.048***	2.009***
	(.150)	(.180)	(.198)	(.193)	(.131)	(.187)	(.216)	(.212)
Border 75km	.845***	1.707***	1.531***	1.411***	1.130***	1.566***	1.607***	1.503***
	(.137)	(.165)	(.180)	(.171)	(.118)	(.164)	(.186)	(.183)
Border 100 km	.948***	1.621***	1.537***	1.433***	1.182***	1.604***	1.508***	1.451***
	(.123)	(.144)	(.158)	(.150)	(.106)	(.145)	(.161)	(.160)
Border 200 km	.907***	1.232***	1.061***	.958***	.932***	.985***	.891***	.880***
	(.094)	(.104)	(.113)	(.110)	(.080)	(.103)	(.116)	(.116)
Interacted Quadratic Polynomial in distance to Karlovitz boundary								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Border 50km	.9689***	1.996***	1.694***	1.699***	1.029***	1.724***	2.264***	2.190***
	(.192)	(.236)	(.248)	(.241)	(.166)	(.236)	(.288)	(.280)
Border 75km	1.088***	1.905***	1.831***	1.905***	1.200***	1.907***	2.384***	2.343***
	(.170)	(.202)	(.221)	(.217)	(.150)	(.211)	(.255)	(.250)
Border 100 km	.931***	1.911***	1.740***	1.704***	1.183***	1.777***	2.062***	1.981***
	(.159)	(.194)	(.210)	(.203)	(.138)	(.196)	(.232)	(.225)
Border 200 km	1.076***	1.735***	1.596***	1.445***	1.113***	1.575***	1.559***	1.577***
	(.127)	(.150)	(.164)	(.155)	(.109)	(.149)	(.168)	(.169)

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Unofficial payments Countries: Bosnia Herzegovina, Croatia, Romania, Serbia

Interacted Linear Polynomial in distance to Karlovitz boundary								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Road_Police	Off_doc	Oth_Police	Courts	Med_treat	Publ_edu	Unemp_ben	Oth_soc.sec
Border 50 km	.859***	.924***	1.129***	1.156***	.641***	1.219***	1.213***	1.293***
	(.196)	(.218)	(.240)	(.239)	(.169)	(.232)	(.256)	(.256)
Border 75 km	.638***	.786***	.965***	.895***	.716***	.983***	.753***	.769***
	(.177)	(.120)	(.221)	(.216)	(.153)	(.207)	(.228)	(.227)
Border 100 km	.831***	.809***	1.091***	1.023***	.711***	1.160***	.902***	.892***
	(.162)	(.183)	(.201)	(.196)	(.140)	(.188)	(.204)	(.205)
Border 200 km	.966***	.976***	.928***	.928***	.697***	.915***	.569***	.710***
	(0.131)	(0.145)	(0.159)	(0.155)	(0.113)	(0.146)	(0.159)	(0.16)
Interacted Quadratic Polynomial in distance to Karlovitz boundary								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Border 50 km	.938***	1.400***	1.457***	1.352***	.730***	1.536***	1.666***	1.738***
	(.262)	(.296)	(.314)	(.316)	(.225)	(.315)	(.348)	(.348)
Border 75 km	.884***	1.113***	1.273***	1.319***	.586***	1.423***	1.607***	1.704***
	(.223)	(.247)	(.268)	(.270)	(.192)	(.267)	(.298)	(.298)
Border 100 km	.685***	1.004***	1.137***	1.121***	.703***	1.176***	1.146***	1.231***
	(.208)	(.232)	(.255)	(.253)	(.179)	(.246)	(.273)	(.270)
Border 20 km	.523***	.542***	.790***	.666***	.468***	.898***	.719***	.685***
	(.178)	(.200)	(.220)	(.214)	(.154)	(.208)	(.229)	(.228)

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: Romania within country analysis

Linear Polynomial in distance to Karlowitz boundary								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Road_Police	Off_doc	Oth_Police	Courts	Med_treat	Publ_edu	Unemp_ben	Oth_soc.sec
Border 100 km	5.043***	4.991***	5.033***	3.490***	3.009***	5.086***	3.402***	4.627***
	(.962)	(1.020)	(1.024)	(.969)	(.760)	(.954)	(.982)	(1.073)
Border 200 km	1.579***	1.639***	1.503***	1.261***	.983***	.985**	.851*	1.631***
	(0.444)	(0.485)	(.482)	(0.478)	(0.378)	(0.443)	(0.481)	(0.508)

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: Robustness check: Interacted Cubic Polynomial in distance to Karlowitz - CEE

	(1) Road_Police	(2) Off_doc	(3) Oth_Police	(4) Courts	(5) Med_treat	(6) Publ_edu	(7) Unemp_ben	(8) Oth_soc.sec
Border 50 km	1.167***	2.391***	1.982***	2.374***	1.520***	2.329***	2.420***	2.244***
	(.243)	(.313)	(.326)	(.335)	(.215)	(.320)	(.367)	(.350)
Border 75 km	1.013***	2.173***	1.786***	1.891***	1.170***	1.882***	2.187***	2.115***
	(.207)	(.258)	(.271)	(.268)	(.180)	(.261)	(.309)	(.301)
Border 100 km	1.069***	1.920***	1.743***	1.888***	1.191***	1.836***	2.376***	2.332***
	(.186)	(.222)	(.240)	(.237)	(.163)	(.229)	(.279)	(.272)
Border 200 km	.799***	1.888***	1.764***	1.722***	1.224***	1.867***	2.047***	1.890***
	(0.153)	(0.191)	(0.208)	(0.199)	(0.136)	(0.196)	(0.227)	(0.218)

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11: Robustness check

Interacted Linear Polynomial in distance to Karlovitz boundary				
	(1)	(2)	(3)	(4)
	Border_200km	Border_100km	Border_50km	Border_10km
Consumption	-922.488***	-1380.22***	-520.8034**	-1230.385***
	(96.71355)	(122.108)	(214.5662)	(240.833)
Interacted Quadratic Polynomial in distance to Karlovitz boundary				
	(1)	(2)	(3)	(4)
Consumption	-1236.013***	-1286.069***	-433.8439*	-178.5138
	(131.0224)	(161.13)	(235.9204)	(321.79)

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 1: Karlowitz Border (1699) Reconstructed on the present day Map of Europe (Authors relaboration of Euroatlas data)

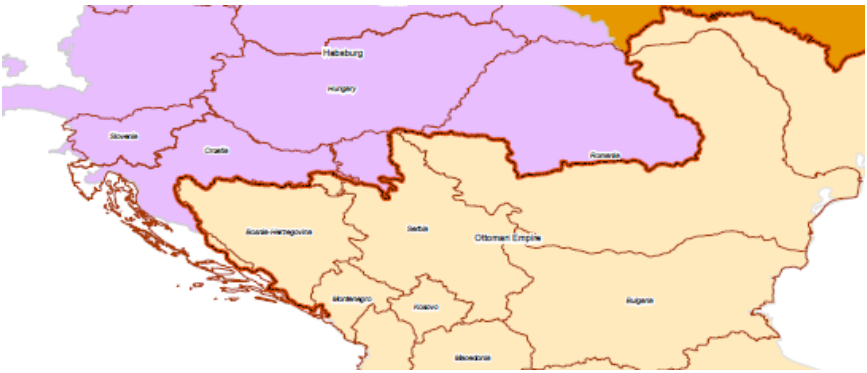


Figure 2: Graphical representation of the Historical legacy index (IV)

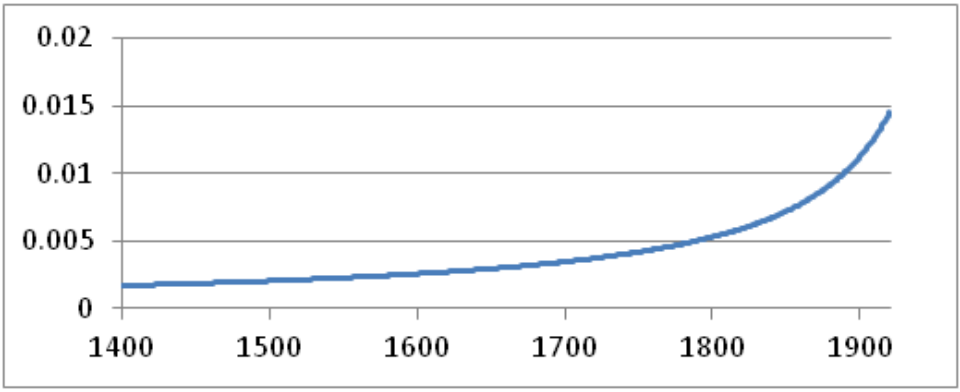


Figure 3: Correlation Log GDPpc and the Instrumented WG Index of Corruption

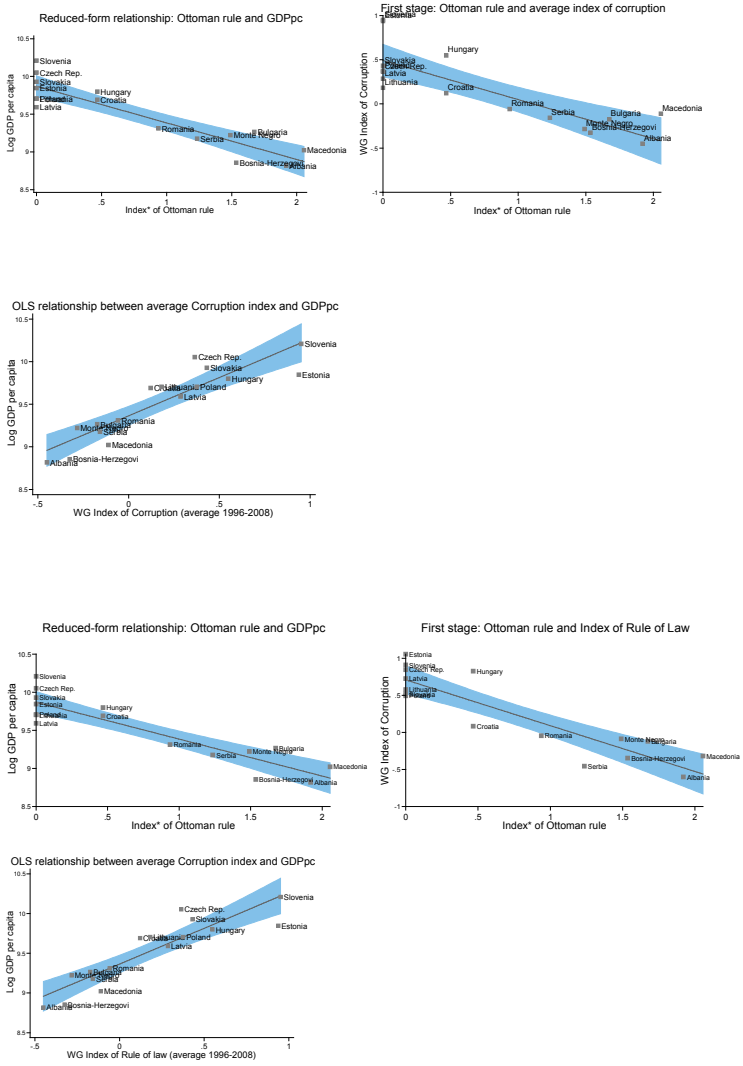


Figure 4: Propensity of Unofficial Payments/Gifts

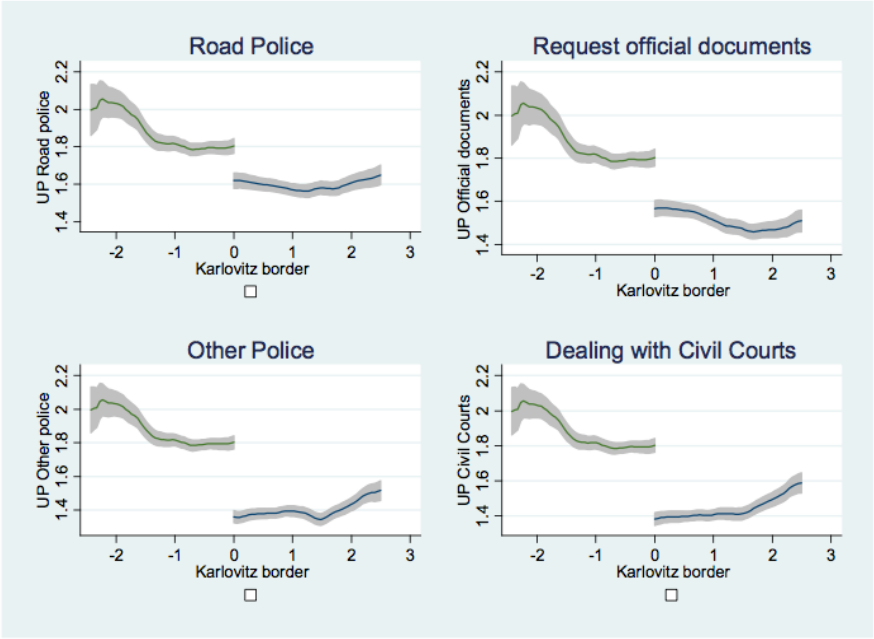
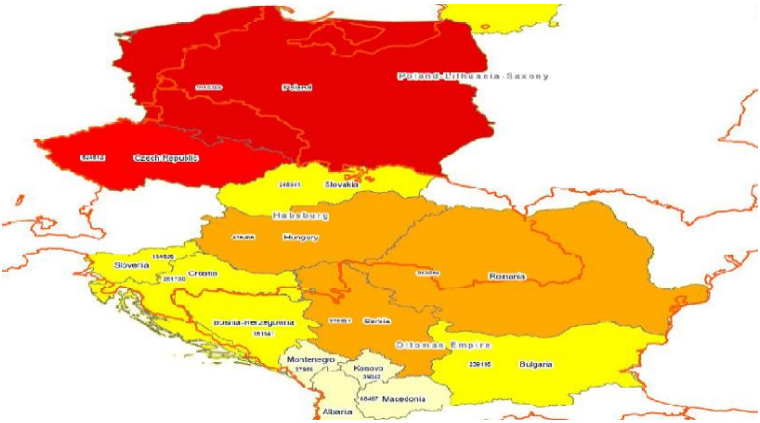


