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Religion, Politics, and Development

Essays in Development Economics and Political Economics

Erik Meyersson

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Abstract

This thesis consists of three essays in development and political economics.

"Islamic Rule and the Emancipation of the Poor and Pious". I estimate the impact of Islamic rule on secular education and labor market outcomes with a new and unique dataset of Turkish municipalities. Using a regression discontinuity design, I compare elections where an Islamic party barely won or lost municipal mayor seats. The results show that Islamic rule has had a large positive effect on education, predominantly for women. This impact is not only larger when the opposing candidate is from a secular left-wing, instead of a right-wing party; it is also larger in poorer and more pious areas. The participation result extends to the labor market, with fewer women classified as housewives, a larger share of employed women receiving wages, and a shift in female employment towards higher-paying sectors. Part of the increased participation, especially in education, may come through investment from religious foundations, by providing facilities more tailored toward religious conservatives. Altogether, my findings stand in contrast to the stylized view that more Islamic influence is invariably associated with adverse development outcomes, especially for women. One interpretation is that limits on religious expression, such as the headscarf ban in public institutions, raise barriers to entry for the poor and pious. In such environments, Islamic movements may have an advantage over secular alternatives.

"Islam and Long-Run Development". I show new evidence on the long-run impact of Islam on economic development. Using the proximity to Mecca as an instrument for the Muslim share of a country's population, while holding geographic factors fixed, I show that Islam has had a negative long-run impact on income per capita. This result is robust to a host of geographic, demographic and historical factors, and the impact magnitude is around three times that of basic cross-sectional estimates. I also show evidence of the impact of Islam on religious influence in legal institutions and women's rights, two outcomes seen as closely associated with the presence of Islam. A larger Islamic influence has led to a larger religious influence in legal institutions and lower female participation in public institutions. But it has

also had a positive impact on several measures of female health outcomes relative to men. These results stand in contrast to the view that Islam has invariably adverse consequences for all forms of women's living standards, and instead emphasizes the link between lower incomes and lower female participation in public institutions.

"The Rise of China and the Natural Resource Curse in Africa".   The rapid emergence of China as one of the largest buyers of African oil has raised numerous concerns regarding not just the economic consequences, but also those related to the development of democratic institutions and respect for human rights. We produce a new empirical strategy to estimate the causal impact of selling oil to China on economic and political development, using an instrumental variables design based on China's economic rise and consequent demand for oil in interaction with the pre-existence of oil in Sub-Saharan Africa. We find that selling oil to China is unique in having large positive growth effects, improvements in the terms of trade, while not lowering the manufacturing share of GDP or the labor for participation rate in any meaningful way. In contrast to what simple cross-sectional comparisons reveal, we also find either no, or negligible, negative impacts on the development of democratic institutions, and in the latter case, the impacts are similar to those of selling oil to the rest of the World. Furthermore, the consequences for human rights is surprisingly, if anything, marginally positive. In short, we provide strong new evidence that the characteristics of the trading partner matters. In the case of Africa, the Chinese oil trade has served as a crucial injection in a region where growth has been chronically low, without causing meaningful detrimental consequences for political development.

To my parents and grandparents.

Acknowledgments

The road to my PhD was never straight nor in any way taken for granted, the least of all by myself. It was not decided at an early stage that I should become a PhD economist, nor did it always seem for sure that I would manage to finish it. Instead it has become the consequence of a desire to do what interests me: social science research. This desire, although economics is my main field, has been one without discrimination – during the process of writing my dissertation, I have found useful guidance and leads pouring over books in history, political science, sociology, and, occasionally, anthropology. This has not only made the process a lot more fun, but has also been useful in determining whether a certain topic may be important in more than one field.

Another crucial source of inspiration is the press. With few exceptions, almost all my research projects have come, less from economics journals, than from reading news articles, be it The New York Times, The Financial Times, or The Economist. The most influential articles have been those having two characteristics. The first is a well-versed, insightful representation of a topic's stylized facts. The other is that I have found the representation of the stylized facts, as well as the conclusion, dead wrong or at least seriously flawed.

Throughout my PhD studies, I have been surrounded with people willing and able to help me in my endeavor. Josh Billings, the American writer, is attributed with a quote that sums up my feelings about this:

> "About the most originality that any writer can hope to achieve honestly
> is to steal with good judgment."

Indeed, several people have contributed to the making of this thesis, and I am indebted and grateful to all of them.

The patience and invaluable assistance of my adviser Torsten Persson and co-adviser David Strömberg, have been instrumental in setting me on the right course to obtaining my PhD. It has been a true privilege for me that they should have been the ones to bear the brunt of my most preliminary, ambitious, and sometimes slightly crazy ideas for economic research throughout my time at IIES.

During my two years in Cambridge, I was fortunate enough to get to work with Philippe Aghion, and I have benefited much from his mentorship, generosity, and insight in discussions as well as coursework.

in the first place.

A number of people have been influential to my research in a more indirect sense. A particular thanks is due to Avinash Dixit, for providing insight into almost every research topic I have ever been interested in, as well as being a tremendous source for suggesting good history books (which partly explains my love for history). I am also grateful to Peter Högfeldt, who taught me not to shy away from important but contentious topics.

Last, but not least, I owe a great deal of support to my nearest family – my mother Eva, my father Lars; my grandparents Per-Martin, Ulla, Maj-Britt, and Gustaf – all to whom the thesis is dedicated. In addition, I thank Selva for tough discussions about Turkey, a no-nonsense approach to proof-reading, and for being an invaluable source of support for me.

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Erik Meyersson

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Chapter 1

Introduction

"The trouble with most folks ain't so much their ignorance as knowing so many things that ain't so." – Josh Billings

This thesis consists of three essays in development and political economics. The essays are all self-contained, and range from issues as diverse as Political Islam to Chinese economic intervention in Africa But a common denominator is the focus on taking issue with stylized facts regarding relevant topics. Stylized facts, a term coined by Nicholas Kaldor, are an important component in most economics research, because it facilitates appropriate abstractions on which a theoretical model can be constructed:

"Since facts, as recorded by statisticians, are always subject to numerous snags and qualifications, and for that reason are incapable of being accurately summarized, the theorist, in my view, should be free to start off with a stylized view of the facts – i.e. concentrate on broad tendencies, ignoring individual detail, and proceed on the 'as if' method, i.e. construct a hypothesis that could account for these 'stylized' facts, without necessarily committing himself on the historical accuracy, or sufficiency, of the facts or tendencies thus summarized." – Kaldor [5].

While Kaldor's stylized facts were meant specifically to guide formulation of theoretical models of economic growth, established empirical regularities play an important role in many other areas of economics. Importantly, stylized facts often leave their mark on policy decisions, and these facts do not always emanate from academic research examining causal relationships, but out of either statistical associations or "common wisdom". In such cases, a problem may arise regarding stylized facts where there

"... is no doubt that they are stylized, though it is possible to question whether they are facts" – Solow [8].

Throughout this thesis, the main motivation has been to get the facts right on causal relationships, occasionally coming up with such running counter to the stylized facts. The main goal of my papers is not an attempt to overturn previously held views and replace them with new ones. Instead, I aim to achieve two ends. One is to purge deeper into the true causal relationship of a topic, that comes equally out of a personal-, as well as a more general, interest. The other is to show that, in situations where economic agents face institutional constraints, stylized facts and commonly held wisdom may be unhelpful, and sometimes even counterproductive, for policy decisions. Interest in this phenomenon comes out of the large literature on the importance of institutions as well as recent innovations in the microeconometric literature on causal effects.[1]

One topic where this point is particularly important concerns the living standards for women in Muslim countries in conjunction with Islamic participation in democratic politics. In several countries, from Afghanistan to Turkey, the compatibility of political Islam and democratic institutions remains hotly debated. Stylized facts say that economic development outcomes, for women in particular, are worse in areas under Islamic political control than those under secular political control. Political elites in countries like Algeria and Turkey have occasionally responded by banning Islamic political parties from the democratic process. Under the assumption that any unfortunate outcome is a direct causal effect of a particular party, such regulation may prove welfare-enhancing. Yet, in a situation where parties simply cater to voter preferences, and the cause of the outcome is instead due to voter characteristics, banning a party may simply serve to exclude certain groups of voters from the democratic process. This poses a significant problem for implementation of democratic institutions in the Muslim World, but so far no research has so far been able to disentangle the causal development impact of Islamic political representation.

Two research papers that have been quite influential in the development of the ideas in this thesis are those of Henderson and Kuncoro ([3]) and Jha ([4]). In the first paper focusing on Indonesia, corruption is found to decline in areas that saw increases in political representation by Islamic parties. An attempt at uncovering the causal effect of Islamic party representation on corruption used variation coming

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[1] On institutions, see Acemoglu et al [1]. For a review of recent innovations in discovering causal effects, see the surveys in Angrist and Pischke [2], and Lee and Lemieux [7].

from a measure of geographic distance to the coast, to account for the fact that historically, Islam spread through Indonesia from the coast and inwards. Yet, as Jha's [4] paper on trade institutions and internal conflict showed, proximity to the coast is correlated not just with the spread of Islam but also with the implementation of a particular set of trade institutions, which could have persistent effects on the outcome in question. Thus, the need for a proper identification of the causal impact of Islamic rule on any development-related outcome needs to be able to distinguish changes in political control from underlying institutional and other historical factors. I claim to be the first to accomplish this task.

Chapter 2 of this thesis shows that, in Turkey during the 1990s, an Islamic party flirting with Sharia law, ended up increasing female participation in secular education more than secular parties did. Due to an institutional setting where female participation in secular post-primary education is contingent on not wearing a headscarf, a democratically-elected Islamic party alleviated constraints to participation among the poor and pious by, for example, investing in add-on education facilities such as Koranic study centers and Islamic dormitories. This way, the Turkish case stands out in contrast to the stylized fact that Islamic influence should, invariably, have detrimental consequences for women's rights.

The findings of this project spurred another one focusing on the long-run development impact of Islam. As Timur Kuran [6] puts it,

> "if one challenge of the social sciences is to account for the rise of the West, another is to explain how the Islamic Middle East became an underdeveloped region."

Given the enormous effort put into explaining the rise of the West, it is surprising that so little of current economics research has been spent to explain the economic and political underdevelopment of the Islamic World. Still, the literature on why Muslim countries are poorer than non-Muslim countries is full of possible explanations and hypotheses. Stylized facts overwhelmingly suggest that areas under more Islamic influence suffered worse development outcomes in the long-run. This seems especially pronounced for women's rights, be it in terms of participation in public institutions or health outcomes. Yet so far, little work as focused on precisely the causal long-run development impact of Islam. Chapter 3 of this thesis, which uses variation in adherence to Islam driven by geographic factors, shows that while Islam has indeed had a negative long-run impact on economic development, its impact on women's rights is more nuanced than previously shown. Women in Muslim

countries do participate at a much lower rate in education, the labor market, and government. But in contrast to a widely view, Islam has instead resulted in relative better health outcomes for women. Again, the simple statistical association hides the possibility that Islam served to improve women's health outcomes in societies where women's rights were already low.

A completely different topic also serves as an example where stylized facts points in one direction without much academic research to back it up. Together with Gerard Padro i Miquel and Nancy Qian, we take exception to how the Western media has proclaimed the adverse development consequences, of Africa selling its natural resources to China. This has struck a raw nerve in the developed world, not just due to China's rapid increasing importance vis-a-vis Western countries, but also due to China's willingness to trade with African countries ostracized by the West for human rights abuse. The result, detractors claim, is an erosion of democratic institutions, the removal of constraints for committing violations of human rights, and a growth-reducing reliance on resource sectors. A central point of evidence for such claims are basic statistical associations – countries selling resources to China have worse political and economic development outcomes.

Here the importance of acting under institutional constraints is again crucial. The statistical associations are consistent with a story of where trading with China has negative causal effects. But they are also consistent with a story of selection: that countries with a bad human rights record or institutions choose to trade more with China because of less restrictions. The innovation in Chapter 3 is thus an empirical strategy using a combination of exogenous demand and supply, coming from China's increased demand for resources, and the existence of this resource in a limited set of African countries. Again, in contrast to the stylized facts in this case, we fail to find meaningful negative consequences for democratic institutions or the propensity to commit human rights abuse. Instead, African countries have experienced substantial higher economic growth as a direct result of the Chinese resource trade.

The tools used include standard methods for estimating causal effects in economics, but this thesis is equally inspired by research from other social sciences including anthropology, history, political science, and sociology.

Chapter 2 "Islamic Rule and the Emancipation of the Poor and Pious".
How does Islamic political representation affect economic development? Turkey is a particularly good testing ground for testing this hypothesis. First, it is one

of a very small number of countries that have experienced Islamic participation in the democratic process for a long period. It is also a large Muslim country – together with Indonesia, it is one of two Muslim countries ranking in the top 20 in both population as well as GDP. Despite being founded as a secular republic, recent migration from rural and socially conservative areas into the cities has made the median voter both poorer and more pious. As a result, Turkey experienced a seismic political change in the 1994 local elections when an Islamic party became the second largest receiver of votes nationally, winning metropolitan mayor offices in both Istanbul and Ankara. This gave political Islam unprecedented representation in the democratic system and accelerated a debate on religious expression in public spaces, which has continued until today.

I estimate the impact of Islamic rule on secular education and labor market outcomes with a new and unique dataset of Turkish municipalities, that I've constructed from different sources. Using a regression discontinuity design, I compare elections where an Islamic party barely won or lost municipal mayor seats. The results show that Islamic rule has had a large positive effect on education, predominantly for women. This impact is not only larger when the opposing candidate is from a secular left-wing, instead of a right-wing party; it is also larger in poorer and more pious areas.

While it is difficult to isolate precisely *how* the Islamic party is able to increase participation in education, an examination of urban planning policies suggests one plausible channel. Local governments have relatively little official responsibility for education policy and thus face a challenge of meeting local demands for this type of public goods. In this situation, economically powerful religious foundations, *vakıflar*, have become important allies of the Islamic party by building schools, dormitories and in general targeting their activities to municipalities ruled by the Islamic party. Such infrastructure has often been seen with suspicion by secularists in Turkey.

I show that municipalities with an Islamic mayor did not significantly shift the allocation of urban space towards more education-related buildings. But they did experience a shift in the composition of education buildings toward increased *vakıf* ownership. *Vakıf*-owned student dormitories, exempt from public monitoring by the Ministry of Education, often house prayer rooms and facilitate extra-curricular religious courses. Such private "add-on" features to the centrally-governed education system in Turkey may have played an important role in convincing relatively moderate Muslims to send their uncovered daughters to secular high school.

Islamic rule may have affected female participation in a broader fashion—not

only by inducing education but also by providing better opportunities for the already educated. Examining economic activity, forms of income, and sector employment in Turkish cities, I find broad evidence of improvements for women in the labor market. Having an Islamic mayor led to fewer women classified as housewives, more salaried employed women, and sector shifts away from agriculture (for women) and construction (for men) towards the service sector.

Altogether, my findings stand in contrast to the stylized view that more Islamic influence is invariably associated with adverse development outcomes, especially for women. One interpretation is that limits on religious expression, such as the headscarf ban in public institutions, raise barriers to entry for the poor and pious. In such environments, Islamic movements may have an advantage over secular alternatives.

Chapter 3 "Islam and Long-Run Development".   Once centers of science and philosophy, Muslims countries are today poorer than non-Muslim ones. In 2000 the group of countries above the median population share of Muslims had just a third of the income per capita of the group below the median. Currently, a quarter of the world's population adhere to Islam, making the link between Islam and income an important issue for development. I use geographical characteristics in the spread of Islam, the proximity to Mecca, as an exogenous source of variation to examine the long-run development impact of Islam. Specifically, whether a country received more or less Islamic influence depended on its distance from Mecca, the holy site of Islam – in fact, around a third of the total variation in the population share of Muslims can be explained by this distance alone. Under the assumption that this distance measure, holding other relevant geographical and climatic factors fixed, only affects development through Islamic influence, an instrumental variable (IV) approach can be implemented.

I find large negative IV estimates of the Muslim share of population on income per capita, around three times the magnitude of standard OLS estimates. A one standard deviation higher fraction of Muslims in the year 1900 would have led to half a standard deviation lower income per capita in 2000. This result is robust not only to controlling for various geographic, geological, and climatic underlying conditions, but also to a host of demographic and historical factors. Importantly, the negative development impact of Islam is not dependent on outcomes in the Middle East.

I also examine the impact on two stylized components of Islamic influence: the religious influence in legal institutions, and women's rights. Countries with a larger population share of Muslims exhibit legal systems more influenced by religious doc-

trine, as well as lower female participation in public institutions such as labor markets, education, and politics. However, the same specified process that led to these outcomes has also improved female, relative to male, health outcomes. Women in Muslim countries live longer relative to men, exhibit lower relative mortality rates across all age groups, and have lower adolescent fertility rates. This muddles the view that Islam is invariably detrimental to women's living standards, and instead underlines the link between lower income levels and low female participation in public institutions.

Chapter 4 "The Rise of China and the Natural Resource Curse in Africa". The rapid emergence of China as one of the largest buyers of African oil and other raw materials has raised numerous concerns regarding not just the economic consequences, but also the consequences for democratic institutions and respect for human rights. A strict interpretation of the principle of sovereignty has allowed close contact, investment, and official development aid to regimes with dubious political, economic and human rights records. Such dealings have generated accusations against China ranging from the abetting of genocidal regimes to the creation of a "League of Dictators" to serve as a buffer to Western influence in the developing world.

We propose a new empirical strategy to estimate the causal impact of selling oil to China on economic and political development. The strategy relies on an instrumental variables design based on China's economic rise and consequent demand for oil in interaction with the pre-existence of oil in Sub-Saharan Africa. We find that selling oil to China, rather than to the rest of the World, has large positive growth effects, improvements in the terms of trade, while it does not lower the manufacturing share of GDP or labor force participation in any meaningful way. In contrast to simple cross-sectional comparisons, we also find no, or negligible, negative impacts on democratic institutions. In cases where we do find a small effect, the impacts are similar to those of selling oil to the rest of the World. Furthermore, the consequences for human rights is, if anything, marginally positive. In short, we provide new evidence that the characteristics of the trading partner matters. In the case of Africa, the Chinese oil trade has served as a crucial injection in a region where growth has been chronically low, without any detrimental consequences for political development.

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Chapter 2

Islamic Rule and the Emancipation of the Poor and Pious[*]

1   Introduction

Does Islamic rule prevent or facilitate development? On the one hand, research in both economics and political science has documented a negative association between more Islamic influence and various development outcomes (see, for example Barro and McCleary [5]; and Kuran [25]). Women are often singled out as particularly vulnerable to Islamic rule (Fish [15]; and Donno and Russett [11]), raising the question whether they are specifically constrained from participating in education and the labor market. Indeed, many Muslim countries rank poorly in gender equality comparisons because of limited participation, especially in secondary education as well as in the labor force.[1]

On the other hand, a different branch of research documents Islamic organizations' effectiveness in improving the living conditions of underrepresented groups

[1]   Women's Empowerment: Measuring the Global Gender Gap, World Economic Forum, www.weforum.org/pdf/Global_Competitiveness_Reports/Reports/gender_gap.pdf

(see, for example Arat [2], Hefner [20], Yavuz [45], and White [40]). This may occur especially when restrictions on religious expression make participation more difficult for religious conservatives.[2] In such circumstances, religious political movements may have a distinct advantage over secular alternatives.

Turkey is a particularly good testing ground for evaluating these contradicting views. It is one of the few countries that have experienced Islamic party participation in the democratic process for a long period. Despite the country being founded as a secular republic, recent migration from rural and socially conservative areas into the cities has made the urban voter poorer and more pious (Rabasa et al. [35]). As a result, Turkey experienced a seismic political change in the 1994 local elections when an Islamic party became the second largest receiver of votes nationally, winning metropolitan mayor offices in both Istanbul and Ankara. This gave political Islam unprecedented representation in the democratic system and accelerated a debate on religious expression in public spaces, which has continued until today.

I study the consequences of this political change using a new and unique dataset of Turkish municipal elections in 1994 and outcomes from the 2000 Population Census. This dataset allows me to track circa 2,700 municipalities, and ask if having a mayor from an Islamic party had any effects on education and labor market outcomes.

Naturally, it is difficult to isolate the causal effect of Islamic rule on development outcomes such as education. Since it is hard to disentangle the effect of Islamic political representation from the effect of underlying demographic trends, an estimate of the causal impact has remained elusive. However, as many local elections are determined with a thin margin for the winning party, a regression discontinuity (RD) design can be implemented. This allows me to estimate a meaningful causal treatment effect by comparing outcomes after elections where an Islamic mayor barely won or barely lost. A convenient consequence of this particular RD design is that the definition of closeness in an electoral environment with many parties provides a heterogenous group of close elections with varying underlying political support. This makes it possible to think of the ensuing estimates as representative and meaningful

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[2] Such restrictions include the ban on wearing headscarves for women in Turkey and other European countries like France (Saul [37]). But they may also include restrictions of to what extent Islamic organizations can participate in the political process. In both Algeria and Turkey, electorally successful Islamic parties have been banned for being too religious (Roy [36]).

for a highly relevant subset of elections.

