ESSAYS IN EMPIRICAL ECONOMICS

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Bledi Çeliku, M.A.

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Bledi Çeliku, M.A.

Dissertation Advisor: William, Jack Ph.D.

Abstract

The first chapter investigates the theoretical and empirical effects of increased law enforcement on the equilibrium level of bribes for the case of Albania during the period of 2005-2010. It centers on "harassment" bribes, which consist of payments for public services that by law should be free. I model bribery behavior as a negotiation process between public officials and consumers. Recent policy changes in Albania offer a good natural experiment to test this empirically. I examine how the 2007 fine increase for corrupt behavior impacts bribery. Using a difference in difference methodology that compares safe left and right-governed districts, I find that a 10 percent increase in enforcement leads to a 4.38 percent drop in bribery frequency.

The second chapter assesses short and medium term impacts of sovereign, banking and currency crises on sectoral value added output for a large group of countries. Sectoral data is combined to represent the industrial, agricultural and service sectors. The effects of crises on sectoral value added growth are negative and vary between 4-16 percent of sectoral output growth. The industrial sector seems to be affected more by banking crises, suggesting that industry is more dependent on finance than the other sectors, while the service sector is affected more severely by debt crises. Employment drops in agriculture are more severe and last longer as compared to services and industry.

The third chapter studies soccer schedules which have recently been established based on broadcasting criteria, international FIFA dates and European cups. However, the order in which teams play during the season, relative to their direct opponent, can generate an unfair advantage and ultimately determine the outcome of championships. This paper estimates the effect of team schedules on game results for the Scottish Premiership, the German Bundesliga and the Spanish Liga BBVA. We use a matching methodology (selection on observables) to control for usual game characteristics. Results show that if a team records a win (loss) on an earlier match, then its direct competitor collects an average of 0.49 (1.08) fewer (additional) points as long as league contenders are within three points of each other.

Index words: Corruption, Public Servants, Bribery, Government, Sectors, Crises, Employment, Soccer Schedule, Discouragement Effect, Bundesliga, Premiership, Liga BBVA

Dedication

To my father, Sadedin Çeliku

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Chapter 1

Crackdown on Corruption: A Natural Experiment in Safe and Swing Districts

1.1 Introduction

This paper models bribery between consumers and public officials. I investigate both the theoretical and empirical effects of increased enforcement on bribe occurrence. Consumers need high quality public services to be delivered in a timely manner. However, public officials do not always deliver. When faced with added bureaucracy or explicit bribe requests, consumers face the dilemma of paying a bribe or assuming the risk of not getting the service at all. Similarly, public officials decide whether to supply services for free or to ask for bribes in order to expedite the process. In other words, officials implicitly value whether taking a bribe is worth more than the risk of getting caught. Depending on different combinations of increased enforcement i.e. fine increase or probability of getting caught, paired with quality of services changes, the share of population that engages in bribery theoretically can increase or decrease. In the empirical application I test the effect of increased enforcement on bribery. Corruption is a bigger problem for poor people, and since the left's political platform is more pro-poor, looking at the left-right governed district variation is reasonable. I find that enforcement increases more in left-governed safe districts than in right-governed districts. Bribery occurrence decreases more in left-governed districts.

While there have been many different opinions regarding the effects of corruption on the economy, scholars have mostly agreed that corruption in developing countries is costly (Olken and Pande 36). As corruption is illegal and hard data on corrupt transactions are hard to find, measuring corruption is difficult. However, since the birth of the corruption literature dating back to studies such as Becker and Stigler [6] and Rose-Ackerman [46], significant progress has been achieved. Several corruption perceptions indexes exist today like the Corruption Perception Index (CPI) and the World Bank Governance Indicators (WGI). They publish yearly indices on corruption perceptions for every country, hence providing a basis for comparison. Nevertheless, "Corruption is a complex notion to be quantified in a single index" (Thompson and Shah 53. Finding good instruments for corruption presents difficulties in a broad macroeconomic setting as endogeneity problems arise. Recently, researchers have put a lot of effort to collect more direct data on corruption, and a number of studies explain within-country corruption. Economists are finding innovative ways to measure corruption and its impact on the economy (examples include McMillan and Zoido [34] and Reinikka and Svensson [42]).

Most of the studies taking up enforcement and corruption have either been theoretical Polinsky and Shavell 38, or they have focused on a specific type of corruption Fisman and Miguel 20. Very few studies look at this issue empirically or study variation of enforcement effectiveness on corruption. This study investigates the effect of increased law enforcement on the equilibrium level of bribes[1] during the 2005-2010 period in Albania (IDRA 29). Since there are different underlying models of incentives for different types of bribery, this paper discusses "harassment" bribes only, as defined in Basu [5]. It consists of bribes paid to public officials by consumers who

[1]Data are taken from the "Corruption in Albania, Perception and Experiences" study

demand services that they are legally entitled to, such as hospital treatment, passport or certificates issuance, school grade certificates or even court services.

By 2005, in Albania the incumbent Socialist Party (SP) had governed for 8 years and lost the general elections. The opposition ran under the slogan “With Clean Hands" and vowed to fight corruption when they came in power. Several reforms were instituted ranging from adapting anti-corruption laws to international standards, setting up new institutions like the “High Inspectorate for Declaration and Audit of Assets" and “Joint Unit for the Investigation of Economic Crime and Corruption". Also measures like setting up e-procurement, e-taxation, and “one-stop shop" procedures to reduce contact with public officials were undertaken in this period. Albania's percentile ranking among several indicators published by the World Bank improved drastically during this period. As Figure 1.1 shows, it has drastically moved from being in the 20th percentile in 2005 to almost the 40th percentile in 2010 in the following categories: Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption.

This paper proposes a victimization index measuring the several ways in which people could be victimized in paying bribes and test the effect of increased enforcement on victimization. Proxies for enforcement are based on variables such as the respondents' knowledge of judges being sanctioned and their awareness of anti-corruption initiatives. Estimating the causal effect of enforcement on bribery frequency is challenging because of the endogeneity problems involved. Omitted variables are an issue and other factors may have changed during this period that a effected enforcement as well as victimization. For instance, the need for increased budget revenue or technological improvements might have also contributed in reducing the level of corruption. In order to account for endogeneity, the paper exploits two main changes that occurred in 2007. There was a federal fine increase in one of the anti-corruption laws in February and local elections that were held in May. I instrument enforcement with the interaction[2] of the post treatment dummy with left-governed safe districts before and after elections. The exclusion restriction implied by the instrumental variable is that the fine increase has no effect on victimization, other than through enforcement. This is a plausible assumption, hence the validity of the IV is not threatened.

My findings suggest that an increase of enforcement of 10 percent leads to a 4.38 percent drop of bribery frequency. In theory, quality of services can either increase or decrease when enforcement increases, but I show empirically that quality of services slightly decreases as enforcement increases.

1.2 Theoretical Framework

A simple theoretical model will provide some context and help motivate the empircal work. The model is based on the seminal work by Becker and Stigler [6]. Some notation follows also from Polinsky and Shavell [38]. The focus of the study is on harassment bribes paid by consumers for public service delivery. There are sanctions in place against such bribes which can be used on the briber or bribe taker. In the presence of such fines consumers choose whether to bribe or not whereas the official chooses whether or not to accept the bribe. Since there exists a range of values for the parameters where paying a bribe is beneficial to both sides, bargaining occurs. There is heterogeneity across both sides of the market being represented by an idiosyncratic shock to their probability of getting caught. Consumers meet public officials randomly. These parameters define the population that would engage in a bribe once they are matched. If the pair of random variables lies in the acceptable range (mutually beneficial), a bribe takes place, if not then one of the sides refuses to give/take a bribe.

[2]The interaction term is a difference-in-difference type of estimator.

Consider the willingness of a public sector official (doctor, judge or administrator) and a consumer to enter into a bribe agreement. Let F be the fine [3] imposed on the consumer in case he is caught bribing; f be the fine imposed on the official in case he is found guilty and b be the bribe payment to an official. Let's also define $\mu_j = \mu_0 + \epsilon_j$ the probability of public official j to get caught and $\rho_i = \rho_0 + \epsilon_i$, the probability of consumer i to get caught. Here μ_0 and ρ_0 represent the mean probability of getting caught (presumably low if corruption is a problem) of the public officials and consumers whereas ϵ_j and ϵ_i represent intrinsic characteristics of each specific bribe case due maybe to the specific sector, the ability of the public official to hide his actions or whether the consumer is satisfied with the service after bribing.

1.2.1 Public Official Decision

Consider a public official problem who is willing to accept a bribe b if the bribe is higher than his expected value of punishment $b > \mu_j f$. When he receives a bribe to provide the service, the official has an expected gain of:

$$b - \mu_j f \tag{1.1}$$

When he doesn't receive a bribe he provides the service for free and gets a zero expected payoff.

1.2.2 Consumer Decision

Now consider the decision of the consumer. If he pays a bribe b, he gets a gain g from getting a better quality or faster service, but he faces an expected cost of $\rho_i F$ where the probability of getting caught is ρ_i and F is the fine. So if the consumer pays the

[3] For simplicity it is assumed to be financial fines. It is not necessary for the model results, as imprisonment could be considered as well.

bribe he gets an expected payoff of:

$$g - \rho_i F - b \tag{1.2}$$

In case the consumer doesn't pay a bribe his expected payoff is g' which is lower than g and represents the gain of not paying the bribe and waiting in line, getting the lower quality service or maybe not getting the service at all. Assuming risk neutrality and combining both cases, the consumer will be willing to bribe if and only if:

$$g - \rho_i F - b > g' \tag{1.3}$$

1.2.3 Equilibrium Bribe

The public official is willing to accept a bribe b if the bribe is higher than his expected value of punishment $b > \mu_j f$ and the consumer will be willing to bribe if $b < g - \rho_i F - g'$ from equation 1.3. As a result, there exists a range of bribes that are mutually beneficial if:

$$\mu_j f < b < g - \rho_i F - g' \tag{1.4}$$

From 1.4 it follows that the surplus from entering into a bribe agreement will be: $g - \rho_i F - g' - \mu_j f$. It is positive when equation 1.4 holds. Assume that the bribe amount is such that the surplus from entering into the bribe arrangement will be split between the parties according to their bargaining power. Let ϕ be the bargaining power of the public official, where $0 < \phi < 1$. Then, the bribe amount is the solution to this Nash bargaining problem:

$$\begin{aligned} b &= argmax(b - \mu_j)^{\phi}(g - g' - \rho_i F - b)^{1-\phi} \\ &= \mu_j f + \phi(g - g' - \rho_i F - \mu_j f) \end{aligned} \tag{1.5}$$

The public official needs to be compensated at least $\mu_j f$ so that he is indifferent to the Nash agreement. Then additionally he will get a proportion ϕ of the Nash bargaining split. Let the critical value of gain ($\hat{g}$) be the level of the gain below which a bribe agreement will not take place. By combining both sides of the market, using equation 1.3 and substituting b from equation 1.5 the following is true:

$$\hat{g} = g' + \mu_j f + \rho_i F \tag{1.6}$$

1.3 Testable Implications

In order to understand equation 1.6 better, the following application might be useful. Assume that μ_j and ρ_i are uniformly distributed. Figure 1.2 presents equation 1.3 graphically. The axes represent μ_j and ρ_i, the probability of getting caught of the public official and consumer respectively. The line represents:

$$g - g' = \mu_j f + \rho_i F \tag{1.7}$$

Its slope is $-f/F$. If a consumer and a public official combined characteristics lie in the acceptance region, a bribe will take place. Otherwise one side or both parties will deny the transaction and the arrangement does not occur. Appendix A contains a comparative statics exercise where the penalty falls only on the public official or consumer respectively.[4]

Consider the policy variables for now to be: μ_0, ρ_0, f and F. Under this setting a policy change (increase in law enforcement) can be represented in two scenarios: Either a line shift in the box or a box shift. A box shift would happen when μ_0

[4] In Basu [5], the author claims letting the briber go free and only punishing the public official would result in bribery incidence going down. I investigate this issue in the model and in one of the four possible cases, shifting the blame to the officials only reduces bribery; in line with Basu [5]. In another case blaming only the consumer has the same decreasing effect on bribery. In two other cases results are ambiguous.

and ρ_0 increase. The size of the box doesn't change but the average probability of getting caught of the public official and/or consumer increases on average as more law enforcement is instituted. The new setting needs to be represented in a different box. Rearranging terms from equation 1.7, the line equation becomes:

$$\rho_i = \frac{g - g'}{F} - \frac{f}{F}\mu_j \tag{1.8}$$

A line shift could happen in case the intercept goes down and the slope stays the same (for the shift to be parallel). This means that $(g - g')$ has to decrease and both fine amounts change by the same amount so the slope doesn't change. To simplify, substitute ρ_i and μ_j in equation 1.8 and get:

$$\epsilon_i = \frac{g - g' - \rho_0 F - \mu_0 f}{F} - \frac{f}{F}\epsilon_j \tag{1.9}$$

where $\epsilon_i \sim \mathcal{U}(0,1)$ and $\epsilon_j \sim \mathcal{U}(0,1)$. It is now simplified to be only a line shift or change in the same box and is shown in Figure 1.3.

The factors that would decrease bribery[5] are listed below:

- Decrease in the quality of the bribed service (g).
- Increase in the quality of the "free" service (g').
- Increase in the probability of getting caught of the consumer (ρ_0) and for the public official (μ_0).

If the change occurs without slope changes, fines have to remain unchanged or they have to change by the same amount. In case there is a change on either the fine F on the consumer side or fine f on the public official side what happens to the

[5] Graphically this is defined as the area of the acceptance region or share of population that pays a bribe

acceptance region is unclear and could lead to different results[6]. In addition, a fine increase coupled with change in quality of "free" or bribed services can also lead to an ambiguous result. Summarizing, an increase in enforcement can lead to different results in bribery depending on the combination of effects noted above. This model provides some context into the factors that can influence bribery and how theoretically enforcement could change this. As it happened during this period in Albania, which I will show in the next sections, there is a fine increase on the public official side. I look at this question empirically and attempt to answer an issue which provides inconclusive results theoretically.

1.4 Data

The dataset in this paper consists of five consecutive repeated cross-section surveys designed and implemented for the "Corruption in Albania, Perception and Experience" series from 2005 to 2010.[7] Each survey has three components: 1) General Public sample 2) Public Sector Employees sample and 3) Judges' sample. The general public sample consists roughly of 1200 people surveyed each year. The public sector sample is comprised of 600 public officials surveyed each year. The judges' survey consists of a sample of roughly 200-300 judges surveyed in the period 2008-2010.

The general public sample was created based on a multi-stage random probability sampling drawn from a list of polling stations. Polling stations are the primary sampling unit in the design. Within the area designated by the polling station, respondents were selected based on random route sampling. Table 1.1 presents the summary statistics. Average age across years is about 42. The number of women surveyed is

[6] This can be verified by taking the derivative on the four possible areas of bribe acceptance region with respect to each fine in Appendix A. Number four is the ambiguous one.

[7] It started as part of LAPOP studies (Latin America Public Opinion Polling)at Vanderbilt University. More information available at:`http://vanderbilt.edu/lapop/index.php`

slightly more than men, which corresponds to the total population demographics. Income data is collected by asking respondents in which bracket their monthly family income falls. The Income variable ranges from [0, 10] and in monetary value from [0, 300.000] Lek[8] per month. Since a value of income equal to three and four correspond to the range [15.000, 20.000] and [20.000, 50.000] Lek respectively, then an average income of 3.43 in 2005, corresponds to a value higher than 200 USD but lower than 500 USD. In order to make sure that income distribution in this survey is representative of Albania and does not show unusual features, I compare in Appendix A the monthly household income of this survey to the well known Living Standards Measurement Survey (LSMS) for Albania[9]. The comparison is done for the 2005 year and results are pretty similar for both surveys. Ideology refers to a [1, 10] discrete scale where going from 1 to 10 peoples' beliefs move from far left to far right. On average people slightly favor more the right and the Democratic Party (DP), which is the political party in power centrally during the time of data collection. Education level data and occupation data are presented next[10]. Almost half of the sampled people have at most a High School education and 15-20 percent hold a University degree. Worth noting is that only 20-25 percent of the respondents are full time employed and almost the same share are unemployed which is considerably higher compared to the official data released by the World Bank.[11] This should not be perceived as sample

[8]Exchange rate in these years has fluctuated near 100 Lek/USD

[9]Data is taken from the 2005 Living Standards Measurement Study at `http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/0,,contentMDK:21588807~pagePK:64168445~piPK:64168309~theSitePK:3358997~isCURL:Y~isCURL:Y,00.html`

[10]The Education variable in 2005 was collected as number of education years whereas later it is collected by asking respondents of the level of education they have. So data in 2005 is averaged out to be compared to the other years.

[11]`http://data.worldbank.org/indicator/`

bias as discrepancies can come from the way unemployment is measured generally and how people perceive themselves to be.[12]

Table 1.2 reveals the major problems the country is facing according to respondents. This is important to know the evolution of problems in Albania and point out which problems persist and which vanish over time. In 2005, 35.3 percent of the respondents said electricity was the country's biggest problem. After 2006, this problem seems to have been solved and other issues were raised. Economic problems[13] and unemployment have been in the top three concerns every year and have become a serious problem for people. Poverty numbers have not changed much, pointing to the fact that poverty is still a big concern. Roughly 10 percent of the respondents each year think poverty is Albania's most important problem.

Table 1.3 presents respondents' corruption perception on various private and public institutions and their representatives through the years. They ranked the institutions in a [1, 10] discrete scale where 1 refers to being ”very honest“ and 10 to being ”very corrupt“. Respondents think the most corrupt institutions are the Tax Collection Sector in general, Government Ministers, Doctors, Judges and University Professors. The least corrupt seem to be the President, Religious Leaders, the Military, Public School Teachers[14] and Media.

[12]In this question the answer is left to respondents' perception of their status.

[13]Respondents were not given options for this question so interpretations of economic problems could be many and it may very well include unemployment.

[14]These are teachers in the pre-university level starting from elementary school up to high school.

1.5 Empirical Strategy and Results

The theoretical model suggests a few ways on how the share of population that enters into a bribe agreement (after being randomly matched) can decrease. However, enforcement increases (fines/punishment or probability of getting caught) paired with changes in quality of services can give different results theoretically. Thus there is a need to assess this question empirically. Assessing the economic effects of corruption, the effectiveness of enforcement mechanisms, or the success of anti-corruption efforts in general, can create a few problems. First, hard data on corrupt activities and transactions are non-existent in most cases, since corruption is an illegal activity. Second, policy variables such as law enforcement are not exogenously determined and they suffer from endogenous placement usually. Their endogeneity presents an identification problem. Despite these major difficulties, there exist answers to questions on people's direct or indirect experience with corruption, their perception on how effective the government is in fighting corruption. Moreover, in recent years economists have made great progress by trying to find innovative ways to measure corruption like Reinikka and Svensson [42] or Ferraz and Finan [19] and see its effects in a case by case basis.

This study adds to the current within-country corruption studies by looking at the Albanian case in the 2005-2010 period. I construct a victimization index comprised of 9 binary [0,1] questions on direct experience with corruption[15] based on the Albanian

[15] 1) Did any police official ask you to pay a bribe during the last year? 2) During the last year, did any public official ask you for a bribe? 3) During the last year, to process any kind of document (like a business license), did you have to pay any money higher than prescribed by the law? 4) In order to obtain your current job; did you have to pay a bribe? 5) During the last year, did you deal with the courts? If yes, did you have to pay any bribe at the courts during the last year? 6) Did you use the public State Health Services during the last year? If yes, to be served at the State Health Service during the last year, did you have to pay any money aside of what was indicated in the receipt? 7) Did you have to pay the doctor or nurse any additional monies beyond those specified in the bill or receipt? 8)

data for several sectors. Table 1.4 shows the distribution of bribes by sector for the 9 questions that comprise the victimization index. It aslo shows the percentage of respondents that pay at least one bribe which varies from 56.5 percent o 64.6 percent of respondents through the years.