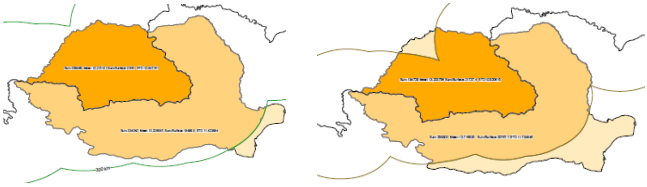
Figure 5: Total Light Intensity index per Country



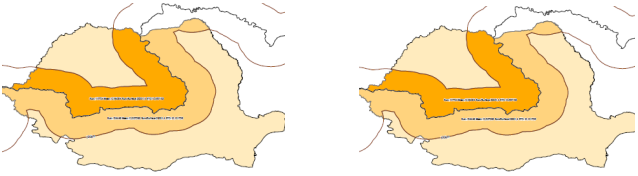
Empire	Sum	Mean	Sum/Surface	STD
Ottomane_300km	1062161	13,6	12895	10,9
Ottomane_200km	846348	13,8	13409	10,9
Ottomane_100km	529240	13,88	15050	10,5
Ottomane_50km	275777	13,55	14721	10,59
Ottomane_20km	112967	12,3	14011	8,68
Ottomane_10km	66105	11,7	15644	7,97
Hasburg_Poland_300km	1306507	14,2	15898	11,1
Hasburg_Poland_200km	832476	13,6	14739	10,69
Hasburg_Poland_100km	438122	13,46	14503	10,8
Hasburg_Poland_50km	258954	13,7	16112	10,7
Hasburg_Poland_20km	124429	14,13	17835	11
Hasburg_Poland_10km	71376	13,7	19289	10,8

Figure 6: Romania Light Intensity

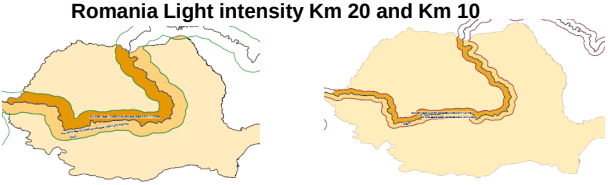
Romania Light intensity Km 300 and Km 200



Romania Light intensity Km 100 and Km 50

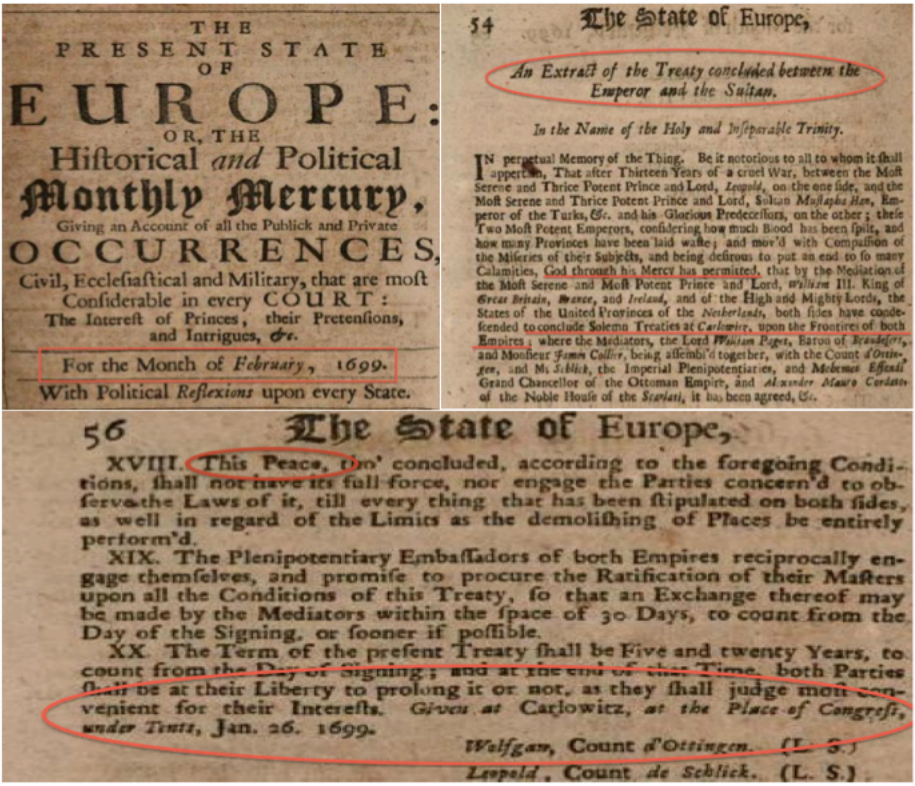


Romania Light intensity Km 20 and Km 10



Romania	Sum	Mean	Sum/Surface	STD
Romania_Ottomane_300km	334040	13,32	19499,9	11,42
Romania_Ottomane_200km	298300	13,71	20767,7	11,7
Romania_Ottomane_100km	154449	12,52	20031,4	10,1
Romania_Ottomane_50km	43617	9,4	11555,7	6,86
Romania_Ottomane_20km	15189	8,8	9914,7	7,45
Romania_Ottomane_10km	9099	9,19	11689	8,5
Romania_Hasburg_300km	209499	13,21	21891	10,84
Romania_Hasburg_200km	194729	13,2	21737,4	10,9
Romania_Hasburg_100km	117724	12,6	20331,4	10,55
Romania_Hasburg_50km	83891	13,9	25809,8	11,7
Romania_Hasburg_20km	30912	13,02	21659,6	11,4
Romania_Hasburg_10km	15851	12,39	21210,7	11,2

Figure 7: Karlowitz Treaty - 1699 Newspaper



THE
PRESENT STATE
OF
EUROPE:
OR, THE
Historical *and* Political
Monthly Mercury,
Giving an Account of all the Publick and Private
OCCURRENCES,
Civil, Eccleſiaſtical and Military, that are moſt
Conſiderable in every COURT:
The Intereſt of Princes, their Pretenſions,
and Intrigues, *&c.*
For the Month of *February*, 1699.
With Political *Reflexions* upon every State.

54 The State of Europe,

An Extract of the Treaty concluded between the Emperor and the Sultan.

In the Name of the Holy and Inſeparable Trinity.

IN perpetual Memory of the Thing. Be it notorious to all to whom it ſhall appertain, That after Thirteen Years of a cruel War, between the Moſt Serene and Thrice Potent Prince and Lord, *Leopold*, on the one ſide, and the Moſt Serene and Thrice Potent Prince and Lord, Sultan *Muſtapha Han*, Emperor of the Turks, *&c.* and his Glorious Predeceſſors, on the other; theſe Two Moſt Potent Emperors, conſidering how much Blood has been ſpilt, and how many Provinces have been laid waſte; and mov'd with Compaſſion of the Miſeries of their Subjects, and being deſirous to put an end to ſo many Calamities, God through his Mercy has permitted, that by the Mediation of the Moſt Serene and Moſt Potent Prince and Lord, *William* III. King of *Great Britain*, *France*, and *Ireland*, and of the High and Mighty Lords, the States of the United Provinces of the *Netherlands*, both ſides have condeſcended to conclude Solemn Treaties at *Carlowitz*, upon the Frontiers of both Empires; where the Mediators, the Lord *William Paget*, Baron of *Beaudeſert*, and Monſieur *James Collier*, being aſſembl'd together, with the Count *d'Ottingen*, and Mr. *Schlick*, the Imperial Plenipotentiaries, and *Mehemet Effendi* Grand Chancellor of the Ottoman Empire, and *Alexander Mauro Cordato* of the Noble Houſe of the *Scarlati*, it has been agreed, *&c.*

56 The State of Europe,

XVIII. This Peace, tho' concluded, according to the foregoing Conditions, ſhall not have its full force, nor engage the Parties concern'd to obſerve the Laws of it, till every thing that has been ſtipulated on both ſides, as well in regard of the Limits as the demoliſhing of Places be entirely perform'd.

XIX. The Plenipotentiary Embaſſadors of both Empires reciprocally engage themſelves, and promiſe to procure the Ratification of their Maſters upon all the Conditions of this Treaty, ſo that an Exchange thereof may be made by the Mediators within the ſpace of 30 Days, to count from the Day of the Signing, or ſooner if poſſible.

XX. The Term of the preſent Treaty ſhall be Five and twenty Years, to count from the Day of Signing; and at the end of that Time, both Parties ſhall be at their Liberty to prolong it or not, as they ſhall judge moſt convenient for their Intereſts. *Given at* Carlowitz, *at the Place of Congreſs, under Tents*, Jan. 26. 1699.

Wolfgan, Count *d'Ottingen*. (L. S.)
Leopold, Count *de Schlick*. (L. S.)

Chapter 2

Uncertainty, Informational Spillovers and Policy Reform: A Gravity Model Approach

2.1 Introduction

Political and economic changes tend to occur in waves, in a pattern often described as the domino effect: changes initiated in one country spread to other countries. Examples of this phenomenon in the political domain include the events of 1848 in Europe, emergence of new independent countries from the ruins of the Ottoman and Hapsburg Empires in the late 19th and early 20th century, decolonization following the end of the 2nd World War, democratizations in Latin America in the late 1980s and in Eastern Europe in the early 1990s, and most recently the Arab Spring in the Middle East and the Occupy movement in Western countries. On the economic front, we can observe similar waves, such as the liberalization and privatization waves during the late 1980s and throughout the 1990s. Reform waves can be observed also with respect to less dramatic changes. The ban on smoking in restaurants and bars, adopted first in

Ireland has since spread to most European countries. Eastern Europe, on the other hand, has experienced similar legislative spillovers with respect to the adoption of the flat tax, first introduced in Estonia in 1994.[1]

We argue that reform waves such as the preceding examples spread because they are aided by *informational spillovers*. The outcome of a reform is inherently uncertain. Reversing an already-implemented reform, furthermore, is costly. Uncertainty about reform outcome combined with costly reversal may cause efficiency-enhancing reforms to be postponed or not implemented at all: a phenomenon referred to as the status-quo bias (see Fernandez and Rodrik, 1991, and Alesina and Drazen, 1991). Individuals, however, can infer important signals about the likely outcome of the reform by observing the outcomes similar reform produced elsewhere. If the reform turns out to have positive repercussions in one country, other countries become more likely to implement the same reform; a negative outcome in one country can stop the reform in its track in other countries too.

To illustrate how this phenomenon might work, we formulate a simple theoretical model of political economy of reform with inter-country informational spillovers. If informational spillovers are important, we would expect nearby countries to be affected more strongly than distant ones. Similarly, events in countries that share cultural, political or historical similarities are likely to bear more weight than events in relatively dissimilar countries.

The model yields testable predictions which we then subject to an empirical analysis. We look at the post-communist transitions in Central and Eastern Europe (with our data spanning the period until the onset of the recent economic and financial crisis, i.e. 1990-2008). We consider the post-communist countries because of two reasons: (1) the vast majority of them at least attempted economic and political reforms during the period in question, and (2) this group of countries displayed a great deal of variation in the depth and outcomes of reforms imple-

[1] In both cases, the innovation originated outside Europe.The smoking banwas introduced in various US jurisdictions about a decade before its introduction in Ireland. Hong Kong, similarly, has had a flat tax for decades before its adoption in Estonia.

mented.While much of the literature on the relationship between reforms and uncertainty has been written with economic reforms in mind, we expect spillovers to apply to political and economic reforms alike. We thus measure reforms using indexes of democratization and economic liberalization. Our findings strongly suggest that informational spillovers indeed played a role in facilitating economic and political changes in these countries. The spillovers with respect to the latter appear particularly prominent.

In the next section, we discuss the related literature on the role of uncertainty in determining the success of reforms and on spillovers or contagion effects in reforms. In section 3, we formulate a simple model of informational spillovers in reforms. We discuss the data in section 4, section 5 presents our methodology and section 6 presents our empirical findings. The last section then outlines our main conclusions.