My results show that Islamic rule in Turkey led to substantially higher education, in particular for women. A municipality that in 1994 received a near-randomly assigned Islamic mayor had, six years later, a 3 percentage point higher share of women with high school degrees in the ages 15-20 than secular-run municipalities. I find similar impacts on enrollment but in contrast, I find no evidence of any causal effect on neither religious education, which exists as a voluntary alternative to secular secondary education in Turkey, nor primary education, which is mandatory.

I argue that this impact comes through the Islamic parties' advantage in mobilizing and increasing access to education for the poor and pious. Education in Turkey is highly correlated with economic status, where children from poorer households face higher opportunity costs of attending education as well as higher barriers to attend better schools.[3] In addition, social constraints such as the ban on wearing the headscarf in public institutions further raise the barriers to participation in more religiously conservative areas.

Consistent with this, I find that the increase in educational attainment is higher in poorer and more pious areas. An analysis using quantile RD shows that the impact of Islamic rule was relatively larger in lower education quantiles. Furthermore, I use multiple measures of religiosity to show that Islamic rule had larger impacts in more religious areas. This is consistent with poor and pious women being more constrained by for example the headscarf ban, and the Islamic party being more capable in improving women's access to education.

While it is difficult to isolate precisely *how* the Islamic party is able to increase participation in education, an examination of urban planning policies suggests one plausible channel. Local governments have relatively little official responsibility for education policy and thus face a challenge of meeting local demands for this type of public goods. In this situation, economically powerful religious foundations, *vakıflar*, have become important allies of the Islamic party by building schools, dormitories and in general targeting their activities to municipalities ruled by the Islamic party. Such infrastructure has often been seen with suspicion by secularists in Turkey.

I show that municipalities with an Islamic mayor did not significantly shift the

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[3] Admission to both high school and university education is partly determined by national exams. Performing well in such exams often requires private tuition, which not all students can afford (OECD, [33])

allocation of urban space towards more education-related buildings. But they did experience a shift in the composition of education building ownership toward increased *vakıf* ownership. *Vakıf*-owned student dormitories, exempt from public monitoring by the Ministry of Education, often house prayer rooms and facilitate extra-curricular religious courses. Such private "add-on" features to the centrally-governed education system in Turkey may have played an important role in convincing relatively moderate Muslims to send their uncovered daughters to secular high school.

Islamic rule may have affected female participation in a broader fashion—not only by inducing education but also by providing better opportunities for the already educated. Examining economic activity, forms of income, and sector employment in Turkish cities, I find broad evidence of improvements for women in the labor market. Having an Islamic mayor led to fewer women classified as housewives, more salaried employed women, and sector shifts away from agriculture (for women) and construction (for men) towards the service sector.

While there exists a substantial literature on the economic effects of political parties (Ferreira and Gyorko [14], Lee et al. [28], Pettersson-Lidbom [34]), research on the consequence of Islamic rule is scarce. An exception is Henderson and Kuncoro ([19]). Focusing on Indonesia after the introduction of local democracy, they find that corruption decreased more rapidly between 2001 and 2004 in districts with more Islamic party representatives. The findings in this paper also resonate with recent research on local democracy in Muslim countries (see Cheema, Khwaja, and Qadir [8]; and Myerson [32]).

Below, section 2 describes the institutional framework, Section 3 describes the RD design I use to estimate the effect of Islamic mayors, and Section 4 presents the data used in the analysis. Section 5 shows the main empirical results on educational attainment and enrollment, and examines the validity of the RD design. Section 6 extends the analysis to heterogenous effects to examine whether impacts were different for the poor and pious. Section 7 presents evidence on the consequences of the Islamic party in the labor market. Finally, Section 8 discusses the results and concludes the paper.

2 Institutional Framework - Turkey

2.1 The Welfare Party, the Poor, and Political Islam

The period leading up to the electoral success of political Islam in 1994 had been characterized by economic liberalization policies and rapid urbanization from poor rural areas into the urban slums and lower middle-class neighborhoods. Once inside the cities, migrants often retained their social norms and customs, and for this reason the link between economic status and religious conservatism tightened. The party of the religious right, therefore, became the party of the urban poor.

This is illustrated by Figure 2.1, with data from a recent survey (Çarkoğlu and Toprak [7]). Figure 2.1A shows that individuals in poorer households rank themselves both more religious and more politically Islamist than those in richer households. Furthermore, according to Figure 2.1B, poorer women are more likely to wear some form of headcover; while on average more than 60 percent of the entire sample did so, the corresponding share was almost 90 percent among the poorest households. This relation also exists at regional level with poorer regions in Turkey being associated with a stronger influence of religion – as can be seen in the uppermost graph of Figure 2.2, poorer provinces have a higher proportion of mosques per population than richer ones.

The shifting demographic and political landscape ultimately came to tilt political power in favor of the poor and pious. The 1994 local election for the first time saw an Islamic party, *Refah Partisi* (eng. "The Welfare Party", henceforth RP), receive nation-wide prominence as Islamic candidates were elected in numerous municipalities, including Ankara and Istanbul. The RP thus united the religious vote that had previously been spread out among the other right-wing parties (Esmer [13]). As a result, mosque construction (Simsek [38]), increased participation in religious schools, and veiled women in public spaces became potent symbols of the religious movement.

A defining characteristic of the RP was its organizational capacity: the party harnessed a network made up of pious entrepreneurs and Sufi brotherhoods (*tarikatlar*), the latter primarily through religious foundations (*vakıflar*). These organizations provided a valuable source for investment in RP-controlled municipalities and, in the case of the vakiflar, substantial experience in organizing relief for the poor and sub-

sidizing education. For example, one contemporary study suggests that two large Sufi brotherhoods, the Süleymancı and the Fethullahçı, "each accommodate over one hundred thousand students" (Ayata [3]).

The RP often appears as a representative candidate for an Islamic political party in more general studies on political Islam (Kepel [22] and Roy [36]). As a figurehead of political Islam, secular elites increasingly came to view the actions of the RP as a strategy to turn Turkey into an Islamic state, and the party was banned in 1998. However, the ban served mostly to exclude the top party leadership, while the local component of the movement remained intact.[4] This ban was later upheld by the European Court of Human Rights (ECHR), cementing the labeling of the RP as an "Islamist" party[5] . In the final ruling, the court grouped the RP infringements into three categories; *"those which tended to show that Refah intended to set up a plurality of legal systems, introducing discrimination on the grounds of belief; those which tended to show that Refah wanted to apply sharia to the Muslim community; and those based on references made by Refah members to jihad (holy war) as a political method."*[6]

As such, the RP stands out as a viable candidate for an Islamic political party, with its relatively pro-Islamic agenda but also through operating in an "electoralist and multiparty framework" (Roy [36]).

2.2   Education in Turkey

Both elementary school and middle school (as of 1998), enrolling students aged 6-14, are mandatory in Turkey.[7] General secondary education, enrolling students aged 14-18, as well as higher forms of education, are voluntary.

For secondary school, there is both a secular and a religious option. On one hand,

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[4] A partial reincarnation of the RP, the FP, was once more banned in 2001, and split the political Islamic movement into the Felicity Party (SP), continuing to subscribe to the policies of the previous Islamic parties, and the Justice and Development Party (AKP), which came to adopt a less pronounced Islamic profile. Several key members of the earlier Islamic parties are today prominent members of the AKP. This includes the current Prime Minister and President of Turkey.

[5] "Turkey Islamists shocked by party ban," BBC News, July 31st 2001, http://news.bbc.co.uk/2/hi/europe/1467665.stm

[6] See a transript of the ruling on "Case of the Refah Partisi (The Welfare Party) and Others v. Turkey", ECHR Third Section judgment and ECHR Grand Chamber judgment (http://echr.coe.int/echr/en/hudoc)

[7] "Turkey in 2007", Office of the Prime Minister, Directorate of General Press and Information, http://www.byegm.gov.tr/yayinlarimiz/kitaplar/turkiye2007/english/index.htm

1.2 million students were enrolled in secular secondary school in 1995. In the same year, about a quarter of a million students were enrolled in so-called *imam-hatip*, or religious, schools. These originally served to train future imams, but more recently have become a more common alternative to secular high school.

One of the main reforms imposed by Atatürk after the foundation of the modern state of Turkey was expanding education to include women (Mango [29]). Yet more than eighty years after, there is still a large education gender gap. In their recent Gender Gap Report, the World Economic Forum ranked Turkey 121th, out of 128 countries included, in terms of overall gender equality.[8] A significant part of this abysmal score was driven by Turkey's low rates of secondary female education (World Bank [43]). Therefore, the main focus in this paper will be on Turkey's general secondary education, i.e. secular high school.

Women are not allowed to wear the headscarf in any type of schools, neither as students nor as teachers, except in religious high schools.[9] This is part of a general ban on religious symbols in public spaces, which also includes public employment. The stated purpose of these restrictions is to guarantee the equality of religious affiliation and gender, as well as to prevent pressure on students. However, these restrictions may also limit access for children whose parents object to sending their daughters to school uncovered .

Surprisingly many parents, particularly among low-income households, disapprove of their daughters removing the headscarf to attend education. Figure 1c shows that a quarter of the respondents in the previously mentioned survey would disapprove if their daughter removed the headscarf in order to attend education, with a much larger disapproval rate in the low income bracket.

In short, existing rules of participation make access to voluntary education for women difficult among the poor and pious. Policies to improve access needs to overcome not only economic constraints, but also religious customs and norms.

2.3   Local Governments and Elections

The main form of local government in Turkey is the municipality (*belediye)*, of which there are about 3,000 in total. Municipalities are grouped into 923 districts (*ilçe)*

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[8] The Gender Gap, World Economic Forum, http://www.weforum.org/en/initiatives/gcp/Gender%20Gap/index.ht
[9] Men also face restrictions, such as the ban on facial hair in high school.

which, in turn, are grouped into 81 provinces (*il*). About two thirds of all municipalities are township (*belde*) municipalities, composed of settlements with more than 2,000 inhabitants in the latest population census. Other types of municipalities act as the center of either a district or a province. Moreover, the 16 largest cities in Turkey have metropolitan (*büyükşehir*) municipalities governing the larger urban region, and sub-metropolitan municipalities nested within the metropolitan municipality.

The official budget size of municipal governments are about 4-6 percent of GDP, on par with many West European countries. The largest share of revenues is made up of transfers from the central government, while property taxes are one of few locally determined sources of revenue. Transfers are largely determined by population and whether a municipality is a district- or province center (World Bank [42]). The provision of education and health services are in the hands of the central government, leaving local public services and urban development (building permits) as a main formal responsibility of municipal mayors.

However, nothing prevents municipalities from engaging in education or health policy, either directly or indirectly and, in reality, municipal mayors have a considerable influence over their constituencies, even in areas such as education, partly due to urban planning policies (World Bank [42]).

Local elections are held every fifth year, with each municipality electing a mayor (*belediye başkanlığı*) as well as a council (*belediye meclsi*). The mayor chairs the municipal council and all other committees, sets the agenda for council meetings, and approves permits. For this reason, I will exclusively focus on the municipal mayor. Independent candidates are allowed to run for office although the candidates nominated by the large national parties regularly enjoy larger electoral success.

Local mayoral elections are determined by single-round plurality elections, which allows the use of an RD design. Obviously, analyzing local governments allows more variation and easier comparisons of parties than national elections. In contrast, national elections are proportional and also include restrictions on minority representation[10] .

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[10] For a party to receive any representation in parliament, it needs to have received at least ten percent of the national vote.

3 Identification Strategy

A key contribution of this paper is the identification of the causal impact of local Islamic rule. The main problem with comparing municipal outcomes by whether an Islamic or secular mayor was elected is that the assignment process of mayor type is not random. As previously noted, the municipalities most likely to vote for an Islamic party may also be those where female participation in education is more constrained or where female returns to schooling are lower. These and other unobserved factors could potentially lead to less education *as well as* an elected Islamic politician, and thus, traditional regression analysis may not be informative about the causal impact of having an Islamic mayor.

The sharp RD design (Hahn and Van der Klauw [17]; Imbens and Lemieux [21]) exploits a discontinuity in the treatment assignment to identify a causal effect. It can be used when treatment assignment, m_i, is determined solely on the basis of a *cutoff score, c*, on an observed *running variable*, x_i. The running variable in this design is the win margin for the Islamic party relative to the largest non-Islamic party and the cutoff is therefore $c = 0$. Those municipalities that fall below the cutoff are placed in the control group $(m_i = 0)$, and receive a secular mayor, whereas those above are placed in the treatment group $(m_i = 1)$ and receive an Islamic mayor. The assignment follows a known deterministic rule: $m_i = 1\,\{x_i \geq c\}$, where $1\,\{\cdot\}$ is the indicator function.

If municipalities close to the threshold, with very similar values of x_i, are comparable, treatment can be considered "as good as randomly assigned" close to c. The causal impact of treatment can then be evaluated by comparing average outcomes with scores of x_i just above c with those just below. Consequently, the RD design identifies the local average treatment effect (LATE) for municipalities close to the cutoff point.[11] This not only assumes that municipalities are comparable close to

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[11] As an illustration to the RD design, suppose that we compare two hypothetical municipalities where the Islamic party, in a race of two parties, received 70 and 30 percent of the vote shares, respectively. In the first municipality, the win margin was 40 percent and in the second it was -40 percent. The large margins will most likely represent certain underlying voter preferences and assignment is therefore unlikely to be random. Comparing outcomes based on party identity will thus not tell us the causal effect of having an Islamic mayor. However, suppose that the Islamic party had instead received 51 and 49 percent of the vote shares in two other municipalities. In the first, the win margin was 2 percent and in the second -2 percent. It is less clear why these two should be systematically different except for which party won the mayor seat. With a sample of such closely determined elections, comparing outcomes by treatment status may yield a better estimate of the causal effect.

the threshold, but also that agents (i.e. politicians and voters) are unable to precisely manipulate the running variable. These assumptions and the validity of the RD design will be investigated in more detail in Section 5 below.

Previous research has used different approaches to RD estimation. One common strategy has been to adopt a parametric *control function approach* (Heckman and Robb [18]),

$$y_i = \alpha + \beta m_i + f(x_i) + \varepsilon_i , \tag{2.1}$$

where y_i is the outcome in question (for example high school attainment for women). Under valid assumptions, $f(x_i)$ will be a continuous function of x_i at the cutoff point and measures the average treatment effect at c. Consequently, as long as $f(x_i)$ is known and included in the regression, equation (2.1) can be consistently estimated.

An alternative approach is to only include data in a 'discontinuity sample' (Angrist and Lavy [1]), a neighborhood around the cutoff value. This is tantamount to estimating

$$
\begin{aligned}
y_i &= \alpha + \beta m_i + \varepsilon_i \\
\forall x_i &\in (c - \delta, c + \delta)
\end{aligned}
\tag{2.2}
$$

for an arbitrarily small neighborhood of δ around c. In other words, comparisons of average outcomes to the left and right of c provide an estimate of the treatment effect that does not depend on a correct specification of the control function. Using this kind of "discontinuity sample", however, means disregarding a substantial amount of the data. In this paper, I use both a polynomial specification (hereby called the *RD Control*) method and a discontinuity sample (hereby called the *RD Sample*) method as complements.

4   Main Data Description

Data for local mayoral elections come from the Turkish Statistical Institute (henceforth TurkStat) and are reported by municipality. In 1994, elections were held in 2,710 municipalities. These include township, district center, province center, metropolitan, and sub-metropolitan mayors. Fourteen parties received votes and

numerous independent candidates also ran for election[12] . Islamic parties, mainly the RP and one fringe party, received about 21 percent of the total vote share and won 340 mayoral seats. Since all mayoral elections are determined by plurality, the main explanatory variable, Islamic mayor in 1994, is an indicator variable, which is one if an Islamic party had the largest amount of votes and zero otherwise.

The running variable used in the RD design is defined as the *difference in vote share between the largest Islamic party and the largest secular party* with a cutoff point of zero.[13] Consequently, the Islamic mayor indicator is one when this measure, hereby labeled the *Islamic win margin*, is positive and zero when it is negative. Each municipality will have a score of the Islamic win margin anywhere between -1 and 1. The running variable is therefore not tied to any particular absolute vote share (such as fifty percent in a two-party race) but will encompass a heterogenous group of elections (this is covered in more detail in section 5.4).[14]

To check that there is no obvious sorting on each side of the cutoff, Figure 2.3 shows the histogram of the running variable, for the entire range in bins of five percent in the upper graph, and for a shorter range around the threshold in bins of one percent. Inspecting the density of the running variable close to the threshold in the lower graph, it is comforting to note that it appears to be smooth around the cutoff point (a more formal test is conducted in Section 5.3).

The main outcome variable and the control variables come from TurkStat's Population Census of 2000. Data on educational attainment (primary, high school, and vocational) and demographics like population, age, gender, and economic activity (including individuals classified as students) are reported by neighborhood (*mahalle*) for cities (*şehir*), and by individual villages (*köy*) outside of cities. One candidate measure of municipality size is population as reported in the 2000 Census. Another is population as reported in the 1994 election data. The results in this paper hold for both measures, but I use the latter because of it being recorded at the beginning of the term. An important missing control variable is income, and in later sections I

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[12] TurkStat reports vote totals for all independent candidates combined. For this reason, the elections where the total vote share of the independents is either the highest, or the second highest, are removed. None of the results are affected by this procedure.

[13] More formally $x_i \equiv \max \left\{ v_i^{I_1}, ..., v_i^{I_K} \right\} - \max \left\{ v_i^{S_1}, ..., v_i^{S_M} \right\} \in [-1, 1]$ for the set of K Islamic parties and M secular parties with $v_i^{I_k} \geq 0, v_i^{I_m} \geq 0, k \in K, m \in M$.

[14] For example, suppose that two secular parties A and B receive 55 and 25 percent of the votes, respectively, while the Islamic party only receives 10 percent of the votes. The value of the Islamic win margin will thus be -45 percent.

use a number of different of proxies for income. For most of the analysis, the census data are aggregated to the municipal level. For the 1990 Population Census the lowest level of aggregation is the municipality.

Matching municipalities across time periods is somewhat intricate. As cities have grown, new provinces and districts have been created, with the result that municipalities change names and associated districts and provinces. Metropolitan municipalities have grown to incorporate an increasing amount of smaller (i.e. district center- and township) municipalities. For this reason, when data from the 2000 Population Census are aggregated to metropolitan levels, I use 1994 metropolitan borders. The matched municipal dataset of 1994 elections and 2000 census data has 2,661 observations (see Appendix A for more details).

The main focus of the paper is on high school attainment for the 15-20 cohort, namely the share of the population between 15 and 20, female or male, that in 2000 reported their education level attained as at least a high school degree. As can be seen from column 1 in Table 2.1, the average high school attainment for this cohort is 16.3 and 19.3 percent for women and men, respectively. The table also reports demographic and administrative variables. Columns 2 and 3 show group means for municipalities with secular and Islamic mayors while column 4 shows the differences between columns 2 and 3. On average, Islamic municipalities have 2.6 percentage points lower female attainment rates than secular municipalities and no corresponding difference for men. A naive conclusion would be that the cause of the lower education is Islamic rule. Yet, Table 2.1 also shows that Islamic areas differ from secular ones in several other ways. On average, municipalities that elected Islamic mayors in 1994 are larger, younger, have larger households, and more likely to be large cities. The following section therefore employs the RD design to estimate the causal impact of local Islamic rule.

5   Main Results

5.1   Graphical Analysis

Figure 2.4 shows graphical illustrations of the RD design, where local averages of high school attainment for women (panel A) and men (panel B) in the 15-20 cohort are plotted against the Islamic win margin in bins of one percent. A vertical line

showing the cutoff at zero and a parametric fourth-order polynomial is fitted to the data on each side of the cutoff. Panel A reveals a clear negative association between female education and the running variable, in line with earlier sections' claim that women are more constrained from participating in education in the more Islamic municipalities. The most striking feature of this graph, however, is the clear positive jump in high school attainment at the cutoff. The size of the jump is quite large, around 3 percentage points.

Panel B shows a different picture for men. Not only is there little negative relation between the outcome and the running variable per se, but there is also less evidence of a jump at the threshold – the jump is smaller in magnitude and less precise. This is consistent with men being less constrained than women in participating in education, and the Islamic mayor consequently having a less clear impact on their education.

Figure 2.5 also compares graphically the impact on high school education with that of other education types. As show in panel B there is essentially no effect on primary school attainment for the 15-20 cohort, nor is there one for vocational high school (panel D), which includes religious education. The existence of a jump in enrollment of 15-30-year-olds (panel C), on the other hand, verifies the impact on participation in post-primary education.

The rest of this section will mostly serve to estimate more precisely, and robustly, the impact on female participation in education uncovered in Figure 2.4.