Table 1.5 shows the mean victimization through the years ranging from zero to nine. The number of ways in which people are being victimized is decreasing overall although in the most recent years a slight increase is observed. This is used as a dependent variable throughout the paper. To test the impact of increased enforcement on bribery level changes one would need very good data on enforcement. In case good measures of enforcement exist, to test the impact of law enforcement on the victimization index one could use the following model:

$$VIC_{ijt} = \alpha_1 + \beta_{1j} + \gamma_{1t} + \delta E_{ijt} + \psi X_{it} + \epsilon_{ijt} \tag{1.10}$$

where VIC_{it} denotes the victimization index for individual i in cross-section t and district j, E_{ijt} the level of law enforcement for individual i in cross-section t and district j, β_{1j} denotes district fixed effects, γ_{1t} denotes year fixed effects and X_{it} additional covariates which include Income, Ideology, Education and Occupation.

In the above specification, potential endogeneity problems exist. In the simplest setting, considering one sector and one location and only considering the temporal variation, there could be other factors that can cause corruption to go down and enforcement to go up simultaneously. One scenario might be that while facing a budget crisis, the government increased the fines/punishment on corruption cases to increase the revenue accrued. Nevertheless, this doesn't seem plausible as the government intake of funds from prosecuting low level corruption cases (which is the focus of this

Did any of your children go to school during the last year? If yes, at the school, did they ask for any payment besides the established fees? 9) Did someone ask you for a bribe to avoid or reduce the payment of electricity, telephone, or water? Seligson [50] also constructs a similar index.

study) seems negligible and there is no clear information that happened. Another possible scenario might be that with more economic growth there are more funds to be channeled to enforcement and policing which could in turn reduce bribery frequency. Looking at the problem through different sectors and regions there are other problems that could surface. For instance, in case districts with low level of enforcement are compared with those with high level of enforcement, this would lead to biased estimates. There could be an endogenous placement story suggesting that places where corruption is high have more enforcement, hence there exists an issue of misidentification. A few potential candidates that can be used as proxies for law enforcement are discussed below.

1.5.1 Enforcement Variables

The first proxy used for enforcement is respondents' answer to the question: "Do you know of any judge who has been sanctioned for not fulfilling his job correctly?". The answer is just a binary yes or no response. This variable can present endogeneity problems since those people who say that they know of judges being sanctioned might be also more exposed to bribery on average than people who respond no to the question. The second proxy is respondent's awareness of anti-corruption initiatives. The answer again is designed in a binary yes or no format and this variable also like any other proxy is not immune to problems of endogeneity as more aware people are maybe also more exposed or more educated. These proxies present difficulties in identifying the causal effect of enforcement on the victimization index. However, two important events occurred in 2007. First, the Parliament changed the federal law and increased the fine (incarceration time) for misuse of public office in February. Second, local elections were held in May. I exploit these two changes to solve the potential endogeneity problems in the above mentioned proxies.

1.5.2 District Variation and Fine increase

The fine increase in the anti-corruption law occurred in February 2007. This was an increase in the federal fine in one of the main laws against misuse or abuse of public office. The punishment for misuse of public office before the change was incarceration from 6 months to 5 years and up to $10,000 fine[16]. The amendment of the law increased the incarceration time to "up to 7 years" and it was made specific that this is the fine in case the abuse of public office is not causing any other criminal offense. In case other laws are broken, the punishment could be much higher. Given that the increase in the fine was federal, identifying its effect on the victimization index (number of bribery occurrences) could be challenging. Suppose that higher fines are correlated with lower levels of victimization. The endogeneity story implies that a decrease in victimization causes fines to increase because of a simultaneity problem. However, this story doesn't seem plausible.

I explore the variation of enforcement between left-governed districts and right-governed districts when the fine increases. Left-governed districts are those districts where the left coalition led by the Socialist Party (SP) won local elections and right-governed districts refers to districts where the right coalition led by the Democratic Party (DP) won.[17] Specifically, I compare districts that were governed by the left and remained such after the local elections with right districts before and after the elections. These districts are left and right strongholds and they will be affected systematically differently from the fine increase. There are several reasons why the left districts enforce more than the right districts. First, while the right (DP) controls

[16]In Albania, mean monthly income was $264 in 2010 according to the Albanian Institute of Statistics.

[17]It should be noted that he same political parties compete in the central and local elections and these two parties are the main ones that have been in power in 22 years of democracy after communism.

the Central Government, districts that are governed by the left locally have incentives to enforce more, as more enforcement is a way to show their disagreement against the central government. In fact there have been cases of this type of friction between local and central governments. During this period, the leader of SP, Edi Rama was also Mayor of Tirana, the capital city. There have been many documented clashes between him as Mayor and the central government on many local projects.[18] Second, political platforms of the party governing the district can influence the level of enforcement. The left Socialist Party has a generally more pro-poor platform than the right. For example, the left favors a progressive tax[19] as compared to the flat tax Albania had during this period instituted by the right.

In order to check whether corruption is a bigger problem for poor people, I refer back to Table 1.2, at those people that say corruption is Albania's most important problem to deal with, and see how they are distributed by income. Figure 1.4 shows that corruption seems to be a problem predominantly for poorer and middle income people.[20] The biggest share of people, 42.2 percent of those that think corruption is Albania's biggest problem, fall into category four, with a household income of 20,001-50,000 Lek or approximately $200-500. It then becomes less of a problem as people get richer. As a result, this suggests that the left as more liberal and with more pro-poor policies, will take the new law in place and enforce much more, whereas in right strongholds the new increase in fine will not have any substantial changing effect.

[18]The Prime Minister said he will block Tirana's city center development project led by the Mayor of Tirana, leader of the opposition at the time. `http://www.gazeta55.al/gazeta/02.04.2010.pdf`

[19]It is often referred to as "honest taxation" by them `http://www.ps.al/programi/`.

[20]0 - No Income; 1 - Less than 10,000; 2 - 10,001-15,000; 3 - 15,001-20,000; 4 - 20,001-50,000; 5 - 50,001-80,000; 6 - 80,001-100,000; 7 - 100,001-150,000; 8 - 150,001-200,000; 9 - 200,001-300,000; 10 - More than 300,000.

Figure 1.5 shows ideological distribution of individuals who claim corruption is Albania's main problem. It shows that the majority of people that think corruption is a big problem are left leaning. Given that those who answer 1-5 are left leaning people and those whose answer is 6-10 are right leaning people, 63,1 percent of people that say corruption is Albania's bigger problem lean to the left. Figures 1.4 and 1.5 provide some intuition of the results that come next.

1.5.3 Judges' Sanctions as Proxy for Enforcement

Table 1.6 illustrates the identification strategy. It displays means of enforcement(Judges' sanctions) and victimization for districts that are governed by left or right both before and after the fine increase in 2007. In columns 1-3, right districts seem to enforce more initially but once the new law is introduced, left districts double their enforcement. The difference in these differences can be interpreted as the casual effect of the increase in the fine. This works under the assumption that in the absence of the new law, enforcement trends would not have been different in left and right-governed districts.

The judges' sanctions proxy has a mean of 0.108 and standard deviation of 0.311 before the new law came in place. This means that before the increase in fine, on average 10.8 percent of people said they were aware of judges being sanctioned. According to Table 1.6, districts governed by the left see an increase in enforcement on average of 6.3 percentage points more after the fine increase, which is an increase of roughly 58 percent on the mean enforcement level of pre-fine increase.

Columns 4-6 show the effect of increased enforcement on the victimization index. The victimization index ranges from 0-9 and has a mean of 1.3 and standard deviation of 1.424 before the increase in the fine. Individuals were victimized (were asked to pay bribes, or did in fact pay bribes) in 1.3 ways out of 9 possible ways before the increase in the fine. Table 1.6 shows that people in left districts after the increase in the fine were victimized in 0.074 ways less. This corresponds to a 5.7 percent drop in victimization. The Wald estimate of the effect of enforcement to victimization is the ratio of these two estimates (0.063/(-0.074)). The difference in difference estimator is significantly different from zero for enforcement and it is not for victimization. The remainder of the paper extends on this strategy to produce compelling results.

The identification strategy could be implemented in a regression setting by exploiting variation in left and right districts with time variation before and after the fine increase. If the fine increase leads to the left enforcing more, that would suggest running a regression similar to Equation 1.11:

$$E_{ijt} = \alpha_1 + \beta_{1j} + \gamma_{1t} + \delta Post_t * Left_j + \psi X_{it} + +\epsilon_{ijt} \quad (1.11)$$

where E_{ijt} is a binary variable showing enforcement levels[21] for person i in district j at time t, β_{1j} incorporates district fixed effects, γ_{1t} denotes year fixed effects, X_{it} includes individual characteristics, $Post_t$ is a dummy variable equal to 1 after the fine increase and $Left_j$ is a dummy equal to 1 for districts that are left strongholds before and after the elections. $Post_t * Left_j$ is the variable of interest which shows the effect of the increase in fine on enforcement levels. Table 1.7 (columns 1-3) shows results of estimating equation 1.11. The variable of interest is $Post * Left$ which is significant in all specifications and positive. Enforcement levels increase by 50.9 percent (0.055/0.108) in left districts after the fine increase.

The same identification strategy could be applied to find the effect of the fine increase on victimization estimating this equation:

$$VIC_{ijt} = \alpha_1 + \beta_{1j} + \gamma_{1t} + \delta Post_t * Left_j + \psi X_{it} + +\epsilon_{ijt} \quad (1.12)$$

[21] I use as a proxy, individual's answer to the question: Do you know of any judge who has been sanctioned for not fulfilling his job correctly?.

where VIC_{ijt} is the victimization of person i in district j in period t. Columns 4-6 in Table 1.7 show that victimization drops by 0.29 units in left governed districts after the fine increase. This corresponds to a 22.3 percent drop in victimization since the average before the increase in the fine was 1.3.

All the estimations rest on the parallel trend assumption, that in the absence of the fine increase, bribery (measured by victimization) trend evolution would not have been different between left and right-governed districts. If on the other hand we assume that the increase in the fine had no effect on victimization other than through enforcement, then we can instrument for enforcement and use a 2SLS regression to estimate the impact of enforcement on victimization. If we estimate an equation like 1.10 estimates may be biased if there is a correlation between enforcement and the errors. As a result, I instrument for enforcement with the interaction term $Post_t * Left_j$. Table 1.8 shows 2SLS estimations. Results show that when enforcement level goes from 0 to 1 (proxied as before with the respondents' answer on judges being sanctioned), victimization drops by 2.88 units out of 9 ways in which people get victimized through bribery. Since enforcement doesn't go up from zero to one, but from 0.108 to 0.171, victimization drops by 0.18 units (2.88*0.063) or 13.8 percent.

1.5.4 Awareness on Anti-Corruption as Proxy for Enforcement

I use below the respondents' awareness on anti-corruption initiatives, instead of using judges' sanctions as a proxy for enforcement to see if the results hold. Awareness has a mean of 0.396 (39.6 percent of people surveyed say they are aware of anti corruption initiatives) and standard deviation of 0.489. Table 1.9 shows first stage regression results where in left districts after the fine increase, enforcement goes up by 0.22 units in column 3, which corresponds to a 55.5 percent increase(0.22/0.396). In the same way as before we can instrument for Enforcement with the interaction term $Post_t * Left_j$. Table 1.10 shows $2SLS$ results. When respondents' answer goes from 0 to 1, victimization drops by 1.59 units out of 9 ways in which people can get victimized by paying a bribe or by 34.9 percent (0.22*1.59).

1.5.5 Quality of Services

Theory suggests that when enforcement increases, quality of services could increase or decrease. Getting a certificate might have taken two hours when customers were paying bribes before the increased enforcement, but it might take them six hours after the increase in enforcement because of longer lines or other similar reasons. On the other hand, before enforcement went up, public officials might have made people wait a long time to extract the bribe from them. After enforcement increases, there is no point anymore in prolonging procedures. Table 1.11 shows reduced form regressions of the impact of increased enforcement on several variables linked to quality of services. The same identification strategy is followed. Respondents were asked how they were treated by the Police, at the Courts, Prosecutor's office and Municipalities. Their answer varied from 1-4 discretely with four being the best treatment. People were treated more poorly and quality of services decreased slightly in left districts. For instance, the courts got in 2006 an average score of 2.43 and after the fine increase average treatment of people by the courts dropped by 0.17 units or 6.9 percent respectively.

1.6 Robustness Checks

In this section a few robustness checks will be performed to understand the results better and to test whether they come from being a left stronghold or mainly form changes through elections. In tables 1.12 through 1.15, "the treatment" group is now considered to be those districts that shifted in the local elections from Right to Left. All the other districts will be part of the control group. Results have the same sign and are significant. In tables 1.16 through 1.19, I compare districts that end up left after the elections with districts that end up right. Results are consistent even in this case.

1.7 Conclusion

This paper addresses the impact of increased law enforcement on the number of bribes in the public service delivery sector. I model the flow of events in the consumer - public official relationship. Once people are matched randomly with public officials there exists a bribe level that can be beneficial to both parties. By defining the share of population that gets involved in a bribe agreement, I show theoretically how law enforcement should impact the level of bribery. Theory suggests that as enforcement increases bribery occurrence can increase or decrease. To look at this empirically, I study the effect of a fine increase on corrupt behavior on the victimization index. I instrument imperfect and endogenous measures of enforcement like judges sanctions or awareness of anti-corruption initiatives with the interaction of the post treatment dummy with left stronghold local governments.

An increase in enforcement reduces bribery frequency significantly. Results are robust to different variations of left and right governed districts. However, quality of services decreases during this time and some institutions treat people worse.

1.8 Figures

Figure 1.1: Albania's Governance Ranking

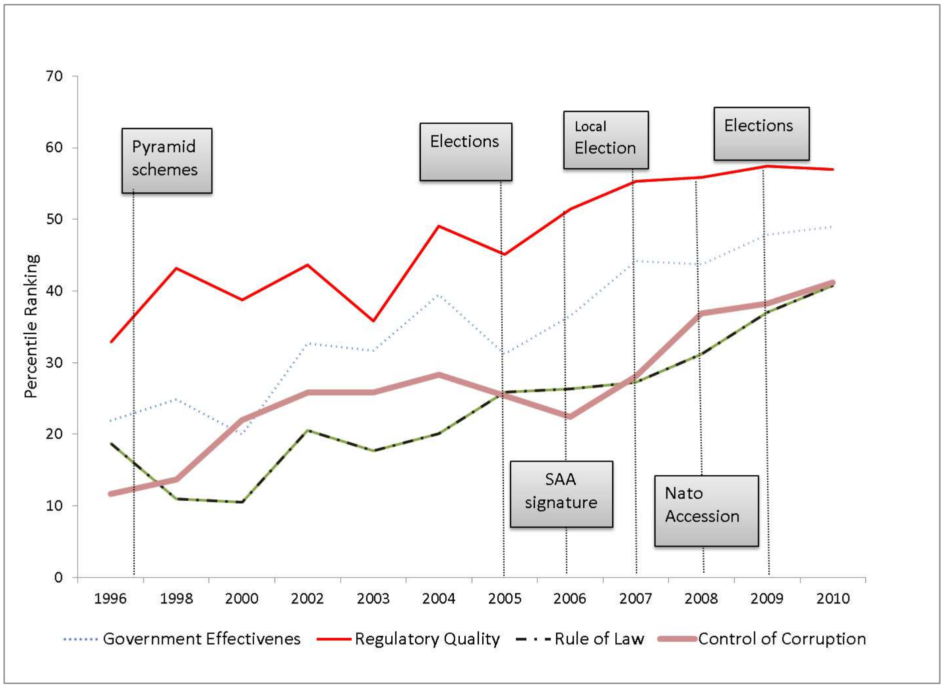


Figure 1.2: Set of Combinations where Bribes take Place

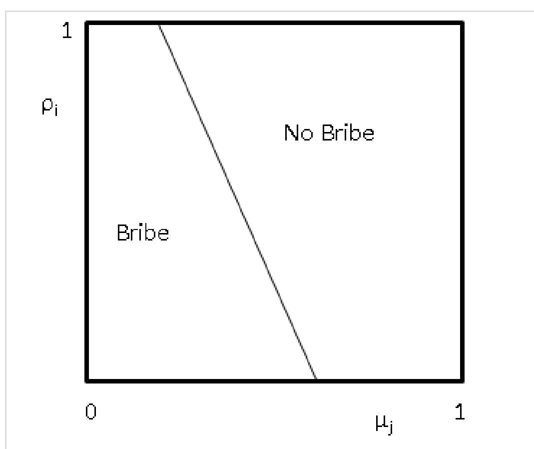


Figure 1.3: Increase in Law Enforcement

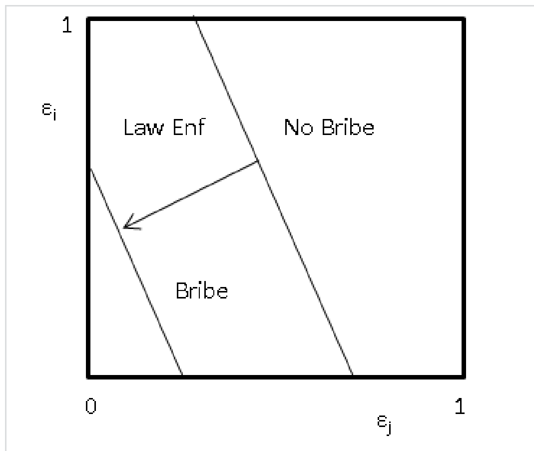


Figure 1.4: Corruption a Bigger Concern for the Poor?

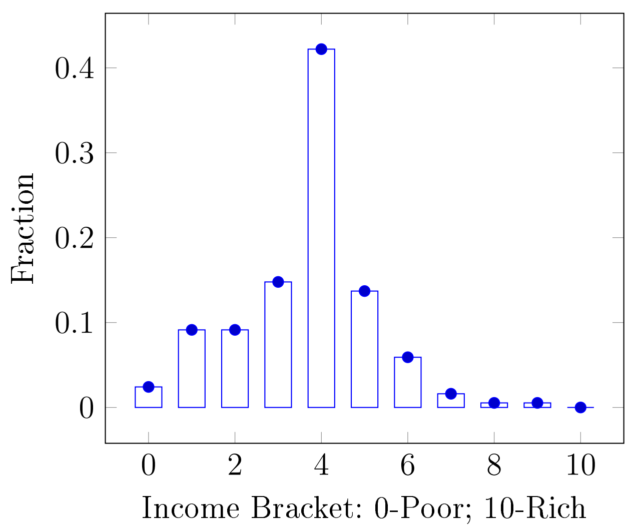
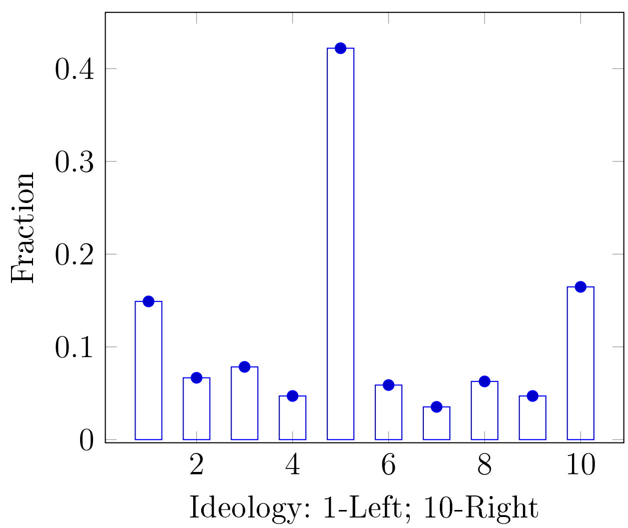


Figure 1.5: Corruption a Bigger Concern for the Left Supporters?