2.2 Related Literature

The relationship between uncertainty and reform success has been explored extensively in the literature motivated by the reforms (and their failures) in Latin America and Easter Europe during the 1980s and 1990s. Fernandez and Rodrik (1991) coined the term status-quo bias to describe situations when countries fail to implement reforms that are expected to increase overall welfare. They argue that this is due to uncertainty about the distribution of costs and benefits of the reform. In particular, it is possible that a reform that benefits the majority of the population ex post is nonetheless rejected ex ante. This can happen if (some) voters expect their payoff from implementing the reform to be negative. Alesina and Drazen (1991), similarly show that uncertainty about the distribution of benefits and costs of reforms can lead to inefficient delays due to war of attrition. Dewatripont and Roland (1992 a,b; 1995) consider aggregate rather than individual uncertainty. They point out that that under uncertainty, reforms implemented gradually rather than in a big-bang fashion are more likely to succeed because their gradual implementation partially resolves the underlying uncertainty about their eventual out-

come. If reform reversal is costly, gradual reform thus allows the voters to receive a signal about the outcome of the full reform. Depending on the signal, they can either implement the full reform or reverse the initial reform to return to the status quo. Doing so helps avoid reversing the full reform, which is assumed to be more costly than reversing a partial reform.

The preceding contributions consider reforms in one country in isolation of what might be going on elsewhere. Yet, the notion that reforms in one country can affect reforms elsewhere is not new. This process has been denoted, variously, as snowballing (Brezis and Verdier, 2003), contagion (Gassebner, Gaston and Lamla, 2008, and Campos and Horvath, 2006) and learning (Meseguer, 2006). The unifying feature of this literature, however, is that it considers primarily the spread of economic reform and ignores the similar waves of political liberalization. A partial exception is the model by Brezis and Verdier (2003) who argue that democratization in a neighboring country makes it easier for repressed citizens to emigrate. That, in turn, reduces the ability of the dictator to repress protest and makes political liberalization there more likely too, thus opening the way for economic reform.

Gassebner et al. (2011) propose a theoretical model of reform spillovers. They consider 'contagion of reforms[2] because of inter-jurisdictional competition due to factor mobility as well as because of trade between countries, and argue that the former is more likely to play a role.[3] They then proceed to test their model using data on a broad panel of countries, with reform measured by the index of economic freedom (Heritage Foundation). They find that economic reforms in other countries are indeed important determinants of reform progress elsewhere and that these spillovers are better facilitated by geographic and cultural proximity than by trade.

Meseguer (2006) formulates a model in which policy makers use the experience of other countries to update their expectations on the outcome

[2]Campos and Horvath (2006) also consider 'contagion of reform.

[3]In a related paper, Faber and Gerritse (2012) consider the impact of trade and investment flows on institutional quality.

of reform in their own country through a process of Bayesian learning. She then tests her model empirically, with reform outcomes measured as having an independent central bank, liberal trade regime, agreement with the IMF and engaging in privatization.[4] She finds evidence of learning in three out of the four policy areas, the exception being central bank independence. The analysis, however, is somewhat ad-hoc: some variables of interest are defined as policies while others capture policy changes. Having an independent central bank and liberal trade regime are examples of the former while engaging in privatization (rather than having most productive assets in private ownership) is the latter. Having an agreement with the IMF, furthermore, does not necessarily capture reform but may reflect the underlying economic hardship that compels countries to seek assistance from the IMF.

In the remainder of the paper, we develop a simple theoretical model of informational spillovers and their impact on reforms under uncertainty. We argue that this mechanism can be at work for economic and political reforms alike. We then test this model empirically on a sample of post-communist countries undertaking both kinds of reforms.

2.3 Model of Reform, Uncertainly and Informational Spillovers

The fundamental problem of implementing political or economic reform is that their outcome is inherently uncertain. Attempts at political change may lead to democracy and rule of law but they can also degenerate into political instability, infighting or open political or even military conflict.For example, consider two countries that experienced transition to democracy in 1989-90: Poland and Romania.Both started with broadly based popular protests and both ended up with their countries implementing wide-ranging democratization and eventually jointing the EU. The initial trajectory and the economic and human cost associated with it

[4]Brueckner(2000), analyzing welfare reform, argues that the level of benefit provision in neighboring states affects policymakers decision on the generosity of the welfare state.

were dramatically different: while in Poland the protests lead to a round-table negotiation between the communist government and the opposition, the Romanian government sought to suppress the protest by calling in the police and later also the army.Similarly, the Tunisian and Libyan protests in 2010-11 both eventually lead to the falls of the incumbent regimes but at dramatically different costs. Economic reform, likewise, can bring about economic growth and rising living standards or it can give rise to unemployment and run-away inflation. The contrast, for example, between the outcomes of economic reforms in Russia and China, is especially poignant.

The role of uncertainty about reforms and their outcomes has been well recognized in the early transition literature (see in particular Fernandez and Rodrik, 1991; and Dewatripont and Roland, 1992a,b and 1995). Uncertainty about the outcome of the reform (or its distributional implications) can lead to it being inefficiently postponed or abandoned altogether. Reducing the uncertainty therefore can bethe key to the successful implementation of the reform. Dewatripont and Roland(1992a,b) show that a gradual reform is associated with partial resolution of uncertainty about the outcome of the full reform. In their framework, a partial reform is never optimal alone but the cost of reversing it is lower than that of reversing the full reform. By implementing the partial reform first, the voters obtain a signal about the outcome of the full reform. With this signal, and with the resulting reduction in uncertainty, they can make a better informed choice whether to continue with the remaining reform measures or reverse those already implemented.

We formulate a simple three-period model which builds on Dewatripont and Rolandwith a crucial difference: in our framework, the resolution of uncertainty comes from observing the experience of other countries. In the two examples at the beginning of this section, the reform waves started in Poland and Tunisia, respectively, and in both cases proceeded relatively smoothly (certainly when compared to the subsequent events in Romania and Libya). Had the order been reversed and the initial country experienced a great deal of bloodshed, it is very well possible

that no reform wave would have followed.[5]

Consider country i with a continuum of risk-averse voters. The voters can be heterogeneous but we only consider uncertainty about aggregate outcomes (i.e. those common for all voters). The status quo is associated with a negative payoff that accrues to all voters; the period value of that payoff is $-\gamma_i$. This disutility can stem either from economic policies or political repression in the status quo: excessive state interference in the economy, distortionary taxes, tolerance of smoking in public places or disregard for political rights of individuals. The status quo can be amended by implementing a reform; the outcome of that reform, however, is uncertain, and may even be worse than the status quo. Based on the information available before the reform, the voters can form expectations about the period value of the reforms outcome. Let $E(\omega_i|I_i$ be the expected value of the future payoff, γ_i, conditional on the information available at present, I_i. For simplicity, we assume that the same payoff will accrue in every period after the implementation of the reform, unless the reform is reversed. If the outcome of the reform is worse than the status quo, the reform can be reversed in the third period; reversal is associated with cost $-\xi_i$ and the decision whether to maintain the reform or reverse it is taken at the end of the first period, after the payoff is revealed (and incurred). If the reform is reversed, the reversal cost is incurred and thereafter the status-quo payoff is again restored. For simplicity, we assume that the status quo payoff and reversal costs are not uncertain.

Assuming no informational spillovers (autarky), the return from implementing the reform will be

$$E(\omega_i|I_i) + \delta E(\omega_i|I_i) + \delta^2 E(\omega_i|I_i) \tag{2.1}$$

in case the reform is maintained, and

[5]Similarly, the Hungarian Revolution of 1956 and the Prague Spring in Czechoslovakia in 1968, both of which were crushed by Soviet invasions, did not set off waves of similar events elsewhere.

$$E(\omega_i|I_i) - \delta\xi_i - \delta^2\gamma_i \tag{2.2}$$

if it is reversed. The payoffs that accrue during the second and third periods are discounted by discount factor δ.

The reform therefore will be implemented if

$$E(\omega_i|I_i) > \gamma_i \tag{2.3}$$

where I_i is stands for all the information available to the voters in country i during the first period. The reform will be maintained if

$$\omega_i + \delta\omega_i > -\xi_i - \delta\gamma_i \tag{2.4}$$

Note that the decision whether to maintain or reverse the reform is based on the actual outcome, revealed once the reform has been implemented, rather than its expectation.

Now we consider the case with informational spillovers. We assume the outcomes of reforms implemented elsewhere can be observed only with a lag. Therefore, voters in country i have an additional option: to postpone implementing the reform in order to observe its outcome in countries that have already implemented it. In that case, the information set available to voters in country i is $[\Omega, X]$. Ω is the vector of actual outcomes in the other countries, $\omega_1, ..., \omega_n$ while X is a vector of parameters $\chi_1, ..., \chi_n$ depicting how similar the conditions in the various other countries are to the conditions in country i. This strategy therefore yields the payoff

$$-\gamma_i + \delta E(\omega_i|\Omega, X) + \delta^2 E(\omega_i|\Omega, X) \tag{2.5}$$

in case the reform is maintained and

$$-\gamma_i + \delta E(\omega_i|\Omega, X) - \delta^2 \xi_i \tag{2.6}$$

if it is reversed. The conditions for maintaining or reversing the reform are similar as before except that now this decision takes place at the end of the second period rather than the first period.

Postponing the reform is costly: it results in the negative status-quo payoff being incurred for one additional period: this is captured by the first term in the payoff functions (5) and (6). The cost of doing so, however, may be outweighed by the benefit of improving the precision of the voters' expectations of the reform's outcome in the next two periods. If the informational spillovers from the other countries are significant, then this helps avoid the potential additional cost of having to reverse a reform whose outcome is worse than the status quo.

This result is similar to that of Dewatripont and Roland (1992a,b) who argue that gradual reform helps reduce uncertainty about the reform outcome. In this case, the reduction of uncertainty stems not from the reform being implemented gradually but from postponing it and learning from the experience of others. Once the outcomes of reforms implemented elsewhere are observed, the reform can still be implemented in a big bag fashion. On the other hand, if the cost of maintaining the status quo is very high, then this strategy may not be optimal.

Informational spillovers such as those discussed in the model above are likely to be one reason for political or economic changes occurring in waves, as was the case in the post-communist countries during 1989-91 or in the Middle East during 2011. For example, the decision of Polish and Hungarian communist governments not to suppress popular protests and then to engage in negotiations with the opposition in spring and summer of 1989 was likely to have been instrumental in encouraging the subsequent protests in East Germany and Czechoslovakia in fall of that year. Had either government chosen to crack down on the protests as later happened in Romania, the enthusiasm for political change may well have waned throughout the region. Similarly, the positive outcome and relatively low cost of political change in Tunisia in spring of 2011 is

likely to have encouraged similar protests throughout the Middle East. It is also not surprising that the remaining authoritarian regimes, such as North Korea and China, seek to suppress the spread of information about the on-going changes in the Middle East.[6]

On the economic front, the countries that initiated reforms relatively late benefited from learning from the experience of Poland and Hungary whose reforms were initiated in 1990. The (predominantly negative) experience with partial economic reforms in the former Yugoslavia in the course of the 1980s also could have had informational value: it may have contributed to the decision of the subsequent reformers to shy away from piecemeal reform.

Last but not least, the experience of other countries can help also with respect to selecting the toolkit for facilitating change. The reliance on text messages and social networks to organize political protests in Iran in the wake of the 2009 election was replicated throughout the Middle East in 2011 and is likely to have contributed to the success of those movements.[7] Economic reforms such as the voucher privatization during the early to mid 1990s, pension reform in mid to late 1990s or the introduction of the flat tax in the 2000s also proceeded in waves.

We therefore hypothesize, in line with our model, that the progress in political or economic reform should be related to spillover effects emanating from the stock of previous reforms implemented elsewhere, corresponding to the vector Ω. The intensity of informational spillovers, furthermore, is also likely to depend on the extent of similarity between the two countries, as captured by vector X in our model. In other words,

[6]The government of North Korea was reported to have banned its citizens who worked in Libya under the Qaddafi regime from returning (see "North Korea bans citizens working in Libya from returning home," The Telegraph, 27 October 2011. China regularly suppresses news about popular protests in its media, regardless of whether those protests take place in China or elsewhere. Websites such as Facebook and Twitter, which helped coordinate protest in the Middle East and elsewhere, have been blocked in China. Finally, it is particularly instructive to compare the results of searching for keywords such as 'Jasmine revolution' on google.com and baidu.com: the two alternative search engines produce dramatically different lists of entries.

[7]The Chinese government has learned this lesson too. During the 2009 unrest in Xinjiang, mobile-phone and internet services remained suspended for extended periods in the province.

we therefore expect the spillovers to be higher for geographically as well as culturally close countries.

We test our model on a sample of post-communist counties during the 1990s and 2000s. We focus on these countries because virtually all of them at least attempted to implement economic and political reforms during this period. The reform strategies as well as their outcomes, however, differed substantially across countries. This sample thus offers sufficient variation in the reform programs, both in the economic and political domain.

2.4 Data

Our analysis is carried out with 29 post-communist countries.[8] We consider political and economic reforms that started in these countries in the early 1990s. While some countries implemented wide-ranging reforms relatively quickly, others proceeded more gradually and/or experienced set-backs and reform reversals. Correspondingly, our data cover the years 1990 to 2008. We use 2008 as the cut-off year to ensure that we capture the reform period but avoid including the current economic and financial crisis. We only consider spillovers among post-communist countries and thus ignore the rest of the world. This is due to the fact that the experience of countries with similar starting position and undergoing similar changes is likely to be more relevant than the experience of established democracies and market economies.