5.2   Basic Regression Results

To refine the analysis, Table 2.2 reports education results in 2000 for women in panel A, men in panel B. In each panel, the first two rows show the mean and standard deviation for the dependent variable of the relevant sample. Columns 1-6 use the share of the 15-20 cohort with high school degrees, where even columns are without covariates and odd columns include controls for log population, the share of the population below 19, the share of the population above 65, five gender-specific age cohort controls, gender ratio, as well as dummies for type of municipality. Columns 1 and 2 report OLS regressions of each outcome on Islamic mayor in 1994. For women, the correlation is significantly negative both with and without controls, while for men the correlation is indistinguishable from zero.

Columns 3 and 4 report results from the RD Sample method, i.e. the same as in columns 1 and 2 but now only including those observations where the absolute value of the Islamic win margin was lower than 2 percent. In column 3, the coefficient for women is positive at 2.9 percentage points and marginally statistically significant. This confirms the finding from Figure 2.4 of a relatively large jump at the cutoff. Adding the covariates in column 4 increases the precision of the point estimate to significant at 1 percent, but does little to change its magnitude.

The following regression is estimated for the RD Control method:

$$y_i = \alpha + \beta m_i + f(x_i) + \mathbf{w}_i' \boldsymbol{\gamma} + \varepsilon_i \; , \tag{2.3}$$

where

$$f(x_i) = \sum_{s=1}^{4} \left(\lambda_s^0 + m_i \lambda_s^1 \right) x_i^s$$

is the control function, and λ_s^0 and λ_s^1 are estimated parameters. Using this method in columns 5 and 6 yields almost exactly the same coefficients, statistically significant at five and one percent, respectively.

Column 7 and 8 show RD Control results for two alternative measures of female participation in education. The first is the share of women with high school degrees in the age cohort 21-25. For this cohort, any impact on education attainment should come through inducing them to finish high school, and the similar estimates for both the 15-20 and 21-25 cohorts suggest that the impact of the Islamic mayor comes both through starting as well as finishing high school. The second column uses a measure of enrollment; the share of women in the cohort 15-30 classified as students, and gives very similar results.

In contrast, for men, the OLS, RD Sample, and RD Control method yield estimates that are either close to or statistically not different from zero. Consequently the broad impact on female cohort education attainment and enrollment found is absent for men.

That Islamic mayors have a positive impact on female attainment of higher education is somewhat striking. So is the finding that the impact is more pronounced for women than for men. Moreover, this phenomenon seems to occur predominantly in voluntary and secular forms of education. Before exploring further this finding, however, the next subsection examines the validity of the RD design.

5.3 Validity and Robustness Checks

In the previous section, estimates by the RD Sample and the RD control method yielded almost identical estimates. This is reassuring as each of the two methods has its own strengths and weaknesses. So is the result that adding covariates to the estimation only makes the estimates more precise without affecting the magnitude of the point estimate. Yet, these estimates can be interpreted as causal only as long as the assumption of random assignment of party identity around the threshold is upheld. If elections could be perfectly manipulated around the threshold, the assumption is violated. Still, the mere existence of election fraud is not sufficient to invalidate the RD design (Imbens and Lemieux [21] and Lee and Lemieux [27]). Instead, as long as politicians, municipalities or voters do not have *precise* control over the running variable, random assignment is still valid.

A common validity check is to examine whether baseline covariates are continuous around the threshold. Figure 2.6 shows that there are no clear and statistically significant jumps at the threshold of the control variables. The lowest right-hand side graph in this figure is a placebo check to show that there is no evidence of any effect on high school attainment for the 15-20 cohort in 1990.

Another testable hypotheses underlying the RD design is local continuity in the density of the running variable at the threshold ex post. If the running variable can be manipulated, there could be sorting around the threshold. The histogram in Figure 2.3 showed no visible evidence of sorting but is not a formal test. McCrary [31] proposes a two-step procedure for explicitly testing for a discontinuity in the density of the running variable. In the first step, the running variable is partitioned into equally spaced bins and frequencies are computed within those bins. The second step treats the frequency counts as a dependent variable in a local linear regression. This is shown graphically in Figure 2.7. This test rejects any discontinuity in the density at the threshold with a comfortable margin.[15]

A more subtle issue is distinguishing an "Islamic-party" effect from a "Right-wing-party" effect. The Islamic parties examined in this paper are all right-wing parties and thus, the estimate could potentially confound the impact of an Islamic mayor with that of a right-wing, mayor. The first three columns in Table 2.3,

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[15] See McCrary [31] for more details on the test.

which has female high school attainment as the dependent variable, investigates this possibility with the two different RD methods. Column 1 shows results from the regression

$$y_i = \alpha + \beta_1 m_i + \beta_2 L_i + \beta_3 m_i L_i + f(x_i, L_i) + \mathbf{w}_i' \boldsymbol{\gamma}_0 + L_i \mathbf{w}_i' \boldsymbol{\gamma}_1 + \varepsilon_i \ , \qquad (2.4)$$

where L_i is a dummy for whether the two adjacent parties on each side of the cutoff constitute an Islamic and a left-wing secular party. Consequently, this dummy variable is interacted with the indicator for Islamic mayor, the control function and all covariates.[16] The coefficient β_1 reflects the effect of an Islamic mayor when the close contest is between an Islamic and right-wing candidate. The effect of an Islamic mayor in a close contest with a left-wing secular candidate is captured by $\beta_1 + \beta_3$. The β_1 coefficient can thus be interpreted as the "Islamic party" effect and β_3 as the "Right-wing party" effect. The effect of an Islamic party, in column 1 of Table 3, in a contest with a right-wing secular party is just slightly lower (2.4 percentage points) than the results in Table 2.2. But the effect of an Islamic party winning against a left-wing party is larger, with an estimate of 7.4 percentage points, although this is not statistically significant. Columns 2 and 3 verify that the positive effect of Islamic parties are more pronounced when competing against a left-wing party, although it should be noted that the number of close elections between Islamic and left-wing secular parties are just a small fraction of the total number of close elections. Consequently, independent of the right-left divide in Turkish politics, there is a clear positive effect on female education of having an Islamic party. (The issue of why the effect is larger vis-a-vis left-wing parties will be further discussed in Section 6).

Column 4 adds a set of controls for various outcomes from the 1990 Census.[17] These include, respectively, the female share of the population with high school attainment, the share that is employed, and the share that is married. The education in 1990 variable is useful as it is likely to be a good proxy for income. These controls may also be helpful proxies for how socially conservative a municipality is. The resulting estimate of having an Islamic mayor in 1994 when controlling for pre-

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[16] The control function is $f(x_i, L_i) = \sum_{s=1}^{4} \left[\lambda_s^0 + m_i \lambda_s^1 + L_i \left(\Lambda_s^0 + m_i \Lambda_s^1 \right) \right] x_i^s$

[17] Adding the controls in this paragraph does not affect the negative significant coefficient in the simple OLS regressions.

treatment education is positive and significant, yet somewhat smaller. Column 5 is a differenced equation in the outcome variable and the controls, measuring the impact of Islamic mayor 1994 on *changes* in the share of women with high school degrees between 1990 and 2000.[18] The resulting estimate is very close to that of the baseline specification.

The rest of Table 2.4 adds additional controls: 1990 levels of log population density, total building space (in log square meters) as well as the education share of all building spaces in column 6; province fixed effects in column 7; an indicator of whether the municipality received an Islamic mayor in the mayoral election of 1989 in column 8; and a polynomial fourth-order function in all continuous covariates in column 9. Columns 10 and 11 show RD Sample regressions where the sample are those observations with the absolute value of the running variable being less than 4 and 1 percent (rather than 2 percent). As is evident from the results, estimates from the RD Sample method converge towards the OLS estimate as the interval of the running variable around the threshold grows.

A concern might also be the existence of additional discontinuities in the running variable at values other than zero which, although not necessarily invalidating the RD design, are usually considered to be unwanted. Figure 2.8 pursues this by estimating placebo RD Control estimates at other points along the running variable. The absolute values of the t-statistics are then graphed on the left-hand side of the figure, with the red line indicating the "true" discontinuity. These t-statistics are then collected in a histogram on the right-hand side with the purpose of showing that the discontinuity at zero is an outlier in the empirical distribution (shown as a black circle in the graph).[19]

Another concern could be that the results for women in younger cohorts, especially for students, are driven by the older cohorts. Table 2.4 shows results for female high school attainment for the 31-64 cohort, essentially a parent cohort. As can be seen from column 1 there is a positive impact of having an Islamic mayor even on this cohort. For example, if the Islamic mayor attracts well-educated conservative parents who immigrate partly so their daughters can attend high school in a more

---

[18] The equation is $\Delta y_i = \alpha_0 + \beta_1 m + f(x_i) + \Delta \mathbf{w}' \boldsymbol{\gamma} + \varepsilon_i$, where Δ is the difference operator between 1990 and 2000, and $f(x_i)$ is defined as in equation (2.3).

[19] I also run goodness-of-fit tests, as suggested by Lee and Lemieux [27], including bin dummies to show that, as the order of the polynomial control function increases, the joint significance of the bin dummies becomes insignificant. (Results are available on request from).

Islamic environment instead of attending high school in a more secular environment, the implications might be different.

This phenomenon is most unlikely for several reasons. First, any effect on older educated women is not large enough to explain the effect on students. Second, allowing for the parent cohort to have a direct effect on the student cohort, leaves the impact of Islamic rule on enrollment largely unaffected.

As an illustration, how many women aged 31-64 would need to be attracted to explain the effect on students in the age 15-30? To compute this, on would need to know the average number of daughters in the age 15-30 per woman aged 31-64. In the absence of detailed data about this, consider the following guesstimate. The average household size is around 4.4, and subtracting 2 parents while assuming equal probability of sons and daughters yields an average 1.2 daughters per household, regardless of daughter age. Since the examined student cohort only includes ages 15-30, assuming further that half of the daughters are above 15, this results in a guesstimate of 0.6 daughters in the age 15-30 per woman aged 31-64. Thus, as long as the impact on students in levels is about half that of the impact on the female cohort 31-64, this would be consistent with no inducement of education above what is due to migration of older cohorts.

This alternative hypothesis is examined in Table 4. Columns 1 through 3 show the impact of Islamic rule on the number of 31-64 year-old women with high school education, the number of 15-30 year-old women who are students, and the number of 15-20 year-old women who have high school degrees.

Comparing columns 1 and 2 shows that the impact on the student cohort relative to the parent cohort, two cohorts of roughly the same size, has a ratio of 2.9. This seems too large an effect to be caused solely by the number of potential well-educated mothers—for every 0.6 potential students resulting from well-educated mothers, an additional 2.3 students are induced. Column 4 shows that adding as a control the number of women with high school degrees aged 31-64 does little to affect the impact of Islamic rule on female enrollment. The coefficient on Islamic rule is circa 70 percent of the original estimate in column 2. Since this coefficient is, if anything, underestimated *at least* 70 percent of the previously estimated impact on students seem to come from actually inducing students of less-educated parents, as opposed to students who would otherwise have gotten the same secular education in less

Islamic environments.[20] The same thing holds for using the 15-20 cohort with high school degree in column 5.

5.4   Conveniently LATE

One potential concern with RD designs is that they estimate *local* average treatment effects (LATE), specifically at a fixed covariate of the running variable. In the presence of heterogenous effects, the RD LATE will often differ from the average treatment effect. This may be particularly problematic in a political economy setting if politicians' incentives are correlated with the level of political competition. If a candidate wins an election with a very thin margin, she may have incentives to allocate more time towards reelection, perhaps pursuing a moderate policy, as opposed to pursuing her preferred policy. A related issue is whether close elections only occur in very few areas of a certain type, distinct from the population as a whole. The main concern is therefore a combination of unrepresentative and homogenous close elections in an environment with heterogenous treatment effects.

Due to the system of Turkish local politics and, consequently, the definition of the running variable, these limitations are less damaging in this particular design. Instead, I argue that the RD LATE estimated is informative about a substantial and highly relevant group of municipalities.

In elections where only two parties participate (such as most areas in the US), a close election means being close to a majority at a fifty percent share of the total vote. This hypothetical one-to-one relationship is illustrated by the diagonal line in Figure 2.9. Such close elections are more likely to be ideologically "moderate" and may also lead politicians to pursue more moderate policies than otherwise.

In contrast, in the current design close elections comprise a heterogenous group – by defining the running variable as a win margin between the Islamic party and the largest of several secular parties, this creates a much larger surface of different close election constellations[21] . As can be seen in the figure, the absolute Islamic vote share of the close elections ranges from the high teens to the low fifties. Around

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[20]   The coefficient on the parent cohort is likely to exhibit an upward bias as omitted factors affecting the returns to schooling for the old are likely to be positively correlated with similar factors affecting the same for the young. Thus, under reasonable assumptions the impact of Islamic rule on the student cohort exhibits a downward bias.

[21]   The median number of parties with non-zero votes in the sample is 5.

a third of the total sample has absolute Islamic vote shares within this range. As a result, several close elections involving Islamic parties occur in municipalities that would vote in a secular mayor with a wide margin if only two parties ran for office. However, due to fragmentation in either block, even a secular-majority municipality may receive an Islamic mayor.

Municipalities with recent close elections are, over time, only marginally more competitive than the average. Factors determining the fragmentation of different political blocks are often quite idiosyncratic, and therefore, so is the incidence of having a close election.[22] For example, analyzing all election periods between 1989-2004, I find that 12 percent of all non-close elections were close in the next election and the corresponding number for close elections was a meagre 19 percent — a politician who just barely won is therefore not meaningfully more likely to subject to a close election the next time around. Consequently, the close elections studied here are not just an eclectic sample of "moderates", but are characterized by heterogenous political compositions and incentives facing the winning candidate.

An important point is also to what extent close elections are observably representative of Turkish municipalities in general. Table 5 reports summary statistics of several municipality groups and the comparisons among them. In addition to the full and close-election sample, the table includes two groups of municipalities won by either an Islamic or a secular politician with an absolute win margin exceeding 2 percent. These two latter groups are referred to as Far Islamic and Far secular municipalities, indicating that they are *far* on either side of the political spectrum. Columns 5 reveals no systematic differences between the sample of close elections and Far Islamic municipalities (with the exception of having slightly older inhabitants and marginally more men). Most noteworthy is the absence of any real differences in education, household size, and children-to-women ratio—useful proxies for social conservatism and income. Given this, it is less surprising that column 6 shows systematic differences between close elections and Far secular municipalities since, as was shown in Table 1, there are differences between Islamic and secular

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[22] An interesting example is the metropolitan municipality of Ankara, where the divide between the city's secular upper-class and the poorer, and more pious, community evenly divides the electorate to the right and left. In the 1989 mayoral election, the left-wing SHP candidate Murat Karayalçın won with a comfortable margin since an uncoordinated right-wing bloc (including the RP) received substantial vote support for each party. In the 1994 election, the right-wing bloc was much more concentrated, resulting in a razor-thin win margin for the RP's Melih Gökçek.

municipalities.

In summary, not only does this RD design capture a kaleidoscope of close elections in terms of underlying voter support and politician incentives, but the close election sample is also observably similar to Turkey's poorer and more socially conservative municipalities. It is thus particularly informative from a development perspective, as it may be helpful in understanding the impact of Islamic rule for the poor and pious. This is the aim of the next section.

6 The Emancipation of the Poor and Pious

How can a religiously conservative mayor from an Islamic party lead to more female participation in secular education? I argue that the mechanism comes through Islamic parties being more effective in mobilizing those groups where the barriers to entry in education are higher, namely the poor and pious. From the household perspective, these barriers may include parents lacking sufficient financial resources to send all or any eligible household members to high school (or university). Equally important, other barriers may be a lacking willingness by pious parents to send their daughters to school without headcover. When social norms and religious practice at the local level conflict with centrally decided rules of secularism, these groups may be the most vulnerable.

The result in column 1 of Table 3 showed that the effect of the Islamic party is larger when the contestant to the Islamic party is a left-wing, rather than a right-wing, party. This is surprising since many left-wing parties have women's rights among their top platform issues.[23] Yet the left-wing parties are also more likely to adhere to Kemalist principles of bundling social and economic reform, thereby raising the barrier to educational participation. In contrast, the Islamic parties' advantage in harnessing local culture and social norms is well documented in Turkey (Yavuz [45] and White [40]) and in other countries (Hefner [20]). If this is the case, then the groups that are most restrained under the current education system, the poor and pious, should be those benefitting the most from having an Islamic mayor. This is investigated in the next two sub-sections

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[23] See the latest party program of the largest secular left-wing party, the CHP available at http://www.chp.org.tr/index.php?module=museum&page=show&entry_id=1659

A related question is how Islamic parties are capable of affecting education with limited formal resources. Part of the answer may come from the RP's close connection with other religious organizations, especially religious foundations which provide an important source of investment in Islamic-ruled regions. This is investigated in the third sub-subsection.

6.1   Who gets mobilized?

The Poor   So far, the analysis has mostly centered on the (local) *average* treatment effect of Islamic rule, but one may also wonder whether the impact varies along the distribution of education; i.e. is the impact different in relatively uneducated and relatively well-educated areas? Educational attainment is also a credible proxy for income, and for this purpose, I use quantile regressions (Koenker and Bassett [24]) to estimate the quantile RD (QRD) effects of having an Islamic mayor. This means estimating the same equation as in equation (2.3), but instead of using least squares to minimize the sum of squared residuals, I minimize a sum of asymmetrically weighted absolute residuals giving differing weights to positive and negative residuals. This allows me to estimate impacts of local Islamic rule at different percentiles of the distribution of education, rather than just at the mean.

Figure 2.10 illustrates the results for the share of women in the 15-20 cohort with high school degrees The estimates are essentially flat, and seem to track the RD-OLS estimate well, with the exception that estimates become increasingly imprecise at the highest quantiles. The similar magnitude of the quantile coefficients hide the fact that the quantile means vary along the distribution. For example, the QRD estimates for 15-20 year-olds in the 25th and median quantiles are almost identical at 2.7 percentage points (both statistically significant), yet the quantile means are 8.2 and 15.6 percentage points, respectively. Consequently, the proportionate increase is almost twice as large in the lower quantile.

The above analysis shows that the impact of the Islamic parties on educational choices have been largest in the lower education quantiles, i.e. the relatively poorer municipalities.

The Pious   If Islamic parties help mobilize women in religiously conservative regions, this suggests that the effect of having an Islamic mayor should be relatively

larger in those areas *within* the municipality that are more religiously conservative. The detail of the 2000 Census is helpful in this respect, as it has data on educational attainment and demographics by neighborhood for the 923 city municipalities. The neighborhood, of which there are about 10,000 in total, is the administrative unit below the municipality. While data for the local election of 1994 only exists at the municipal level, for the 1995 parliamentary elections data exists by neighborhoods, and the major Islamic party was the same in both elections. Therefore, in order to examine whether the Islamic party effect varies by the neighborhood-level support of the party, I specify the following regression model

$$y_{ij} = \alpha + \beta_0 m_i + \beta_1 m_i s_{ij} + \delta s_{ij} + f\left(x_i, s_{ij}\right) + \mathbf{w}'_{ij} \boldsymbol{\gamma}_0 + s_{ij} \mathbf{w}'_{ij} \boldsymbol{\gamma}_1 + \varepsilon_{ij} , \qquad (2.5)$$

which is similar to equation (2.4) with the exception that the measure of religiosity is defined as $s_{ij} = v_{ij}^{RP}/v_i^{RP}$, the ratio of the vote share for the Islamic party in neighborhood j in municipality i to that of the entire municipality i. Scaling the religiosity variable by the aggregate municipal vote share makes it easier to distinguish variation within municipalities from variation across municipalities.[24] Moreover, introducing an additional margin at the neighborhood level also allows me to test whether Islamic mayors have adverse effects in more secular neighborhoods.

Even though the RP represented the main political party of religious conservatives, the neighborhood level RP vote share is an imperfect measure of religiosity - other parties such as the ANAP and various regional Kurdish parties may also have received support from such groups. However, I would argue that this measure is still very informative. First, surveys show that voting for the Islamic party is highly correlated with religious intensity (Esmer [12]). Second, the hypothesis is that the effect should be relatively larger for women than for men. If the variable s_{ij} is solely a measure of relative electoral support, then there should be no difference between men and women in this direction. Thus, evidence of a relatively larger effect in neighborhoods with higher values of s_{ij} for women but not for men would be hard to explain by patronage.[25]

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[24] Allowing the effect of the Islamic party to vary by religiosity at the municipal level would be less informative about this issue since any resulting heterogeneity could just as easily be interpreted as varying the type of competitive elections between a close election in a concentrated (e.g. only two parties and close to 50 percent vote share for the Islamic party) race versus a close election in a less concentrated race (e.g. four parties with around a quarter of the vote share each).