1.9 Tables

Table 1.1: Descriptive Statistics

	Dec-05		Dec-06		Feb-08		Feb-09		Feb-10	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Age	41.81	15.39	41.20	15.80	41.22	15.32	41.11	15.15	42.04	15.73
Monthly Family Income	3.43	1.92	3.18	1.51	3.45	1.44	3.48	1.55	3.39	1.62
Ideology	5.56	3.09	5.43	2.68	5.39	2.63	4.96	2.76	5.26	3.00
Female (pct)	52.17		52.17		51.87		49.08		53.55	
No School at all (pct)	0.67		1.17		1.96		0.34		0.24	
Elementary 4 Years (pct)	4.20		5.18		5.01		3.43		3.26	
Elementary 8 Years (pct)	23.17		29.88		27.55		27.72		27.23	
High School (pct)	47.44		47.91		49.32		45.90		50.88	
University (pct)	19.40		15.69		15.90		21.86		17.64	
Graduate Degree (pct)	5.12		0.17		0.26		0.75		0.75	
Full time employed (pct)	24.43		21.25		21.41		26.39		22.06	
Part time Employed (pct)	3.03		4.44		2.67		4.81		5.01	
Self-Employed (pct)	15.95		16.89		16.41		13.32		15.79	
Unemployed (pct)	23.26		25.00		26.66		26.05		21.64	
Housewife (pct)	7.05		7.08		9.20		7.00		9.86	
Retired (pct)	14.95		14.85		14.45		11.97		13.28	
Student (pct)	6.88		8.70		7.05		7.76		8.69	
Farmer (pct)	2.94		1.62		0.95		1.60		1.50	
Business owner (pct)	1.51		0.17		1.20		1.10		1.25	
Other (pct)									0.92	

Summary statistics for the general public survey are shown. Means and standard deviations are shown by year.

Table 1.2: Albania's main Problem

	Dec-05	Dec-06	Feb-08	Feb-09	Feb-10
Corruption (pct)	5.4	5.1	5.0	9.2	7.3
Economic Problems (pct)	17.4	21.6	31.9	35.1	36.8
Electricity (pct)	35.3	22.8	2.64	0	0.92
Inflation (pct)	0.5	0.83	7.8	5.2	2.17
Political Stability (pct)	1.5	1.17	0.68	0.67	5.8
Poverty (pct)	10.3	7.3	11.4	11.7	12.4
Unemployment (pct)	16.5	25.7	32.0	25.2	27.4
Other (pct)	13.1	15.6	8.6	12.9	7.4

This table displays the percentage of respondents that mentioned these topics as Albania's biggest challenge.

Table 1.3: Corruption Perceptions

	Dec-05 Mean	Dec-06 Mean	Feb-08 Mean	Feb-09 Mean	Feb-10 Mean
The President	2.89	3.78	4.31	4.07	3.74
Parliamentarians	7.45	7.53	8.01	7.98	7.71
Ministers	7.41	7.41	7.99	8.10	7.73
Mayors	6.80	6.97	7.17	7.05	7.25
Leaders of Political Parties	7.23	7.52	7.72	7.45	7.64
Politicians Average	6.40	6.69	7.03	6.98	6.79
Judges	7.46	7.72	7.72	7.71	7.69
Prosecutors	7.46	7.60	7.83	7.75	7.80
Judicial Sector Average	7.47	7.65	7.77	7.72	7.74
Professors	7.11	7.21	7.22	6.71	7.42
Public School Teachers	4.80	4.95	4.77	4.88	5.15
Education Sector Average	5.93	6.06	5.96	5.72	6.25
Customs Officials	8.83	8.69	8.62	8.59	8.56
Tax Officials	8.48	8.33	8.05	8.28	8.28
Tax Collection Sector Average	8.65	8.51	8.33	8.43	8.41
Policemen	6.97	6.35	6.47	6.68	6.95
Military	3.84	4.19	4.19	4.53	4.07
Doctors	8.21	8.17	8.07	7.94	8.15
Business People	6.14	6.15	5.99	6.23	6.07
Leaders of NGOs	4.92	5.14	4.85	5.20	5.23
Media	4.39	4.78	4.20	4.42	4.78
Religious Leaders	3.51	3.83	3.42	3.44	3.70
Observations	1200	1200	1176	1194	1197

Mean corruption peception indices are shown for the main political actors and institutions in Albania. They are rated on a 1 to 10 scale, where 1 refers to being "very honest" and 10 "very corrupt".

Table 1.4: Percentage Distribution of Bribe-Payers by Type of Bribe

	Dec-05	Dec-06	Feb-08	Feb-09	Feb-10
Respondents who pay at least 1 Bribe (pct)	64.6	56.7	57.7	55.3	56.5
Police (pct)	19.0	15.9	18.0	14.1	14.5
Public Official (pct)	18.8	15.0	18.6	10.9	15.2
Process Documents (pct)	45.5	34.0	44.2	33.0	34.9
Obtain Job (pct)	3.4	1.5	3.8	3.4	8.0
Court (pct)	5.0	4.6	5.2	4.8	4.0
Bribe for Medical Care (pct)	64.5	68.1	66.9	65.5	54.4
Nurse or Doctor (pct)	61.4	60.0	66.9	69.7	65.5
School System (pct)	20.5	19.0	12.2	7.0	16.9
Electricity or Water (pct)	11.5	11.5	13.0	9.2	9.6

This table shows distribution of bribes by type for those people that paid at least one type of bribe.

Table 1.5: Mean Victimization

	Mean	sd	Min	Max
2005	1.613	1.623	0	9
2006	1.300	1.424	0	9
2008	1.065	1.222	0	9
2009	1.204	1.344	0	9
2010	1.226	1.381	0	9

Note: Mean victimization levels for respondents through the years. It refers to questions about their direct experience with corruption. Constructed by the author by adding the number of ways individuals are victimized.

Table 1.6: Means of Enforcement and Victimization by District

	Enforcement (Judges' Sanctions)			Victimization		
	Left (1)	Right (2)	Difference (3)	Left (4)	Right (5)	Difference (6)
Before	0.103 (0.0991)	0.127 (0.0210)	-0.025 (0.0220)	1.324 (0.0465)	1.210 (0.0878)	0.114 (0.1009)
After	0.210 (0.0080)	0.172 (0.0123)	0.038 (0.0152)	1.176 (0.02550)	1.136 (0.0440)	0.040 (0.0500)
Difference	0.108 (0.0145)	0.045 (0.0262)	0.063 (0.0305)	-0.148 (0.0507)	-0.074 (0.0860)	-0.074 (0.1082)

Note: Standard errors are in parentheses.

Table 1.7: First Stage and Reduced Form, Judges' Sanctions

	Dependent Variable					
	Judges' Sanctions			Victimization		
	(1)	(2)	(3)	(4)	(5)	(6)
Ideology	-0.0022	-0.0019	-0.0019	-0.040***	-0.038***	-0.037***
	(0.0026)	(0.0025)	(0.0025)	(0.0091)	(0.0091)	(0.0091)
Education	0.029***	0.029***	0.026***			
	(0.0085)	(0.0085)	(0.0084)			
Post*Left	0.064***	0.11***	0.055**	0.0016	-0.18***	-0.29***
	(0.014)	(0.016)	(0.035)	(0.050)	(0.060)	(0.091)
Constant	0.080***	-0.063**	-0.077*	1.45***	1.42***	1.35***
	(0.030)	(0.032)	(0.045)	(0.068)	(0.078)	(0.083)
Year Fixed Effects	No	No	Yes	No	No	Yes
District Fixed Effects	No	Yes	Yes	No	Yes	Yes
Observations	2982	2982	2982	3029	3029	3029

Note: Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.8: 2SLS, Judges' Sanctions

	Dependent Variable	
	Victimization	
	(1)	(2)
Judges' Sanctions	-2.88*	-1.57**
	(1.66)	(0.77)
Constant	1.72***	1.90***
	(0.17)	(0.34)
Control Variables	No	Yes
Year Fixed Effects	Yes	Yes
District Fixed Effects	Yes	Yes
Observations	3255	2854

Note: Controls include income, fixed effects, Ideology, Education and Occupation. Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.9: First Stage, Awareness

	Dependent Variable		
	Awareness		
	(1)	(2)	(3)
Ideology	0.0099**	.0121***	0.0096**
	(0.0047)	(.0029)	(0.0047)
Education	0.11***	0.11***	0.11***
	(0.015)	(0.014)	(0.015)
Post*Left	0.013	0.046*	0.22***
	(0.026)	(0.027)	(0.056)
Constant	0.093*	0.20***	-0.45***
	(0.050)	(0.045)	(0.13)
Year Fixed Effects	No	No	Yes
District Fixed Effects	No	Yes	Yes
Observations	1516	1650	1516

Note: Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.10: 2SLS, Awareness

	Dependent Variable	
	Victimization	
	(1)	(2)
Awareness	-1.59*	-1.58*
	(0.91)	(0.84)
Constant	2.12***	1.52***
	(0.48)	(0.29)
Control Variables	No	Yes
Year Fixed Effects	Yes	Yes
District Fixed Effects	Yes	Yes
Observations	1651	1650

Note: Controls include income, fixed effects, Ideology, Education and Occupation. Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.11: General Public Treatment

	Dependent Variable			
	Police	Courts	Prosecutor's Office	Municipality
	(1)	(2)	(3)	(4)
Ideology	0.032***	0.026**	0.028*	0.0058
	(0.0097)	(0.012)	(0.015)	(0.0063)
Post*Left	-0.063	-0.17**	-0.29**	-0.084**
	(0.093)	(0.079)	(0.14)	(0.042)
Year Fixed Effects	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Observations	785	492	346	1357

Note: Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.12: First Stage and Reduced Form, Judges'Sanctions

	Dependent Variable					
	Judges' Sanctions			Victimization		
	(1)	(2)	(3)	(4)	(5)	(6)
Ideology	-0.0024	-0.0023	-0.0019	-0.027***	-0.037***	-0.036***
	(0.0022)	(0.0021)	(0.0021)	(0.0070)	(0.0074)	(0.0074)
Education	0.024***	0.024***	0.020***			
	(0.0071)	(0.0071)	(0.0070)			
Post*Left	-0.0086	0.093***	-0.0099	-0.20***	-0.30***	-0.24**
	(0.018)	(0.025)	(0.029)	(0.058)	(0.089)	(0.092)
Constant	0.13***	-0.046*	-0.17***	1.46***	1.35***	1.43***
	(0.024)	(0.026)	(0.031)	(0.043)	(0.055)	(0.067)
Year Fixed Effects	No	No	Yes	No	No	Yes
District Fixed Effects	No	Yes	Yes	No	Yes	Yes
Observations	4322	4322	4322	5505	4382	4382

Note: Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.13: 2SLS, Judges' Sanctions

	Dependent Variable	
	Victimization	
	(1)	(2)
Judges' Sanctions	-3.22*	-2.83*
	(1.86)	(1.64)
Constant	1.61***	1.50***
	(0.31)	(0.27)
Control Variables	No	Yes
Year Fixed Effects	Yes	Yes
District Fixed Effects	Yes	Yes
Observations	4703	4702

Note: Controls include income, fixed effects, Ideology, Education and Occupation. Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.14: First Stage, Awareness

	Dependent Variable		
	Awareness		
	(1)	(2)	(3)
Ideology	0.0088**	0.0083**	0.0083**
	(0.0039)	(0.0039)	(0.0039)
Education	0.12***	0.11***	0.11***
	(0.012)	(0.012)	(0.012)
Post*Left	-0.038	0.13***	0.15***
	(0.037)	(0.046)	(0.052)
Constant	0.047	0.067	0.047
	(0.039)	(0.14)	(0.15)
Year Fixed Effects	No	No	Yes
District Fixed Effects	No	Yes	Yes
Observations	2168	2168	2168

Note: Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.15: 2SLS, Awareness

	Dependent Variable	
	Victimization	
	(1)	(2)
Awareness	-2.83	-2.80**
	(1.74)	(1.41)
Constant	2.77***	2.06***
	(0.81)	(0.34)
Control Variables	No	Yes
Year Fixed Effects	Yes	Yes
District Fixed Effects	Yes	Yes
Observations	2339	2077

Note: Controls include income, fixed effects, Ideology, Education and Occupation. Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.16: First Stage and Reduced Form, Judges'Sanctions

	Dependent Variable					
	Judges' Sanctions			Victimization		
	(1)	(2)	(3)	(4)	(5)	(6)
Ideology	-0.0019	-0.0019	-0.0019	-0.028***	-0.037***	-0.036***
	(0.0021)	(0.0021)	(0.0021)	(0.0069)	(0.0074)	(0.0074)
Education	0.022***	0.022***	0.020***			
	(0.0071)	(0.0071)	(0.0070)			
Post*Left	0.075***	0.12***	0.052*	-0.25***	-0.22***	-0.24***
	(0.012)	(0.014)	(0.027)	(0.038)	(0.049)	(0.070)
Constant	0.090***	-0.17***	-0.10***	1.55***	1.40***	1.39***
	(0.024)	(0.028)	(0.038)	(0.046)	(0.058)	(0.067)
Year Fixed Effects	No	No	Yes	No	No	Yes
District Fixed Effects	No	Yes	Yes	No	Yes	Yes
Observations	4322	4322	4322	5505	4382	4382

Note: Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.17: 2SLS, Judges' Sanctions

	Dependent Variable	
	Victimization	
	(1)	(2)
Judges' Sanctions	-2.03*	-1.96*
	(1.16)	(1.14)
Constant	1.65***	1.54***
	(0.14)	(0.22)
Control Variables	No	Yes
Year Fixed Effects	Yes	Yes
District Fixed Effects	Yes	Yes
Observations	4703	4142

Note: Controls include Income fixed effects, Ideology and Occupation. Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.18: First Stage, Awareness of Anti-corruption Initiatives

	Dependent Variable		
	Awareness		
	(1)	(2)	(3)
Ideology	0.0089**	0.0082**	0.0078**
	(0.0039)	(0.0039)	(0.0039)
Education	0.12***	0.11***	0.11***
	(0.012)	(0.012)	(0.012)
Post*Left	0.043**	0.062***	0.21***
	(0.022)	(0.024)	(0.046)
Constant	0.028	0.066	-0.082
	(0.039)	(0.14)	(0.15)
Year Fixed Effects	No	No	Yes
District Fixed Effects	No	Yes	Yes
Observations	2168	2168	2168

Note: Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.19: 2SLS Results, Awareness

	Dependent Variable	
	Victimization	
	(1)	(2)
Awareness	-1.20**	-1.12*
	(0.57)	(0.59)
Constant	2.01***	1.72***
	(0.27)	(0.19)
Control Variables	No	Yes
Year Fixed Effects	Yes	Yes
District Fixed Effects	Yes	Yes
Observations	2339	2077

Note: Controls include income, fixed effects, Ideology, Education and Occupation. Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Chapter 2

The Costs of Financial Crises: A Sectoral Analysis

2.1 Introduction

This study uses value added data from 1970-2011 to estimate the costs of sovereign defaults, banking crises and exchange rate crises on agricultural, industry and services sectors. Crises have been a part of countries' history for at least eight centuries. Reinhart and Rogoff [41] report that sovereign default episodes have occurred in advanced economies as well as in emerging markets and developing countries throughout time. While defaults on sovereign debt have frequently occurred in emerging market economies (EM) over the past quarter of a century, banking and exchange rate crisis on the other hand have occurred consistently across all country groups. For example, in Table 2.1, Advanced Economies (AE), have experienced no debt crises in the 1970-2011 period, whereas banking and currency crises have occurred more frequently in all country groups, including emerging markets (EM) and other developing economies (OE).[1] The effects of these crises on sectoral value added are not homogeneous and vary across sectors and country groups. We find that the industrial sector is affected more by banking crises and the service sector is affected more severely by debt crises. Advanced economies experience larger losses in value added following a banking crisis as compared to emerging and developing economies. Value added in different sectors tends to recover more quickly following a currency crisis, suggesting an increase in

[1]Please see Appendix B for a list of countries and crises in each group.

competitiveness. Emerging markets and other developing economies usually suffer from low sectoral value added growth in the years prior to a debt crises. Empirical estimates of crises on growth of sectoral value added range between 4-16 percent.

Following the Great Recession of 2008 there have been numerous contributions to the theoretical and empirical literature on the causes of crises. This study does not deal with what causes the crises, but we focus instead on the costs of these crises to the real economy.[2] International contracts cannot be enforced across countries and as a result countries can be tempted to default or restructure to increase current consumption. However, the literature suggests that defaults are costly and international markets can penalize countries for years to come.[3][4] This paper follows the methodology of recent important empirical contributions on the costs of default and crises and tries to shed light on the pain that crises bring to different sectors of the economy. Investigating costs of crises on sectoral value added is interesting and useful in itself as there is information to be gained by dis-aggregating data. There are cases where one sector may face a recession, but the other can have positive growth, therefore not resulting in an economy wide recession. In fact as we will demonstrate, there are more sectoral value added recessions[5] than total GDP recession episodes. Sectoral data has recently been used in a few studies related to current account reversals (Craighead and Hineline

[2] The reader is strongly recommended to see Claessens and Kose [14] for an up to date survey about the causes and explanations of financial crises.

[3] In 2012, an Argentine ship was seized in West Africa following a ruling of an international court after investors complained following losses during 2001 default. We do not see this as a wide phenomena and sufficient to enforce international repayment of sovereign default. In June 2014, US Supreme Court ruled that Argentina could not repay selectively creditors with whom it had successfully negotiated haircuts, delaying yet again a full resolution to its 2001 default.

[4] Gelos et al. [25] show that countries are excluded from international capital markets for four years on average after default, whereas in Richmond and Dias [43], sovereign defaults cause an exit from international capital markets for about four years.

[5] We define a sectoral *recession* episode when value added output declines for at least one year.

15) or in investigating whether export-oriented industries are hurt more by sovereign defaults (Borensztein and Panizza 10). To the best of our knowledge, this is the first attempt to quantify the costs of different crises in sectoral value added of the economy.

Financial crises affect potential output in both direct and indirect ways. The direct channels[6] include but are not limited to an exclusion from international capital markets, a decrease in the level of investment often accompanied with raising the real cost of borrowing, and international trade effects.[7] Furthermore, financial crises affect the long-term level of output vicariously by leading to the implementation of fiscal policies and structural reforms. Furceri and Zdzienicka [22], using an unbalanced panel of 154 countries for the period from 1970 to 2008, show that debt crises episodes can lead to an average output loss of about 6-10 percent in the short run, whereas in the medium run estimated to be about 10 percent.

Furceri and Mourougane [21] look at the long-term outcomes of financial crises for a panel of 30 OECD countries for the period from 1960 to 2008 and find that potential output growth rate is reduced permanently by 1.5 percent to 2.4 percent on average 10 years after the occurrence of an episode. They also show evidence for the existence of a significant and permanent effect of crises on each of the three components of potential output. Capital experiences the largest decline by -1 percent, while the magnitude of potential employment falls by -0.7 percent and TFP even increases by 0.2 percent. Sturzenegger [51] estimates that the decline in output following a default is between 0.6 and 2.2 percent on average. Borensztein and Panizza [9] evaluate it to be about 1.2 percent per year, while De Paoli et al. [16] - 5 percent per year. On the other hand, Levy-Yeyati and Panizza [32] show that debt default episodes are,

[6] See Panizza et al. [37] for a survey on the costs of sovereign default.

[7] Rose [45] finds a significant reduction of about 8 percent per year in bilateral trade following the occurrence of a sovereign default

in fact, preceded by output contractions and followed by an expansion in the GDP growth rate.

In addition, debt crises can trigger banking and currency crises making output losses more severe (De Paoli et al. 16). Indeed, a series of papers from Claessens, Kose and Terrones (See Claessens et al. 13) have found that recessions that are associated with multiple types of crises are deeper and last longer. Taking these observations into consideration, we study the effects of banking crises and exchange rate crises as well as sovereign defaults following the methodology of the previous literature. We maintain that each type of crises will have a different effect on the real value added output growth of different sectors. Indeed, our results suggest that following a banking crisis, recessions[8] in the industrial sector last longer. More recently, Dell'Ariccia et al. [17] find that industries largely dependent on external financing, experience on average a 1 percent greater reduction in growth during crises. At the same time, we show that the service sector is hit harder following a debt crisis as compared to other types of crisis.