To capture the countries' progress in implementing market-oriented policies, we use the average of eight progress-in-transition indicator compiled and published annually by the European Bank for Reconstruction and Development (EBRD).[9] We use the average Freedom House

[8] Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Monte Negro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

[9] These indicators measure each country's progress in the following fields: price liberalization, foreign exchange and trade liberalization, small scale privatization, large scale privatization, enterprise reform, competition policy, banking reform, and security markets and non-banking financial institutions. Each indicators ranges from 1 (unreformed

democracy index[10] to take account of the progress in democratization. Finally, we identify periods of war using the Correlates of War (2010) dataset.

2.5 Methodology

Our theoretical model predicts the existence of informational spillovers with respect to policy reform and also that these should decline with the distance between countries. The distance, furthermore, can be interpreted as not only the geographic distance but also as cultural proximity or possessing common historical legacies. In order to take account of this, our analytical approach combines two well know empirical models: the spatiotemporal autoregressive model (STAR) and the gravity model. We start by describing the latter and then discuss how our approach compares to the former.

The gravity model (see Baldwin and Taglioni, 2005, and the references therein) is widely used in the international trade literature, where it is used to explain bilateral trade flows between pairs of countries (later applications used it also to analyze foreign direct investment and migration flows). It takes its inspiration from the theory of gravity in physics, where the force of gravity between two objects is computed as follows:[11]

$$F_{i,j} = G\frac{M_i M_j}{D_{ij}^2} \tag{2.7}$$

The force of gravity, F, between objects i and j is thus proportional to their masses, M_i and M_j, the gravitational constant, G, and inversely

centrally-planned economy) to 4+ (liberal market economy). As is common in this literature, we replace plus and minus distinctions by adding and subtracting 0.33 (so that 4+ becomes 4.33 while 4- is 3.67). We do not use the more recently available EBRD indicators of infrastructure reform, only the eight original indicators measuring progress in Washington-consensus reform (liberalization, stabilization and privatization).

[10] Specifically, this index is the average of the Freedom House measures of political freedoms and civil liberties, rescaled so that higher values correspond to more democracy. It ranges between 1 (autocracy) to 7 (fully free).

[11] This follows Baldwin and Taglioni (2005).

proportional to the square of distance between them, D_{ij}. Applied to the study of economic phenomena, the gravity model takes the following form (omitting time subscripts for simplicity):

$$X_{ij} = A\frac{Y_i Y_j}{(D_{ij} cult_{ij})^2} \tag{2.8}$$

where X_{ij} stands for the economic flow (such as exports or migration) between two countries, i and j, Y_i is the economic equivalent of physical mass of country i (in the context of trade and migration, mass is typically proxied by total GDP and population, respectively), A is an arbitrary constant term, and, finally, the denominator collects the various distance terms, such as geographic distance and common cultural and/or historical legacies.

In our analysis, we wish to capture the flow of information about the outcome of policy reform between countries. The gravity relation (now with the time subscripts added back) therefore can be rewritten as follows:

$$X_{ij,t} = A\frac{Y_{i,t-1} Y_{j,t-1}}{(D_{ij} cult_{ij})^2} \tag{2.9}$$

$X_{ij,t}$ now stands for the informational spillovers from country j to country i at time t. This depends on the stock of policies implemented in both countries in the preceding period, $t-1$. Specifically, in line with our theoretical model, we expect the informational spillover to be proportional to the stock of policies in country j and inversely proportional to the distance between them.

In formulating our analysis, we have to deal with specific characteristics of the issue at hand. In particular, while we are interested in capturing informational spillovers from j to i which in turn affect the overall progress in policy reform in i, we can only observe the latter. This implies that instead of observing the actual informational spillovers, $X_{ij,t}$, we observe

$$\dot{Y}_{i,t} = f(X_{1,j,t}, X_{2j,t}...X_{nj,t}) \tag{2.10}$$

where the left-hand side is the change in the policies in period t and n is the number of countries in our sample. In other words, we assume that the overall progress in reform in country i depends on the informational spillovers from all of the other countries. Furthermore, while we cannot observe the individual arguments of the $f(.)$ function (individual spillovers), we assume the partial derivatives to be positive: the presence of particular policy in one country makes it more likely for other countries to implement a similar reform. Thus, the underlying gravity relation can be approximated by

$$\dot{Y}_{i,t} = A\frac{Y_{i,t-1}Y_{j,t-1}}{(D_{ij}cult_{ij})^2} \tag{2.11}$$

We linearize this relation by taking logs of both sides and augment it to include the effects of mutual interactions between distance and reforms to better capture the effect of distance. Using lower case letters to denote logs, our baseline regression becomes

$$\begin{aligned}\triangle y_{i,t} &= \alpha + \beta_1 y_{i,t-1} + \beta_2 y_{j,t-1} + \beta_3 * d_{ij} + \beta_4 * contiguity_{ij} \\ &+\beta_5 * smcntry_{ij} + \beta_6 y_{j,t-1} * dist_{ij} + \beta_7 y_{j,t-1} * contiguity_{ij} \\ &+\beta_8 y_{j,t-1} * smcntry_{ij} + \beta_9 war_{it} + \beta_{10} war_{jt} + \eta_i + \upsilon_t + \epsilon_{it}\end{aligned} \tag{2.12}$$

The dependent variable is the log-difference in the index of policies (see below) in country i during period t. The first row collects the standard gravity variables: indexes of policies in countries i and j, the distance between the two countries, and dummies for contiguity (sharing a common border) and belonging to the same country in the past (former Soviet Union, Yugoslavia and Czechoslovakia). Because the dependent variable captures the overall progress in policy reform rather than the informational spillover between the two countries, the second row

introduces interaction terms between the policy index in country j and the distance terms. Finally, we also control for the possibility that either country can be involved in a military conflict, and introduce country and year fixed effects (η_i and υ_t respectively).

The terms in the second row of the preceding equation are essentially the same as the spatial lags used in the STAR (spatiotemporal autoregressive) model. That model is used for analyses involving regional (geographic) data that are thought to display correlation of residuals among adjacent or nearby regions (this correlation can be contemporaneous or can involve also temporal lags).[12] There are several differences between our model and the STAR model. First, while the unit of observations in our approach is a pair of countries, the STAR model regresses the outcome of interest on the sum of all spatial lags, thus allowing the effects of individual counterparts to cancel out. In other words, our specification is more disaggregate than the typical STAR model.

Second, our approach is more flexible in that it allows us to consider spillovers from adjacent as well as distant regions, it facilitates the use of multiple distance measures (geographical distance, contiguity and common history in our case), and it is consistent with countries having different number of neighbors. The STAR model, in contrast, typically allows for only one type of spillover at a time, such as from contiguous regions, weighted by geographical distance or from regions that are culturally or linguistically close (see, for example, Table 3 in Becker et al., 2009). In case of contiguity, furthermore, it is common to normalize the weight of all neighboring regions to unity so that the impact of a particular region on another depends on the number of other contiguous regions that the region in question has.

Third, a potentially important drawback of the STAR model is that it introduces spatial lags (interactions between the variables of interest and the various distance measures used as weights) without also including the distance terms on their own. Finding, for example, that the spatial lag weighed by distance is negative may be driven by the fact that poli-

[12]Recent applications of this model in economics are Becker, Egger and Seidel (2009) and Bartz and Fuchs-Schndeln (2012).

cies in other countries have a negative effect in general, without taking account of distance, that countries that are relatively remote implement less reform, or that the effect of other countries' policies declines with distance. Without including the original terms as well as the interactions, these three possible explanations cannot be disentangled.

A specific feature of our analysis is that although we consider all possible pairs of countries, we only observe the change of policies in each country and year rather than the actual informational spillover between the two countries. This implies that while we have 12-13 thousand pairs of countries, we only have 580 unique observations of reform progress (29 countries and 20 years), the dependent variable. OLS, therefore, would produce standard errors that are incorrectly estimated (biased downwards). We therefore present regression results obtained with cluster-robust standard errors, with country-year combinations set as primary sampling units.

Note that we carry out our analysis with policy indexes rather than with outcomes such as growth or inflation rates. Policy indexes assess whether particular policies were put in place. Implementing policy reform may be associated with an initial cost (temporary worsening of economic performance) followed by a subsequent improvement. For example, moderate inflation following a policy of price liberalization may be judged a success, since the alternative might be run-away hyperinflation. Similarly, a recession in the wake of fiscal stabilization may be superior to a failed stabilization resulting in a sovereign default and a much deeper contraction.

2.6 Results

We consider two types of reform: economic and political one. The dependent variable is always the log-difference of the index of economic reform or democracy. We account for distance using three different measures: actual geographic distance, dummy for contiguity (having a common land border between two countries), and having common history (being part of the same country, i.e. the former Soviet Union, Yugoslavia

and Czechoslovakia). We first introduce each on its own and then also run a regression with all three measures at the same time. We always enter the distance measure on its own as well as interacted with the index of reform in country j.

The results are summarized in Table 12. Overall, they shows strong support for our theoretical prediction in case of democratization and somewhat weaker support in case of economic liberalization. The lagged level of the reform index in country j is not consistently positive, indicating that spillovers, if any, indeed depend on distance. The coefficient for geographical distance (on its own, not interacted with the index) is negative, significantly so for democracy. This can be interpreted as suggesting that countries that are relatively remote (i.e. those that are far from other countries in the sample) tend to reform their policies more slowly. The interaction between distance and both reform indexes is also negative, again significantly so for democracy: the impact of political liberalization in other countries declines with distance. The common border dummy is positive and significant for democracy while the same-country dummy is positive and significant for both indexes. Hence, countries that share borders or historical legacies with more countries tend to reform faster, especially with respect to democratization. This is similar to the negative effect of distance: countries that are relatively distant (geographically or culturally) tend to experience less spillovers than other countries. The interactions with the policy indexes reinforce this effect further: the spillovers in terms of political liberalization increase both with common border and common history, while only the latter appears important for economic liberalization.

Looking at the remaining variables, the lagged level of either index in country i is always strongly significant and has a negative effect on further progress. This stems from the fact that both indexes are bound from above. Therefore countries that have already achieved a relatively high degree of economic or political freedom can only experience incremental further progress. The effect of war in country i is negative and always very strongly significant: countries at war tend to postpone reform. In contrast, war in country j seems to matter little.

2.7 Conclusions

We address the question of what drives the apparent waves of political and economic changes that have been observed repeatedly throughout history. We argue that the reform waves reflect learning and resolution of uncertainty about the outcome of reforms, a phenomenon which we denote informational spillovers. Observing the outcome of reforms implemented elsewhere thus reduces uncertainty and helps voters and policy makers make better informed decisions. In this way, a (relatively) successful reform in one country increases the probability that other countries implement the same or similar reform. Conversely, a reform effort that played out badly in one country would discourage reforms elsewhere.

To illustrate this mechanism, we first formulate a simple model of reform spillovers. The model demonstrates that countries can reduce uncertainty about the reform outcome by observing the experience of other countries that implemented the same or similar reform earlier. This in turn should help reduce the status-quo bias highlighted in the previous literature.

We test our model's predictions on a sample of countries that implemented political and economic reforms during the 1990s and 2000s: the formerly communist countries in Central and Eastern Europe. We find strong support for the presence of spillovers in reform, especially when considering democratization. We also confirm spillovers in economic liberalization, although here the results are somewhat weaker and less clear-cut. Our findings are thus in line with those of Meseguer (2006) and Gassebner et al. (2011), who find spillovers with respect to economic reform, or Becker et al. (2009) who find them with respect to corruption. We believe we are the first to consider also political changes. Importantly, our results suggest that spillovers are even more important in the political domain than with respect to economic reform.

Our findings suggest that the experience of other countries indeed plays an important role in mobilizing support and maintaining the momentum for reform. The fact that spillovers appear especially impor-

tant with respect to political reform should not come as surprising. The success of political reform crucially hinges on the ability of the reformers to garner and maintain popular support for their cause. This is a standard collective action problem: while many would benefit from the changes, few are willing to risk life and limb to make change happen if the outcome is highly uncertain. Observing successful democratizations in other countries helps reduce the uncertainty and thus reduces the underlying collective action problem. Learning from the experience of others thus is an important way of breaking the status-quo bias.

Table 12: Spillovers with respect to Democratization

$\triangle y_{i,t}$	(1)	(2)	(3)	(4)
$y_{i,t-1}$	-.2967***	-.2962***	-.2961***	-.29689***
	(.0556)	(.0556)	(.0555)	(.05560)
$y_{j,t-1}$	.0786***	-.0020**	-.0014*	.06278*
	(.0270)	(.0010)	(.0007)	(.03518)
Distance	-.0079***			-.00709**
	(.0029)			(.00366)
Contiguity		.0105**		.00002
		(.0046)		(.00573)
Same country			.0183***	.00833
			(.0072)	(.00740)
$y_{i,t-1} * dist_{ij}$	-.0106***			-.00859*
	(.0037)			(.00463)
$y_{j,t-1} * contiguity$		.0149**		-.00039
		(.0066)		(.00885)
$y_{j,t-1} * smcntry$			.0359***	.02285
			(.0141)	(.01448)
War_i	-.1837***	-.1832***	-.1832***	-.18350***
	(.0673)	(.0673)	(.0673)	(.06725)
War_j	.0012	-.0001	.0019	.00241
	(.0016)	(.0015)	(.0017)	(.00178)
Constant	.3469***	.2890***	.2903***	.34061***
	(.0906)	(.0899)	(.0900)	(.08990)
R^2	0.4477	0.4473	0.4475	0.4478
Observations	13,107	13,107	13,107	13,107
PSUs	580	580	580	580
Countries	29	29	29	29
Years	20	20	20	20
Country_FE	Y	Y	Y	Y
Year_FE	Y	Y	Y	Y

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All variables are in logs, except dummy variables. The dependent variable is the log-difference of the variable indicated in the column heading.