[25] If parties rewarded different neighborhoods more or less depending on whether they voted

While in equation (2.4) each municipality received equal weight in the regression, estimating equation (2.5) unweighted instead gives each neighborhood equal weight and thus puts more emphasis on larger municipalities (which have more neighborhoods). For this purpose, the regression is weighted by the inverse of the number of neighborhoods within each municipality. Moreover, standard errors are clustered by municipality to allow for correlation within municipalities.

In contrast to the interaction model in equation (2.4), the religiosity measure is not a binary but a continuous variable, and so it is more informative to graph the partial derivative $\beta_0 + \beta_1 s_{ij}$ for relevant values of s_{ij} rather than just reporting the individual coefficients (these are reported in Table 2.A1). This is done in panel A of Figure 2.11A through three graphs representing the heterogenous effect of having an Islamic mayor on high school attainment for women in the uppermost panel, men in the upper-middle panel and the ratio of the female-to-male outcomes in the lower-middle. The bottom graph in panel A shows the histogram of the religiosity variable. The value on the y-axis at $s_{ij} = 1$ denotes the average effect of the Islamic party $(\beta_0 + \beta_1)$, which is positive for both men and women. For high school attainment, what is striking is how the effect of the Islamic party is clearly larger for women but not for men in neighborhoods with higher religiosity. For men, the line is almost completely flat. Moreover, while the effect for women in more religious neighborhoods is clearly positive, the corresponding effect for the more secular neighborhoods is not significantly negative. This relatively larger impact in more Islamic neighborhoods is also present when the outcome is the ratio of female-to-male high school attainment.

As an alternative measure, I examine a measure of religious infrastructure in Figure 2.11B, the share of a municipality's building space made up by religious buildings in 1990. This amounts to estimating equation 2.5 at the municipal level, with the religious building share as the interacting variable. Results on high school reveal very similar findings with the estimate being clearly larger in municipalities with relatively more religious buildings.

Altogether, areas that can be considered more religiously conservative saw the

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more or less for the party, one would expect the effect in more supportive neighborhoods would be expected to be equal for men and women. This is because votes are secret and the party should have no good way of determining whether men or women voted in one way or the other, only the neighborhood total.

largest effects on female education from having an elected Islamic mayor.

6.2   Education, Islamic Networks and the *Vakıf*

So far, the analysis has solely focused on educational attainment and enrollment, with less time spent on what actual policy might have triggered these changes. The results are not only striking because of their sign and magnitude but also because local governments in Turkey have little official responsibility for education policy. Education spending is almost entirely within the realm of the central government. Yet, even though municipalities' official responsibilities do not include education, they are not prohibited to engage in this policy area. In fact, municipalities do build schools and cater to their constituencies' demands for better schools in several ways. Municipalities indirectly affect education through urban planning policies, including building permits.[26] Any construction or large repair of buildings, including education-related buildings, needs the approval of the municipal mayor.

Focusing on urban planning, i.e. buildings constructed and permits given, also allows me to examine the role of the Islamic party's link with other religious organizations, in particular the *vakıf*. The *vakıf*, a common form of organization in the Muslim world with roots in Islamic Law (Kuran [26]), is a religious foundation that is legally distinct from other civil society organizations, and has larger economic freedoms (White [40]). The *vakıf* also achieves its preferred legal status versus general associations (*dernekler*) once it is endowed with property as collateral. A *vakıf* may engage in a wide number of charitable activities including education (Yavuz [46]). Granting scholarships, selling subsidized school supplies at school starts, as well as building student dormitories and schools are a few examples.

When a *vakıf* builds a school, either a religious or a secular one, it will be subject to monitoring by the state through the Ministry of Education, and must consequently also adhere to a centrally determined curriculum. But a substantial amount of activity also goes into building other education-related facilities including religious study centers and student dormitories. Such dormitories may house students attending religious as well as secular schools, and do not fall under the umbrella of state monitoring. Being able to wear the headscarf, use prayer rooms, and

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[26] Building permits are an important and common form of local policy area (see for example Bertrand and Kramarz [6])

take part in religious courses outside the main education curriculum, may enable religious segments of the population to participate in education. At times, rapid construction of dormitories has also led to suspicions of unmonitored spread in religious education (Balli [4], and Kinzer [23]).[27] Nonetheless, the legal and economic strength of such private civil organizations, in a country where associational freedoms are relatively restricted, is an important source of social aid and local public service delivery.[28] Even though the link between the Islamic party and the *vakıf* is largely implicit, anecdotal evidence provides numerous examples of the connection between the two. Indeed, "a strong selling point for the Welfare Party — at least among many parents — has been its readiness to provide dormitories for women who as students are coming to the big cities for the first time." (Cowell [10]). Moreover, White [40] notes that officially independent *vakıflar* often received offices in RP-controlled municipal buildings.

Against this background, the aim of this section is to determine whether Islamic mayors shift the allocation of the urban space towards education, and to assess the role of *vakıf* physical investment in education. For these purposes, two datasets were collected. The first comprises completed buildings between 1990-2000 by type, financier and owner from the 2000 Building Census. The second comprises building permits for the years 1991-2004 by type and financier. Both datasets come from TurkStat.

Panel A of Table 2.8 reports the effect of an Islamic mayor on buildings completed 1990-2000 as estimated by the RD Control method set up in equation (2.3). Row 1 reports averages of the share of all building space (in square meters) that comprise education buildings (schools, dormitories etc.). On average, about 4 percent of the construction between 1990 and 2000 consisted of such buildings. A fifth of all the education buildings constructed during the period were privately financed, regardless of who eventually became the owner of the building. Most education buildings, i.e. 58 percent, are owned by state-controlled organizations (mostly the Ministry of Education). Also shown are the average ownership shares of municipalities (2.3

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[27] In addition, the existence of dormitories, in conjunction with boarding schools, may be particularly beneficial for poorer households by reducing the direct costs of education. This comes as children in such facilities often receive free school uniforms, textbooks, and free meals, as well as certain stipends which can be shared with their families (World Bank [44]).

[28] For an extensive source of indices of associational freedoms, see the World Freedom Atlas (http://freedom.indiemaps.com/)

percent) and private *vakıf* ownership share (1.6 percent). Column 2 and 3 report OLS and RD Control estimates the effect on these shares according to equation (2.3). The results in this panel show that Islamic rule, while not leading to more education facilities per se, did result in a larger share of them being financed privately and subsequently owned by religious charities.

Panel B of the table shows results for building permits given between 1991-2004 in panel regressions specified as

$$y_{it} = \alpha + \beta m_{it} + f(x_{it}) + \mathbf{w}'_{it}\boldsymbol{\gamma} + \mu_t + \varepsilon_{it} \tag{2.6}$$

$$f(x_{it}) = \sum_{s=1}^{4} \left(\lambda_s^0 + m_{it}\lambda_s^1\right) x_{it}^s \,,$$

where the variables are defined as previously except for the dependent variables and an additional time-specific effect μ_t.[29] The data is averaged over election periods, so the effect of the 1989 election will have one effect on the years 1990 through 1994, and so on. The first column in panel B shows an average floorspace share of permits given to schools at 3 percent, while the share of these 3 percent allocated to privately-financed schools is around 50 percent. Neither the OLS specification in column 2 nor the RD specifications in columns 3 show any clear effect on the school share of building permits. In contrast, the effect of an Islamic mayor on the private share of school permits is both large and significant, with the RD specification in column 3 showing estimates of around 10 percent.

These results suggest that Islamic mayors did not necessarily increase the share of school and other education buildings. But they did affect who financed and owned them. More specifically, having an Islamic mayor meant that newly constructed educational buildings were more likely to be financed by private organizations and more likely to be owned by religious foundations. As such the increase in participation, especially with regards to enrollment in post-primary education, may have been facilitated by building particular facilities more tailored to religious conservatives.

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[29] Adding fixed effects to the equation does not change the results.

7   Labor Market Outcomes

Given the results on increased female participation in education, a logical follow-up question is whether female participation in labor markets were also affected, and this section therefore examines direct effects of having an Islamic mayor on labor market outcomes. Unfortunately, detailed and consistent labor market data exist for cities only. For the 923 city municipalities, the Population Census reports neighborhood-level data on several measures of labor market activity, forms of income and sector employment. Since the number of municipal observations is on the low side, and more disaggregated data by neighborhood is available, I focus on RD regressions at the neighborhood level. Regressions are weighted (as in Section 6) by the inverse number of neighborhoods within a municipality and standard errors are clustered by municipality.

Table 2.9 shows results on economic activity, forms of income and sector employment. The columns also show sample means and standard deviations, as well as specifications for OLS, RD Sample, and RD Control, while the final column reports an unweighted RD Control specification.

For labor supply, i.e. the share of the population classified as participating in the labor force, average female labor market participation is a paltry 8.5 percent compared to 46 percent for men. A substantial share, on average 70 percent, of women are classified as housewives (*ev kadını*). The OLS results in column 2 show negative correlations for both female employment and the share classified as housewives, consistent with Islamic municipalities being poorer and more socially conservative. The RD estimates, on the other hand, show no significant effects on female employment (with some specifications having positive coefficients) and a reduction in the share classified as housewives. This is consistent with the result obtained earlier of increased participation in education, although not necessarily increased participation in the labor market per se. On the other hand, if Islamic parties increase educational attainment for the purpose of later labor force participation, this may not show up as early as in 2000. A successful high school graduate could just as well continue university education as taking a job. Therefore, it may be more informative to look at measures of the quality of employment among the employed.

As for the form of income in Panel B, a substantial amount of women in the labor market are family-employed and non-salaried (almost 20 percent) as opposed

to being wage-earners, a much larger number than for men (8 percent). This can be explained by the prevalence of domestic piecework among women in poorer neighborhoods. This form of exchange is often met through the organization of the family through a male entrepreneur, often without monetary payments (White [41]). While not all members of such organization of labor are necessarily Islamist, "the Islamist segment of the business class comes primarily from this sector" (Gülalp [16])

The RD estimates, however, show the opposite effect namely that the share of wage-earners is actually higher at the expense of the proportion of family-employed. This resonates well with the findings in preceding sections of a more well-educated female population in older cohorts. Moreover, the RP and its affiliated organizations' use of educated female labor is well documented.[30]

Finally, as can be seen in Panel C for sector employment, a substantial share of the labor force is employed in agriculture. The largest employer for women is the service sector. The results show a shift of employed women from the agricultural sector (and partly the manufacturing sector, although the estimates are statistically insignificant) to the service sector. For men, there is also a shift to the service sector, in particular from the construction sector.[31]

Altogether, these results confirm the view that Islamic rule has improved the situation for a large group of people, not only with regard to getting an education but also in terms of labor market prospects. While no aggregate labor force participation effects were found, having an Islamic mayor is conducive to a lower share of women being classified as housewives, which is consistent with the finding of increased participation in education. Whether such participation will ultimately lead to subsequent inclusion in the labor force is too early to tell (although if this is the case, the next 2010 Population Census should reveal more evidence on this).

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[30] Female Islamic activists have been an important tool in campaigning for the Islamic parties, not only as a symbol at political rallies. In socially conservative neighborhoods, veiled female activists provided a practical advantage over male activists. Whereas it would be culturally inappropriate for a male to enter a house with only women present, female activists had no restrictions against doing so (White [40]).

[31] The construction sector in Turkey is the sector where occupational accidents end in the highest mortality rates among all sectors (see for example Colak et al [9])

8   Concluding Remarks

The institutional setting of local politics in Turkey provides a powerful test of the consequences of Islamic rule on education and labor market outcomes. Since women are often proclaimed to be most vulnerable in an occurrence of Islamic rule, I focus on this group.

My findings show that despite its pro-Islamic and often socially conservative characteristics, Islamic rule has had a large and positive impact on education. An "as good as" randomly-assigned Islamic mayor increased educational attainment, and relatively more so for women than for men. This finding is robust to enrollment and other voluntary forms of secular education. An examination of direct impacts on labor market outcomes provide further evidence of a remarkable phenomenon: a religiously conservative Islamic party can be more effective in educating and providing better jobs for women than secular parties, despite the latter parties often having women's rights as a key policy issue.

This points to a delicate tradeoff between restrictions on religious expression and constraints to participation for religious conservatives. In Turkey a large majority of women wear some form of headcover. Consequently, the ban on wearing the headscarf in public institutions makes the barriers to participation highest among those who need it the most. Policymakers thus face a double challenge of alleviating economic constraints, as well as social constraints, to participation.

One observed mechanism behind the increase in education seems to be investment by private religious charities, the Islamic *vakıf*. These facilities are examples of a different type of public goods with less focus on the exclusion of religious expression in public spaces. For opponents of political Islam, this has been one out of several threatening symbols of creeping Islamification. Yet the Islamic party's capacity to mobilize women may instead have resulted from the unbundling of social and economic reforms. Secular — especially left-wing — parties often pursue a two-fold agenda of economic as well as social modernization. In contrast, the Islamic party seems to have focused more on the economic reforms while harnessing, rather than attempting to change, existing social norms and customs.

My results stand in contrast to some cross-country evidence documenting a negative correlation between Islamic influence and development, as well as gender-related outcomes. To be fair, the approach here differs from previous research in several

aspects, and generalizations to other contexts should be done with utmost care. As the RD design only provides for a local average treatment effect in close elections, it may be less informative about the impact of Islamic rule far away from the threshold, i.e. for uncompetitive elections. Yet, a consequence of this particular design is that the treatment effect estimated can be considered particularly informative for areas where Islamic rule was plausible. The RD local average treatment effect is therefore economically meaningful for a substantial and highly relevant subgroup.

However, other concerns about external validity also deserve to be mentioned. The impact and nature of the Islamic party, or rather parties, may or may not have changed character over time. The focus on local democratic politics excludes evaluating the impact of Islamic rule on national policies and outcomes, or the actions of Islamic political organizations in autocracies.

Finally, much of the discussion about cross-country-level findings and discussions about allowing Islamic parties or not is inherently tied to institutions. The approach here has been to evaluate the treatment of local Islamic rule, holding the institutions fixed. Therefore, it is important to point out that the results in the paper do not imply a judgment on secular institutions or regulations per se. It might just be the strong secular nature of Turkey's institutions that led Islamic parties to participate in democratic politics, as opposed to engaging in violent struggle.

Even though it may be tempting to dismiss the results found here as a particular trait of Turkey's Islam or institutions, I argue that the uniqueness of this study comes not from the institutional setting, but from the possibility of identifying a meaningful causal treatment effect of Islamic rule. The initial negative association between Islamic influence and development is the same as in many other settings around the world. It is the identification of the causal impact, not the initial setting, that makes the difference. Regarding the nature of Islam, even though Turkey never experienced the kind of Salafist and Deobandi influence that became prevalent in other Muslim countries (Rabasa et al [35]), the influence of the Sufi brotherhoods like the Nakşibendi, Nurcu, and Süleymanlı movements which make up the backbone of the *vakıf* in Turkey are shared across most of Central Asia (Yavuz [46]).

The irony in the positive impact of Islamic parties on female participation in education and labor markets may not have been completely lost on secular and

especially left-wing parties in Turkey.[32]   Nonetheless, the headscarf as well as a more general debate on religious expression in public spaces remain contentious. In this regard, Turkey is not the only country with such restrictions, nor is it the only country where the manifestation of political Islam in democratic politics is highly divisive. The school ban on the headscarf exists in Singapore, Tunisia, Malaysia, France and some states in Germany (Saul [37]). Recent immigration into urban areas is also changing the demographics of European cities, resulting in a debate on and the compatibility between secular institutions and the preferences of a growing constituency of religious conservatives. In this regard, Turkey in the 1990s provides an example of where locally elected religious governments and organizations served to improve access to education for those citizens who may have needed it the most.

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[32]   There is some evidence that secular parties may be trying to soften their secular stance in a attempts to broader their appeal to a wider public. For example, the party leader of the CHP recently made headlines appearing on stage at a campaign rally together with women wearing the chador. "Chador not political symbol, opposition leader Baykal says," *Today's Zaman,* November 28, 2008, http://www.todayszaman.com/tz-web/detaylar.do?load=detay&link=159821

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2.A   Appendix

Source: *Türkıye İstatistik Kurumu* (Turkish Statistical Institute), www.tuik.gov.tr

2.A.1   Election Data (*Mahalli İdareler Seçimi, Milletvekili Genel Seçimi*)

- *Islamic mayor in 1994* is a dummy variable taking on the value of 1 if the municipality received a mayor in 1994 from either the Welfare Party (Refah Partisi, RP), which received 19.4 % of the votes and was awarded 329 municipalities; or the Great Union Party (Büyük Birlik Partisi, BBP) which received 0.94 % of the votes and was awarded 11 municipalities. For the *Islamic mayor in 1989* variable, RP is the only Islamic party.

- *Islamic win margin* is defined as the difference in vote share between the largest Islamic party and the largest secular party.

- *Neighborhood-level RP vote share relative to municipal-level RP vote share in 1995* is the vote share of a neighborhood's vote share in the national election in 1995 relative to the municipality's RP vote share in the same election.

- *Municipality dummies*: Dummy variables indicating whether a municipality is a district center, province center, metropolitan, or sub-metropolitan municipality

2.A.2   Population Census 1990/2000 (*Genel Nüfus Sayımları*)

- *Share of Population with High School Education* is the number of individuals (male/female) recorded in the relevant census municipality or neighborhood as having obtained secondary education degree (Lise) divided by the total population (male/female) in the municipality or neighborhood.

- *Share of Population with University Education* is the number of individuals recorded in the relevant census municipality or neighborhood as having obtained university education degree (Yüksek Öğretim) divided by the total population (male/female) in the municipality or neighborhood.

- *Share of Population with Primary Education* is the number of individuals recorded in the relevant census municipality or neighborhood as having obtained primary education degree (İlkokul or İlköğretim) divided by the total population (male/female) in the municipality or neighborhood.

- *Share of Population with Vocational Education* is the number of individuals recorded in the relevant census municipality or neighborhood as having obtained vocational education degree (Lise dengi meslek) divided by the total population (male/female) in the municipality or neighborhood.

- *Age distribution shares*: the share of the population below 20 years of age, and above 60 years of age.

- *Gender ratio*: ratio of female-to-male population

- *Household size*: Average of household population per household.

- *Children/women*: Number of children divided by number of women.

2.A.3   Building Census 2000 (*Bina Sayımı*)

- *Log Population Density 1990:* The logarithm of total population in 1994 divided by total building floor space in 1990.

- *Share of education floor space in 1990:* Share of total municipal floor space stock, consisting of education facilities in 1990.

- *Education Share of All Buildings:* Share of total municipal floor space, constructed between 1990-2000, consisting of education facilities.

- *Privately-financed share of Education Buildings:* Share of all education facilities in floor space, constructed between 1990-2000, consisting of privately-financed education facilities.

- *Vakıf-owned share of Education Buildings:* Share of all education facilities in floor space, constructed between 1990-2000, consisting of vakif-owned education facilities.

- *Municipal-owned share of Education Buildings:* Share of all education facilities in floor space, constructed between 1990-2000, consisting of municipality-owned education facilities.

- *Government-owned share of Education Buildings:* Share of all education facilities in floor space, constructed between 1990-2000, consisting of central-government-owned education facilities.

2.A.4   Building Permits 1991-2008 (*Bina Ruhsatı*)

- Education Share of All Building Permits: Share of building permits in floor space allocated to education facilities, by election periods (1991-1994, 1995-1999, 2000-2004, 2005-2008).

- Private Share of All Education Building Permits: Share of building permits in floor space allocated to education facilities that were privately-financed, by election periods (1991-1994, 1995-1999, 2000-2004, 2005-2008).