Next, we investigate employment cycles in each sector during the same time period. Crises affect the levels of unemployment by increasing uncertainty and risk premium. This can lead to an increase in the long-term structural unemployment via the hysteresis effect (Ball 4). Furceri et al. [23] find that financial crises lead to a 1 percent higher unemployment rate three years after a crisis and about 0.5 percent higher after the sixth year. We maintain that these effects are different for different sectors. Our results suggest that duration of employment drops is lowest in the service sector while the amplitude of employment drops are similar for the services and industry sectors, and lower than agriculture.

[8]This is consistent with previous findings that manufacturing sector is dependent on finance. A seminal paper is Rajan and Zingales [39]

The paper is organized as follows. Section 2.2 presents some stylized facts for the sectoral value added and employment in different sectors offering comparisons across country groups and crises. Section 2.3 discusses various data issues and presents an empirical framework to better capture the effects of these crises on sectoral value added. Section 2.4 presents conclusions and lays out directions for future research.

2.2 Sectoral Cycles: Basic Features

We use value added data for agriculture, industry and services from World Development Indicators for the period 1970-2011 to conduct our analysis. We follow a similar methodology to Claessens et al. [13] to construct sectoral *recessions*. We define a sectoral *recession* to be an episode during which output falls for at least one year. Duration of a sectoral *recession* constitutes the time period during which the value added in each sector decreases from peak to trough. Amplitude is the fall in value added for each sector from peak to trough. Table 2.2 gives a snapshot of the sectoral value added and output *recessions*. The table reports means of duration and amplitude of each sectoral *recession* and the number in parenthesis show standard deviations. GDP is reported in 2005 USD. Stars next to each figure show whether mean duration and amplitude of sectoral *recessions* in services and industry are statistically different from agriculture. Several interesting results can be observed from the tables. The table suggests that the drops in value added seem to have been less severe for services compared to agriculture and industry. Furthermore, the last row shows that the occurrences of these *recession* episodes in agriculture have been much higher than other sectors; 1070 for agriculture compared to 798 for industry 608 for services. At the same time, we see only 481 episodes of fall in output. This is not unusual as these sectoral *recessions* do not have to coincide with economy wide recessions (and in fact they don't in many cases), and one sector may rebound quicker than the others, increasing total output and ending the *recession*.

The fall in value added in agriculture sector is on average 14.9 percent. This decline is similar in industry at 14.9 percent, and followed by services at 11.8 percent. These numbers are on average higher than the decrease in total output, which is on average 8.5 percent. The *recessions* seem to have lasted on average 1.6 years or 19 months. We do not notice huge differences across sectors on duration and the average duration varies from close to 18 months in services to 21 months in agriculture. However crises duration in the service sector are significantly lower compared to agriculture. Results for agriculture and industry, although statistically different, are very similar. The standard errors are large in both sectors suggesting that in many cases these recessions may have lasted much longer than the average recession duration in the economy.

Table 2.3 is similar in style to Table 2.2 but it looks at employment cycles, instead of sectoral value added cycles. It records the drops in employment by sector (in the same way as for value added) and measures their amplitude and duration. Employment data for each sector is available in the WDI database but it has certain limitations. Most notably, employment data from WDI suffers from the lack of information on the informal sector. Especially for developing countries and emerging markets the lack of information on the informal sector may distort our estimates of the real effects of crises in these economies. Luckily, the Groningen Growth and Development Center database provides an alternative as it includes employment data from survey sources. We use this data to construct the employment series from 1970 to 2005.[9] The results show that the drop in employment is much less severe for the industry and services

[9]In its present form there is information for ten sectors of the economy, namely: agriculture, mining, manufacturing, construction, public utilities, retail and wholesale trade,

sector and more severe for agriculture. Mean amplitude for industry and services is 15.6 percent and 16 percent, while for agriculture is 26.5 percent. These results may be associated with structural changes in the economy where employees can move from agriculture to the industry or services sector. Duration of unemployment drops is similar for agriculture and industry (2 years vs. 21 months) but longer compared to services (18 months). It also appears that the occurrences of these employment *recession* episodes in agriculture and industry have been much higher compared to the service sector (176 and 182 for agriculture and industry respectively compared to 135 for services). However, these episodes occur less often than sectoral value added recessions suggesting that value added in each sector is much more volatile than employment.

Next, we turn to the effects of financial crises episodes and how they relate to sectoral *recessions*. To identify financial crises we use data on banking, currency and debt crises from Laeven and Valencia [30] - LV and Reinhart and Rogoff [41] - RR.[10] LV provide data on the starting date of crises episodes.[11] The data is collected from Beim and Calomiris [8], World Bank (2002), Sturzenegger and Zettelmeyer [52], and IMF Staff reports. The database spans the period from 1970-2012. RR provide data for each year that the country has been in crisis. The data are made available online by the authors and it covers the period from 1960 onwards. There are slight differences across the two sources on the dating of crises and the combination of the two may

transport and communication, finance and business services, other market services and government services. The sectors have been combined to represent the three sectors of agriculture, industry and services to make it consistent with the World Development Indicators sectoral division. The analysis above can be easily applied to more sectors of the economy by reporting employment and value added statistics for ten sectors.

[10]RR distinguish between domestic and external debt crises.

[11]It also includes the number of years of sovereign defaults to private lending plus years of debt rescheduling.

provide more information than a single source. Tables B.1-B.5 in Appendix B, provide more detailed information on crises and countries.

Value added output across sectors and across countries does not behave uniformly around crises episodes. Figures 2.1 and 2.2 show the evolution of sectoral value added and sovereign default episodes. Although these are both EM economies and Latin American countries , an initial look at the data suggests that there is variation across countries in how the value added in each sector reacts to sovereign default episodes. For example, in the case of Argentina, we see that the industrial sector has been affected more from the debt crises. Moreover, debt crises were accompanied by banking and exchange rate crises and it took longer for output to recover. In the case of Chile we see that value added for each sector increased sharply in each sector following sovereign default. A cursory look at Tables B.1-B.5 shows that banking crises had already happened in Chile by the time the country chose to default and around the same time there was also a sharp exchange rate devaluation. Devaluation and default, followed by a number of structural reforms, may have helped revive the economy in each sector. Figures 1.1-1.2 provide a good motivation to examine more carefully the real effects of each crises on different sectors of the economy.

As Figures 1.1-1.2 demonstrate, the drops in sectoral value added output do not necessarily correspond to crises. Table 2.4 looks at the amplitude and duration of sectoral *recessions* when any year during which the country is in recession coincides with a financial crisis as suggested by Laeven and Valencia [30] database. As expected, in most cases in Table 2.4 mean duration is longer and mean amplitude is larger when sectoral recessions are accompanied by crises. In some cases the difference between the Crisis and Non-Crisis events is statistically significant. For example, in the top panel, the amplitude in agriculture non-crisis events is lower and significantly different compared to events that are accompanied by a currency crisis. The industry sector is hit most by a banking crises where duration is over three years and the amplitude is larger compared to all other crises. These results are in line with previous literature including Claessens et al. [13] and Rajan and Zingales [39].

Next, we look at the behavior of value added around financial crises times across different country groups. We differentiate between advanced economies (AE), Emerging markets (EM) and other developing economies (OE). Table 2.5 shows that these effects do indeed vary across crises type and country groups. The top panel of Table 2.5 shows the median growth rate of sectoral value added for each country group one year before the crisis (first row) and one year after the crisis (second row). The last row in the top panel shows the change in growth of sectoral value added between growth rate one year after the crisis and one year before the crisis. For banking crises, the change is negative all the time except for Agriculture in the OE group. The results are consistent with all three sectors in each country group being dependent of finance. A banking crisis seems to be hitting each sector abruptly and the growth rate in sectoral value added declines following each crises. Another observation from the top panel of Table 2.5 is that AEs are hit harder then EM and OE following a banking crises. This is in line with Laeven and Valencia [30] and is probably a result of AE having a more developed financial system. At the same time EM are hit harder than OEs following a banking crises.

The middle and bottom panel of Table 2.5 show the same calculations for currency and debt crises, respectively. Remember from Table 2.1 that no debt crises have occurred in AEs since 1970s. The middle panel shows that in most cases the decline in sectoral value added growth following a currency crises is less severe than in the case of banking crises. We interpret this as evidence of the competitiveness effect through devaluation. The same pattern can be seen for debt crises in the agriculture and industry sectors. This is consistent with Marchesi and Prato [33] who examine the effects of debt default episodes on economic growth by using the investors'/creditors' losses (haircuts) as a proxy of the intensity of the default. While their findings confirm that default episodes are associated with a decline in output growth, the negative impact lasts only in the short run. In fact, their analysis shows a positive and significant correlation between the severity of the default and the increase in the level of GDP three years following its occurrence. Results are similar for sectoral value added growth two years before and after crises events. This story can also be seen in Figures 2.3 and 2.4 where we show value added growth for agriculture between two years before a crisis and two years after the event with year zero being the crisis year. In Figure 2.3 agricultural value added growth keeps decreasing even after the banking crisis hits, hinting to the fact that when a country defaults that is some kind of resolution to the crisis. On the other hand in Figure 2.4 agriculture value added growth is increasing as the debt crisis hits at year zero, showing that the sector has been hit before the start date of the crisis.

Figures 2.5 and 2.6 present employment growth for the industry sector in the years before and after a banking and a debt crisis. Again a similar trend can be seen, as in Figure 2.5 employment growth decreases after a banking crisis hits before recovering later, while in Figure 2.6 employment growth is decreasing before the crisis hits one to two years before year zero depending on the country group.[12]

2.3 Empirical Framework and Results

In this section we use regression analysis to quantify the effects of financial crises on sectoral value added. There is a vast literature on the determinants of economic growth both in the long term and in the short run. Our methodology is similar to Furceri and Zdzienicka [22] and consists of estimating sectoral output against a dummy variable

[12] Again, remember that there are no debt crises for advanced economies.

that is 1 when a crisis occurs and 0 otherwise, and a set of covariates affecting short term growth. The regression framework for each sector can be represented in a panel setting as follows:

$$va_{i,t} - va_{i,t-1} = \alpha_i + \beta D_{i,t} + \delta' X_{i,t} + \epsilon_{i,t} \tag{2.1}$$

where $va_{i,t}$ is the log of real sectoral value added for country i at time t (for one sector at a time), $D_{i,t}$ is a dummy variable that is 1 if a type of crisis occurred in country i at time t and 0 otherwise, α_i represents country fixed effects included to account for idiosyncratic growth trends among countries, $X_{i,t}$ comprises a set of variables that affect growth in the short-term, and β represents the marginal effect of crisis event on growth. The variables included in the vector X have been restricted to: trade openness (share of total exports and imports over GDP), (private) credit growth, real exchange rate growth, population growth, and the initial (lagged) level of value added. To minimize potential omitted variable bias we include two lags of real sectoral value added growth in the regressions. We are interested on the effects of the crises on the short run value added growth of each sector and in doing so we are following the same methodology as in Furceri and Zdzienicka [22]. A paper that looks at the long run effects of crises is Borensztein and Panizza [9]. To address potential endogeneity and reverse causality and other concerns embedded in the panel setting like heteroscedasticity and serial correlation, equation 2.1 has been estimated using the Arellano-Bond GMM estimator. Following Roodman [44], we use lags 1-2 of the left and right hand side variables as moment GMM instruments. The two-step GMM estimator uses Windmeijer standard errors.

Results are displayed on Tables 2.6 - 2.12 for each type of crisis. For each crisis we report regression results using two sources: Leaven and Valencia dataset – LV and Reinhart and Rogoff dataset – RR. All regressions include controls such as growth of trade, exchange rate growth, population growth and two lags for sectoral output level. There are two specifications for each sectoral regression: one with a one-year lag of the crisis dummy (variable is equal to 1 in the year preceding the crisis) and the other without the crisis lag.

Tables 2.6 - 2.7 display the effect of banking crises on sectoral output growth through the two sources used. The variable of interest is $Crisis_t$. Results are negative and significant for the industry and services sectors but they are insignificant for agriculture output growth. Industry is the most affected sector from banking crises since it might be more dependent on financing than other sectors of the economy. $Crisis_{t-1}$ is not significant except for the services sector with the LV database.

Tables 2.8 - 2.9 show the effect of currency crises on value added growth. Results are significant and negative (as expected) across all specifications for the LV database. The one-year lag on the crisis dummy is insignificant. Industry and agriculture have a greater negative shock as a result of the currency crises as compared to services.

Tables 2.10 - 2.12 show results referring to debt crises. Results here are split between three tables because RR database records debt crises into two categories: domestic debt crises and external debt crises. Domestic debt crisis seem to have no significant effect on sectoral output growth. Debt crises affect negatively the services sector and in greater magnitude compared to other sectors, although other sector effects are not significant for the LV database. When using the RR database effects are negative and significant for services and agriculture. They are however bigger in magnitude for services compared to agriculture. Overall, the magnitude of the effect of crises fluctuates between 4-16 percent of output growth.

It is interesting to not only look at the effects of crises on different sectoral output, but also to compare the effects of different crises for the same sector. For example, it can be seen that agriculture is affected more by currency crises than others. Industry seems to be hit the hardest from banking crises and services are affected more by debt crises. The rest of the results seem intuitive. If a country is more open, it will experience more output growth. Same positive results hold for controls like population growth and credit growth in line also with the GDP growth literature.

2.4 Conclusion

This paper investigates the impact of sovereign debt, banking and exchange rate crises on sectoral value added output for a large group of countries. The findings suggest that the effects of crises on sectoral value added are negative and significant across all sectors and they vary between 4-16 percent of sectoral value added output growth. We confirm the findings of the previous literature that the industrial sector is affected more by banking crises, while the service sector is affected more severely by external debt crises. Employment drops on the other hand are more severe and last longer in agriculture compared to the services and industry sector.

We believe that the analysis in this paper is important to the growth literature for two reasons. First, it provides estimates of the effect of the crises on sectoral value added. Second, it offers a way to look at the effects of financial crises on structural change. Following the influential work of McMillan and Rodrik [35], many authors have focused on the role of structural change on the growth success stories of East Asian economies. Evidence has shown that countries that have concentrated their efforts in the export and industrial sector have been better able to maintain long term economic growth. Still, there is little understanding as to what drives the structural change and most authors think of these efforts as choices made by governments in specific countries. While there is some anecdotal evidence of that for countries like China and South Korea, we maintain and explore the hypothesis that different crises will jump start structural changes that will have huge effects on the long term growth of countries. This remains an avenue for future research.