Table 13: Spillovers with respect to Democratization

$\triangle y_{i,t}$	(5)	(6)	(7)	(8)
$y_{i,t-1}$	-.3990***	-.3991***	-.3982***	-.39755***
	(.0473)	(.0471)	(.0471)	(.04694)
$y_{j,t-1}$	.0310	.0022	-.0008	.02393
	(.0259)	(.0016)	(.0006)	(.04229)
Distance	-.0029			-.00318
	(.0026)			(.00418)
Contiguity		-.0086		-.01787
		(.0080)		(.01105)
Same country			.0200***	.02254***
			(.0064)	(.00803)
$y_{i,t-1} * dist_{ij}$	-.0041			-.00298
	(.0035)			(.00550)
$y_{j,t-1} * contiguity$		-.0086		-.02178*
		(.0092)		(.01322)
$y_{j,t-1} * smcntry$			.0384***	.04333***
			(.0121)	(.01370)
War_i	-.3491***	-.3491***	-.3473***	-.34696***
	(.0702)	(.0702)	(.0701)	(.07000)
War_j	.0040	.0037	.0079***	.00858
	(.0025)	(.0024)	(.0031)	(.00320)
Constant	-.2100	-.2370	-.2130	-.18558
	(.1528)	(.1479)	(.1467)	(.14919)
R^2	0.6068	0.6068	0.6075	0.6079
Observations	12,705	12,705	12,705	12,705
PSUs	580	580	580	580
Countries	29	29	29	29
Years	20	20	20	20
Country_FE	Y	Y	Y	Y
Year_FE	Y	Y	Y	Y

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All variables are in logs, except dummy variables. The dependent variable is the log-difference of the variable indicated in the column heading.

Chapter 3

Cultural Interactions and Imperial Legacies: A within-country analysis with Social Network data

3.1 Introduction

A growing body of literature argues for the beneficial effects on development of generalized trust, or trust between strangers. Higher-trust societies enjoy lower transaction costs to economic activity, more investment, a more stable financial and commercial environment and, ultimately, higher levels of economic growth. A society's stock of generalized trust becomes even more important there when other formal institutions indispensable for the market economy are missing or working inefficiently as in the case of transitional economies.

While analyzing the determinants of trust, culture as a measure of common norms of behavior is taken into account. The path development of trust levels has deeper roots on shared cultural norms of a society where religion among others is argued to play a significant role.

Since the seminal work of of AJR (2001) the long historical context of a

country and the effect on institutional framework has come to attention. Although transition economies are argued to lack on generalized trust (Raiser and al 2004) little attention have been given to historical determinants for this countries. Their institutional and economic performance have been investigated only with reference to the legacies of the communist rule. Roland (2004) underlines the slow moving aspect of informal institutions and how this affect reform outcomes in transition. This research brings attention to the role played by long term history, therefore cultural roots, on today trust outcomes, considered as an informal institution, with a focus on a (ex) transition country: Romania. This country appears a very interesting natural experiment in the field of historical analysis of institutional behavior. Since unified Romania have experienced the common faith of communist rule for over fifty years, almost fifteen years of transition toward the market economy and EU standards of accession and share a present status as a member of European community. But before unification and, for centuries this region have been under the rule of Empires struggling for power in Eastern Europe. Two of the three main regions in the country, Wallachia and Moldavia have been ruled by the Ottomans while Transylvania by the Habsburgs. We use a geographical information approach and new data as proxy for growth to investigate the differences that these imperial powers may have created on country's levels of generalized trust.

3.2 Literature Review

Recent literature has devoted a great deal of attention to the concept of social capital, defined by Putnam (1993) as the 'features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit.' Fukuyama (1996) argues that social capital stems from the existence of trust in a society, and is likewise determined by common norms of cooperative behavior and ethical values. In particular, generalized trust, or trust in strangers, been brought to attention as an important constituent of social capital, and determinant of economic development.

A number of studies have shown generalized trust to have a positive and significant relationship with income level (Knack and Keefer, 1997; Zak and Knack, 2001). The literature argues that 'high-trust' societies have lower transaction costs, which lead in turn to a better environment for investment and trade, and a better-performing economy overall. Williamson(2009) argues that transaction costs govern most mundane transactions. As transaction costs are higher were the rule of law is not established, and given that institutional quality is associated with low levels of generalized trust, high-trust societies benefit from lower transaction costs.

Analyzing generalized trust as an enhancer of economic performance and as a means to lower transaction costs becomes even more important in the case of transitional economies. To switch economic and / or political systems, transitional societies must implement new formal institutional frameworks. In the institutional chaos that typically accompanies transition, informal norms of behavior and sociability play an important role in shaping the transitional society's developmental path. Trust, which Arrow (1973) termed a "lubricant of the economy," is particularly crucial in influencing the future transformation of a transitional society. Trust is especially influential for reform implementation and for the effective allocation of public resources and foreign capital.

That generalized trust is crucial for a society's path of economic and political development has been widely documented in the existing literature. Most famously, historical, country-level differences in religious traditions have been associated with variance in levels of interpersonal trust, as well as with differential levels of economic development. Following the early ideas of Weber ([YEAR]), the literature has placed particular emphasis on the normative differences between egalitarian Protestantism and hierarchical Catholicism (Putnam 1993; Fukuyama 1995; La Porta et al 1997; Putnam 2000; Zak and Knack 2001). Generalized trust is not only a determinant of the institutional and political environment however: different governance practices may act to influence generalized trust. Pagden (1988) provides such an example in his description of how Aragonese rulers acted to rend the fabric of civil soci-

ety in 18th Century Naples, a development whose consequences possibly last into the present.

As previously hinted, regional differences in social capital and generalized trust have received ample attention in the case of Western Europe, with a particular focus on the Italian case. In recent years, a secondary regional focus, on South Eastern Europe, has emerged in the literature on social capital on the continent. Variations in the experience of post-Communist transition in Eastern Europe, together with the accession of many Eastern European countries to the European Union, have brought to the fore the need to study informal social structures and their interaction with political processes. The urgency of understanding the role of informal networks in economic life as well as in the unfolding of political process has become especially poignant in the Southern part of the Eastern European region, particularly afflicted by a syndrome of corruption, inter-ethnic conflict, chronic distrust of government, an overall level of malaise that does not bode well for the future of the region. It is to the understanding of this especially complex part of Europe that our article seeks to make a scholarly contribution.

The study argue that long-term history is a determining factor of cultural outcomes for a set of transition economies. Similarly, Karaja (2012) showed variation in the reported frequency of bribing local officials in Eastern European countries with different historical legacies in the region. Our aim is to show trace of history on current social structure in the context of South Eastern Europe. To further focus our analysis, we choose to limit its scope to Romania, a particularly interesting case study of a currently-existing state previously divided between two empires

3.2.1 Romania: Romania and the Principalities

For virtually the entirety of the Modern era, the history of Romania's constituent regions (Wallachia, Moldavia and Transylvania) bears the imprint of its two neighbor macro-states, the Habsburg (later Austro-Hungarian) and Ottoman Empires. Wallachia and Moldavia, later joined together as the Romanian Principalities, shared approximately the same

vassal status to the Ottoman Empire. Conversely, Transylvania became a part of the Habsburg Empire with the Habsburg victory at the Battle of Vienna, maintaining its connection to Habsburg rule (in the Austro-Hungarian empire after 1848) until the early Twentieth Century.

Modern Romania was constituted in two stages. First, Moldavia and Wallachia were joined together in the Romanian Principalities (later the Kingdom of Romania) in a gradual process lasting from 1859 to 1881. The second unification came four decades later, when Transylvania and the Principalities were joined after the First World war. This second development was officialized in the 1920 Treaty of Trianon. The establishment of "Greater Romania" created an effectively new state, divided internally in parts of similar size by what had long been the border of two of Europe's most long-lived Empires. At the time Romania paralleled the example of Yugoslavia, another state created from the remnants of erstwhile empires.

[....]

Unlike Yugoslavia, Romania survived as a unitary state into the Twenty-First Century. After a loss of territory in the wake of the Second World War (when Romania fought on the side of the Axis), the state's borders were stabilized to a shape that has remained essentially constant for the past seven decades. But even though Romania's main internal border did not re-assert itself in the same way as happened in the case of former Yugoslavia, the border remains salient to this day. Indeed, a World Bank study (Amelina, Chiribuca and Knack, 2004) investigating social features and economic outcomes of the Romanian found important differences in social capital and interpersonal trust between the country's historical regions. In this work we aim to bring additional, finer-grained evidence as to the importance of Romania's former division, by harnessing the power of a novel dataset.

[...]

Before the unification and the subsequent common Communist rule the three main regions of the country, namely Wallachia, Moldavia and Transylvania have experienced dissimilar historical faith. Wallachia and Moldavia have shared jointly the status of vassal areas of the Ottoman

Empire while Transylvania (and Banat and Southern Bukovina) has been mainly under Hungarian and Habsburg rule under the same period and formally occupied by the Austro-Hungarian Empire until 1918. Different cultural and institutional settings of the two rules are argued here to have shaped the region. Among others the role of Protestantism and the earlier abolition of serfdom[1]. Even when occupied from the Ottoman empire and ruled as a vassal state as the other two provinces, Transylvania was ruled from Hungarian princes that kept implementing the Hungarian legacy while still fighting the Habsburgs (Magocsi 1993)

[As argued by Fukuyama (1996), Knack and Keefer (2002), Rothenstein (2011) among others higher (lower) quality of public bureaucracy is linked with higher (lower) interpersonal trust]

3.3 Data

This analysis use data from CouchSurfing.org, an online network facilitating the exchange of hospitality between individuals interested in hosting others and individuals looking for a place to spend the night while travelling. Previous exploratory work (Vaicekauskas 2010) has pointed out the existence of a statistical association at the country-level between population-adjusted levels of CouchSurfing membership and generalized trust, as measured by the European Social Survey. CouchSurfing currently has close to 19,000 members in Romania, their location recorded to the level of the city or village in which they live. The precision with which location is recorded, coupled with the large number of individual members suggests the potential usefulness of using this organization's membership as a fine-grained, behavioral proxy for generalized trust, to enrich our understanding of the trace of Empires in current Romanian society.

Beyond describing the evolution of one Internet-based organization in Romania, our analysis is intended as illustration of the potential usefulness for the measurement of social institutions of data collected by

[1]Serfdom was abolished by the Habsbourg Emperor Joseph II in Transylvania in 1785 while it survived unti 1864 in Wallachia and Moldavia

Internet ventures.The focus on Romania because of its historical background yielding a clearly-visible internal border with respect to institutions, along the Carpathian mountain range. The choice to use data from CouchSurfing is motivated by the organization's activity particular sensitivity to the informal institutions with which this article is concerned.

Arguably, becoming a CouchSurfer even nominally - creating a profile on the website CouchSurfing.com - represents an act of trust in itself. One has to at least take into consideration the possibility of interacting with unknown others, and be willing to tolerate the prospective risks inherent in the worst-case scenarios hospitality interactions may elicit. It thus seems reasonable to assume that CouchSurfers are more trusting than the general population from which they are drawn. Given the hypothesized difference in trust between the Romanian Principalities and Transylvania, we thus expect CouchSurfing membership to be more prevalent inside the Carpathian arc than in the extra-Carpathian regions of Romania.

In addition to adducing further evidence to the lasting impact of old Imperial institutions on the current social climate in Romanian regions, we explore in more depth geographical differences in behavior for persons who have joined CouchSurfing. Here contrast two potential accounts with respect to the relation between levels of generalized trust reported in the population and the behavior of individuals who select themselves as members of a trust network. A first explanation would suggest that local CouchSurfing communities should replicate larger societal divisions: members from low-trusting areas should trust less themselves, whereas those members coming from high-trust areas should trust more.

A countervailing hypothesis emerges if one considers the interaction between individual and environment however. Arguably, the lower the level of generalized trust in a society, the more dangerous hosting a stranger appears to the members of that society. Individuals alone do not establish how "foolish" engaging in such interactions is, however: the potential risks are framed in part through a collective understanding created by everyday discourse. Because such a consensus is more

likely to be more negative in societies lower in generalized trust, those actors who are considering joining CouchSurfing in such societies may face higher "resistance," in the form of a more acute perception of risk. As a result, it may be the case that only the most trusting individuals from a low-trust society would join the organization, whereas CouchSurfing may draw more representative sample of individuals from a higher-trust context. We therefore also consider the possibility of a reverse association between local generalized trust and willingness to trust others once one has joined CouchSurfing.