Table 2.1 Descriptive statistics: Census 2000 outcomes and 1994 Local elections

	(1)	(2)	(3)	(4)
Municipality Sample	*All*	*Secular*	*Islamic*	*Diff*
	(N=2633)	*(N=2318)*	*(N=315)*	*(3)-(2)*
Dependent Variables				
(1) Female High School Share	0.163	0.166	0.140	-0.026***
15-20 years of age	(0.096)	(0.097)	(0.090)	[0.006]
(2) Male High School Share	0.193	0.192	0.196	0.004
15-20 years of age	(0.077)	(0.078)	(0.076)	[0.005]
Main explanatory variable				
(4) Islamic mayor 1994	0.120	0.000	1.000	1.000
	(0.325)	(0.000)	(0.000)	[0.000]
Covariates				
(5) Log Population	7.840	7.776	8.315	0.540***
	(1.191)	(1.074)	(1.767)	[0.071]
(6) Share below 19	0.405	0.400	0.445	0.046***
	(0.083)	(0.082)	(0.075)	[0.005]
(7) Share between 20-59	0.503	0.506	0.482	-0.024***
	(0.062)	(0.061)	(0.060)	[0.004]
(8) Share above 60	0.092	0.095	0.073	-0.022***
	(0.040)	(0.040)	(0.031)	[0.002]
(9) Gender ratio	1.073	1.073	1.076	0.003
	(0.253)	(0.266)	(0.117)	[0.015]
(10) Household size	5.834	5.751	6.445	0.694***
	(2.359)	(2.375)	(2.147)	[0.141]
(11) District center	0.345	0.338	0.394	0.055*
	(0.475)	(0.473)	(0.489)	[0.029]
(12) Province center	0.023	0.017	0.067	0.050***
	(0.149)	(0.129)	(0.250)	[0.009]
(13) Metropolitan	0.006	0.004	0.019	0.015***
	(0.075)	(0.062)	(0.137)	[0.005]
(14) Sub-metropolitan	0.022	0.015	0.076	0.062***
	(0.147)	(0.120)	(0.266)	[0.009]

Standard deviations in paranthesis, standard errors in square brackets. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2.2 Education in 2000 and 1994 Local Elections

Dependent Variable	Share of Cohort with High School Degree							Student Share
Cohort	15-20						21-25	15-30
Specification	OLS		RD Sample		RD Control		RD Control	RD Control
Covariates	N	Y	N	Y	N	Y	Y	Y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Women								
Outcome mean	0.163		0.145		0.163		0.165	0.130
Islamic Mayor 1994	-0.026***	-0.012**	0.029*	0.034***	0.031**	0.029***	0.030***	0.023***
	(0.006)	(0.005)	(0.014)	(0.012)	(0.014)	(0.011)	(0.011)	(0.008)
Panel B. Men								
Outcome mean	0.193		0.199		0.193		0.262	0.186
Islamic Mayor 1994	0.004	0.008	0.023	0.02	0.015	0.011	0.008	0.007
	(0.005)	(0.005)	(0.014)	(0.013)	(0.012)	(0.011)	(0.015)	(0.010)
Observations	2633	2633	102	102	2633	2633	2633	2633

Panel A reports high school attainment results for the female 15-20 age cohort and panel B shows the same for the male 15-20 cohort. The first row in each panel shows the mean for the relevant sample. Columns 1-2 are basic OLS specifications; columns 3-4 are reduced-sample specifications including observations where the absolute Islamic win margin was less than 2 percent; and columns 5-6 are full-sample polynomial specifications where a fourth-order polynomial in the Islamic win margin is estimated on each side of the threshold at zero. In column 7 the outcome is the share of women (panel A) or men (panel B) with high school degree in the age cohort 21-25, and in column 8 the outcome is the share of all women (panel A) or men (panel B) classified as students in the age cohort 15-30. The Islamic win margin is defined as the difference in vote share between the largest Islamic party and the largest secular party in 1994. Covariates include the share of the total population under 19 years, the share of the total population above 60, five gender-specific age cohorts, the gender ratio, log total population and dummies for municipality types. Robust standard errors clustered by province in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.3 Robustness Checks for Female 15-20-year-olds with High School Degrees in 2000

Robustness Check	Islamic-Left vs. Islamic-Right			1990 Census Controls	Long-Difference 1990-2000	Building Census controls	Province Fixed Effects	Incumbent Islamic Mayor	Covariate Polynomial	|Margin| < 0.04	|Margin| < 0.01
	All	Isl./Left	Isl./Right								
Specification	RDC	RDS	RDS	RDC	RDC	RDC	RDC	RDC	RDC	RDS	RDS
Covariates	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Islamic mayor in 1994	0.024**	0.058	0.022	0.024**	0.021*	0.024**	0.025***	0.026*	0.024**	0.020**	0.042**
	(0.012)	(0.056)	(0.017)	(0.011)	(0.011)	(0.011)	(0.009)	(0.016)	(0.010)	(0.008)	(0.017)
Islamic mayor and I-L interaction	0.074										
	(0.045)										
Islamic-Left Contes	1.474*										
	(0.793)										
Observations	2661	23	79	1866	1613	2615	2661	1915	2661	209	56

All regressions are estimated using OLS, with RDS meaning a regression including only observations within 2 percent of the threshold, and RDC meaning a full-sample regression with a fourth-order polynomial in the running variable on each side of the threshold. Column 1 includes an interaction of the Islamic mayor dummy with a dummy denoting whether the contest was between an Islamic party and a left-wing secular party. Columns 2 and 3 show reduced sample regressions with the samples of Islamic versus left-wing and right-wing, respectively. Column 4 adds census 1990 controls including the female share of the population with high school attainment, employed, and married. Column 5 is a (long) difference equation of changes between 1990 and 2000. Column 6 includes log population density, log total floor space of all buildings and the share of education building space, all measured in 1990. Column 7 includes (80) province dummies. Column 8 adds a dummy for whether an Islamic mayor was elected in 1989. Column 9 includes fourth-order polynomials in all continuous covariates. Columns 10 and 11 are RD Sample regressions including observations not further than 4 and 1 percent, respectively, from the threshold. Robust standard errors clustered by province in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.4 Direct effects and indirect effects

	(1)	(2)	(3)	(4)	(5)
	Share of Women with High School	Share of Women	Share of Women with High School	Share of Women	Share of Women with High School
Outcome variable	Degrees	who are Students	Degrees	who are Students	Degrees
Cohort	*31-64*	*15-30*	*15-20*	*15-30*	*15-20*
Islamic mayor 1994	0.008**	0.023***	0.028***	0.016**	0.018**
	(0.003)	(0.008)	(0.011)	(0.007)	(0.009)
Share with High School (ages 31-64)				0.808***	1.306***
				(0.119)	(0.151)
Observations	2633	2633	2633	2633	2633
Relative size				**0.70**	**0.64**

Covariates include fourth-order polynomial in Islamic win margin, log population, cohort population shares, gender ratio, and dummies for municipality type. Standard errors clustered by province in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.5 RD Sample comparisons

	(1)	(2)	(3)	(4)	(5)	(6)
	All	*Far Secular*	*Close |x|<.02*	*Far Islamic*	*Diff (3)-(4)*	*Diff (3)-(2)*
Women 15-20 with High School	0.163	0.167	0.145	0.137	0.007	-0.023**
	(0.096)	(0.097)	(0.091)	(0.089)	[0.010]	[0.010]
Men 15-20 with High School	0.193	0.192	0.199	0.194	0.005	0.007
	(0.077)	(0.078)	(0.078)	(0.076)	[0.009]	[0.008]
Log Population	7.840	7.771	8.096	8.343	-0.247	0.326***
	(1.191)	(1.063)	(1.547)	(1.802)	[0.202]	[0.110]
Share below 19	0.405	0.399	0.446	0.444	0.002	0.047***
	(0.083)	(0.082)	(0.078)	(0.075)	[0.009]	[0.008]
Share between 20-59	0.503	0.506	0.474	0.484	-0.010	-0.033***
	(0.062)	(0.061)	(0.061)	(0.059)	[0.007]	[0.006]
Share above 60	0.092	0.095	0.080	0.072	0.008**	-0.015***
	(0.040)	(0.040)	(0.033)	(0.031)	[0.004]	[0.004]
Gender ratio	1.073	1.074	1.047	1.079	-0.032**	-0.026
	(0.253)	(0.268)	(0.096)	(0.120)	[0.013]	[0.027]
Household size	5.834	5.742	6.332	6.439	-0.108	0.590**
	(2.359)	(2.354)	(2.734)	(2.128)	[0.270]	[0.240]
Children/Women	3.444	3.409	3.700	3.649	0.051	0.291***
	(0.749)	(0.742)	(0.724)	(0.766)	[0.088]	[0.075]
Observations	2633	2269	102	262	364	2371

The table shows summary statistics for 1) the full sample, 2) secular municipalities where the *Islamic win margin* was smaller than -2 percent, 3) municipalities where the *absolute Islamic win margin* was below 2 percent, and 4) Islamic-run municipalities where the *Islamic win margin* was larger than 2 percent. Standard deviations are in parenthesis and standard errors are in square brackets. *p<0.1 ** p<0.05 *** p<0.01

Table 6. Islamic Rule and Urban Planning

Dependent Variable	(1) Mean	(2) OLS	(3) RDC	(4) Obs (Clust.)
Panel A. Building Space Constructed between 1990-2000				
(1) Education Share of All Bldgs	0.04	-0.002 (0.003)	0.000 (0.007)	2644 (80)
(2) Privately-financed share of Education Bldgs	0.20	0.045** (0.018)	0.085* (0.048)	2012 (80)
(3) *Vakıf*-owned share of Education Bldgs	0.02	0.016** (0.008)	0.073** (0.028)	2012 (80)
(4) Municipal-owned share of Education Bldgs	0.02	-0.003 (0.007)	-0.017 (0.014)	2012 (80)
(5) Government-owned share of Education Bldgs	0.58	-0.017 (0.030)	-0.010 (0.055)	2012 (80)
Panel B. Municipal Building Permits for Educational Buildings 1991-2004				
(6) Education Share of All Bldg. Permits	0.03	0.003 (0.005)	0.009 (0.017)	5867 (2573)
(7) Private Share of All Education Bldg. Permits	0.49	0.039 (0.024)	0.173** (0.088)	2192 (1338)

All regressions are estimated with OLS and include controls for log population, age below 19, age below 60, gender ratio, and municipality types. Panel A shows results from the Building Census of 2001; row 1 shows the education share of all building space (in square meters) constructed between 1990 and 2000. Rows 2 through 5 show, for the same period, shares of education building spaces financed privately (row 2), owned by religious foundations (vakıflar, row 3), owned by municipalities (row 4), and owned by the central government (row 5). Panel B shows panel regressions of the election period average of Education Share of Building Permits (in row 6) and Private Share of School Permits (row 7) on Islamic mayor at the start of the election period (either of 1989, 1994, or 1999). Regressions in panel A have standard errors clustered by province while regressions in panel A include election period-specific effects and have standard errors clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1

Table 2.7 Labor Market Outcomes in Cities

			Neighborhoods				Municipalities
		Mean (sd)	OLS	RDS	RDC	RDC	RDC
		(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Economic Activity (shares of male or female population)							
(1) Employment	Men	0.460	0.002	-0.006	-0.013	-0.018	-0.029
		(0.143)	(0.008)	(0.024)	(0.025)	(0.030)	(0.024)
	Women	0.085	-0.014***	0.008	-0.008	0.001	-0.003
		(0.071)	(0.004)	(0.011)	(0.011)	(0.010)	(0.010)
(2) Housewives	Women	0.704	0.034***	-0.046***	-0.025	-0.033**	-0.021
		(0.104)	(0.005)	(0.017)	(0.017)	(0.015)	(0.018)
Panel B. Form of Income (shares of men or women employed)							
(3) Wage-taker	Men	0.660	0.039***	0.034	0.012	-0.029	-0.013
		(0.152)	(0.009)	(0.027)	(0.026)	(0.026)	(0.023)
	Women	0.767	0.038***	0.105*	0.086*	0.04	0.042
		(0.248)	(0.014)	(0.054)	(0.046)	(0.040)	(0.057)
(4) Family-employed	Men	0.080	-0.008*	-0.018	-0.009	-0.004	0.003
		(0.072)	(0.004)	(0.012)	(0.010)	(0.011)	(0.010)
	Women	0.182	-0.033**	-0.088*	-0.081*	-0.04	-0.043
		(0.233)	(0.013)	(0.050)	(0.043)	(0.038)	(0.055)
Panel C. Sector Employment (shares of men or women employed)							
(5) Agriculture	Men	0.154	-0.047***	-0.055*	-0.046*	-0.033	-0.007
		(0.169)	(0.010)	(0.029)	(0.026)	(0.027)	(0.019)
	Women	0.211	-0.054***	-0.112**	-0.081	-0.047	-0.034
		(0.273)	(0.016)	(0.055)	(0.049)	(0.043)	(0.063)
(6) Industry	Men	0.163	0.032***	-0.002	-0.023	-0.048	-0.035
		(0.126)	(0.009)	(0.028)	(0.027)	(0.044)	(0.027)
	Women	0.148	0.033**	0.014	-0.038	-0.060	-0.053
		(0.182)	(0.014)	(0.042)	(0.043)	(0.058)	(0.042)
(7) Construction	Men	0.100	0.002	-0.035**	-0.046***	-0.028**	-0.034**
		(0.081)	(0.004)	(0.014)	(0.013)	(0.011)	(0.014)
	Women	0.006	0.000	-0.001	-0.004***	-0.002	-0.002
		(0.026)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
(8) Services	Men	0.580	0.014	0.091***	0.113***	0.108***	0.076**
		(0.167)	(0.012)	(0.031)	(0.034)	(0.036)	(0.029)
	Women	0.632	0.02	0.100	0.122**	0.109*	0.087
		(0.276)	(0.018)	(0.065)	(0.060)	(0.060)	(0.058)
Observations		9,998	9,998	653	9,998	9,998	907
Covariates		-	Y	Y	Y	Y	Y
Weighted		Y	Y	Y	Y	N	N

All regressions are estimated with OLS and include covariates for population, age, gender ratio and type of municipality. Columns 1 through 4 are weighted by the inverse number of neighborhoods within a municipality. Column 5 is unweighted. Coslumn 6 includes observations at the municipal level.

Table 2.A1. Neighborhood-level heterogeneous effects

	(1)	(2)	(3)	(4)	(5)	(6)
	High School			**Students**		
Interaction	No	Yes	Yes-FE	No	Yes	Yes-FE
	Panel A. Women					
Islamic mayor	0.026**	-0.01		0.015	0.011	
	(0.011)	(0.025)		(0.009)	(0.019)	
Islamic mayor * Rel.vshr.		0.032	0.034*		0.001	-0.008
		(0.022)	(0.020)		(0.013)	(0.013)
Relative Islamic vote share		0.002	0.013		0.074***	0.065**
		(0.035)	(0.035)		(0.027)	(0.025)
Adjusted R-squared	0.382	0.414	0.681	0.095	0.115	0.477
	Panel B. Men					
Islamic mayor	0.039***	0.042*		0.013	0.026	
	(0.013)	(0.025)		(0.011)	(0.022)	
Islamic mayor * Rel.vshr.		-0.009	-0.007		-0.024	-0.027
		(0.020)	(0.019)		(0.019)	(0.017)
Relative Islamic vote share		0.026	0.002		0.025	0.042
		(0.038)	(0.039)		(0.039)	(0.039)
Adjusted R-squared	0.248	0.276	0.651	0.427	0.443	0.661
	Panel C. Ratio					
Islamic mayor	0.032	-0.078		0.009	-0.179	
	(0.035)	(0.088)		(0.033)	(0.133)	
Islamic mayor * Rel.vshr.		0.101	0.105		0.218*	0.165
		(0.085)	(0.077)		(0.128)	(0.129)
Relative Islamic vote share		-0.24	-0.028		1.512	1.471
		(0.156)	(0.201)		(0.950)	(0.982)
Adjusted R-squared	0.29	0.29	0.52	0.33	0.40	0.45
Observations	10194	8056	8056	10194	8056	8056

The graph shows neighborhood-level results on high school (columns 1-3) and students (columns 4-6) as a share of the female population (Panel A), the male population (Panel B), and the female-to-male ratio (Panel C). Columns 1 and 4 show results without interactions. Columns 2 and 5 show interaction results with the interacting variable defined as the neighborhood-level vote share for the Islamic party divided by the municipal-level vote share for the party. Columns 3 and 6 shows similar models including municipal-fixed effects. All regressions include a fourth order polynomial on each side of the threshold at zero, covariates as described in the text, and the interacting variable is interacted with the polynomial control function and other covariates. Standard errors are clustered by municipality and observations are weighted by the inverse number of neighborhoods existing within a municipality.

Table 2.A2. Heterogenous Effects by Share of Religious Buildings

	(1)	(2)	(3)	(4)	(5)	(6)
	High School Education			**Primary Education**		
	Women	*Men*	*Ratio*	*Women*	*Men*	*Ratio*
Islamic mayor	-0.006	0.003	-0.019	-0.014	-0.007	-0.01
	(0.012)	(0.017)	(0.035)	(0.020)	(0.011)	(0.028)
Islamic mayor * Shr.Rel.	1.624**	1.359	3.659	0.214	0.355	-0.568
	(0.784)	(1.224)	(2.660)	(1.501)	(0.725)	(2.196)
Share Religious Buildings	-6.131	-4.925	-9.975	3.871	0.166	3.849
	(4.189)	(4.620)	(8.797)	(5.587)	(3.517)	(8.652)
Adjusted R-squared	0.54	0.44	0.51	0.63	0.72	0.40
Observations	2643	2643	2643	2643	2643	2643