2.5 Figures

Figure 2.1: Sovereign Debt Crises and Sectoral Value Added: Argentina

Figure 2.2: Sovereign Debt Crises and Sectoral Value Added: Chile

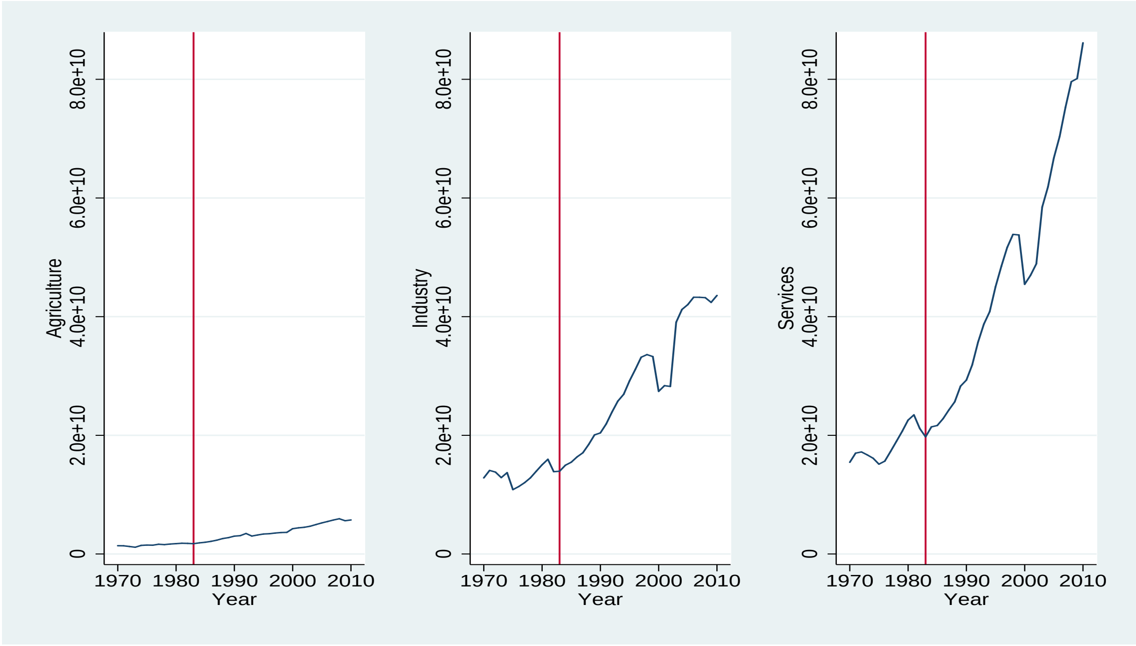


Figure 2.3: Agriculture Banking

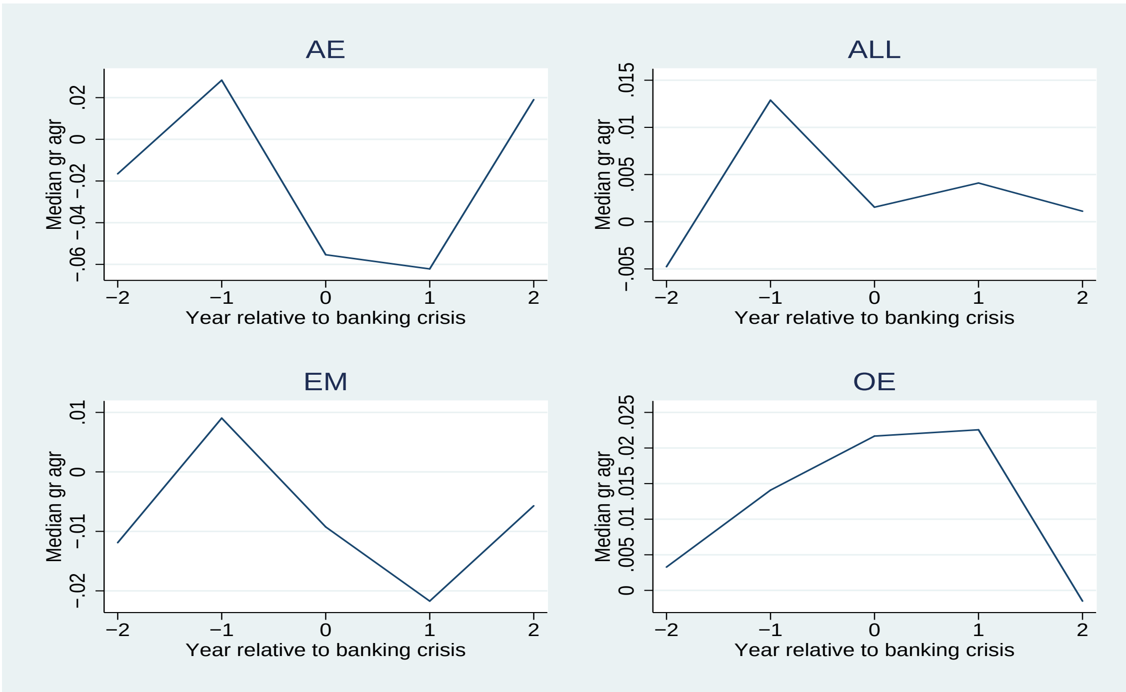


Figure 2.4: Agriculture Debt

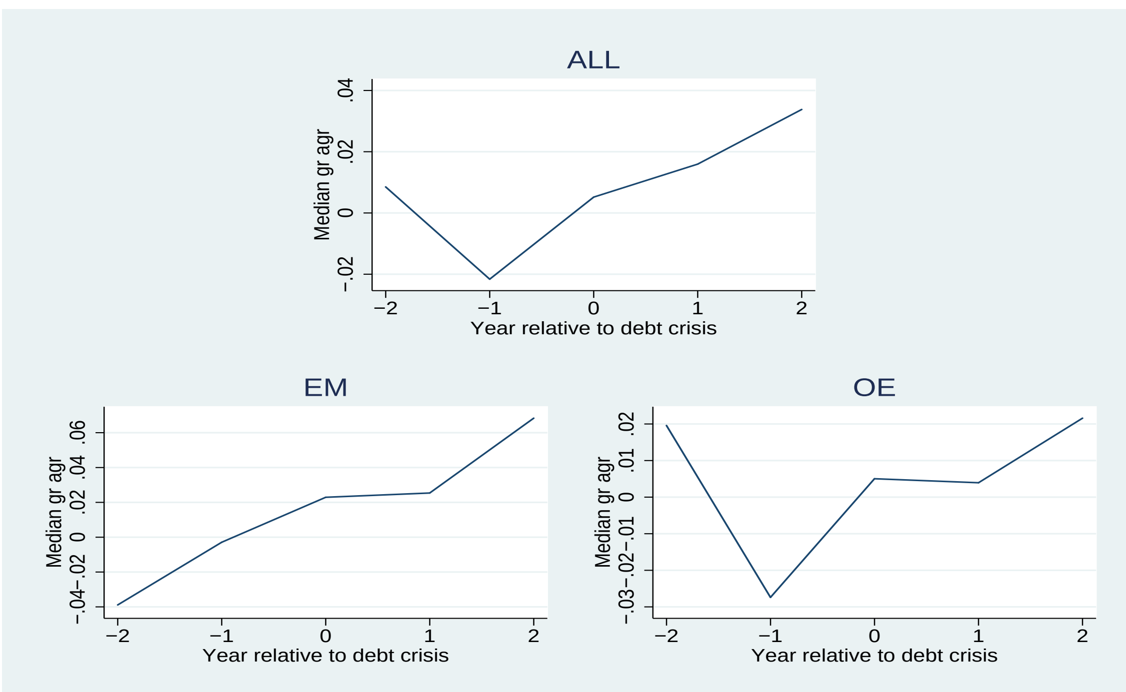


Figure 2.5: Industry Banking

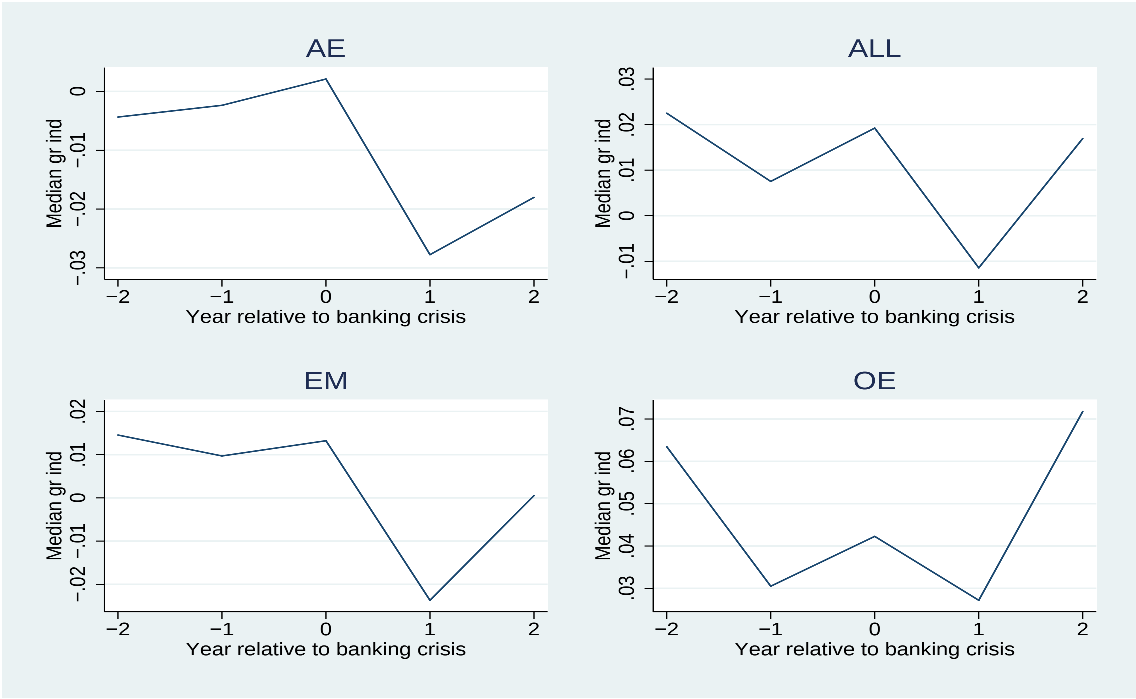
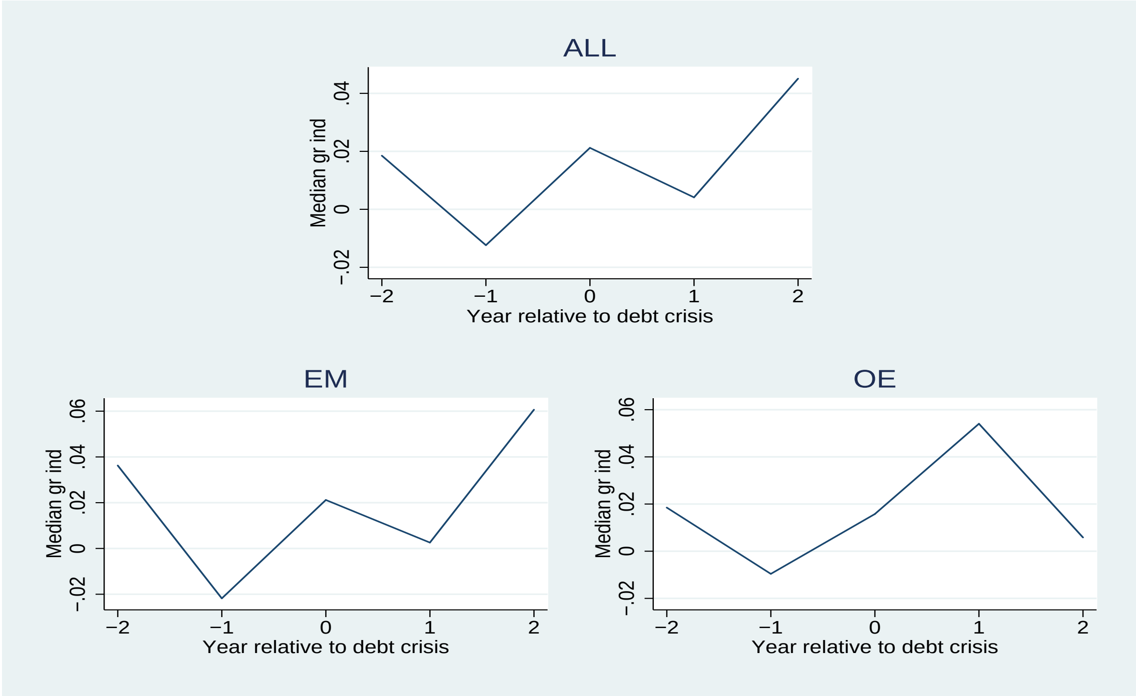


Figure 2.6: Industry Debt



2.6 Tables

Table 2.1: Crises by Country Group

	AE	EM	OE	Total
Banking	23	32	76	131
Currency	9	41	118	168
Debt	0	15	43	58
Total	32	88	237	357

Source: Laeven and Valencia [30].

Table 2.2: Sectoral Statistics

Sector	Agriculture	Industry	Services	All (GDP)
Amplitude (pct)	-14.9	-14.9	-11.8***	-8.49***
	(19.9)	(28.3)	(25.9)	(18.7)
Duration (years)	1.696	1.603*	1.533***	1.624
	(1.27)	(1.146)	(1.012)	(1.376)
Episodes	1,070	798	608	481

Note: Amplitude is defined as the fall in value added from peak to trough. Duration is defined as the years during which output is falling. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ show whether differences of the industry sector and services are statistically different from agriculture.

Table 2.3: Employment Sectoral Statistics

Sectoral Employment	Agriculture	Industry	Services
Amplitude (pct)	-26.5	-15.6***	-16.0**
	(48.4)	(25.2)	(31.4)
Duration (years)	2.017	1.775	1.504***
	(2.041)	(1.342)	(0.999)
Episodes	176	182	135

Note: Amplitude is defined as the fall in employment from peak to trough. Duration is defined as the years during which employment is falling. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ show whether differences of the industry sector and services are statistically different from agriculture.

Table 2.4: Crises Effects on Different Sectors

Agriculture	Banking		Currency		Debt	
	Crisis	Non-Crisis	Crisis	Non-Crisis	Crisis	Non-Crisis
Amplitude	-0.162	-0.149	-0.192	-0.147**	-0.178	-0.149
	(0.207)	(0.199)	(0.163)	(0.201)	(0.164)	(0.199)
Duration	1.714	1.696	1.667	1.698	2.071	1.691
	(1.213)	(1.272)	(1.200)	(1.274)	(1.207)	(1.271)
Episodes	28	1,042	57	1,013	14	1,056

Industry	Banking		Currency		Debt	
	Crisis	Non-Crisis	Crisis	Non-Crisis	Crisis	Non-Crisis
Amplitude	-0.473	-0.141	-0.276	-0.142	-0.139	-0.149
	(0.471)	(0.272)	(0.341)	(0.278)	(0.150)	(0.285)
Duration	3.263	1.562***	2.225	1.570**	1.875	1.597
	(2.306)	(1.074)	(1.609)	(1.108)	(0.957)	(1.150)
Episodes	19	779	40	758	16	782

Services	Banking		Currency		Debt	
	Crisis	Non-Crisis	Crisis	Non-Crisis	Crisis	Non-Crisis
Amplitude	-0.152	-0.117	-0.161	-0.115	-0.0809	-0.119
	(0.293)	(0.258)	(0.212)	(0.261)	(0.0824)	(0.261)
Duration	1.944	1.520	1.769	1.517	1.286	1.539*
	(1.552)	(0.990)	(1.366)	(0.982)	(0.469)	(1.021)
Episodes	18	590	39	569	14	594

Note: This table compares amplitudes and durations of drops in value added output in different sectors in crisis and non-crisis episodes. The crises data comes from Laeven and Valencia [30]. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ show whether differences of the non-crisis episodes are statistically different from when a sectoral recession is accompanied by a certain crisis.

Table 2.5: One Year Growth VA by Country Group

Banking	AE			EM			OE			ALL		
	Agr	Industry	Services	Agr	Industry	Services	Agr	Industry	Services	Agr	Industry	Serv
One Yr Before	0.0284	0.0274	0.0299	0.00904	0.0324	0.0638	0.0141	0.0176	0.0405	0.0129	0.0258	0.04
One Yr After	-0.0622	-0.0829	-0.0107	-0.0217	-0.0234	0.0119	0.0226	0.0164	0.0231	0.00411	-0.0148	0.0
Change	-0.0905	-0.110	-0.0388	-0.0308	-0.0557	-0.0519	0.00848	-0.00119	-0.0173	-0.00878	-0.0406	-0.0

Currency	AE			EM			OE			ALL		
	Agr	Industry	Services	Agr	Industry	Services	Agr	Industry	Services	Agr	Industry	Serv
One Yr Before	-0.0176	-0.00398	0.0330	-0.00485	0.0243	0.0680	0.0130	0.0135	0.0201	0.00975	0.0142	0.0
One Yr After	0.0404	-0.00634	0.0238	0.0583	0.0492	0.0237	0.0333	0.0343	0.0197	0.0387	0.0365	0.0
Change	0.0579	-0.00236	-0.00920	0.0632	0.0250	-0.0443	0.0203	0.0208	-0.000457	0.0289	0.0223	-0.00

Debt	AE			EM			OE			ALL		
	Agr	Industry	Services	Agr	Industry	Services	Agr	Industry	Services	Agr	Industry	Serv
One Yr Before				-0.00290	-0.00314	0.0341	-0.0274	-0.0308	0.0427	-0.0241	-0.0102	0.0
One Yr After				0.0254	0.0588	0.00798	0.00394	0.0262	-0.000220	0.0160	0.0389	0.00
Change				0.0283	0.0619	-0.0261	0.0313	0.0569	-0.0429	0.0401	0.0490	-0.0

This Table shows that these effects do indeed vary across crises type and country groups. The top panel shows the median growth rate of sectoral added for each country group one year before the crisis (first row) and one year after the crisis (second row). The last row in the top panel shows the c in growth of sectoral value added between growth rate one year after the crisis and one year before the crisis. The middle and bottom panel show the calculations for currency and debt crises.

Table 2.6: Banking Crises: Leaven and Valencia Dataset

	Agriculture		Industry		Services	
$Crisis_t$	-0.082	-0.093	-0.145*	-0.166***	-0.07**	-0.085***
	(0.063)	(0.061)	(0.080)	(0.050)	(0.031)	(0.032)
$Crisis_{t-1}$		-0.065		-0.101		-0.076**
		(0.070)		(0.067)		(0.034)
ΔVA_{t-1}	-0.709***	-0.713***	-0.203***	-0.227***	-0.28**	-0.302***
	(0.036)	(0.033)	(0.022)	(0.024)	(0.109)	(0.111)
ΔVA_{t-2}	-0.341***	-0.346***	-0.246***	-0.246***	-0.211***	-0.205***
	(0.027)	(0.029)	(0.021)	(0.022)	(0.034)	(0.037)
Observations	2,527	2,527	2,548	2,548	2,457	2,457
Countries	119	119	120	120	118	118

Note: The table shows Arellano-Blundell-Bond regressions. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include growth of trade, exchange rate growth, credit growth, population growth and last year's sectoral output level.

Table 2.7: Banking Crises: Reinhart and Rogoff Dataset

	Agriculture		Industry		Services	
$Crisis_t$	-0.005	-0.003	-0.07***	-0.074*	-0.045**	-0.045
	(0.028)	(0.047)	(0.026)	(0.039)	(0.021)	(0.030)
$Crisis_{t-1}$		-0.007		0.006		-0.006
		(0.061)		(0.042)		(0.023)
ΔVA_{t-1}	-0.727***	-0.726***	-0.076*	-0.072	-0.329**	-0.339*
	(0.042)	(0.062)	(0.046)	(0.045)	(0.165)	(0.181)
ΔVA_{t-2}	-0.413***	-0.4***	-0.261***	-0.251***	-0.153**	-0.161***
	(0.056)	(0.079)	(0.045)	(0.053)	(0.066)	(0.061)
Observations	1,727	1,727	1,801	1,801	1,726	1,726
Countries	61	61	64	64	61	61

Note: The table shows Arellano-Blundell-Bond regressions. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include growth of trade, exchange rate growth, credit growth, population growth and last year's sectoral output level.

Table 2.8: Currency Crises: Leaven and Valencia Dataset

	Agriculture		Industry		Services	
$Crisis_t$	-0.095**	-0.096***	-0.091***	-0.089**	-0.044***	-0.049***
	(0.037)	(0.032)	(0.029)	(0.037)	(0.014)	(0.014)
$Crisis_{t-1}$		-0.008		0.01		-0.025
		(0.046)		(0.050)		(0.017)
ΔVA_{t-1}	-0.715***	-0.714***	-0.197***	-0.196***	-0.287***	-0.293***
	(0.032)	(0.031)	(0.027)	(0.026)	(0.103)	(0.109)
ΔVA_{t-2}	-0.351***	-0.352***	-0.249***	-0.25***	-0.206***	-0.208***
	(0.028)	(0.028)	(0.024)	(0.023)	(0.029)	(0.030)
Observations	2,527	2,527	2,548	2,548	2,457	2,457
Countries	119	119	120	120	118	118

Note: The table shows Arellano-Blundell-Bond regressions. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include growth of trade, exchange rate growth, credit growth, population growth and last year's sectoral output level.

Table 2.9: Currency Crises: Reinhart and Rogoff Dataset

	Agriculture		Industry		Services	
$Crisis_t$	-0.021	-0.023	-0.037	-0.03	-0.039**	-0.036**
	(0.019)	(0.021)	(0.035)	(0.029)	(0.019)	(0.017)
$Crisis_{t-1}$		-0.008		-0.019		-0.012
		(0.016)		(0.020)		(0.010)
ΔVA_{t-1}	-0.747***	-0.73***	-0.048	-0.036	-0.319*	-0.327*
	(0.058)	(0.053)	(0.076)	(0.073)	(0.189)	(0.179)
ΔVA_{t-2}	-0.421***	-0.4***	-0.26***	-0.271***	-0.128**	-0.131*
	(0.049)	(0.042)	(0.043)	(0.040)	(0.062)	(0.073)
Observations	1,727	1,727	1,801	1,801	1,726	1,726
Countries	61	61	64	64	61	61

Note: The table shows Arellano-Blundell-Bond regressions. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include growth of trade, exchange rate growth, credit growth, population growth and last year's sectoral output level.

Table 2.10: Debt Crises: Leaven and Valencia Dataset

	Agriculture		Industry		Services	
$Crisis_t$	-0.076	-0.081	-0.009	-0.011	-0.102**	-0.112***
	(0.130)	(0.118)	(0.077)	(0.090)	(0.040)	(0.042)
$Crisis_{t-1}$		-0.025		0.002		-0.068
		(0.093)		(0.103)		(0.043)
ΔVA_{t-1}	-0.721***	-0.723***	-0.2***	-0.203***	-0.291***	-0.315***
	(0.034)	(0.035)	(0.025)	(0.025)	(0.106)	(0.115)
ΔVA_{t-2}	-0.354***	-0.354***	-0.245***	-0.247***	-0.198***	-0.203***
	(0.030)	(0.030)	(0.022)	(0.020)	(0.033)	(0.038)
Observations	2,527	2,527	2,548	2,548	2,457	2,457
Countries	119	119	120	120	118	118

Note: The table shows Arellano-Blundell-Bond regressions. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include growth of trade, exchange rate growth, credit growth, population growth and last year's sectoral output level.

Table 2.11: Domestic Debt Crises: Reinhart and Rogoff Dataset

	Agriculture		Industry		Services	
$Crisis_t$	-0.024	-0.027	-0.03	-0.039	-0.026	-0.032
	(0.051)	(0.048)	(0.036)	(0.037)	(0.022)	(0.023)
$Crisis_{t-1}$		0.04		0.025		0.012
		(0.033)		(0.020)		(0.019)
ΔVA_{t-1}	-0.726***	-0.728***	-0.029	-0.034	-0.311*	-0.313*
	(0.042)	(0.043)	(0.045)	(0.044)	(0.177)	(0.177)
ΔVA_{t-2}	-0.416***	-0.416***	-0.246***	-0.232***	-0.137**	-0.134***
	(0.048)	(0.047)	(0.044)	(0.045)	(0.057)	(0.052)
Observations	1,727	1,727	1,801	1,801	1,726	1,726
Countries	61	61	64	64	61	61

Note: The table shows Arellano-Blundell-Bond regressions. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include growth of trade, exchange rate growth, credit growth, population growth and last year's sectoral output level.

Table 2.12: External Debt Crises: Reinhart and Rogoff Dataset

	Agriculture		Industry		Services	
$Crisis_t$	-0.023	-0.043***	-0.023	-0.05	-0.069***	-0.082***
	(0.022)	(0.020)	(0.023)	(0.034)	(0.017)	(0.022)
$Crisis_{t-1}$		0.018		0.043		0.022
		(0.037)		(0.031)		(0.022)
ΔVA_{t-1}	-0.721***	-0.728***	-0.044	-0.04	-0.36**	-0.355**
	(0.045)	(0.045)	(0.041)	(0.046)	(0.181)	(0.180)
ΔVA_{t-2}	-0.414***	-0.405***	-0.262***	-0.265***	-0.196***	-0.187***
	(0.048)	(0.046)	(0.039)	(0.038)	(0.054)	(0.067)
Observations	1,727	1,727	1,801	1,801	1,726	1,726
Countries	61	61	64	64	61	61

Note: The table shows Arellano-Blundell-Bond regressions. Standard errors are shown in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include growth of trade, exchange rate growth, credit growth, population growth and last year's sectoral output level.