3.4 Methods

The primary data consists of a set of X data points given in terms of the latitude and longitude coordinates of CouchSurfers' place of residence. The data contain Y unique values, corresponding to the cities, towns and villages in which members of the organization live, indexed according to the organization's own geographical schema. We calculate the rate of CouchSurfing "prevalence" in a certain area, the population of which we obtained from the World Gazetteer, a worldwide geographical database of inhabited place. We matched each place of residence listed in the CouchSurfing data with the nearest Romanian locality listed in the World Gazetteer. These Z localities represent our unit of analysis. While we argue that CouchSurfing membership acts as a measure of trust in strangers, we are also cognizant of the many causes that may result in one's joining CouchSurfing, such as one's desire to experience cultural diversity, the community that local CouchSurfing networks can provide, or the economic incentive offered by the prospect of free lodging while traveling. Thus I expect CouchSurfing membership levels to be a noisy measure. To smooth out the variations due to other causes we first present measures of CouchSurfing membership aggregated at county level.

To provide a spatially-continuous, better-resolution indicator of trust, we likewise compute a Kriege, a technique used in Geographic Information Systems. [more on krieges here]

3.5 Results

Figure 9 shows the density of CouchSurfing membership (CouchSurfers / population) for the forty Romanian counties and the Municipality of Bucharest. A clear discrepancy appears at the border between regions under former Austro-Hungarian and Ottoman suzerainty. The six counties where CouchSurfing is least prevalent are all in Wallachia: Mehedinti, Olt, Giurgiu, Calarasi, Ialomita, and Buzau. The Carpathian border forms a clear delimitation of a contiguous region of higher levels of membership in Transylvania, compared to membership in the former Principalities. The mapping between Romania's historical provinces and CouchSurfing membership is not perfect, however. In particular, Bucharest and Iasi stand out as high-membership regions. Indeed, Bucharest alone has more CouchSurfers (number) than any of the other regions. As Figure 10 reveals, including Bucharest in the regional total for Wallachia puts this region ahead of Transylvania in terms of levels of CouchSurfing membership, despite the clear trend towards lower membership in the rest of Wallachia. We argue that Bucharest should be treated separately from the rest of Romania however. Because it is Romania's political, administrative, economic and educational center, Bucharest has attracted migrants from the rest of Romania, while also creating its own social dynamics. Because of its special status – often the case with capital cities – Bucharest thus appears as a class of its own, and its inclusion skews the results of our analysis. With Bucharest taken out of the sample (Figure 10b), the results show Wallachia and Moldova close together in average CouchSurfing membership of just under 50 CouchSurfers / 100,000 persons, whereas Transylvania shows triple the amount. As a robustness check we also took out the largest cities in Moldova (Iasi) and Transylvania (Cluj-Napoca) from our analysis. The results (Figure 10c) show qualitatively-similar findings. The disproportionate impact of Bucharest on the previous analysis does suggest one potential alternative explanation for discrepancies between Transylvania and the rest of Romania. CouchSurfing is primarily associated with large cities, and Transylvania has a higher level of urbanization than the

rest of Romania. Thus, the existence of more cities in Transylvania may drive the prevalence of CouchSurfing there, rather than the fact that such cities are in Transylvania. Were this to be the case, we would expect to see similar dynamics for cities South and North of the prior border between the Ottoman and Habsburg Empires. We present the results of an analysis meant to answer such question in Figure 11. Here we report on an Ordinary Kriege Interpolation of CouchSurfing prevalence levels across all Romanian localities in the World Gazetteer. Applying this technique allows us to obtain a smoothed surface whose height encodes differential levels of CouchSurfing membership, taking advantage of the fact that levels in the variable of interest are likely to display local dependency structures. The interpolated levels of CouchSurfing prevalence shown in Figure 11 display peaks around some of the large Romanian cities, suggesting that, rather unsurprisingly, CouchSurfing membership is more prevalent in some large cities. What is notable thus, is not the fact that peaks in membership levels are concentrated around some large centers of population, but the notable absence of many cities. The map shows clear peaks around the Transylvanian towns of Cluj-Napoca, Brasov, Sibiu, Timisoara, Arad – even the small Northern town of Sighetu Marmatiei. The scarcity of peaks in the former Ottoman parts of Romania is conspicuous. The only two cities visible on the map are Bucharest and Iasi show elevation gain in the smoothed surface, their higher levels of membership tempered by the very low levels of CouchSurfing membership in the surrounding areas. Other cities of comparable size to their earlier-mentioned Transylvanian counterparts are strikingly absent from the map: the estimated surface is flat around Constanta, Craiova, Pitesti, Ploiesti, Galati, Bacau or Suceava. This suggests that while CouchSurfing's membership is indeed associated with cities, Transylvanian cities are likelier to have higher levels of membership than similarly-sized cities from the Principalities.

Table 14: Descriptive Statistics by Region.

Variable	Bucharest	Principalities	Transylvania	Total
Population	1,677,985	10,630,388	6,475,894	18,784,267
CouchSurfers	7,441	4,178	7,539	19,158
CS-ers / 1,000 pop.	4.434	0.393	1.164	1.020
Individual Attributes				
Mean Age	27.880	28.027	27.240	27.660
Gender				
...Female	0.484	0.461	0.431	0.458
...Male	0.469	0.504	0.519	0.496
...Couple	0.046	0.035	0.050	0.045
...N.A.	0.001	0.001	0.001	0.001
Mean Tenure	24.083	22.018	22.382	22.964
CouchSurfing Activity				
Prop. hosts	0.419	0.466	0.419	0.429
Login prob. / month	0.305	0.363	0.432	0.369
Mean logins / month	3.288	3.454	3.329	3.337
Requests Received	13,986	3,972	16,044	34,002
Requests Received / User	1.585	1.677	2.016	1.775
Request Outcome				
...Ignored (by host)	0.260	0.428	0.318	0.307
...Declined	0.426	0.294	0.372	0.385
...Maybe	0.097	0.062	0.072	0.081
...Yes	0.170	0.174	0.183	0.176
...Cancelled (by surfer)	0.047	0.041	0.055	0.050

Source: CouchSurfing US dataset.

Table 15: Recorded Ties Between CouchSurfers, by region.

All Ties			
	Bucharest	Principalities	Transylvania
Bucharest	2,344	449	836
Principalities		389	288
Transylvania			3,198
Ties Mediated by CouchSurfing			
	Bucharest	Principalities	Transylvania
Bucharest	787	160	383
Principalities		119	141
Transylvania			838
Ties Not Mediated by CouchSurfing			
	Bucharest	Principalities	Transylvania
Bucharest	1,147	205	278
Principalities		213	87
Transylvania			1,737

Source: CouchSurfing US dataset.

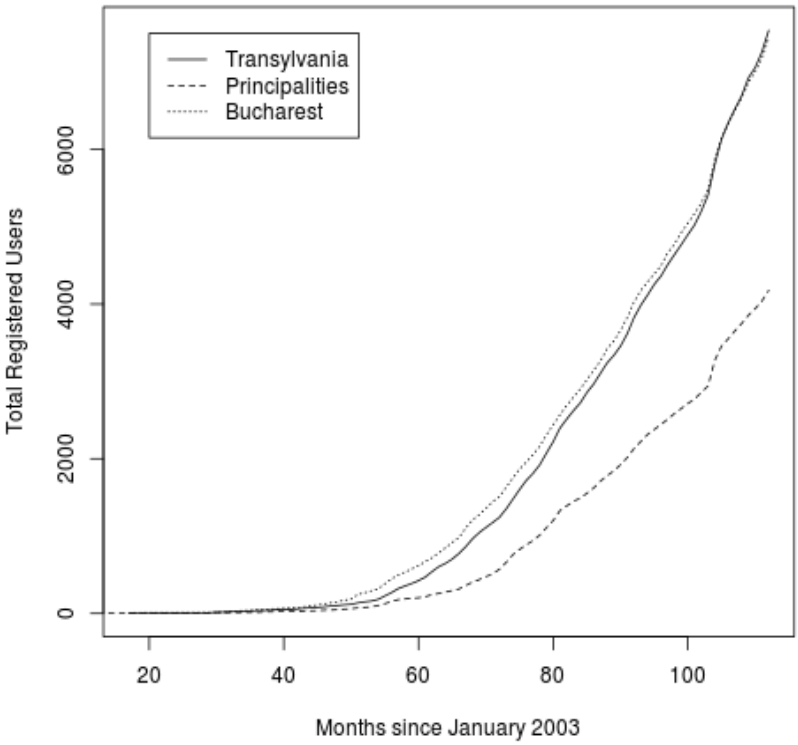


Figure 8: CouchSurfing Membership Density in Romanian Counties

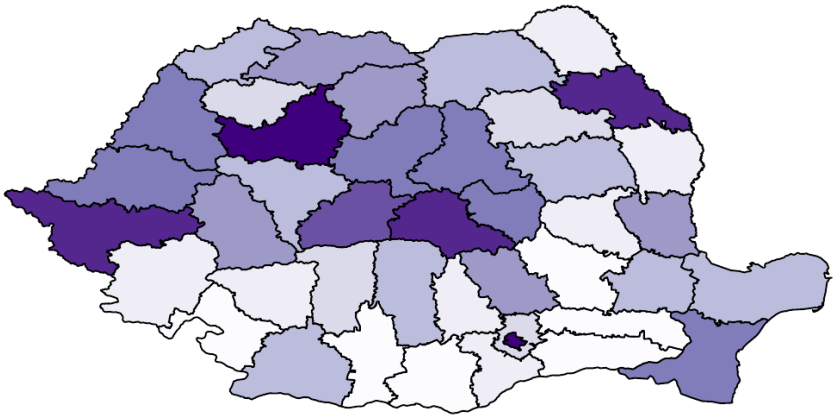


Figure 9: CouchSurfing Membership Density in Romanian Counties

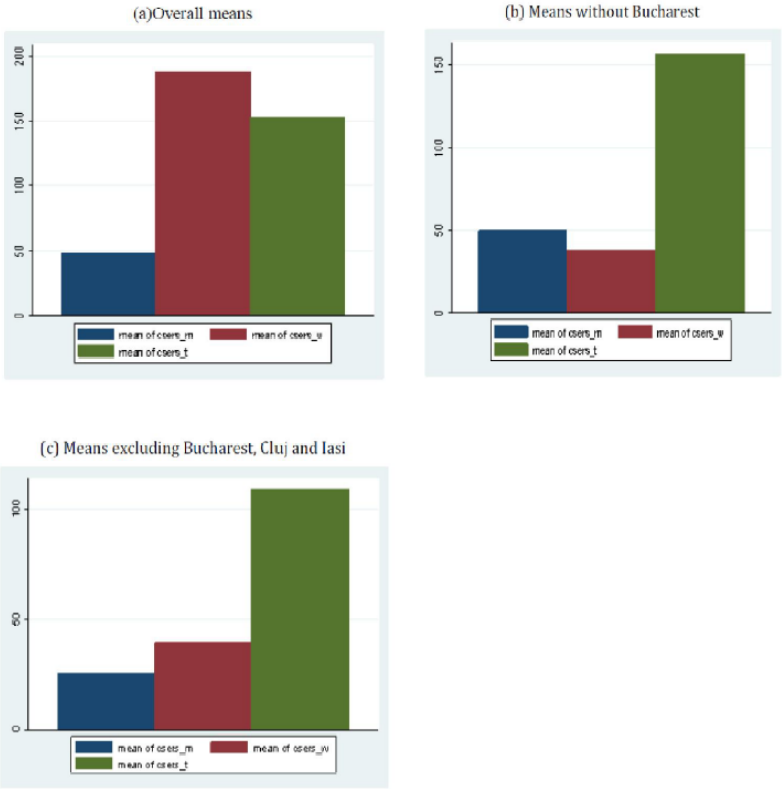


Figure 10: Mean CouchSurfing membership, per 100,000 inhabitants

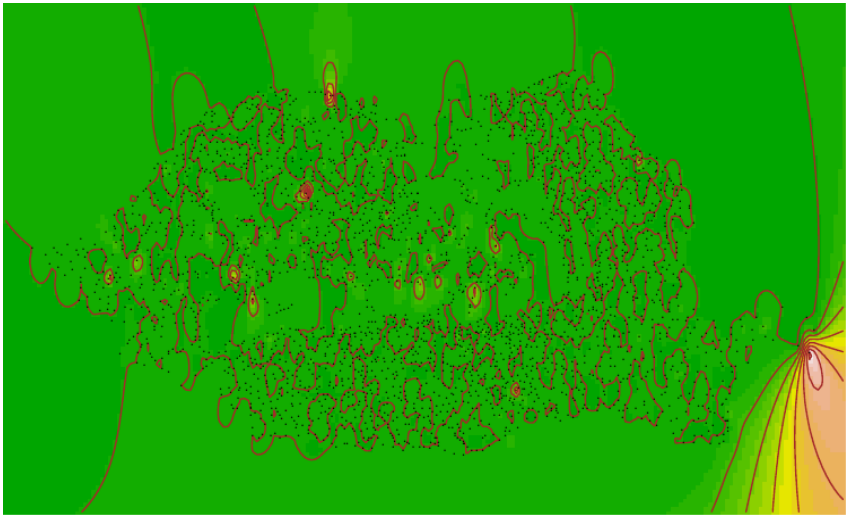


Figure 11: Ordinary Kriege Prediction of CouchSurfing Prevalence in Romania

Chapter 4

Financial reforms and Historical Legacies in Transition

4.1 Introduction

We analyze the effects of financial reform and development on economic growth in conjunction with the historical legacies of nine CEE and CIS countries. Financial development positively affects economic growth and furthermore this link become crucial for this set countries that started the conversion to a market economy system with much undeveloped financial systems. Financial reform on the other hand is of crucial as stimulus for the development of a modern financial sector.