The graph shows municipal-level results on high school (columns 1-3) and primary education (columns 4-6) as a share of the female population (columns 1 and 4), the male population (columns 2 and 5), and the female-to-male ratio (columns 3 and 6). All regressions include a fourth-order polynomial in the Islamic win margin on each side of the threshold at zero, and covariates as described in the text. The interacting variable is the share of a municipality's building floor space composed of religious buildings. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.
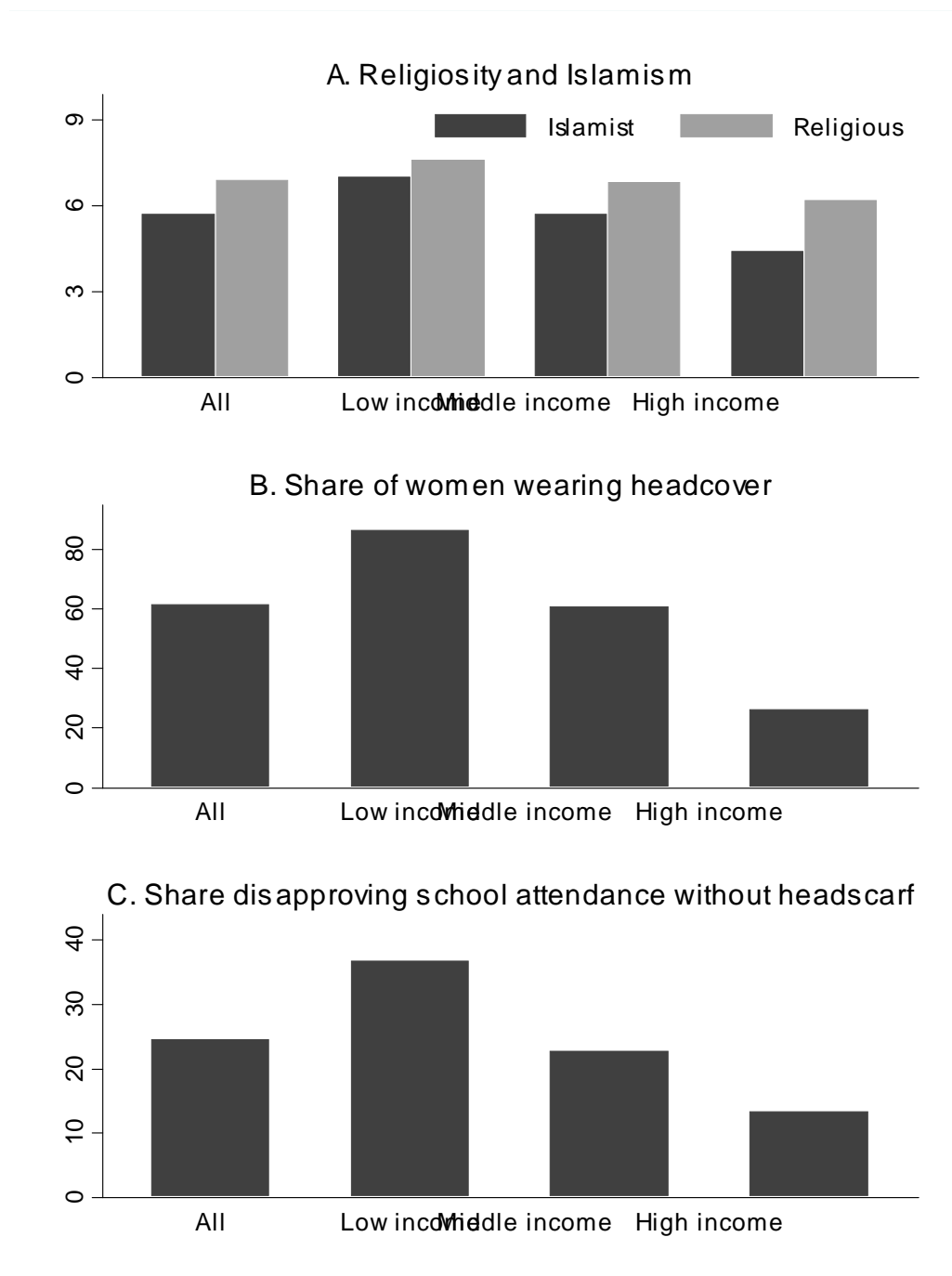
Figure 2.1: **Religious preferences, Education, and the Headscarf**. The graphs show results from a survey of 1500 individuals by TESEV in 2006. Fig A: Religiosity measures the degree to which respondents defined themselves as being religious Muslims. The Islamist index allows respondents to place themselves on a range from 1 to 10, with 1 being "Secularist" and 10 being "Islamist". B: Share of female respondents who wear some form of headcover. C: Share of Respondents who would disapprove if daughter removed headscarf to attend education. Source: Çarkoğlu, Ali and Binnaz Toprak, "Religion, Society and Politics in Changing Turkey," TESEV (2006), http://www.tesev.org.tr/
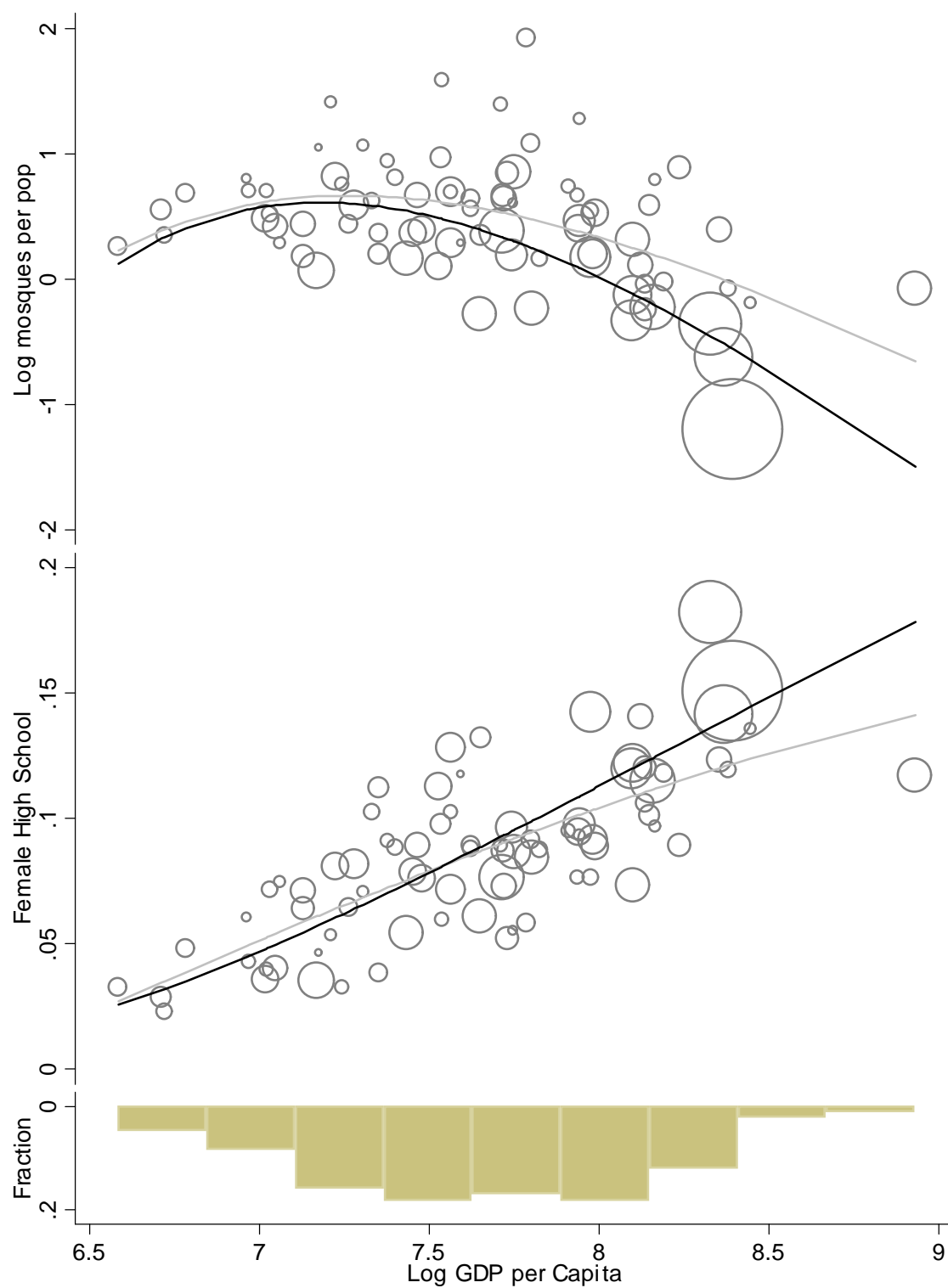
Figure 2.2: **Education, Religion, and Income.** The graph shows province-level Log GDP per Capita (x-axis), its distribution (lowest y-axis), female high school education attainment (middle y-axis), and log mosques per population (upper y-axis). Observations are weighted by population and fitted by fractional polynomials, weighted (black) and unweighted (gray).
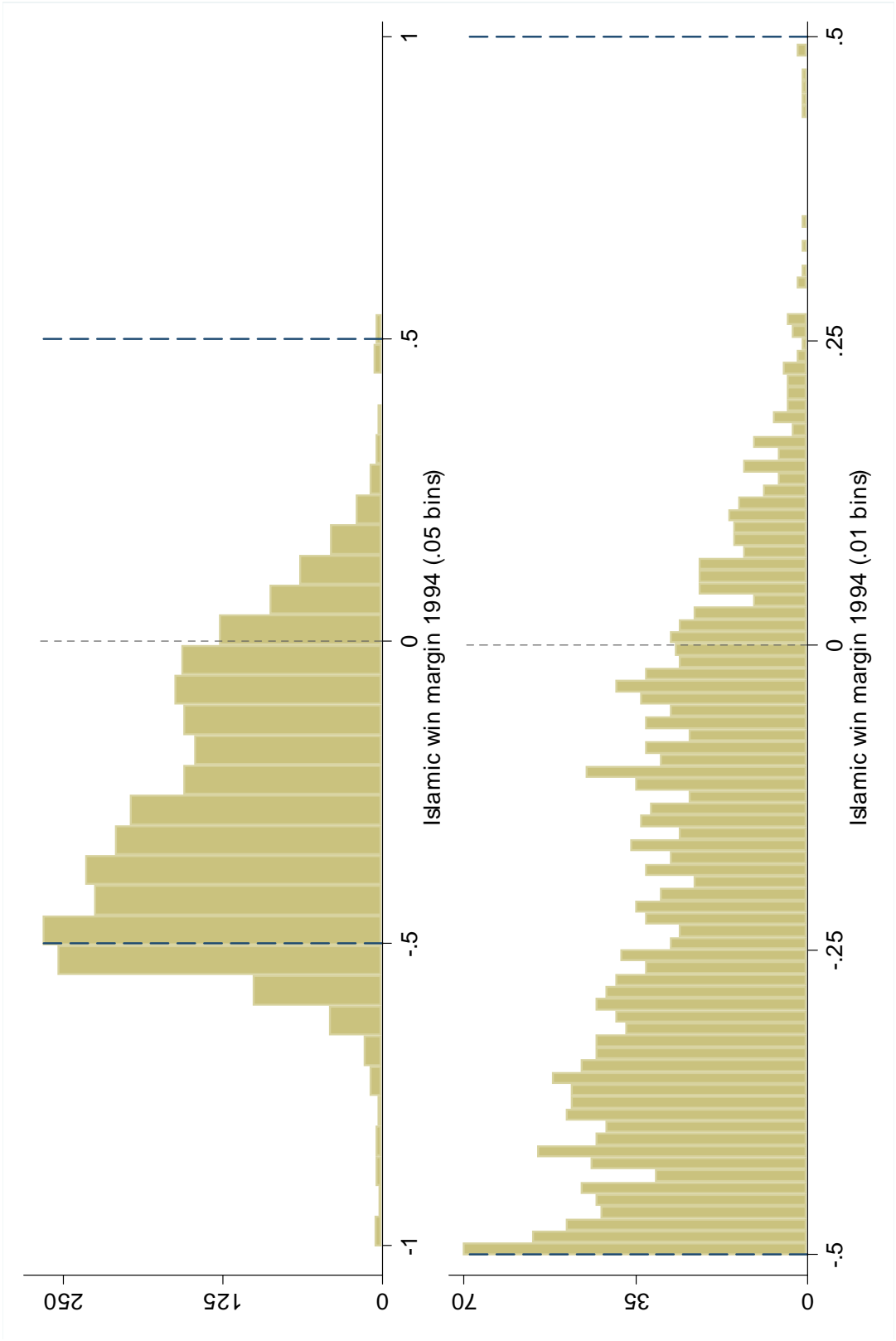
Figure 2.3: **Histogram of running variable.** Graph shows histogram of the Islamic winning margin in 1994 for the full range in 5 percent bins (upper graph) and for a smaller range for bins of 1 percent.

Figure 2.4: **Islamic win margin in 1994 and High School Education in 2000.** The graphs show unconditional means in one-percent bins for the share of women (left) and men (right) respectively between 15-20 years of age with a high school degree. The solid represent the predicted values of a fourth-order polynomial fit estimated on each side of the threshold at zero. The outer gray lines denote 95 percent confidence intervals.