Chapter 3

Sorting out Soccer Schedules: A Tacit Unfair Advantage

“We hope that they (Spanish Soccer League) will compensate the number of times we have played after Barcelona because it is a psychological advantage for them"
-Miguel Perdaza (Real Madrid’s director of football)[1]

3.1 Introduction

During the first 27 weeks of the 2010-2011 Liga BBVA, Real Madrid played 19 times after Barcelona whereas Barcelona played only 8 times after Real Madrid.[2] This scheduling bias led Jose Mourinho (Madrid’s coach in 2010-2013) to state that:

> “They are laughing at me behind my back... They decide in favor of their friends. There are interests. Some seem to be able to pick and choose when they play."[3]

This is just one of many examples of perceived unfair advantages in sports. Other well-known cases include the order in which penalty kicks are assigned in a shootout, the first overtime possession in American Football, which lanes are allocated to track and field runners, and ultimately, who serves, bowls or kicks the first ball in practically any match. Fortunately, many of these advantages are randomly distributed. But

[1] Sports Illustrated, March 5^{th} 2011.
[2] See Table C.1 in Appendix C.
[3] Ibidem.

in some cases (such as soccer schedules), the fixture list is dictated by systematic decisions based on broadcasting criteria, international FIFA dates and European cups. Hence, the order in which teams play during the season, relative to their most direct opponent, can sometimes generate an unfair advantage and ultimately determine the outcome of championships.

In this paper we estimate the effect of team scheduling on game results for direct competitors. In other words, we test whether a team's result on an earlier match affects the subsequent outcome of its main competitor on a later match. We focus on the Scottish Premiership during 2002-2011, the German Bundesliga during 2011-2013 and the Spanish Liga BBVA during 2008-2013. These seasons pose methodological advantages since there were only two clear-cut competitors for the league title: namely Celtic and Rangers in Scotland, Bayern Munich and Borussia Dortmund in Germany and Real Madrid and Barcelona in Spain. Hence, the definition of a competitor is straightforward and unambiguous.

Scheduling is a complex yet crucial aspect in soccer. According to Goossens and Spieksma [26], most leagues follow a double-round robin tournament which is scheduled around FIFA dates, European Cup games, and National Cup games. However, schedules are also influenced by the different stakeholders' criteria in order to maximize stadium attendance and TV revenue. Consequently, many teams end up playing a disproportionate number of games before and after their main competitors. For example, Celtic played 20 matches after Rangers in the 2005-2006 Scottish Premiership season whereas Rangers played 7 matches after Celtic. Similarly, Real Madrid played 24 matches after Barcelona in the 2009-2010 Liga BBVA season whereas Barcelona only played 12 matches after Real Madrid. Also, Bayern Munich played 14 matches after Borussia Dortmund in the 2011-2012 Bundesliga season whereas Borussia Dortmund only played 8 matches after Bayern Munich.

To date, the majority of the literature on soccer (and sports in general) has primarily focused on game factors like home-field advantage, seen in Carmichael and Thomas [12] and Vergin and Sosik [54], and referee bias like seen in Garicano et al. [24] and Dohmen [18]. In similar fashion, Apesteguia and Palacios-Huerta [3] study the effects that psychological pressure can have on penalty kicks and find that there is a first-mover advantage in a penalty kick shootout. Also, Harris and Vickers [27], Harris and Vickers [28] and Cao [11] study the existence of a "discouragement effect" in scenarios ranging from different firms competing to obtain a patent, to basketball and football competitions. The authors show that as a player positions far behind its opponent, he or she is likely to exert less effort. Conversely, competitors exert high effort when they are close to each other. Finally, literature reviews such as Goossens and Spieksma [26] discusses several factors that can affect soccer schedules.

However, to our knowledge there are no studies that explicitly address the scheduling criteria and their effects on games' results. Hence, our study provides new evidence of unfair psychological advantages in a manner not currently represented in the literature. Our setting centers on a competitive tournament and as such, agents perform under psychological stress induced by high stakes and emotional factors.[4] We believe that a better understanding of the order in which games are played and their associated behavioral effects can benefit the design of sports tournaments world-wide.

We employ a matching methodology and control for usual game characteristics such as home advantage, standing differential, point differential and fatigue. Our results show that competitors exhibit a significant psychological effect when they are within three points of each other. Specifically, if a team records a win on an earlier match, then its direct competitor collects an average of 0.49 fewer points. Alternatively, if a team records a loss on an earlier match, then its competitor collects

[4] See [7].

an average of 1.08 additional points. Effects are larger when excluding the first two months of each season.

The paper proceeds as follows: Section 3.2 provides some background for each of the leagues. Section 3.3 explains the data collection process and descriptive statistics. Section 3.4 presents the empirical strategy. Section 3.5 presents results and Section 3.6 concludes.

3.2 European Soccer Leagues

In this paper we will consider three leagues: Scottish Premiership, German Bundesliga and Spanish Primera Division. Each year teams compete in each European League with a fixed number of teams. Each team collects 3 points for a win, 1 point for a draw and 0 when they lose. At the end of the season (usually a round-robin format where each team plays every other team twice, once at home and once away) the total number of points are tallied to decide the winner of the competition. If two or more teams are equal on points, then goal difference and goals scored determine the winner of the league in the Scottish Premiership and German Bundesliga. In Spanish Primera Division the first tie-breaker is the goal difference for the two matches those clubs have played against each other (away goals count the same as home goals). If teams are still tied then total goal difference and total goals scored are used. We explain below each league in a bit more in detail.

3.2.1 Scottish League

The Scottish Premiership is comprised of twelve teams. Each year, the winner competes in the UEFA Champions League while the two runner-ups (ranked second and third) compete in the UEFA Europa League (the winner of the Scottish Cup also competes in the Europa League). The team that comes in last place gets relegated each year to the Scottish Championship while the winner of the Championship takes its place.

The schedule of the Scottish Premiership is organized in a non-conventional fashion. In the first stage of the competition, teams play each other three times, twice at home and once away or vice-versa[5], bringing the total number of matches (per team) to thirty-three. In the second stage, teams are split into two groups based on their standings from the first stage and they play each-other once more.[6] Namely, one group consists of the six highest-ranked teams and the other group consist of the remaining teams. Teams then play each other once more, for a total of five additional matches per team. Finally, the team with the most number of points (out of a total of 114 points), wins the league.

Our data set includes results from all seasons during the 2002-2011 period, obtained from the Scottish Premiership website.[7] Results for the 2011-2012 season were not included since it was a particular unusual season. That is, on February 14^{th} 2012, Rangers F.C was placed in administration and deducted 10 points. In June 2012, after failing to reach an agreement with its creditors, the club entered a liquidation phase and was purchased by a new company which registered Rangers F.C. within the third division. In every year of our sample, except for the $2005-2006$ season, Celtic and Rangers have been competing with each other for first and second

[5] Each season the League seeded the clubs and predicted their likely standing at the end of the season to give clubs the best chance of playing each other twice at home and twice away. `http://www.highbeam.com/doc/1P2-18987329.html`

[6] The reason why this split was instituted was to increase competitiveness as mentioned in this news article: `http://bleacherreport.com/articles/1596665-scottish-premier-league-in-defence-of-the-split`. Nevertheless it was a controversial decision.

[7] Information is available at: `http://www.scotprem.com/content/default.asp?page=s83`

position in the league. Thus, the choice of the Scottish Premiership seems a natural one.

3.2.2 German League

The German Bundesliga is comprised of eighteen teams. Each year, the top four teams compete in the UEFA Champions League. The teams that rank in the last two places get relegated each year to the 2nd Bundesliga while the third lowest ranked team in Bundesliga competes in a two-leg playoff match with the third highest ranked team in the 2nd Bundesliga. We study the German Bundesliga for two soccer seasons 2011/2012 and 2012/2013. In both seasons the only two clear competitors are FC Bayern Munich and Borussia Dortmund. The choice is conditioned to these two recent years because in previous recent seasons there are more than two explicit competitors for the league and that would make our results harder to interpret. Data are taken from the German Football Federation website[8].

3.2.3 Spanish League

We study the Spanish League during the 2008-2013 period which includes five soccer seasons. Primera Division is comprised of twenty teams and each soccer season has 38 weeks. The top four teams compete in the UEFA Champions League. The teams that rank in the last three places get relegated each year to the Segunda Division. The only two clear competitors are FC Barcelona and Real Madrid CF during this period. Data are taken from the ESPN Football website[9].

[8] Please see: `http://www.dfb.de/index.php?id=82918`

[9] Please see: `http://www.espnfc.com/results/_/league/esp.1/date/20130204/spanish-primera-division?cc=5901`

3.3 Data

We collected data from three different leagues and chose those years in which there are two clear competitors for the league. We put together data for nine seasons of the Scottish Premiership (2002-2011), two seasons of German Bundesliga (2011-2013) and five seasons of the Spanish Primera Division (2008-2013). These 16 seasons comprise 620 game-weeks in which we collect data for the Later Game and Earlier Game and record the game result, whether the game is played home or away, the Score Differential of the game (positive if the team wins and negative otherwise), the competitor's Standing and Point Differential with the team they are playing against that week. We also collect important factors that can capture player fatigue like FIFA dates and European Cup (Champions or Europa League) games. For the Scottish Premiership there were numerous occasions (precisely 28) where only one team played in midweek. In order not to lose these observations we considered the midweek game as the Later Game and dhe competitor game in the previous weekend as the Earlier Game.

Table 3.1 shows summary statistics for the Earlier Games and the Later Games showing means for the full sample and the sub-sample when games were played simultaneously or not. Statistics for each league are also shown in Tables C.2 - C.4 in Appendix C. Out of 620 weeks in total 118 are simultaneous games. Regarding simultaneous games, in order not to lose the data we randomly chose a Later Game and Earlier Game and the results in these games can be used as a benchmark comparison to the non-simultanous case.

On average competitors win 2.22-2.51 points. This is sensible given that they win most of the games as league competitors. For non-simultaneous games in Table 3.1, more Home games are played in Earlier Games then Later Games. Home games constitute 43 percent of the sample for the Later Game and 57 for the Earlier Game, so there seems to be a bias in that more Earlier Games are played at home, which makes controlling for this fact very important. This bias seems to be larger for the German Bundesliga and Scottish Premier League. For the Spanish Primera Division there is an even distribution between Home and Away games played in the Earlier and Later Games. The point differential is very large and varies from 11.57 to 21.87 is a clear indication of competitors' disconnect from the rest of the league in terms of quality. It also reinforces the idea of these teams being clear competitors for the league and serves to corroborate our choice of competitors. On average competitors play a team which is six positions below in the standings and they win by a margin of 1.55 goals.

Table 3.2 shows similar summary statistics for the Earlier Games and the Later Games showing means for the full sample and the sub-sample divided in treated and untreated observations. Statistics for each league are also shown in Tables C.5 - C.7 in Appendix C. We define a game-week to be treated if the Earlier Game result is a Win and untreated otherwise (draw or loss). More will follow on this in Section 3.4. Observing from Table 3.2 there are almost three times as many treated variables (458) as there are untreated (162)[10]. When the Earlier Game result is a win teams are playing 59 percent of the time at home. In comparison when the result of the Earlier Game is a draw or a loss only 31 percent of the games are played at home. The Later Game team collects slightly more points (2.41 $>$ 2.30) in the untreated category compared to the Treated one and this difference is more pronounced on the German Bundesliga.

Table 3.3 provides some insight and is a good preamble of the empirical strategy and results that are to follow. We show the distribution of Earlier and Later Game results for non-simultaneous games. We also display percentages to make the message

[10]This makes sense as there are many more wins that draws or losses in the sample.

clearer. For the Scottish Premiership the Later Game competitor loses more often when the Earlier Game competitor wins (11 percent vs. 6 and 6 percent). The Later Game result is a draw more often when the Earlier Game is also a draw (28 percent vs. 15 and 12 percent). Finally the Later Game team wins a bigger percentage of its games when the Earlier Game team loses (82 vs. 74 and 66).

Results reverse for the Spanish Primera Division where a team playing in the Later Game loses more often if the Earlier Game team loses as well (29 percent vs 7 and 4 percent) and this seems to drive the overall result as well (14 percent vs 10 and 5 percent). However when looking at the data overall, the competitor that plays in the Later Game draws more often when also the Earlier Game result is a draw (22 percent vs 15 and 12 percent) and wins more often when the Earlier Game result is a win (75 percent vs 74 and 73 percent), although with a very small margin

Table 3.4 shows the same results but we start each season's data from week eight[11] and also when league competitors are less than three points from each other. That means that one win/loss situation can reverse the standings at the top of the league. Results are not that different from Table 3.3 and again it appears that overall Later Game loses more often (20 percent vs 11 and 6 percent) when the Earlier Game result is also a loss. This result holds for the Spanish Primera Division, but it doesn't for the Scottish Premiership. These are of course unconditional means that do not account for observable characteristics such as whether the game is played home or away, difficulty level of the game, fatigue etc, that might affect the result of the game. We explain that further in the empirical strategy section.

[11] Arguably the importance of early games is not the same compared to games later in the season.

3.4 Empirical Strategy

Our methodology follows the literature that applies quasi-experimental methods in order to draw causal inference on empirical questions. Ideally, a controlled experiment would allow us to obtain different values of treatment (from some underlying probability distribution) at each period. Observations with no treatment would correspond to the control group. It follows that, since assignment to treatment would be -by construction- random, any possible selection bias disappears. However, as noted by [2], "Experiments are time consuming, expensive, and may not always be practical"[12] In many cases, it is even infeasible to carry out experiments to answer relevant empirical questions.

The literature on quasi experimental methods has been increasingly growing, but to our knowledge, it has remained absent, almost entirely, from sports economics. There exist an extensive sports literature on identifying advantages or biases that can affect game results. [12] and [54] study Home-field advantage while others like [24] and [18] analyze referee bias in extra time in home games or in awarding penalty kicks and goals. One paper that relates to our idea is [3]. They study the effects psychological pressure can have in competitive environments. In a randomized natural experiment setting, they find that there is a first-mover advantage in shooting the first penalty in a penalty kick shootout.

Our identifying strategy is based on the Conditional Independence Assumption (CIA). Namely, conditional on a set of control variables, the assignment of treatment (which in our case corresponds to a team's opponent losing or winning on an earlier match) is independent of potential outcomes, or *as good as randomly assigned*. This assumption is sometimes referred to as selection-on-observables because covari-

[12] pg.2

ates to be held fixed are assumed to be known and observed. Our main motivation for choosing this approach stems from the fact that it is unlikely that the unconditional mean of a team's result (when its direct opponent wins) represents a valid counterfactual to the case in which its opponent wins, and vice-versa.[13]

Formally, let the outcome of a team and its opponent in period "t" follow linear functions as in equations (3.1) and (3.3):

$$LG_t = \beta_0 + \beta_1 D_t + \beta_2 W_t + \epsilon_t \tag{3.1}$$

$$D_t = 1[EG_t = 3, \text{ records a win}] \tag{3.2}$$

$$EG_t = \alpha_0 + \alpha_1 W_t + v_t \tag{3.3}$$

Where LG_t corresponds to a game's result when a team plays after its direct opponent (opposite for EG_t), W_t is a vector of control variables (which can differ across teams), and where D_t defines treatment assignment, equal to unity whenever EG_t records a victory and zero otherwise. Equation (3.1) hence describes the game result of a team who plays after its opponent and equation (3.3) describes the game result of a team who plays before.

The underlying assumption is that conditional on W_t, the error terms ϵ_t and v_t are independent and treatment assignment is not correlated to potential outcomes. It follows that the parameter β_1 represents the average treatment effect of a team's result given that its opponent previously won its match. Formally, this can be expressed as shown in equation (3.4):

[13] See [31].

$$
\begin{aligned}
& E\left[LG_t \mid D_t = 1, W_t = w\right] - E\left[LG_t \mid D_t = 0, W_t = w\right] \\
= \; & \beta_1 + E\left[\epsilon_t \mid v_t = (EG_t \text{ records a win}) - \alpha_0 - \alpha_1 w_t, W_t = w\right] - \\
& E\left[\epsilon_t \mid v_t = (EG_t \text{ records a loss or draw}) - \alpha_0 - \alpha_1 w_t, W_t = w\right] \\
= \; & \beta_1 \qquad (3.4)
\end{aligned}
$$

Where the last step follows from the fact that conditional on W_t, previous game results (i.e. treatment) are as good as randomly assigned.

We also consider a second treatment assignment, where the treatment will be one if Earlier Game records a loss and we want to estimate the effect of a Earlier Game loss in the Later Game result. This treatment is not symmetric[14] to the first treatment and we explore it to see whether the effect changes when the Earlier Game result is a loss and whether we observe any slackness in the Later Game result. The same methodology will apply and it will rely once again on the Conditional Independence assumption.

3.5 Estimation and Results

In this section we estimate the effect of treatment on the Later Game result. We consider two different treatment statuses that correspond to: 1) Earlier Game recording a win and 2) Earlier Game recording a loss. For each we present linear regressions (with and without control variables) as well as the average treatment effect through a matching methodology.

[14] A treatment which would be symmetric to the first one would be to if treatment is one when Earlier Game result is a loss or draw.

In essence, when drawing causal inference it is ideal for both treatment and control groups to exhibit similar covariate distributions. However, in practice this is seldom the case, especially without the ability to carry out a controlled experiment. Thus, the use of relevant control variables is crucial to eliminate any discrepancies in teams' characteristics that can ultimately introduce bias to our estimates such as home/away advantage, point and standing differential, fatigue from playing other European games, etc. Also, by using a matching estimator following [47], we are able to "balance out" these characteristics and further sub-categorize them by their values. Moreover, matching techniques do not require parametric assumptions like regression models do. In this sense our study follows the quasi-experimental literature that include [48], [49] and [2].

3.5.1 Treatment I: Early Game Wins

Table 3.5 shows linear regression and matching results for the whole sample in columns 1-3. We estimate the effect of treatment status on the Later Game result. Results show that when the Earlier Game result is a win and the competitor collects all three points, the Later Game collects 0.19 points less on average. The results are consistent when adding controls like home or away games, Standing Differential and Point Differential with Competitor although the effect is not significant on all specifications.

As it can be expected, playing home has a positive effect and also if the Later Game competitor plays a weaker team (standing differential is larger), collects more points on average. Results are significant and negative also when using a matching estimator showing that the Later Game competitor collects 0.28 points less on average when the Earlier Game competitor loses. The full sample includes both simultaneous and non-simultaneous games. Although one specification is marginally significant (10 percent p-value), it is hard to interpret the results when simultaneous games are included since the aim of the paper is to explore the effect of the game ordering between competitors. The sub-sample is constructed by deleting simultaneous games from the data and it is used from here on. Results are not significant initially but we explore them further below.

We investigate next whether there is any significant effect when competitors are close in the standings as compared to when they have a larger difference in terms of points with each other. Specifically we check results when competitors are within reach of each other (three points behind or ahead of their competitor[15]). Table 3.6 reports results when the difference between the competitors for the league is less than three points in absolute value (so the result of one game can change the standings) in columns 1-3. Results are significant across all specifications when competitors are within three points. The Later Game collects 0.22 - 0.31 less points on average after an Earlier Game win in this case which might be interpreted as a factor of teams facing more pressure if they are very close in terms of points in the standings. Columns 4-6 present results when difference in points between league competitors is more than three points in absolute value. In this case results are not significant, showing that the effect vanishes when teams have a larger point difference in the standings. These results seem to contradict with the theoretical predictions of Harris and Vickers [28] and Cao [11] of the existence of a "discouragement effect".

There might be claims that as the season progresses every game becomes more important so effects we want to test might be different. To investigate this, we include in the sample only data after the first two months of the season, namely 7 weeks. Table 3.7 shows results where the sample includes only games starting with game-week 8

[15]One win is worth three points so the standings can theoretically be overturned if one team loses and the other wins.

and after[16]. Results are significant again across all specification when competitors are within three points. The magnitude is even higher and the Later Game team collects 0.41-0.58 points less on average when the Earlier Game team loses. Results again are not significant when considering the sub-sample where teams have a larger than three point difference in the standings. Matching results are again consistent showing a point estimate of -0.49.