In this work we use a new dataset that quantifies the level of financial reform in these countries. However, these measures are only de jure. Informal institutions such as corruption, rule of law, etc as well as attitudes and culture may affect the way these de jure reforms are translated into de facto reform. We believe that the historical legacies of these countries shaped in a large proportion the informal institutions of these countries. We investigate the relationship between de jure and de facto financial reform on economic growth using a constructed index (by the author) of

historical legacies to proxy for de facto reform (interacting de jure reform and historical legacies).

4.2 Related Literature

4.2.1 From institutions to growth

"Institutions are the rules of the game in a society or, more formally, are the humanly devised constrains that shape human interaction" (Douglas North, 1990). They encompass informal constraints (norms and beliefs) and formal constraints (rules and organizations, which are exogenous to the individual), which "conjointly generate a regularity of behavior" (Greif (2006)). Furthermore, 'new institutional economics' emphasize the role of institutions as social arrangements that reduce transaction costs and promote economic growth. Institutions matter and can be the "rules of the game" as argued by Williamson (2005) when dealing with economics of governance.

As early as 1776 scholars such as Adam Smith, Jon Locke and John Stuart Mill assert the importance of economic institutions. The Coase Theorem (Coase 1960) highlights economic institutions as a crucial aspect for attaining social efficiency when dealing with potential externalities. Demsetz (1967), De Sotto (2000), Acemoglu and al. (2002 2004 2008) underline the importance of economic institutions in influencing the structure of economic incentives in a society. North and Thomas (The Rise of The Western World: A New Economic History"), as cited by Acemoglu and al. (2004), argue that factors like innovation, capital accumulation and education are not causes of growth but 'they are growth' and the fundamental explanation for comparative growth is to be found in institutions. Cross-country differences in output per worker can be only partially explained by cross-country variation in the stock of physical and human capital, and these stocks fail to converge over time. The findings of Hall and Jones (1999) suggest that the differences in capital accumulation, productivity, and output per worker, across 127 countries, are in fact, driven by differences in social infrastructure, namely institutions

and government policies.

Tabellini (2008) explains the divergence of several political, institutional and economic outcomes in regions of Europe by accounting for their culture. Translated in individual values, culture represents the channel through which history can potentially affect institutional outcome. The author remarks differences in bureaucracy, in countries with similar legislations and resources, and underlines the importance of historical legacy persistence on policies. Rodrik et al (2004), using instrumental variables, estimate the contributions of institutions, geography and trade in determining income levels around the world. Moreover, they show that the quality of institutions, in particular for property rights and the rule of law, matters more than the other factors.

Several EBRD Transition Reports maintain the vital importance of market and state institutions for transition economies. Institutions can provide incentives for investment and innovation, which constitute important sources of growth. Furthermore, in transition countries with strong institutions, politicians' ability to extract rents is lower.[1] Institutional building for transition economies is also strongly advocated by Roland, 2000, 2003, 2004, 2009, Polishchuk, 2001, Fischer Sahay 2004. Beck and Laeven (2006) show the importance of institutional development for the economic growth in 24 former Communist transition countries. Moreover, they advance the idea that the economies relying more on natural resources and in which the socialist elites were more entrenched (more years under socialism), were less likely to develop market oriented institutions and to achieve economic development.

So far, in the economic literature, little attention was paid to the potential impact of historical legacies on the institutional development and economic growth of the transition economies of Eastern Europe. Important exceptions are the contribution of Dimitrova-Grajzl (2007), and the recent work of Grosejan on the effect of historical spatial proximity on cultural transmission (2011) and the persistence of former ottoman institutions on current financial sector development (2011).

[1] EBRD 2009

4.2.2 Financial sector reform and growth in transition

Understanding the relationship between the legal environment, financial development and economic growth has important policy and conceptual consequences. The interest in determining the legal rules that best help financial systems to develop and thus help economic growth started in the 1990s, building upon the emerging emphasis on institutions.

LaPorta, Lopez-de-Silanes et al. (1997) and LaPorta, Lopez-de-Silanes et al. (1998) use data on the legal systems of forty nine countries and show that legal systems that are better at rigorously protecting creditors and enforcing contracts, encourage the functioning and development of debt and equity markets. Levine (1998), in a cross-country analysis, finds that differences in the legal rights of creditors and the efficiency of their enforcement explains a large part of the differences in financial development among countries. Moreover, the author uses the origin of the legal systems as instrumental variable to identify the part of financial development that affects long-run economic growth, capital accumulation, and productivity growth finding a positive relationship.

Financial sectors are both overseen and used by national governments. Governments directly and indirectly set and enforce the regulation of financial institutions. But governments also use the financial sectors to borrow; and historically (although it still happens nowadays) they can directly intervene in the functioning of the domestic financial systems, for example by controlling parts of the banking sector or by directing the allocation of credit (Spratt (2009)).

McKinnon (1973) and Shaw (1973) argue that "financial repression" is directly responsible for lower growth as it prevents financial sectors from performing their roles. This influential hypothesis represented the framework for financial sector development throughout the world, over the past decades. Financial liberalization is likely to cause an increase in the size of the financial sector. Some of the theoretical arguments that support a positive relationship between financial liberalization, financial development and growth are as follows. More competition in the financial sector increases loans and deposits, and concomitantly, the

pressure put on profit margins, may decrease the rates on loans, thus stimulating savings and investments. Moreover, financial intermediaries are pushed to become more efficient and to reduce overhead costs, improve risk management and offer new instruments and services (Hermes and Lensink (2008)).

On the other hand, financial liberalization may leave financial systems more fragile and exposed to crises leading to economic and financial disasters. The asymmetric information problems might become even worse through the reduction of relationship lending and information capital, when competition is increased. Reduced margins leave banks more fragile and predisposed to excessive risk-taking, thus increasing the number of bank failures or even bank runs. Demirguc-Kunt and Detragiache (1999) use interest rate controls as proxy for financial liberalization and find that financial liberalization significantly increases the probability of banking crises, in a sample of both developed and developing countries, but that this tendency can be lowered by improving institutional quality (for example, less corruption or stronger rule of law). Thus, a strong set of financial market regulations is necessary in order to reduce the negative effects of financial liberalization.

After the fall of their Communist regimes, the countries from CEE and ex-USSR liberalized their financial sectors, although not to the same degree, or by employing the same set of policies. In the years prior to the transition, capital was allocated by state-controlled banks, through credits to state-owned enterprises. Credit evaluation and risk management played no role in lending decisions while banking was often segmented along functional lines. Household savings were collected by a state savings bank and often the result of the unavailability of consumer goods to purchase.

The development of banking sectors in transition economies had several stages. First, the establishment of commercial banks, second the recapitalization and restructuring of bank portfolios, and third the transfer of ownership from the government-privatization. In the late 1990, early 2000 the former Communist countries made rapid progress in bank privatization often with the participation of foreign banks, although by tak-

ing different approaches and with various degrees of success. However, the ultimate goal of bank privatization in a transition country should be banks' independence from government or from clients, hard budget constraints and the capacity to manage financial risks. Bonin, Hasan et al. (2004) using a sample of six developed Eastern European countries observed over the 1994-2002 period, empirically find that privatizing state-owned banks, by selling them to foreign investors, improves the performance of the banking sector but does not improve the effectiveness of financial intermediation.

4.3 Financial sector and Imperial narrative

4.3.1 Financial sector reform and economic growth

Financial sectors are both overseen and used by national governments. Governments both directly and indirectly set and enforce the regulations of financial institutions. Governments also borrow from the financial sectors and historically, and sometimes even nowadays, governments can intervene directly in the functioning of domestic financial systems, for example by controlling parts of the banking sector or by directing the allocation of credit (Spratt (2009)).

After the fall of the Communist regimes, the countries from CEE and ex-USSR liberalized their financial sectors, although not to the same degree, or by employing the same set of policies. In the years prior to the transition, capital was allocated by state-controlled banks through credits to state-owned enterprises. Credit evaluation and risk management played no role in lending decisions while banking was often segmented along functional lines. Household savings were collected by a state savings bank and often the result of the unavailability of consumer goods to purchase. McKinnon (1973) and Shaw (1973) argued that "financial repression" is directly responsible for lower growth as it prevents financial sectors from performing their roles. This influential hypothesis has represented a framework for the financial sector development throughout the world, over the past decades. Demirguc-Kunt and Detragiache

(1999) use interest rate controls as a proxy for financial liberalization and find that financial liberalization significantly increases the probability of banking crises, in a sample of both developed and developing countries, but this tendency can be lowered by improving the quality of the institutions (for example, less corruption or stronger rule of law).

An important angle on the financial sector development in the transition countries is related to the institutional changes and reforms that reshaped financial intermediation in these countries in the years following the fall of Communism. From the previous chapters, it seems that the depth and the efficiency of the financial system can foster growth. The development of banking sectors in transition economies usually had several stages. First, the establishment of commercial banks, second the recapitalization and restructuring of bank portfolios and third the transfer of ownership from the government-privatization. In the late 1990, early 2000 the former Communist countries made rapid progress in bank privatization often with the participation of foreign banks, although by taking different approaches and with various degrees of success. However, the ultimate goal of bank privatization in a transition country should be banks' independence from government or from clients, hard budget constraints and the capacity to manage financial risks. Bonin, Hasan et al. (2004). using a sample of 6 developed Eastern European transition countries during the period 1994-2002, empirically find that privatizing state-owned banks by selling them to foreign investors improves the performance of the banking sector. They find no evidence that privatization improves the effectiveness of financial intermediation.

The effect of financial liberalization is likely to be an increase in the size of the financial sector but it may also leave it more fragile and exposed to crises. Some of the theoretical arguments that support a positive relationship between financial liberalization, financial development and growth are as follows. More competition in the financial sector increases rates and deposits, and concomitantly, the pressure put on profit margins may decrease the rates on loans, thus stimulating savings and investments. Moreover, financial intermediaries are pushed to become more efficient and to reduce overhead costs, improve risk management

and offer new instruments and services (Hermes and Lensink (2008)). On the other hand, it has been argued that there were cases when financial liberalization led to economic and financial disasters and generally disappointing results. The asymmetric information problems might become even worse through the reduction of relationship lending and information capital, when competition is increased. Reduced margins leaves banks more fragile and predisposed to excessive risk-taking, thus increasing the number of bank failures or even bank runs in the economy. Thus, a strong set of financial market regulations is necessary in order to reduce the negative effects of financial liberalization.

4.3.2 Imperial power in CEE and CIS

Specific institutions may persist over time, especially informal ones, such beliefs and social norms. These informal institutions affect the set of formal ones evidenced in the literature to have a strong effect on growth-among the others rule of law and corruption. Social norms and beliefs are considered as direct channels of persistence of historical background and historical legacies for the considered set of countries.

The present study agree with the Dimitrova-Grajzl tested conjecture that the fall of the iron curtain laws accompanied with a desired divergence from the socialist ideology therefore a reversal to pre-system historical traditions norms and rules. According to EBRD Transition report (1994) "transition from a command to a market economy is the movement towards a new system for the generation and allocation of resources. It involves also changing and creating the institutional framework. A major impediment to assess the role of institutions in explaining economic performance during the transition refers to the difficulties in identifying theoretically-sound measures of those institutions that are relevant for growth (Coricelli et al. 2002). The EU accession process is claimed to have a positive effect in terms of institutional framework being reforms required considerably more rigorous. On the other hand progress on a set of Institutions is required for a definitive and positive outcome of the process, highlighting country's specific peculiarities.

Therefore historical background becomes furthermore important.

(Description of main Empires in the region)

4.4 Data

In our analysis we explore data from the following Eastern European countries: Albania, Bulgaria, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia and Ukraine. We omit other countries from the Eastern region mainly because of the lack of data on financial reforms for these countries.

Ottoman index, Habsburg index, Prussia index and Russia index are calculated indicators ranging from 0 to 1 for the duration of the respective empire's rule in a country. The methodology used in computing them is explained in more detail in the next section.

In order to quantify the various aspects of de jure financial sector reform we use indicators from the EBRD dataset described in the paper by Abiad, Detragiache et al. (2008).

The financial reform index is based on seven dimensions of financial sector policy: credit controls and excessively high reserve requirements, interest rate controls, entry barriers, state ownership in the banking sector, capital account restrictions, prudential regulations and supervision of the banking sector, securities market policy. Each country is assigned a score along each of these dimensions, with zero for the highest degree of financial repression and three or more for the highest degree of financial liberalization. The aggregation of these seven variables offers a single financial liberalization index, which in this paper was used as normalized to one. The seven components of the financial reform index are described below.