Figure 2.5: **Islamic Mayor and Education by Type.** The graphs show unconditional means in one-percent bins for the share of women (left within panel) and men (right within pan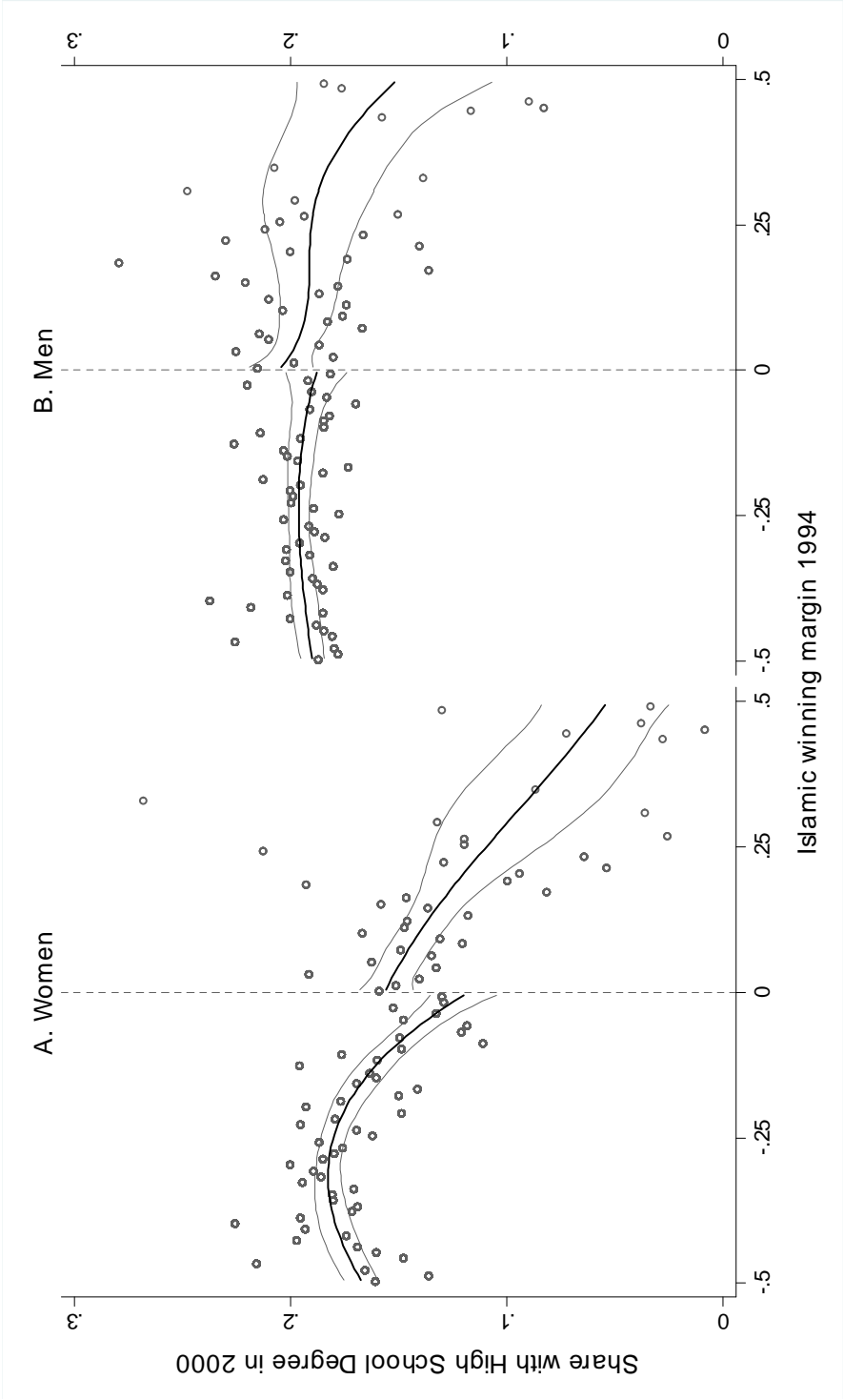el) with high school degree in the cohort 15-20 (panel A), primary school in the cohort 15-20 (panel B), enrollment in the cohort 15-30 (panel C), and vocational high school in the cohort 15-20 (panel D). The solid represent the predicted values of a fourth-order polynomial fit estimated on each side of the threshold at zero. The outer gray lines denote 95 percent confidence intervals.
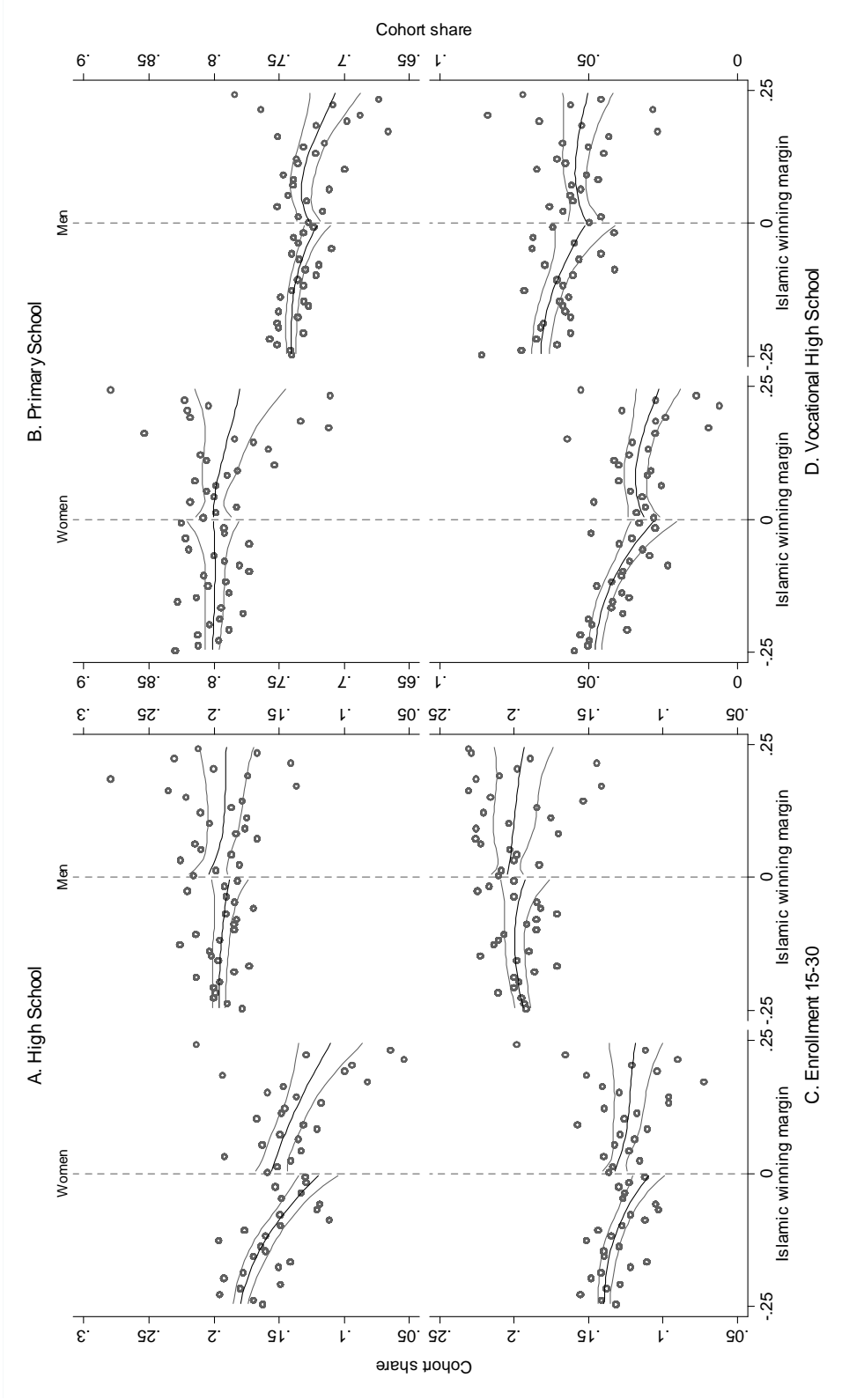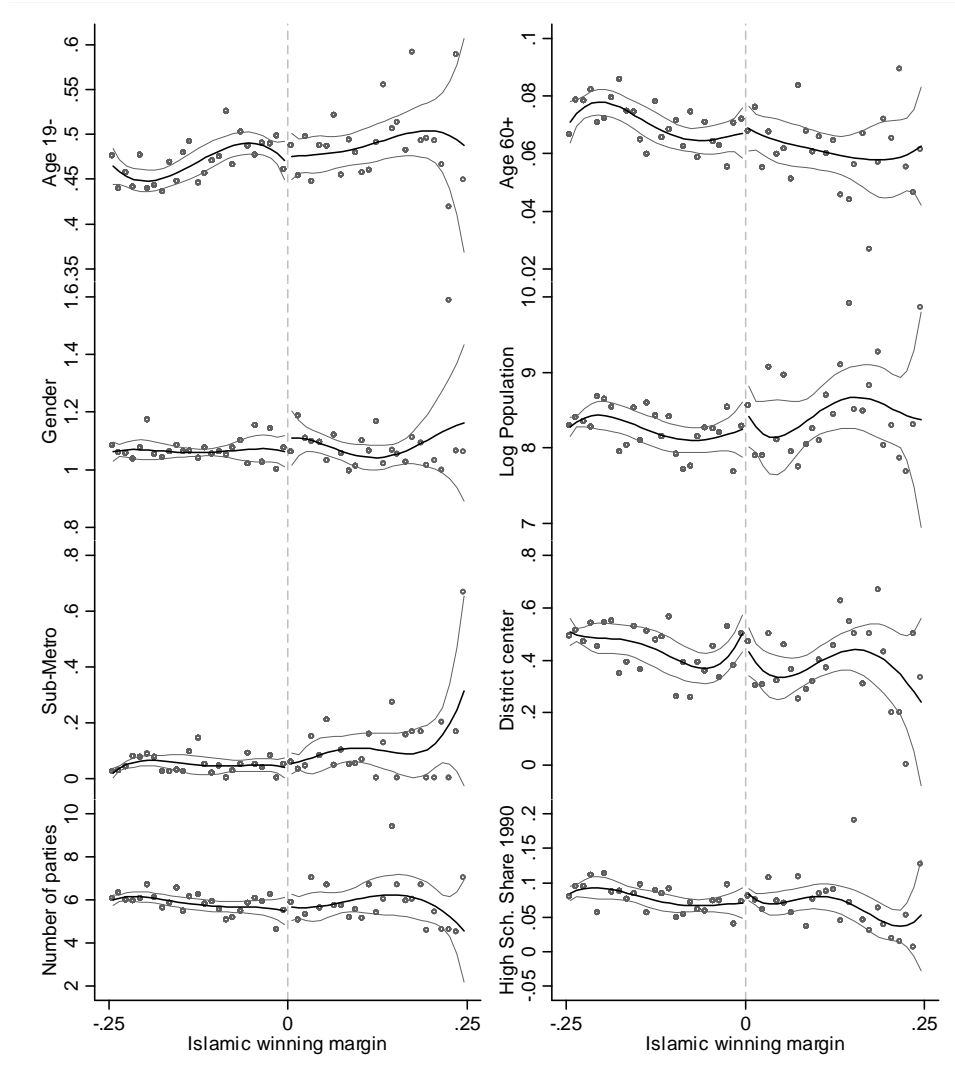
Figure 2.6: **Balanced Covariate Checks.** The panels refer to the following munic-ipality characteristics: Share of the population aged below 19, share the of popula-tion aged above 60, gender ratio, log population, sub-metro municipality indicator, district municipality indicator, number of parties, and the share of female 15-20-year-olds with a high school degree in 1990. Each circle corresponds to the unconditional mean in bins of one percent by the Islamic win margin in mayoral elections 1994. The solid line represents the predicted values of a fourth-order polynomial fit, one on each side of the threshold at zero. Dashed lines indicate 95 percent confidence intervals.
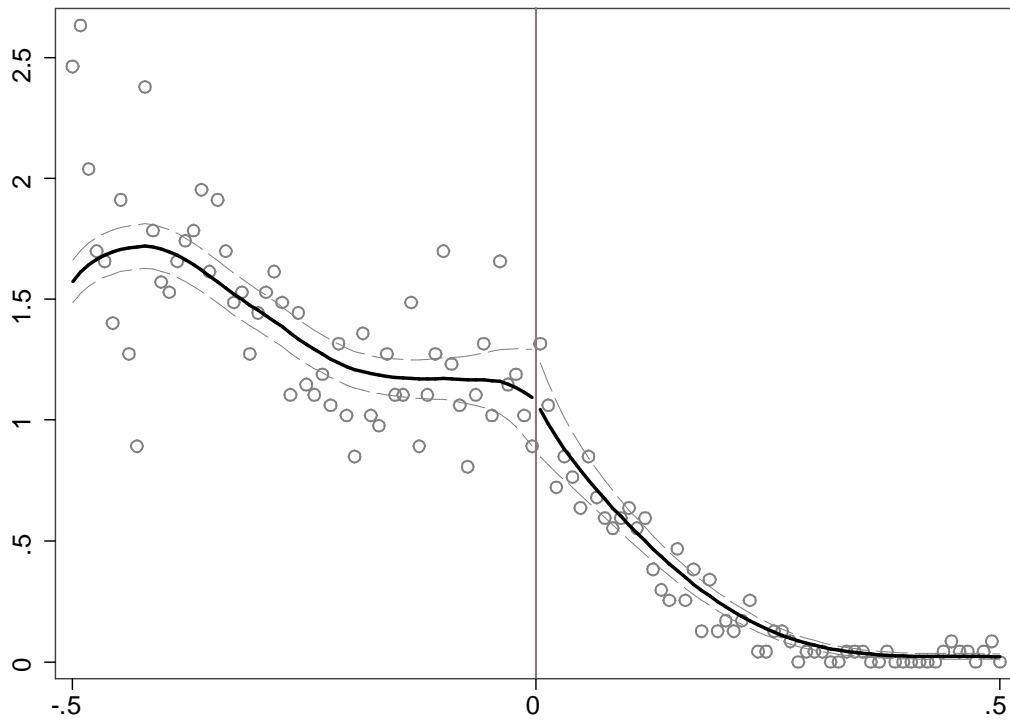
Figure 2.7: **Running variable density test.** The graph shows the McCrary (2008) test of whether there is a discontinuity in the density of the Islamic win margin. Theta=-0.016, S.E=0.141, bin width=0.009, bandwidth=0.165.
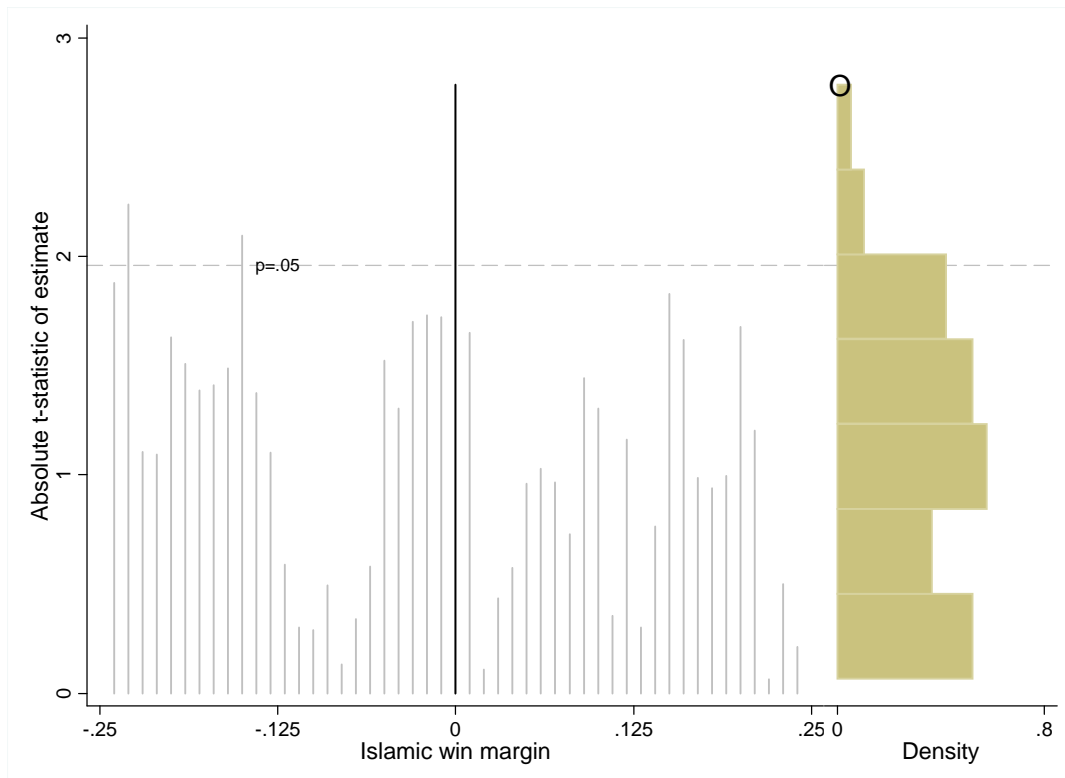
Figure 2.8: **Alternative Breaks.** The graph shows, on the left-hand side, absolute t-statistics of placebo RD estimates at various thresholds, where a fourth-order polynomial in the Islamic win margin is estimated on each side of the threshold. The points included have at least 50 observations within a bandwidth of .25. The right-hand side shows the distribution of the t-statistics, with the threshold at zero indicated by a black circle.
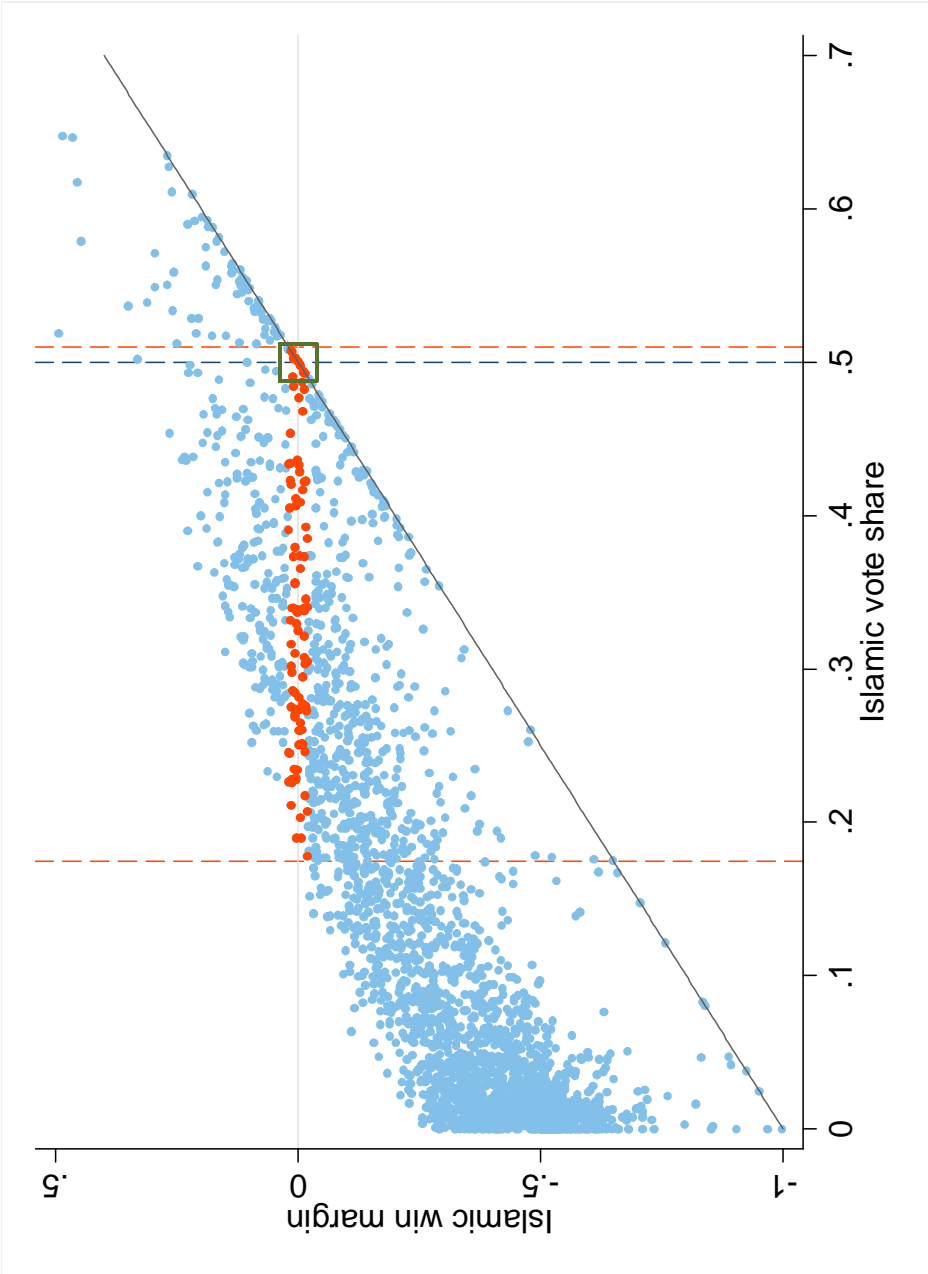
Figure 2.9: **Islamic win margin and Islamic vote share.** The graph shows the absolute vote share for the Islamic party plotted against the Islamic win margin, both in 1994. Observations less than 2 percentage points away from the threshold at zero are in black. The diagonal line is the hypothetical one-to-one relationship between the two variables in an election with only two parties.
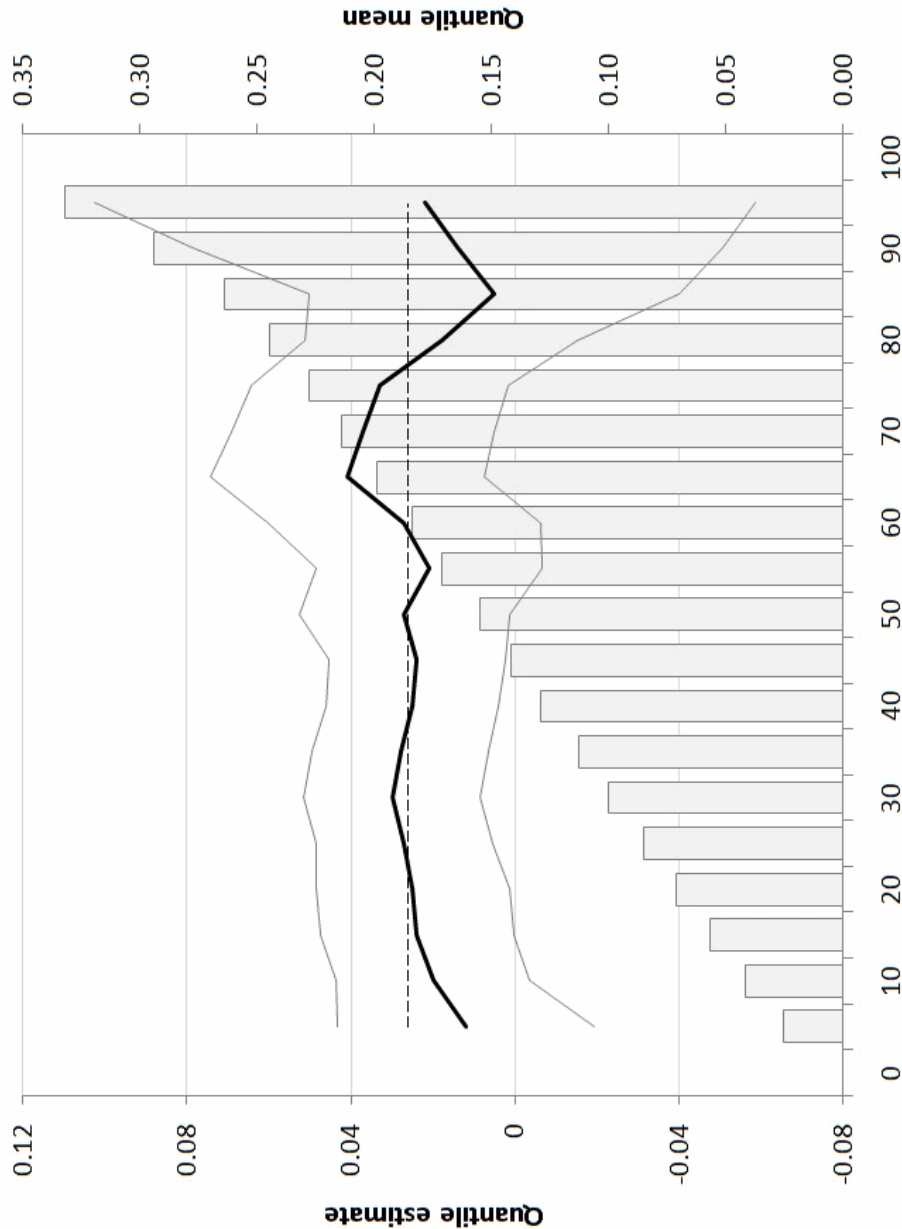
Figure 2.10: **Quantile RD Estimates on 15-20-year-old women's high school education.** The graph shows quantile RD estimates (black line) high school attainment cohorts for ages 15-20. The gray lines indicate 95 percent confidence intervals, where standard errors are bootstrapped using 1000 replications and clustered by province. The gray bars show quantile means of the dependent variable. All regressions include controls for log population, total population below 19, total population above 60, five female age cohorts, gender ratio, and type of municipality.
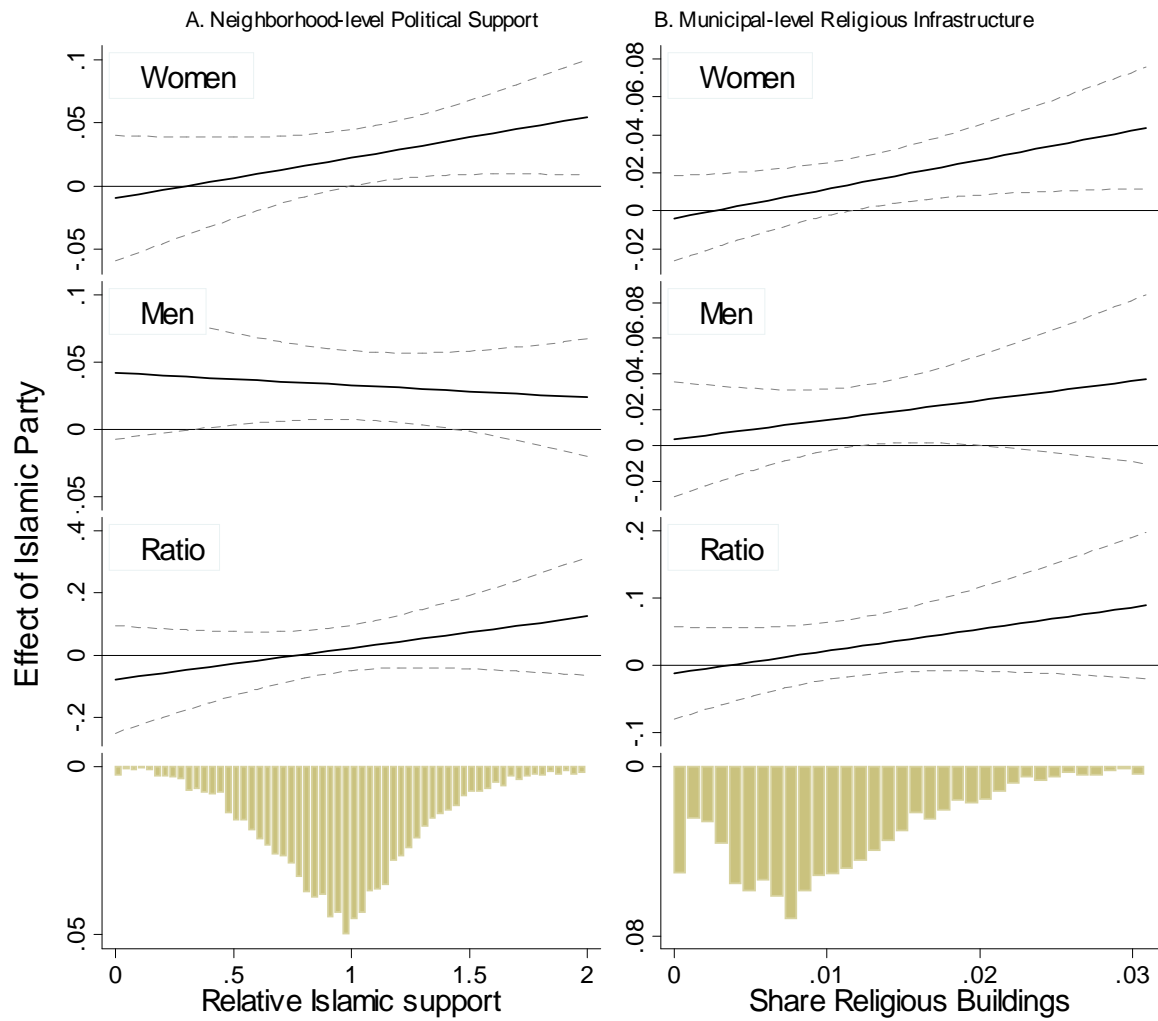
Figure 2.11: **Impact of Islamic Mayor on High School Education by Relative Islamic Influence.** The above graphs show neighborhood-level heterogeneous effects of Islamic party in 1994 on the share of the population with a high school degree in 2000, by the ratio of neighborhood-to-municipal vote share for the Islamic party (Panel A) and the share of all building space made up by religious buildings in 1990 (panel B). The uppermost panels show results for women, the upper-middle for men, and the lower-middle is the ratio of the female-to-male outcome. The bottommost graph is a histogram of the interacting variable. In each regression, the outcome is regressed on the Islamic mayor indicator, a fourth-order polynomial in the Islamic win margin, log population, age below 19, age above 60, gender ratio, type of municipality, and the interacting variable. The latter is also interacted with each of the variables on the right-hand side of the regression equation including the polynomial control function. The neighborhood-level regression is weighted by the inverse of the number of neighborhoods within a municipality and standard errors are clustered by municipality to allow for correlation among neighborhoods within the same municipality. For municipal-level regressions standard errors are clustered by province. Dashed lines denote 95 % confidence intervals.

Chapter 3

Islam and Long-Run Development[*]

1 Introduction

> "By all standards of the modern world—economic development, literacy,
> scientific achievement—Muslim civilization, once a mighty enterprise,
> has fallen low."

Such was Lewis' [24] devastating evaluation of the development track record of
Islam. Once centers of science and philosophy, Muslims countries are today poorer
than non-Muslim ones. In 2000 the group of countries above the median population
share of Muslims had just a third of the income per capita of the group below the
median. Today a quarter of the world's population adhere to Islam, making the link
between Islam and income an important issue for development economics. Moreover,
along with the recent nation-building attempts in countries like Afghanistan and
Iraq, the extent to which Islam has any effect on development is more important
than ever before.

One branch of previous research has either focused on cross-country correlations
(Kuran [20]; Fish [14]; Donno and Russett [13]) or historical evidence (Kuran [22],
Lewis [25]). Moreover, the literature on religion and economics has documented
positive development consequences of religiosity in general but a negative effect of
Islam (Barro and McCleary, [5]).

A set of recent micro-based studies has, however, documented various positive effects of local Islamic shocks, specifically with regards to political Islamic movements gaining control over local governments (Henderson and Kuncoro [16]; Meyersson [27]). Moreover, Clinginsmith, Khwaja, and Kremer [10] show that Muslims who went on the Hajj came back with more moderate views on a range of issues. This raises the question whether the effects of Islam at the country-level really represent a causality. The purpose of this paper is to shed light on this matter.

I use geographical characteristics in the spread of Islam, more precisely proximity to Mecca, as an exogenous source of variation to examine the long-run impact of Islam on development[1] . An essential factor determining whether a country received more or less Islamic influence was its distance from Mecca, the holy site of Islam, and around a third of the total variation in Muslim share of population can be explained by this distance alone. Under the assumption that, holding other relevant geographical and climatic factors fixed, this distance measure only affects development through Islamic influence, an instrumental variable (IV) approach can be implemented.

I find large negative IV estimates of the Muslim share of population on income per capita, around three times the magnitude of standard OLS estimates. A one standard deviation higher fraction of Muslims in the year 1900 would have led to half a standard deviation lower income per capita in 2000. This result is robust not only to controlling for various geographic, geological, and climatic underlying conditions, but also to a host of demographic and historical factors. Importantly, the negative development impact of Islam is not dependent on outcomes in the Middle East.

I also examine the impact on two stylized components of Islamic influence; the first being religious influence in legal institutions and the second being women's rights. Countries with a larger population share of Muslims exhibit both legal systems more influenced by religious doctrine, as well as lower female participation in public institutions such as labor markets, education, and politics. However, the same specified process that led to these outcomes has also led to improved female, relative to male, health outcomes. Women in Muslim countries live longer relative to men, exhibit lower relative mortality rates across all age groups, and have lower

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[1] For other papers using similar distance-based exogenous sources of variation see Becker and Woessmann (2009) and Nunn (2008).

adolescent fertility rates. This muddles the view that Islam is invariably detrimental to women's living standards, and instead emphasizes the link between lower income levels and low female participation in public institutions.