One way to explain the results might be that earlier in the season teams behave more like expected points maximizer. They don't much care about their place in the standing, but they want to collect the highest number of points. Whereas, later in the season a team cares exactly about its position in the standings and as the season progresses it tries and maximize the probability of winning each game. However when adopting this more aggressive strategy their probability of winning each game is higher but since the strategy is riskier, there is a high chance the game might end up in a loss or draw and the expected number of points in the later stages of the season is lower. That can explain results from Table 3.7 which are larger in magnitude compared to before, after starting each season from game 8.

[16]The German League, Spanish Primera Division and Scottish Premiership have 34, 38 and 38 weeks respectively in each season.

3.5.2 Treatment II: Early Game Loses

We now consider the treatment to be a Early Game Loss to investigate the effects of a competitor losing in the earlier game to the later game competitor. Table 3.8 shows OLS and matching results. Although initially significant in the full sample data, the problems discussed above with the full sample including simultaneous games still persist. We therefore consider only non-simultaneous games.

Table 3.9 is the counterpart of Table 3.6 with the first treatment. Column 3 where all relevant covariates are included results in a positive and significant point estimate. Specifically if the Early Game competitor loses, the Later Game team wins on average 0.53 points more when teams are within three points in the standings. Results are insignificant when considering larger point differences between competitors as we found with the first treatment also.

Table 3.10 also consider the data starting from game-week 8 excluding the first two months of data like Table 3.7. Results are again consistent with Table 3.9, although they are of a bigger magnitude this time and the effect ranges from 0.59 to 0.81 more points collected on average by the Later Game when the Earlier Game is a loss. The Matching estimator is significant and positive.

3.6 Conclusion

Sport scheduling is an arduous task undertaken by national leagues. It is constrained by a number of reasons including broadcasting, international FIFA dates and attendance of games. There have often been cases when clubs or coaches have raised concerns about their schedules not being fair or that the other competitor is favored in some way. In this paper, we demonstrate that an additional important factor for the final standings of the league is the order in which games are played between direct competitors every week in soccer. We estimate the effect of team schedules on game results for the Scottish Premiership during 2002-2011, the German Bundesliga during 2011-2013 and the Spanish League during 2008-2013. These leagues are strategically chosen as they pose a methodological advantage since there were only two clear-cut competitors for the league title during this period, namely Celtic and Rangers in Scotland, Bayern Munich and Borussia Dortmund in Germany and Real Madrid and Barcelona in Spain.

We believe that our paper is an important addition to sport literature in explaining unfair advantages in sports, some of which are random, like the decision of first possession in overtime in American football or the which team has the first penalty kick after extra time in a World cup or European cup game. The weekly decision of which competitor plays first is not completely random as there are factors like European games, advertising, FIFA dates etc. We also contribute in the psychology literature which relates to how performance changes under pressure.

Using a matching methodology and a linear probability model and controlling for game characteristics like home advantage, standing differential and fatigue, we find that when the Earlier Game result is a win, the Later Game competitor collects on average 0.22-0.58 points less when league competitors are within one game difference (three points) and vanish later on. This result contradicts claims by Harris and Vickers [28] and Cao [11] of the existence of the "discouragement effect". Results are larger in magnitude when excluding the first 7 game-weeks where the importance of the games presumably is different. One reason could be that in the first weeks of the season a team cares more about expected number of points than standings. As the season progresses when competitors are close, a team cares about their exact standing position and will sometimes take a riskier strategy which can give a higher probability of winning one game but will deliver a lower number of expected points. Therefore as the season draws nearer to closing as the Earlier Game wins, the Later Game collects less points on average.

We next consider a second treatment where the Early Game result is a loss and we estimate the effect of this result to the Later Game. Results are consistent largely with the first treatment and we show that the Later Game competitor collects 0.27-1.08 points more on average when the Earlier Game competitor loses confirming a negative relationship between the Earlier and Later Game result. Future research can focus on applying the same methodology to teams facing relegation and competing with each other to see if the effect remains the same.

3.7 Tables

Table 3.1: Summary Statistics - Total

	Full		Simultaneous Games		Non-Simultaneous Games	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.33	1.12	2.01	1.30	2.40	1.06
Home (pct)	0.48	0.50	0.69	0.46	0.43	0.50
Score Differential	1.53	1.85	1.13	2.01	1.63	1.80
Standing Differential	5.82	4.80	3.75	4.77	6.31	4.69
Point Differential	17.87	15.29	12.19	17.26	19.20	14.50
Earlier Game						
Points Collected	2.36	1.10	1.90	1.39	2.47	1.00
Home (pct)	0.52	0.50	0.30	0.46	0.57	0.50
Score Differential	1.55	1.79	0.81	1.97	1.72	1.70
Standing Differential	6.05	5.09	3.36	4.83	6.67	4.94
Point Differential	17.87	15.15	12.89	16.30	19.03	14.65
Observations	620		118		502	

This table shows summary statistics for Earlier and Later Games for the full sample for all leagues. Statistics are shown also grouped by simultaneous and non-simultaneous games.

Table 3.2: Summary Statistics - Total

	Full		Treated		Untreated	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.33	1.12	2.30	1.15	2.41	1.03
Home (pct)	0.48	0.50	0.44	0.50	0.60	0.49
Score Differential	1.53	1.85	1.52	1.91	1.59	1.67
Standing Differential	5.82	4.80	6.26	4.76	4.67	4.75
Point Differential	17.87	15.29	19.12	15.29	14.62	14.82
Earlier Game						
Points Collected	2.36	1.10	3.00	0.00	0.58	0.50
Home (pct)	0.52	0.50	0.59	0.49	0.31	0.47
Score Differential	1.55	1.79	2.32	1.32	-0.61	0.93
Standing Differential	6.05	5.09	6.65	4.98	4.42	5.05
Point Differential	17.87	15.15	19.36	14.82	13.94	15.38
Observations	620		458		162	

This table shows summary statistics for Earlier and Later Games for the full sample for all leagues. Statistics are shown also grouped by treated and untreated.

Table 3.3: Earlier and Later Game Results

Earlier Game		Later Game					
		Lost	Pct	Drew	Pct	Won	Pct
Scottish Premiership							
Win	219	25	11%	32	15%	162	74%
Draw	50	3	6%	14	28%	33	66%
Loss	17	1	6%	2	12%	14	82%
Spanish Primera Division							
Win	139	10	7%	18	13%	111	80%
Draw	22	1	4%	3	14%	18	82%
Loss	14	4	29%	2	14%	8	57%
Total							
Win	389	39	10%	58	15%	292	75%
Draw	78	4	5%	17	22%	57	73%
Loss	35	5	14%	4	12%	26	74%

This table displays Earlier and Later Game results for non-simultaneous games. Based on the Earlier Game result, the total number of points then for the second competitor results is shown.

Table 3.4: Results after Week 8 and Competitors within Three Points

Earlier Game		Later Game					
		Lost	Pct	Drew	Pct	Won	Pct
Scottish Premiership							
Win	136	19	14%	16	12%	101	74%
Draw	33	2	6%	6	33%	20	61%
Loss	7	1	14%	2	29%	4	57%
Spanish Primera Division							
Win	93	5	5%	11	12%	77	83%
Draw	14	1	7%	2	14%	11	79%
Loss	10	3	30%	2	20%	5	50%
Total							
Win	249	26	11%	33	13%	190	76%
Draw	51	3	6%	13	25%	35	69%
Loss	20	4	20%	4	20%	12	60%

This table shows Earlier and Later Game results for non-simultaneous games. Seasons are considered starting from week eight and when competitors are within three points. Based on the Earlier Game result, the total number of points then for the second competitor results is shown.

Table 3.5: OLS and Matching Estimation: Effects on Later Game

	Later Game Result					
	Full Sample			Sub-Sample		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.12	-0.12	-0.19*	0.0066	0.020	0.0085
	(0.103)	(0.103)	(0.106)	(0.114)	(0.113)	(0.116)
Standing Diff		0.029***	0.022**		0.0096	0.0092
		(0.00992)	(0.0101)		(0.0105)	(0.0106)
European Game (wk before)		-0.15	-0.14		-0.14	-0.14
		(0.110)	(0.110)		(0.115)	(0.116)
Home/Away		0.24***	0.37***		0.35***	0.37***
		(0.0912)	(0.104)		(0.0957)	(0.106)
Standing Diff (Competitor)			0.024**			0.0012
			(0.0101)			(0.0110)
Home/Away (Competitor)			0.22**			0.043
			(0.106)			(0.108)
ATT (Matching)	-0.28**			-0.21		
	(0.140)			(0.172)		
R^2	0.002	0.028	0.044	0.001	0.032	0.032

Standard errors are in parenthesis. ***,**,* correspond to significance levels of 1%, 5% and 10%, respectively.

Table 3.6: OLS and Matching Estimation: Effects on Later Game

	Later Game Result					
	Less than Three Points			Three Points or More		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.30***	-0.22***	-0.31***	0.16	0.15	0.16
	(0.0380)	(0.0277)	(0.0645)	(0.173)	(0.174)	(0.166)
Standing Diff		0.032***	0.025***		0.0055	0.0054
		(0.00333)	(0.00603)		(0.0131)	(0.0134)
European Game (wk before)		-0.15**	-0.18***		-0.18**	-0.18**
		(0.0626)	(0.0665)		(0.0756)	(0.0799)
Home/Away		0.66***	0.82***		0.23	0.23
		(0.0925)	(0.0676)		(0.190)	(0.206)
Standing Diff (Competitor)			0.018			0.00051
			(0.0147)			(0.00294)
Home/Away (Competitor)			0.32***			-0.0095
			(0.0764)			(0.0359)
ATT (Matching)	-0.49*			0.11		
	(0.284)			(0.154)		
R^2	0.017	0.131	0.148	0.003	0.021	0.0214

Standard errors are in parenthesis. ***,**,* correspond to significance levels of 1%, 5% and 10%, respectively.

Table 3.7: OLS and Matching Estimation: Effects on Later Game

	Later Game Result					
	Less than Three Points			Three Points or More		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.46***	-0.41***	-0.58***	0.20	0.20	0.19
	(0.0202)	(0.0417)	(0.0537)	(0.166)	(0.158)	(0.159)
Standing Diff		0.018	0.015		0.0015	0.00039
		(0.0143)	(0.0122)		(0.0185)	(0.0182)
European Game (wk before)		-0.094	-0.14		-0.24***	-0.24***
		(0.120)	(0.113)		(0.0698)	(0.0740)
Home/Away		0.47***	0.73***		0.21	0.21
		(0.0495)	(0.124)		(0.190)	(0.204)
Standing Diff (Competitor)			0.028			0.0060**
			(0.0286)			(0.00257)
Home/Away (Competitor)			0.52***			-0.0040
			(0.138)			(0.0368)
ATT (Matching)	-0.49**			0.17		
	(0.215)			(0.166)		
R^2	0.038	0.091	0.132	0.005	0.025	0.025

The sample starts from game-week 8 and onwards. Standard errors are in parenthesis. ***,**,* correspond to significance levels of 1%, 5% and 10%, respectively.

Table 3.8: OLS and Matching Estimation: Effects on Later Game

	Later Game Result					
	Full Sample			Sub-Sample		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.29**	0.27*	0.36**	-0.065	-0.058	-0.045
	(0.144)	(0.144)	(0.147)	(0.187)	(0.184)	(0.188)
Standing Diff		0.029***	0.022**		0.0097	0.0093
		(0.00987)	(0.0101)		(0.0105)	(0.0106)
European Game (wk before)		-0.15	-0.15		-0.14	-0.14
		(0.109)	(0.109)		(0.115)	(0.116)
Home/Away		0.24***	0.37***		0.35***	0.37***
		(0.0908)	(0.103)		(0.0956)	(0.106)
Standing Diff (Competitor)			0.024**			0.0011
			(0.0101)			(0.0110)
Home/Away (Competitor)			0.22**			0.041
			(0.105)			(0.107)
ATT (Matching)	0.41***			0.09		
	(0.146)			(0.284)		
R^2	0.01	0.03	0.05	0.00	0.03	0.03

Standard errors are in parenthesis. ***,**,* correspond to significance levels of 1%, 5% and 10%, respectively.

Table 3.9: OLS and Matching Estimation: Effects on Later Game

	Later Game Result					
	Less than Three Points			Three Points or More		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.39	0.38	0.53**	-0.34	-0.30	-0.30
	(0.341)	(0.257)	(0.211)	(0.342)	(0.315)	(0.308)
Standing Diff		0.028***	0.019***		0.0063	0.0061
		(0.00246)	(0.00579)		(0.0127)	(0.0128)
European Game (wk before)		-0.13*	-0.14*		-0.16*	-0.16*
		(0.0761)	(0.0826)		(0.0857)	(0.0911)
Home/Away		0.69***	0.88***		0.23	0.23
		(0.0966)	(0.0395)		(0.195)	(0.205)
Standing Diff (Competitor)			0.018			0.00088
			(0.0145)			(0.00408)
Home/Away (Competitor)			0.35***			0.00097
			(0.0546)			(0.0442)
ATT (Matching)	1.08***			-0.37		
	(0.465)			(0.287)		
R^2	0.012	0.134	0.153	0.005	0.022	0.022

Standard errors are in parenthesis. ***,**,* correspond to significance levels of 1%, 5% and 10%, respectively.

Table 3.10: OLS and Matching Estimation: Effects on Later Game

	Later Game Result					
	Less than Three Points			Three Points or More		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.59***	0.61***	0.81***	-0.42	-0.38	-0.37
	(0.0508)	(0.0464)	(0.0258)	(0.342)	(0.301)	(0.305)
Standing Diff		0.014	0.010		0.0034	0.0020
		(0.0101)	(0.0119)		(0.0178)	(0.0173)
European Game (wk before)		-0.021	-0.028		-0.21**	-0.22**
		(0.0844)	(0.0602)		(0.0837)	(0.0883)
Home/Away (Competitor)		0.50***	0.78***		0.22	0.22
		(0.0413)	(0.117)		(0.196)	(0.201)
Standing Diff (Competitor)			0.023			0.0068*
			(0.0283)			(0.00370)
Home/Away (Competitor)			0.51***			0.010
			(0.130)			(0.0150)
ATT (Matching)	0.63***		-0.60			
	(0.155)		(0.386)			
R^2	0.029	0.091	0.128	0.008	0.026	0.027

Standard errors are in parenthesis. ***,**,* correspond to significance levels of 1%, 5% and 10%, respectively.

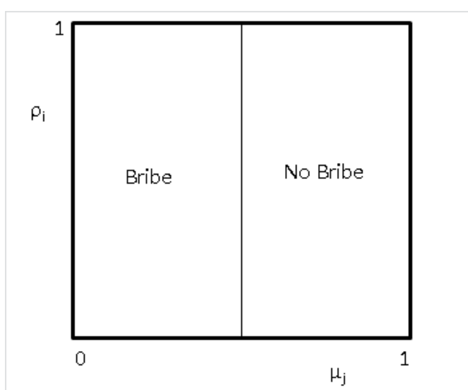
Appendix A

A.0.1 Fine Incidence

In (Basu 5) the author advocates letting only the public official take the sanctions of a bribe exchange and considering the act of bribe giving on the consumer side as legal, but only for "harassment" bribes. His claim is that enacting this policy would immediately reduce the incidence of bribery and increase the incentive of bribe reporting. This claim doesn't mean that the act of bribe giving becomes legal, just that the punishment or sanction is shifted onto the bribe taker only. Abbink et al. [1] set up an experiment to investigate this claim and conclude that the policy can potentially reduce bribe practices, but that the incentives for the bribe giver are weak and once retaliation by the bribe-taker is accounted for, then the effect of this policy diminishes. So implementing this policy in the field would face challenges.

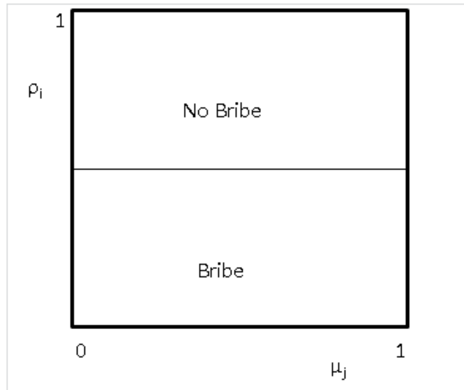
In the model, the extreme cases where the penalty falls only on the public official or consumer respectively the set of combinations where a bribe would take place is presented in Figure 6 and Figure 7. The equation of the line becomes $\mu_j = \frac{g-g'}{f}$ in Figure 4 and $\rho_i = \frac{g-g'}{F}$ in Figure 5.

Figure A.1: Fine falls on public official only



If μ_j and ρ_i are uniformly distributed then the share of the population that is involved in a bribe transaction is represented by the area of the square where a bribe would take place. In the extreme case where only the official takes the penalty or only

Figure A.2: Fine falls on the consumer only

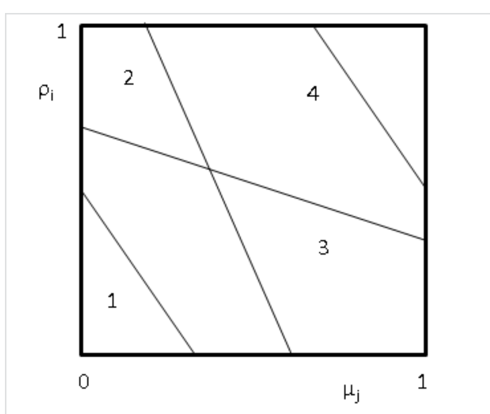


the consumer the area would be:

$$Area = \begin{cases} \mu_j = \frac{g-g'}{f} & \text{when only the public official is fined} \\ \rho_i = \frac{g-g'}{F} & \text{when only the consumer is fined} \end{cases}$$

There are four general cases of the population that engages in bribery depending on the parameters shown in Figure 8. The share of population that engages in bribery is calculated after some algebra below:

Figure A.3: Different Scenarios



$$Area = \begin{cases} 1: \frac{(g-g')^2}{2fF} & \text{intercepts } \mu_j < 1,\ \rho_i < 1 \\ 2: \frac{2g-2g'-F}{2f} & \text{intercepts } \mu_j < 1,\ \rho_i = 1 \\ 3: \frac{2g-2g'-f}{2F} & \text{intercepts } \mu_j = 1,\ \rho_i < 1 \\ 4: \frac{2fF-(g-g'-F)(g-g'-f)}{2fF} & \text{intercepts } \mu_j = 1,\ \rho_i = 1 \end{cases}$$

It would be interesting to see what happens to the share of population involved in a bribe transaction when both the bribe giver and bribe taker are punished, compared to when only one of them is punished. The areas above could be rewritten in this way:

$$Area = \begin{cases} 1: \frac{g-g'}{f}\frac{g-g'}{2F} & \text{intercepts } \mu_j < 1,\ \rho_i < 1 \\ 2: \frac{g-g'}{f} - \frac{F}{2f} & \text{intercepts } \mu_j < 1,\ \rho_i = 1 \\ 3: \frac{g-g'}{F} - \frac{f}{2F} & \text{intercepts } \mu_j = 1,\ \rho_i < 1 \\ 4: \frac{1}{2} - \frac{g-g'}{f}\frac{g-g'}{2F} - \frac{g-g'}{f}\frac{F+f}{2F} & \text{,intercepts } \mu_j = 1,\ \rho_i = 1 \end{cases}$$

In Case 2 it is clear that the share of population that is involved in bribery decreases when only the official is punished. The same happens in case 3 when only the consumer is punished. This contradicts the implication of (Abbink et al. 1). Results are not clear however, for the two other cases.

A.0.2 Income Distribution

In order to make sure the income distribution of this study is close to other surveys conducted in Albania, I compare income data from the survey used in this paper to the LSMS (Living Standards Measurement Survey) conducted by the World Bank. The comparison is done for the 2005 year. Nevertheless, the comparison can't be done in a complete way since in this paper's survey respondents' answer is based on an income bracket[1], whereas in LSMS households give their exact monthly income. Table A.1 shows the comparison by percentiles. The two surveys are pretty close to each other so income distribution is representative in this survey compared to LSMS and does not raise concern.