Credit controls and excessively high reserve requirements is an aggregate measure of the extent to which a country requires the banks to lend (sometimes at subsidized rates) to certain sectors such as manufacturing, agriculture or the government, and also a measure of the government imposed ceilings on credit extended by the banks. It also includes excessively high reserve requirements imposed on banks, for example,

more than 20% reserve requirements is used as the highest threshold. Based on these aspects each country is assigned a score between 0 and 4, with 0 meaning fully repressed and 4 - fully liberalized. Credit ceilings- one of the components of credit controls is coded as 0 is there are ceilings on the expansion of bank credit and 1 if there are no restrictions.

Interest rate liberalization: this measure considers both lending and deposit rates, ranking each of them into government set or subject to a binding ceiling/floor, fluctuating within a band or freely floating. The resulting measure ranges between 0 - fully repressed and 4-fully liberalized. Interest rate controls are one of the most common forms of financial repression even in developed countries.

Banking sector entry considers the extent to which the government allows foreign banks, as well as, new domestic banks to enter the market, whether there are restrictions on branching and if the government allows the banks to engage in wide range of activities. The scores can range between 0 and 5, 4 or 5 representing full liberalization and 0- full repression.

State ownership in the banking sector is a relatively crude measure of the control a country's government can have over the credit allocation. Due to lack of data sources on the state ownership of banks, this measure makes only the following differentiations. A score of 3 means full liberalization, consistent with the state not owning any significant portion of banks and/or public owned bank assets are less than 10%. Largely liberalized (score of 2) means that most banks are privately owned and/or the proportion of public bank assets is between 10% and 25%. Partially repressed (a score 1) means that most banks are privately owned but there are still major banks that are state-owned and/or the percentage of public bank assets is between 25-50%. Fully repressed (score 0) means that major banks are all-state owned, or that the proportion of public bank assets is between 50% and 100%.

Capital account restrictions include multiple exchange rates for various transactions, transaction taxes, and restrictions on outflows/inflows of capital, specifically regarding financial credits. Typically such measures are imposed in order to give the government a greater control over

the flow of capital and greater control over the exchange rate. The range is between 0 and 3, with 3 signifying full liberalization.

The measure securities markets refers to two sub-dimensions: government policies to encourage the development of securities markets, and policies on the openness of the securities markets to foreign investors. A score of 4 or 5 indicates a fully liberalized economy and a score of 0 a fully repressed one.

Prudential regulations and banking sector supervisions is a measure (the only one in this set) that actually interprets a greater degree of government intervention as reform. The dimensions captured by it are: whether the country adopts the capital adequacy ratios based on the Basel I capital accord, whether the banking supervisory agency is independent from the executive's influence and if it has enough legal power, whether certain financial institutions are exempt from supervisory oversight and how effective are the on and off-site examinations of banks. The measure can take values between 6- highly regulated and 0 not regulated.

4.5 Methodology

Construction of historic legacy indeces

In this study we use the historic legacy index as previously constructed by the author. [..] The hypothesis is, as evidenced in previous literature, that the more time a country has spent under the rule of a certain empire the stronger the influence of that empire's culture and institutions is on the country's current culture and institutions. Furthermore, being under occupation more recently plays a more important role than being under occupation earlier. . Explain 1400 and 1918. Each year of occupation by an empire, starting with 1400 and ending with 1918, is assigned a weight. Next, we compute indices for each country and each empire by adding the

For example, the weight of the Ottoman Empire for country i is computed as:

$$\text{Index Ottoman}_i = \sum_{j=\text{year start Ottoman}}^{\text{year end Ottoman}} \text{value year}_j$$

where "year start Ottoman" is the year when the Ottoman Empire's rule of country i has started and "year end Ottoman" is the year when Ottoman Empire's rule of country i has ended. However, there is no underlying theory that could provide us insights into how to assign relative importance to each year under occupation. While it seems obvious that one year spend under an empire in the 1900s should matter more than a year spent under occupation in the 1400s, it is not at all obvious how much more it matters. Thus here, we introduce two ways of assigning weights to the years under occupation. First we assume that the importance of years increases from past to present, following a linear trend.

Thus, the importance associated with year x is given by:

$$\begin{cases} f(x) = 0 & \text{if } x < 1400 \\ f(x) = x - 1400 & \text{for } x \geq 1400 \end{cases}$$

The resulting indexes for each country and each empire are normalized to 1.

According to this definition, a country that was under the rule of an empire for 100 years starting with the year 1400 would have an index of 0.037; a country a country that was under the rule of an empire for 100 years starting with the year 1818 would have an index of 0.388.

The second definition assumes that years closer to present are, in fact, much more important than earlier years. According to the second definition, the importance assigned to each year is equal to the inverse of the distance between 1989 and the year itself. The year 1989 was used because it represents the end of the Communism in these countries and the beginning of our analysis of financial development, but also because it yields a convenient shape to the importance function. The shape is similar to an exponential function, for which we observe a significant increase

in importance for years after 1800. For both definitions, the country empire weights are normalized to 1. Thus an empire would have a weight of 1 for a country if that country was under the empire's rule since 1400 until 1918.

4.6 Results

Table 16 presents correlation coefficients and their p-values between the four historical legacies considered in this paper, calculated using the linear function explain in detail above, annual per capita GDP, annual economic growth and various measures of financial reform in 11 transition economies. There are strongly significant correlations between historic legacies and per capita GDP. An Ottoman or Russian legacy is associated with lower per capita GDP, while a Habsburg or Prussian legacy is associated with higher per capita GDP. While none of the historical legacies is significantly correlated with the economic growth, there seem to be influences on the level of financial reform. The aggregated financial reform index is negatively correlated with an Ottoman legacy and positively correlated with a Prussian legacy. Both these results are statistically significant. Habsburg and Russian legacies are positively correlated with financial reform, however not statistically significant.

Ottoman legacy is negatively correlated with all components of financial reform with the exception of "international capital", which is positively correlated with the Ottoman legacy. These results are statistically significant for 7 of the 9 components. Habsburg historical legacy is significantly and negatively correlated with directed credits and credit controls and significantly and positively correlated with credit ceiling, interest rate controls, banking supervision and privatization. Prussian legacy is positively correlated with all the financial reform indicators and the correlations are significant for 7 of the 9. A Russian legacy is significantly and positively correlated with directed credits, credit ceilings, credit controls and interest rate controls.

Countries with Ottoman historical legacies are more likely to incur a reversal in financial reforms, while countries with a Prussian legacy are

less likely to undergo such a process. The correlations are not significant for countries with Habsburg or Russian historical legacies.

Table 16: Correlations between historical legacies, economic growth and financial reforms in Albania, Bulgaria, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia and Ukraine.

	Ottoman index	Habsburg index	Prussian index	Russia index
gdp per capita	-0.48***	0.59***	0.41***	-0.23***
	(0.00)	(0.00)	(0.00)	(0.00)
growth	0.05	-0.04	0.11	-0.05
	(0.55)	(0.60)	(0.17)	(0.53)
directed credits	0.08	-0.30***	0.17**	0.32***
	(0.34)	(0.00)	(0.03)	(0.00)
credit ceilings	-0.39***	0.14*	0.09	0.21***
	(0.00)	(0.08)	(0.27)	(0.01)
credit controls	-0.07	-0.21***	0.18**	0.36***
	(0.36)	(0.01)	(0.02)	(0.00)
interest rate controls	-0.56***	0.21***	0.23***	0.20***
	(0.00)	(0.01)	(0.00)	(0.01)
entry barriers	-0.15*	-0.06	0.03	0.13*
	(0.05)	(0.44)	(0.70)	(0.10)
banking supervision	-0.16**	0.14*	0.20*	-0.10
	(0.04)	(0.07)	(0.01)	(0.19)
privatization	-0.29***	0.14*	0.23***	0.07
	(0.00)	(0.07)	(0.00)	(0.35)
international capital	0.07*	-0.11	0.26***	0.01
	(0.35)	(0.18)	(0.00)	(0.92)
security markets	-0.41***	0.26***	0.26***	0.05
	(0.00)	(0.00)	(0.00)	(0.55)
financial reform index	-0.32***	0.11	0.31***	0.11
	(0.00)	(0.17)	(0.00)	(0.16)
reversal	0.18**	-0.03	-0.17**	-0.04
	(0.03)	(0.75)	(0.03)	(0.66)

p-values in parentheses, level of significance denoted by * at 10%, ** at 5%, *** at 1%.

Table 17: Dependent variable: average economic growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
L2.loggdp	-6.561	-0.641	1.721	-1.609	3.123	2.157	-4.597	1.015	2.194	2.181
	(0.141)	(0.879)	(0.662)	(0.700)	(0.478)	(0.581)	(0.371)	(0.801)	(0.603)	(0.522)
av_inflation	-0.0241**	-0.0424***	-0.0442***	-0.0403***	-0.0485***	-0.0393***	-0.0370***	-0.0376**	-0.0437***	-0.0325***
	(0.0116)	(1.77e-06)	(8.22e-07)	(3.98e-06)	(1.15e-07)	(0.000109)	(7.67e-05)	(0.000192)	(1.02e-05)	(0.000258)
av_finreform	0.930***									
	(0.000875)									
av_directedcedit		3.502**								
		(0.0363)								
av_creditceilings			4.746*							
			(0.0827)							
av_creditcontrols				4.083**						
				(0.0146)						
av_intratecontrols					0.633					
					(0.623)					
av_entrybarriers						3.891				
						(0.107)				
av_bankingsuperv							2.578**			
							(0.0223)			
av_privatiz								1.660*		
								(0.0675)		
av_intlcap									0.984	
									(0.286)	
av_securitymarkets										2.854***
										(0.00252)
Constant	41.66	3.339	-12.64	9.030	-21.09	-23.32	36.73	-5.677	-14.50	-18.68
	(0.196)	(0.916)	(0.676)	(0.772)	(0.524)	(0.428)	(0.348)	(0.855)	(0.653)	(0.482)
Observations	44	44	44	44	44	44	44	44	44	44
R-squared	0.736	0.674	0.660	0.690	0.628	0.655	0.683	0.663	0.639	0.720
Number of id	9	9	9	9	9	9	9	9	9	9

p-values in parentheses, level of significance denoted by * at 10%, ** at 5%, *** at 1%.

Table 18: Dependent variable: average economic growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
L2.loggdp	-8.379	-8.946	-7.032	-8.699	-8.575	-11.39**	-7.972	-9.933*	-10.12*	-7.404
	(0.128)	(0.106)	(0.202)	(0.122)	(0.137)	(0.0436)	(0.187)	(0.0925)	(0.0507)	(0.180)
av_inflation	-0.0297***	-0.0251***	-0.0248***	-0.0255***	-0.0255***	-0.0184**	-0.0261***	-0.0272***	-0.0279***	-0.0227***
	(0.00241)	(0.00117)	(0.00108)	(0.00108)	(0.00109)	(0.0271)	(0.00136)	(0.00103)	(0.000177)	(0.00406)
av_finreform	-0.399									
	(0.461)									
period2	8.433***	6.763***	8.827***	7.023***	7.085***	6.673***	7.277***	7.402***	8.587***	6.348***
	(0.00190)	(0.000523)	(0.000272)	(0.00117)	(0.000241)	(0.000301)	(0.000423)	(0.000211)	(1.74e-05)	(0.00121)
period3	10.34**	7.438***	9.574***	7.775***	7.848***	7.169***	8.372***	8.461***	10.48***	6.383***
	(0.0104)	(0.000299)	(0.000122)	(0.000666)	(0.000106)	(0.000216)	(0.00296)	(0.000181)	(8.58e-06)	(0.00541)
period4	13.53***	9.797***	12.25***	10.34***	10.44***	10.22***	11.01***	11.45***	13.78***	8.777***
	(0.00758)	(0.000293)	(5.22e-05)	(0.000463)	(6.87e-05)	(4.17e-05)	(0.00118)	(0.000221)	(5.58e-06)	(0.00219)
period5	15.84***	11.56***	13.79**	12.27***	12.36***	12.61***	12.89***	13.95***	16.51***	10.64***
	(0.00690)	(0.000620)	(6.26e-05)	(0.000569)	(0.000134)	(5.84e-05)	(0.000708)	(0.000806)	(1.13e-05)	(0.00201)
av_directedcredit		0.962								
		(0.499)								
av_creditceilings			-3.615							
			(0.208)							
av_creditcontrols				0.0906						
				(0.956)						
av_intratecontrols					-0.0462					
					(0.963)					
av_entrybarriers						3.117				
						(0.105)				
av_bankingsuperv							-0.392			
							(0.781)			
av_privatiz								-0.602		
								(0.523)		
av_intlcap									-1.915**	
									(0.0255)	
av_securitymarkets										1.078
										(0.268)
Constant	65.91	65.04	53.05	64.35	63.62	76.61*	59.01	74.35	77.63*	53.09
	(0.120)	(0.125)	(0.208)	(0.134)	(0.146)	(0.0671)	(0.202)	(0.103)	(0.0522)	(0.213)
Observations	44	44	44	44	44	44	44	44	44	44
R-squared	0.818	0.818	0.825	0.815	0.815	0.831	0.815	0.817	0.845	0.823
Number of id	9	9	9	9	9	9	9	9	9	9

p-values in parentheses, level of significance denoted by * at 10%, ** at 5%, *** at 1%.

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