[1] In which income bracket does your family income fall in new Leks? 0 - No Income; 1 - Less than 10,000; 2 - 10,001-15,000; 3 - 15,001-20,000; 4 - 20,001-50,000; 5 - 50,001-80,000; 6 - 80,001-100,000; 7 - 100,001-150,000; 8 - 150,001-200,000; 9 - 200,001-300,000; 10 - More than 300,000.

Table A.1: Monthly Household Income Comparison

Percentiles	Author's Survey	LSMS
1%	No Income	0
5%	No Income	4,050
10%	$<$ 10,000	7,500
25%	10,000-15,000	14,000
50%	20,000-50,000	24,000
75%	20,000-50,000	40,000
90%	50,000-80,000	60,000
95%	80,000-100,000	80,000
99%	$>$ 300,000	150,000
Mean	3.434	37464
Std. Dev.	1.921	2380298
Variance	3.692	5.67E+12

This table compares monthly household income data of the survey used in this paper to LSMS data. The comparison is done for 2005.

Appendix B

Table B.1: Debt Crises

LV	Malawi 1982	Dominican Republic 1982 2005	Honduras 1981
Albania 1990	Mexico 1982	Ecuador 1982 1999 2998	Hungary 1960
Angola 1988	Moldova 2002	Dominican Republic 1975	India 1969 1972
Argentina 1982 2001	Morocco 1983	Ecuador 1999	Indonesia 1966 1998 2002
Bolivia 1980	Mozambique 1984	El Salvador 1981	Kenya 1994
Brazil 1983	Panama 1983	Indonesia 1997	Mexico 1982
Cameroon 1989	Peru 1978	Mexico 1982	Morocco 1983 1986
Chile 1983	Philippines 1983	Panama 1988	Nicaragua 1994
Congo, Dem. Rep. 1976	Russian Federation 1998	Peru 1985	Nigeria 2004
Congo, Rep. 1986	Senegal 1981	Russian Federation 1998	Panama 1983
Costa Rica 1981	Seychelles 2008	Sri Lanka 1996	Paraguay 1991 2003
Cote d'Ivoire 1984 2001	Sierra Leone 1977	Turkey 2001	Peru 1969 1976 1978 1980 1984
Dominica 2002	South Africa 1985	Venezuela, RB 1995	Philippines 1981
Dominican Republic 1982 2003	Sudan 1979	Zimbabwe 2006	Poland 1992
Ecuador 1982 1999 2008	Togo 1979	**RR External**	Russian Fed. 1991
Egypt, Arab Rep. 1984	Trinidad and Tobago 1989	Algeria 1991	South Africa 1985 1993
Gabon 1986 2002	Turkey 1978	Angola 1985	Sri Lanka 1979 1981
Gambia, The 1986	Ukraine 1998	Argentina 1965 1982 2001	Tunisia 1979
Greece 2012	Uruguay 1983 2002	Bolivia 1987	Turkey 1978 1982 2001
Grenada 2004	Venezuela, RB 1982	Brazil 1983 2002	Uruguay 1983 1990
Guyana 1982	Vietnam 1985	CAR 1981 1983	Uruguay 2003
Honduras 1981	Zambia 1983	Chile 1961 1963 1965	Venezuela 1983 1990 1995 2004
Indonesia 1999	**RR Domestic**	Chile 1972 1974 1983	Zambia 1983
Iran, Islamic Rep. 1992	Angola 1992	Costa Rica 1962 1981 1983	Zimbabwe 1969 2000
Jamaica 1978 2010	Argentina 1982 1989 2001	Cote d'Ivoire 1983	
Jordan 1989	Bolivia 1982, 1983, 1984	Egypt, Arab Rep. 1984	
Madagascar 1981	Brasil 1986, 1987, 1990, 2002	Guatemala 1986 1989	

This table shows debt crisis episodes from LV-Laeven and Valencia [30] and RR-Reinhart et al. [40].

Table B.2: Banking Crises

LV	Egypt, Arab Rep. 1980	Morocco 1980
Albania 1994	El Salvador 1989	Mozambique 1987
Algeria 1990	Eritrea 1993	Nepal 1988
Argentina 1980 1989 1995 2001	Finland 1991	Netherlands 2008
Armenia 1994	France 2008	Nicaragua 2000
Austria 2008	Germany 2008	Nigeria 2009
Azerbaijan 1995	Georgia 1991	Norway 1991
Bangladesh 1987	Greece 2008	Panama 1988
Belarus 1995	Guinea 1993	Paraguay 1995
Belgium 2008	Guyana 1993	Peru 1983
Benin 1988	Hungary 1991	Philippines 1983 1997
Bolivia 1986 1994	Iceland 2008	Poland 1992
Brazil 1990 1994	India 1993	Portugal 2008
Bulgaria 1996	Indonesia 1997	Romania 1990
Burkina Faso 1990	Ireland 2008	Russian Federation 1998 2008
Burundi 1994	Italy 2008	Senegal 1988
Cameroon 1987 1995	Jamaica 1996	Sierra Leone 1990
Cape Verde 1993	Japan 1997	Slovak Republic 1998
CAR 1976 1995	Jordan 1989	Slovenia 1992 2008
Chile 1976 1981	Kazakhstan 2008	Spain 1977 2008
China 1998	Kenya 1985 1992	Sri Lanka 1989
Colombia 1982 1998	Kyrgyz Republic 1995	Swaziland 1995
Congo, DR 1983 1991 1994	Latvia 1995 2008	Sweden 1991 2008
Congo, Rep. 1992	Lithuania 1995	Switzerland 2008
Costa Rica 1987 1994	Luxembourg 2008	Thailand 1983 1997
Cote d'Ivoire 1988	Macedonia, FYR 1993	Togo 1993
Croatia 1998	Madagascar 1988	Tunisia 1991
Czech Republic 1996	Malaysia 1997	Turkey 1982 2000
Denmark 2008	Mali 1987	Uganda 1994
Djibouti 1991	Mauritania 1984	Ukraine 1998 2008
Dominican Republic 2003	Mexico 1981 1994	United Kingdom 2007
Ecuador 1982 1998	Mongolia 2008	United States 1988 2007

This table shows banking crisis episodes from LV-Laeven and Valencia [30] and RR-Reinhart et al. [40].

Table B.3: Banking Crisis Cont.

Uruguay 2002	Hungary 1991 2008	Tunisia 1991
Venezuela, RB 1994	Iceland 1985 1993 2007	Turkey 1982 1991 1994 2000
Vietnam 1997	India 1993	United States 1984 2007
Yemen, Rep. 1996	Indonesia 1992 1994 1997	Uruguay 1983 2002
Zambia 1995	Italy 1990	Venezuela, RB 1978 1993
Zimbabwe 1995	Japan 1992	Zambia 1995
RR	Kenya 1985 1992	Zimbabwe 1995
Algeria 1990	Korea, Rep. 1983 1985 1997	
Argentina 1980 1989 1995 2001	Malaysia 1985 1997	
Australia 1989	Mexico 1981 1994	
Austria 2008	Morocco 1983	
Bolivia 1986 1994	Netherlands 2008	
Brazil 1985 1990 1994	New Zealand 1987	
Canada 1983	Nicaragua 1994 2000	
Central African Republic 1976 1988	Norway 1987	
Chile 1976 1982	Panama 1988	
China 1992	Paraguay 1995 2002	
Colombia 1982 1998	Peru 1983 1999	
Costa Rica 1987 1994	Philippines 1981	
Cote d'Ivoire 1988	Philippines 1997	
Denmark 1987 2008	Poland 1992	
Dominican Republic 1996 2003	Portugal 2008	
Ecuador 1981 1998	Romania 1990	
Egypt, Arab Rep. 1981 1990	Russian Fed. 1995 1998 2008	
El Salvador 1989	Singapore 1982	
Finland 1991	South Africa 1977 1989	
France 1994 2008	Spain 1977 2008	
Germany 1977 2008	Sri Lanka 1989	
Guatemala 1990 2001 2006	Sweden 1991	
Honduras 1999 2001	Thailand 1980 1996	

This table shows banking crisis episodes from LV-Laeven and Valencia [30] and RR-Reinhart et al. [40].

Table B.4: Currency Crises

LV	Georgia 1992 1999	Paraguay 2002
Albania 1997	Ghana 2009	Peru 1976 1981 1988
Algeria 1988 1994	Guatemala 1986	Philippines 1983 1998
Angola 1991 1996	Guinea 2005	Portugal 1983
Argentina 1975 1981 1987 2002	Guyana 1987	Romania 1996
Armenia 1994	Honduras 1990	Russian Federation 1998
Azerbaijan 1994	Iceland 1975 1981 1989 2008	Senegal 1994
Bangladesh 1976	Indonesia 1979 1998	Serbia 2000
Belarus 1994 1999 2009	Iran, Islamic Rep. 1985 1993 2000	Seychelles 2008
Benin 1994	Italy 1981	Sierra Leone 1983 1989 1998
Bolivia 1973 1981	Jamaica 1978 1983 1991	South Africa 1984
Brazil 1976 1982 1987 1992 1999	Jordan 1989	Spain 1983
Bulgaria 1996	Kazakhstan 1999	Sri Lanka 1978
Burkina Faso 1994	Kenya 1993	Sudan 1988 1994
Cameroon 1994	Kyrgyz Republic 1997	Suriname 1990 1995 2001
Central African Republic 1994	Lao PDR 1986 1997	Swaziland 1985
Chile 1972 1982	Latvia 1992	Sweden 1993
Colombia 1985	Lesotho 1985	Tajikistan 1999
Comoros 1994	Madagascar 1984 1994 2004	Tanzania 1990
Congo, Dem. Rep. 1976 1983 1989 1994 1999 2009	Malawi 1994	Thailand 1990 1998
Congo, Rep. 1994	Malaysia 1998	Togo 1994
Costa Rica 1981 1991	Mali 1994	Trinidad and Tobago 1986
Cote d'Ivoire 1994	Mauritania 1993	Turkey 1978 1984 1991 1996 2001
Dominican Republic 1985 1990 2003	Mexico 1977 1982 1995	Turkmenistan 1993
Ecuador 1982 1999	Moldova 1999	Uganda 1988
Egypt, Arab Rep. 1979 1990	Mongolia 1990 1997	Ukraine 1998 2009
El Salvador 1986	Morocco 1981	Uruguay 1983 1990 2002
Ethiopia 1993	Mozambique 1987	Uzbekistan 1994 2000
Fiji 1998	Namibia 1984	Venezuela, RB 1984 1989 1994 2002 2010
Finland 1993	Nepal 1984 1992	Vietnam 1987
Gabon 1994	Pakistan 1972	Yemen, Rep. 1995
Gambia, The 1985 2003	Papua New Guinea 1995	Zambia 1983 1989 1996 2009

This table shows currency crisis episodes from LV-Laeven and Valencia [30] and RR-Reinhart et al. [40].

Table B.5: Currency Crises Cont.

RR	Italy 1976 1992 2005
Algeria 1988 1994	Japan 1979
Angola 1991 1996 2000 2009	Kenya 1976 1981 1989 1991 1999 2008
Argentina 1965 1967 1969 1974 1984 1986 2002	Korea, Rep. 1970 1975 1979 1997 2008
Australia 1976 1982 1985 1997 2000 2008	Malaysia 1997
Austria 2005	Mauritius 1979 1981 1983 1997
Belgium 2005	Mexico 1976 1982 1989 1994 1998 2008
Bolivia 1972 1979 1982 1987 1989	Morocco 1985
Brazil 1965 1968 1971 1974 1977 1987 1990 1994 1999 2001 2008	Netherlands 2005
Canada 2008	New Zealand 1981 1984 1997 2008
Central African Republic 1994	Norway 1982 1986 2008
Chile 1960 1962 1967 1969 1976 1982 1987 1989 2008	Paraguay 1992 1998 2001
China 1984 1986 1989 1994	Peru 1968 1976 1987 1998
Colombia 1965 1967 1976 1980 1995 1997 2002	Philippines 1962 1971 1983 1990 1997 2000
Costa Rica 1974 1981 1987 1991 1995	Poland 1992 1995 1999 2008
Cote d'Ivoire 1994	Portugal 1976 1981 2005
Denmark 2010	Romania 1990 2008 2010
Dominican Republic 1985 1987 1990 2002	Russian Federation 1990 1999 2008
Ecuador 1971 1982 1995	Singapore 1997
Egypt, Arab Rep. 1979 1990 2001 2003	South Africa 1981 1984 1988 1996 1998 2000 2008
El Salvador 1973 1988	Spain 1977 1982 1993 2005
Finland 1992	Sri Lanka 1968 1977 1980 1983 1989
France 1976 2005	Sweden 1977 1982 1992 2005 2008
Germany 1984 1997 1999 2005	Thailand 1984 1997 2000
Guatemala 1986 1989	Tunisia 1965 1974 1978 1986
Honduras 1990 1993 1996	Turkey 1971 1977 1978 2008
Hungary 1968 1982 1989 1991 1993 1995 1999	United States 1971 1975 2002
Iceland 1974 1988 2008	Uruguay 1983 1994 2001
India 1967 1984 1988 1991 1993 2008	Venezuela, RB 1984 1986 1989 2002 2004 2010
Indonesia 1962 1966 1978 1983 1997 2000 2008	Zambia 1977 1983 1988 1998 2000 2008
Ireland 2005	Zimbabwe 1977 1982 1988 1993 1996 2000 2003

This table shows currency crisis episodes from LV-Laeven and Valencia [30] and RR-Reinhart et al. [40].

Appendix C

Table C.1: Distribution of Later Game: Is it Fair?

Played Later Game	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013
Scotland											
Celtic	12	13	12	20	11	19	16	20	17		
Rangers	9	18	20	7	21	18	21	16	16		
Spain											
Barcelona							18	12	14	18	19
Madrid							17	24	21	16	16
Germany											
Dortmund										8	9
Bayern										14	10

This table shows the distribution of Later Games by League and competitor for each league.

Table C.2: Summary Statistics - Scottish Premiership

	Full		Simultaneous Games		Non-Simultaneous Games	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.30	1.14	2.07	1.30	2.36	1.08
Home (pct)	0.47	0.50	0.70	0.46	0.41	0.49
Score Differential	1.33	1.68	1.08	1.82	1.39	1.64
Standing Differential	4.59	3.45	2.47	3.61	5.15	3.19
Point Differential	17.92	15.37	12.34	17.59	19.39	14.41
Earlier Game						
Points Collected	2.32	1.12	1.79	1.39	2.46	0.99
Home (pct)	0.53	0.50	0.26	0.44	0.61	0.49
Score Differential	1.42	1.74	0.62	1.92	1.63	1.63
Standing Differential	4.45	3.51	2.74	3.33	4.90	3.41
Point Differential	17.10	14.87	12.91	15.92	18.21	14.40
Observations	363		77		286	

This table shows summary statistics for Earlier and Later Games for the full sample for the Scottish Premiership. Statistics are shown also grouped by simultaneous and non-simultaneous games.

Table C.3: Summary Statistics - Bundesliga

	Full		Simultaneous Games		Non-Simultaneous Games	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.22	1.17	2.07	1.27	2.32	1.11
Home (pct)	0.43	0.50	0.59	0.50	0.34	0.48
Score Differential	1.79	2.11	1.63	2.20	1.90	2.06
Standing Differential	7.84	4.93	7.48	5.09	8.07	4.87
Point Differential	14.62	12.83	13.22	14.93	15.54	11.34
Earlier Game						
Points Collected	2.37	1.16	2.33	1.30	2.39	1.07
Home (pct)	0.57	0.50	0.48	0.51	0.63	0.49
Score Differential	1.53	1.82	1.56	1.76	1.51	1.87
Standing Differential	6.21	5.71	5.48	6.70	6.68	4.97
Point Differential	13.01	13.92	13.52	16.72	12.68	11.94
Observations	68		27		41	

This table shows summary statistics for Earlier and Later Games for the full sample for the German Bundesliga. Statistics are shown also grouped by simultaneous and non-simultaneous games.

Table C.4: Summary Statistics - Primera Division

	Full		Simultaneous Games		Non-Simultaneous Games	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.41	1.07	1.57	1.34	2.48	1.02
Home (pct)	0.52	0.50	0.86	0.36	0.50	0.50
Score Differential	1.84	2.00	0.43	2.47	1.95	1.92
Standing Differential	7.48	6.10	3.50	6.11	7.79	6.00
Point Differential	18.96	15.85	9.36	20.42	19.73	15.24
Earlier Game						
Points Collected	2.44	1.05	1.64	1.45	2.51	0.99
Home (pct)	0.48	0.50	0.14	0.36	0.50	0.50
Score Differential	1.80	1.84	0.43	2.41	1.91	1.75
Standing Differential	9.06	5.98	2.64	6.51	9.58	5.65
Point Differential	21.11	15.53	11.57	18.60	21.87	15.06
Observations	189		14		175	

This table shows summary statistics for Earlier and Later Games for the full sample for the Spanish Primera Division. Statistics are shown also grouped by simultaneous and non-simultaneous games.

Table C.5: Summary Statistics - Scottish Premiership

	Full		Treated		Untreated	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.30	1.14	2.27	1.18	2.38	1.03
Home (pct)	0.47	0.50	0.40	0.49	0.64	0.48
Score Differential	1.33	1.68	1.31	1.76	1.37	1.47
Standing Differential	4.59	3.45	4.87	3.42	3.86	3.44
Point Differential	17.92	15.37	18.95	15.28	15.27	15.36
Earlier Game						
Points Collected	2.32	1.12	3.00	0.00	0.59	0.49
Home (pct)	0.53	0.50	0.62	0.49	0.31	0.47
Score	1.42	1.74	2.21	1.30	-0.61	0.89
Standing Differential	4.45	3.51	5.00	3.44	3.04	3.27
Point Differential	17.10	14.87	18.78	14.56	12.79	14.87
Observations	363		261		102	

This table shows summary statistics for Earlier and Later Games for the full sample for the Scottish Premiership. Statistics are shown also grouped by treated and untreated.

Table C.6: Summary Statistics - Bundesliga

	Full		Treated		Untreated	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.22	1.17	2.04	1.24	2.78	0.65
Home (pct)	0.43	0.50	0.38	0.49	0.56	0.51
Score Differential	1.79	2.11	1.58	2.13	2.50	1.95
Standing Differential	7.84	4.93	8.31	5.10	7.33	4.19
Point Differential	14.62	12.83	16.50	12.90	11.22	11.88
Earlier Game						
Points Collected	2.37	1.16	3.00	0.00	0.56	0.51
Home (pct)	0.57	0.50	0.60	0.49	0.44	0.51
Score Differential	1.53	1.82	2.31	1.27	-0.67	0.91
Standing Differential	6.21	5.71	7.35	5.83	3.56	4.57
Point Differential	13.01	13.92	16.06	14.55	6.22	9.28
Observations	68		51		17	

This table shows summary statistics for Earlier and Later Games for the full sample for the German Bundesliga. Statistics are shown also grouped by treated and untreated.

Table C.7: Summary Statistics - Primera Division

	Full		Treated		Untreated	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Later Game						
Points Collected	2.41	1.07	2.44	1.05	2.33	1.13
Home (pct)	0.52	0.50	0.52	0.50	0.53	0.50
Score Differential	1.84	2.00	1.87	2.03	1.72	1.89
Standing Differential	7.48	6.10	8.06	5.77	5.49	6.79
Point Differential	18.96	15.85	20.28	15.99	14.49	14.71
Earlier Game						
Points Collected	2.44	1.05	3.00	0.00	0.56	0.50
Home (pct)	0.48	0.50	0.53	0.50	0.26	0.44
Score Differential	1.80	1.84	2.51	1.37	-0.60	1.05
standingdifferential1	9.06	5.98	9.36	5.73	8.05	6.75
Point Differential	21.11	15.53	21.47	15.19	19.91	16.75
Observations	189		146		43	

This table shows summary statistics for Earlier and Later Games for the full sample for the Spanish Primera Division. Statistics are shown also grouped by treated and untreated.

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