The rest of the paper is organized as follows. Section 2 describes the empirical strategy. Section 3 presents the main results, and investigates their robustness. Section 4 then examines the Islamic impact on religious influence in legal institutions and women's rights. Section 5 concludes.

2 Mecca and the Spread of Islam

Mecca is central to Islam in several ways. In addition to being a religious center, it is also a geographic center, as can be seen from Figure 3.1, where a country's population share of Muslims is clearly larger the closer it is to Mecca. This figure also shows certain exceptions, such as the high share of Muslims in Africa and Southeast Asia, as well as certain region-specific variations. While proximity to Mecca seems to be a relevant predictor for the distribution of Muslims in the world, it does not capture all the variation.

The two main channels whereby Islam spread were through military conquests in the Middle East and the region around it (Donner [12], Kennedy [19]), and through (Sufi) missionary activity, often in conjunction with trading missions in places as far away from Mecca as China, Western Africa and Indonesia (Hourani [17]). In the case of conquest, conversion to Islam was a natural response by poorer segments of the population, for those seeking a career in the civil bureaucracy in the Islamic empire, or by those who wanted lower taxes (Bulliet [8]). In the case of missionary activity, conversion could open up possibilities for lucrative trading links with the Arabian peninsula (Chaudhuri [11], Jha [18]). Moreover, the physical centrality of Mecca has also been reinforced by the practice of pilgrimage to the holy city, where higher proximity meant lower transportation costs. Thus, distance to Mecca matters for at least two reasons: one being the manner in which conversion to Islam spread around the world and the other being how the religion emanated outward from the center for those already converted.[2]

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[2] Distance to Mecca has previously been used as a control for predicting measures of Islam or other outcomes, sometimes together with other ecclestial centers (see for example Michalopoulos et al [28] and Iyigun and Fletcher [15]). This study differs from these earlier ones in taking this

A basic innovation of the empirical strategy is that, while the population share of Muslims is highly endogenous – a result of a complicated historical process of conversion by conquest or by choice – the distance to Mecca is arguably unaltered by individual or group decisions, and is therefore predetermined. But even though the proximity to Mecca is a clear and predetermined predictor of the distribution of Muslims around the world, using this as an instrument for the population share of Muslims in a country requires an exclusion restriction – the only way that proximity to Mecca affects development is singularly through the population share of Muslims. Yet, proximity to Mecca also implies other characteristics that may affect development. For example, being closer to Mecca means certain geographic preconditions – being closer to higher temperatures, deserts, and oil. Historical factors, such as the Middle East's vulnerability to invasions, historical income levels, and access to trade networks, are also of importance. If proximity affects development through some other channel than the degree of Islamic influence, then the instrument will be invalid.[3] Many of these factors, including proxies for initial development, ethnic- and religious composition, will be accounted for in Section 3.3.

3 Results

3.1 Main Data and Basic Correlations

As the key explanatory variable I use the population share of Muslims in a country. Since my main interest lies in the long-run development impact of Islam, this is proxied for by a country's population share of Muslims in 1900 taken from Barro and McCleary [5]. Such a measure is not unambiguous, as countries with equal nominal Muslim population shares may differ in religious practice and values etc. Yet the nominal measure is useful not just because it remains the most common measure of Islamic influence and appears frequently as an important predictor of various development outcomes, but also because it is highly correlated with measures of religious intensity (Barro and McCleary [5]).

Income per capita is from the World Development Indicators database and is

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measure as an instrument while at the same time making sure relevant factors are controlled for.

[3] Some have for example suggested that the reason for the Middle East's underdevelopment is the existence of oil (Ross [32]) or factors specific to Arab countries (Donno and Russett [11]).

measured as the logarithm in international (PPP) dollars in the year 2000. For Afghanistan, Iraq, and Somalia, where WDI data is missing, data from the Penn World Tables is used instead. My set of geographic covariates includes average elevation, lowest monthly rainfall, average maximum humidity, average minimum temperature, log coastline length divided by land area, a landlocked indicator, an island indicator, a desert indicator, as well as continent dummies[4] . An additional set of resource covariates includes log oil reserves and log natural gas reserves from the BP Statistical Energy Review. Key summary statistics can be found in Table 3.1.

With this data, I postulate the following cross-country specification of Islam and long-run development

$$y_{i,2000} = \alpha + \beta m_{i,1900} + \mathbf{X}_i' \boldsymbol{\gamma} + \varepsilon_i, \tag{3.1}$$

where $y_{i,2000}$ is log GDP per Capita in 2000 i country i, $m_{i,1900}$ is the Muslim share of population in 1900, and $\mathbf{X}_i$ denotes the covariate set.

Panel A of Table 3.2 reports basic OLS regressions of income per capita on the Muslim share of the population. Although the unconditional OLS estimate in column 1 is not statistically different from zero, adding the basic geography covariate set in column 2 results in a negative significant estimate. Adding controls for the existence of oil and gas resources (in column 3) and excluding the Middle East (in column 4) leads to a marginally larger negative estimate. Taking the estimate from column 3 as a baseline specification, the estimate of -0.703 implies that a standard deviation increase in a country's share of Muslims in 1900 led to a fifth of a standard deviation reduction in income per capita in 2000.

This negative correlation between Islam and income does not necessarily imply a causality. Several factors could be correlated with both income and whether a society is more or less Muslim. For example, certain societies with especially bad development prospects could potentially have selected into Islam as religion, resulting in an OLS estimate that would be inconsistent (and, in this case, resulting in a downward bias). In addition, recent research revealing a positive association with trade institutions and Muslims in South Asia could also be a sign of positive

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[4] These measures have previously been used as geographic controls in for example Acemoglu, Johnson, and Robinson [2] as well as Nunn [29].

selection (Jha [18], Henderson and Kuncoro [19]). For example, in both Indonesia and India, the spread of Islam occurred along important and prosperous trade routes, and conversion to Islam was often associated with business interest and networks. If this was the case, then the reported OLS estimate would exhibit an upward bias. The following sub-section focuses on an important source of variation in the distribution of Islam across countries, the spread outward from Mecca, as a way to shed light on the causal relation between Islam and development.

3.2   Instrumental Variable Results

I use the logarithm of the inverse great-circle distance to Mecca in kilometers from a country's capital city, as an instrument for the Muslim share of population[5] . The identification strategy builds on the assumption that once underlying geographic and climatic factors are take into account, a country's proximity to Mecca should have no other channel of affecting development than through increasing the influence of Islam in that country.

Panel B of Table 3.2 reports reduced-form regressions where income is regressed on the measure of proximity to Mecca. As column 1 illustrates the unconditional OLS estimate shows a negative but insignificant estimate, and is consistent with the idea that being close to Mecca means being close to a geography and climate that could potentially have ambiguous effects on income[6] . However, adding the two covariate sets (in columns 2 and 3) as well as excluding the Middle East (in column 4) from the sample, lead to similarly negative and significant estimates. Undoubtedly, proximity to Mecca is an important predictor of income per capita, even when taking into account other geographic factors.

As for the first-stage of the IV, Panel C in Table 3.2 reports estimates of the population share of Muslims regressed on proximity to Mecca. Here, the first-stage estimate is positive and very significant – moreover, adding the covariate sets and excluding the Middle East has essentially no effect on the estimates. The R-squared, reported in column 1, reveals that the proximity measure alone explains almost a

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[5] Distance measures using the country centroid instead of the capital city do not result in meaningfully different results.

[6] Such factors seem particularly related to the Middle East, as removing this region from the sample in this specification leads to estimates almost identical to those of the full-sample estimates including controls in columns 2 and 3.

third of the total variation in Muslim share of population. F-statistics at around 17 are also high enough to qualify the instrument as strong.

Finally, Panel D of Table 3.2 reports the second-stage IV regressions. As with Panel B, column 1 shows no significant effect of Muslim share of population on income, but once geographic factors are taken into account in columns 2 through 4, the ensuing estimate is negative and very significant. What is striking about this is that the IV estimate is so much (circa three times) larger negative than the OLS estimate, and suggests an upward bias in the latter. Consequently, previous studies may have underestimated the negative impact of Islam on income. Moreover, excluding the Middle East from the sample seems to have little bearing on the estimate in column 4. This suggests that the finding is not simply a result of some process specific to the Middle East. The magnitude of the IV estimate (in column 3) implies that a one standard deviation higher population share of Muslims, a hundred years ago, results in half a standard deviation lower in income per capita today.

Before pursuing this further, however, it is crucial that the exclusion restriction is upheld. The IV estimates using proximity to Mecca obviously rely upon a proper controlling for other relevant factors, and so the next section will examine the robustness of these results.

3.3 Robustness checks

Table 3.3 illustrates the robustness of the main result from column 3 in Table 3.2D, which is reported in row 1, by altering the specification and inclusion of controls. Rows 2 and 3 adjust the sample to show that the result is not driven by outliers; the former excludes those countries that are in the 10th and 90th percentile of the proximity to Mecca measure, while the latter excludes all countries except Sub-Saharan Africa and Asia[7]. Reducing the sample size in these two manners serves only to increase the standard errors in the first- and the second-stage without affecting the latter estimate in any way. Consequently, the main result does not seem to be driven by countries very close or very far away from Mecca, nor is it driven by countries in Europe and the Americas.

The remaining rows are specifications meant to control for potential factors that

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[7] Including or excluding East Asia in this regression has no bearing on the estimates.

could be of importance. The first set relates to geography. Row 4 adds controls
for shares of a country's land area suitable for any of 6 rainfed crops and the share
of the land area suitable for irrigation. Row 5 adds more detailed controls for
humidity (morning minimum and maximum), temperature (monthly high and low),
and rainfall.[8] Row 6 adds fourth-order polynomials in the continuous variables in
the geography covariate set used in Table 3.2.

Looking at Figure 3.1 one can see that Islam seems to have spread horizontally
rather than vertically. Row 7 therefore adds controls for various circular sectors,
including quadrant controls as well as the absolute value of degrees away from the
latitude of Mecca. Row 8 adds twenty controls for the share of a country's land area
located in either of the 20 different Köppen-Geiger climate regions. Row 9 adds
additional dummy variables for the existence of twenty natural resources, and row
10 adds controls for whether a country is in either of a number of natural disaster
risk zones.

The next group relates to demographic, social, and ethnic factors. Row 11 adds
controls for log population, the female share of population, as well as the shares of
population under 15 and above 65 respectively. Row 12 includes, in addition to a
Herfindahl index of religious composition, also shares of the non-Muslim population
composed of Christians, Jews, Hindus, Buddhists, as well as other minor religions.
Row 13 includes logarithms of distance measures to Rome and Northeastern India,
centers that could be considered predictors of other religions. Row 14 adds controls
for the share of each of five major Muslim ethnicities; Arab, Turkish, Persian, Hausa,
and Malay. Row 15 includes a measure of ethnolinguistic fractionalization from
Alesina et al [3].

The next set relates to historical factors. Row 16 excludes all former Soviet
countries from the sample. Row 17 includes controls for whether a country was
colonized by either the Belgians, British, Dutch, French, German, Portuguese, or the
Spanish. Row 18 includes a control for whether a country belonged to the Ottoman
Empire. Row 19 adds dummy variables for each of British, French, or German legal
origin (La Porta et al [23]). Row 20 includes a control for log population density

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[8] For temperature this includes minimum monthly high , maximum monthly high, minimum
monthly low, and maximum monthly low. For humidity this includes morning minimum, morning
maximum, afternoon minimum, and afternoon maximum. For rainfall this includes monthly min-
imum, monthly maximum, minimum days/month with rainfall, and maximum days/month with
rain.

in 1500, and row 21 includes a control for a measure of urbanization in 0 AD from Peregrine [30]. Row 22 includes a control for of State Antiquity measured up until 650 AD from Bockstette et al [6]. Row 23 includes a control for the average years in armed conflict 1960-1990. Row 24 alters the specification by redefining the endogenous variable and instruments as dummy variables, being one if the values are in the top third quantiles respectively. Row 25 uses log infant mortality in 2000 instead of income per capita as the dependent variable.

Figure 3.2 provides a simple check on how suitable a linear functional form is in the reduced-form and first-stage regressions. In the upper graph residuals of income regressed on controls are plotted against the residuals from a regression of the instrument on controls. A local polynomial regression is fitted against these two series showing a similar shape as the linear fit. In the lower graph, the same is done where the y-axis constitute residuals from a regression of the Muslim share of population on controls. Both of these graphs fail to show any clear deviation from a linear relationship.

A final robustness test relates to what extent the proximity to Mecca measure stands out as particularly bad among other potential locations in the world. Moreover, if the negative relation between proximity to Mecca and income is driven by some adjacent location, then we might expect several adjacent locations to have much larger negative effects. For this purpose, I run placebo regressions where, instead of the log proximity to Mecca, the proximity to each of the 175 country capitals in the sample is used while including the set of controls from Table 3.2. Figure 3.3 shows the values of these proximity coefficients on the x-axis, and their corresponding p-values (in log scale) on the y-axis. Moreover, proximity coefficients for capitals that are within the tenth percentile closest to Mecca are marked as squares, and the vertical dashed line denotes the 90th percentile of the most negative coefficients. This shows, on one hand, that the proximity to Mecca estimate, denoted by a triangle in the figure, is in the 90th percentile among the most negative locations in the world. On the other hand, an overwhelming majority of the squares, proximity coefficients for Mecca-adjacent capitals, are scattered closer to zero than the actual Mecca estimate. This is comforting as it signals the large importance of proximity to Mecca relative to other geographical locations, and that this is unlikely to be driven by some systematic factor coming from an adjacent location.

4   Discussion – Two Channels

4.1   Islamic Law

Researchers have claimed that a main channel through which Islamic influence may have affected development is particular set of Islamic legal institutions (See for example the work of Kuran ([20], [21], [22]). These took the form of substantial influence of religious doctrine in the legal system, i.e. Islamic Law. To investigate this possibility, I use measures of religious influence in a country's institutions from two different data sources. One is an "Islamic Law" indicator, which is one if the CIA Factbook determines that a country's legal system has significant influence of Islamic law. The other data source is the Religion and State Project[9] , recently used in Barro and McCleary [4]. From this dataset, I extract five variables measuring the influence of religion in a country's legal system:

1. Existence of a State Religion in 2000

2. Laws of inheritance defined by religion.

3. Blasphemy laws (Blasphemy laws, or any other restriction on speech about religion or religious figures.)

4. Presence of religious courts which have jurisdiction over some matters of law.

5. The Proportion of laws influenced by religion or based on religious codes.

Table 3.4 shows results on the Islamic Law indicator as well as the five above outcomes. In all columns the Muslim share of the population has a significant positive correlation with the degree of religious influence in legal institutions. IV estimates using the proximity to Mecca as an instrument for the Muslim share also leads to very similar estimates. Although not shown in the table, excluding the Middle East from the sample or similar robustness checks from the last section doesn't affect the estimates in a meaningful way.

One concern with these results on legal institutions could be that they are simply a by-product of poverty. If poorer countries have more religious influence in their legal institutions, the above result is less important on its own. We can think of

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[9]   Available at http://www.thearda.com/ras/

this as an omitted variable problem: suppose there is no direct effect of Islam on religious institutions, but Islam reduces income per capita and poorer countries have more religious institutions. Then IV estimates on religious institutions would show positive effects, caused not by Islam per se, but because of the impact of Islam on income. For this purpose, panel C shows OLS estimates of regressing the outcome in the corresponding column on log income per capita in 2000 and the same set of controls. These correlations do not hold any causal interpretation, but are merely to illustrate the extent to which religious-influenced legal systems are a property of poor countries. In all columns the correlation between religious institutions and income is small and insignificantly negative. Thus poorer countries are associated with more religious institutions, but only to a very small degree – for example, the standardized beta coefficient of income on the share of religious laws in column 6 is 0.14, whereas the IV estimate in panel B is 0.7. Even if we disregard the fact that the OLS estimate in panel C is statistically insignificant, the magnitude of such a potential bias seems irrelevant. In short, the impact of Islam has led to a much higher degree of religious influence in legal institutions, beyond what can be accounted for as a direct consequence of poverty.

4.2 Women's Participation and Rights

A further defining feature of Muslim countries is the degree to which women are absent from public institutions such as education, the labor force, and government. By default, the absence, or discrimination, of such a large group of the population from these activities may have a profound negative impact on both economic and political development (Becker [7], World Bank [34]). Thus, one way in which Islam may have affected economic development could be through deterring female participation in public institutions. The negative association between Islam and gender-related outcomes has been documented by several researchers (see Fish [15], Donno and Russett [11], and Ross [32]).

Equally important is the stylized fact that female discrimination in Muslim countries occurs in manners directly affecting women's health outcomes. Female circumcision, "honor killings", temporary marriages, and draconian adultery laws, are often reported in the press as especially common in Muslim countries:

"It is perfectly true that the condition of most Muslim women is not
good. Except in a few unusual groups, such as the bedouin of the Ara-
bian desert and some matrilineal villagers of South-East Asia, the great
majority are economically and physically subservient to their menfolk.
If they are struck by their husbands they tend to be told that it is on
God's instructions. In Egypt, Sudan and Somalia many still submit to
one or other of the three main forms of circumcision, a description of
the mildest of which would make most men go green." (The Economist,
[33])

Few of the these appalling practices are directly taken from the Koran, but ap-
pear as post-Koranic interpretations or preexisting practices in societies that have
converted to Islam.[10] Nonetheless, the Koran stipulates that men outrank women
in certain ways – they inherit more, and their testimony is worth more in a court
of law. Consequently, religious doctrine, either based on the Koran or later inter-
pretations, give rise to factors that could potentially have consequences on women's
rights. These may affect the economic incentives of women in ways that reduce
their likelihood of participation in public institutions, but also the possibility of
direct impacts on health.

I investigate this looking at both economic and political measures of participa-
tion, as well as health outcomes such as sex ratios, relative life expectancy, adolescent
fertility and mortality. In particular, a deficit of females relative to males has been
described as evidence of "various forms of lifelong discrimination against girls and
women—particularly inferior nutrition and health care early in life and during child-
bearing years," as well as from "sex-selective abortions or infanticide." (Population
Reference Bureau, [31]).

Table 3.5 illustrates the correlation between the population share of Muslims in
1900 and various gender-related outcomes in panel A. Columns 1 through 4 show
the correlation against the female-to male employment ratio, the female share of
government ministerial positions, the female-to-male enrollment ratio in primary
and secondary education, and the female-to-male literacy ratio. In all of these

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[10] For example, according to the Koran, Eve was not simply a belated product of Adam's rib,
but instead both were "from a single soul". Moreover, it was Adam, not Eve, who initiated eating
the forbidden fruit.

correlations, more Muslim countries have lower relative female participation. These negative estimates are also upheld in IV estimates as can be seen in panel B, where the estimates are around twice the magnitude of the OLS estimates.

One interpretation of these results is that lower female participation could be a mechanism for how Islam affects income. Yet, the causal ordering could also be the opposite; these results on economic and political participation could potentially be a result of the negative income effects, to the extent that lower incomes are associated with less female participation. Panel C shows that for education and literacy, the female deficit could potentially be a by-product of these countries lower income levels. Yet, the results on employment and government representation seem more likely driven by the actual impact of Islam, since the gender-outcome and income correlations are both economically and statistically insignificant.

Columns 5 through 9 show correlations of Islam with health-related outcomes, namely the female-to-male sex ratio, life expectancy ratio, and adult mortality ratio, as well as the total fertility rate and the adolescent fertility rate, both per thousand population. With exception of the correlation with the sex ratio, which shows that Muslim countries have less women relative to men, the other correlations do not show a clear adverse relationship, with some even having the opposite sign.

The IV estimates in panel B show a different picture of the impact of Islam on women's health-related outcomes. Despite the negative OLS correlation with the sex ratio in column 5, the IV estimate is equally large but negative (although not statistically significant). More striking, perhaps, is that the impact on female relative life expectancy is positive and significant in column 6, and that the impact on female relative mortality is negative in column 7. In addition, the impact on adolescent fertility is also negative.

In all these cases, the health-related estimates are relatively large in terms of magnitude. Comparing with the gender-income correlations in column C, it's difficult to see these results as simply driven by lower incomes. Poorer countries do have higher sex ratios, but not higher female relative life expectancies, nor higher relative mortality rates or adolescent fertility rates. In these cases, Islam seems to have an impact independent of the income-channel.

A concern with the mortality-measure could be that the average mortality confounds differences in age composition with actual mortality for a given age group.

If richer countries have older populations with higher mortality rates, the comparison may not be very useful. For this purpose I also examine age-specific mortality. The WHO publishes mortality rates by age groups starting with infants, one-year-olds, and then in five-year brackets. Consequently, I run the following reduced-form regression

$$\frac{mort_{ij}^{female}}{mort_{ij}^{male}} = \alpha + \sum_{j=0}^{90} \beta_j Z_i A_j + \phi_i + \varepsilon_{ij}$$

where the dependent variable is the female-to-male age-group j-specific mortality ratio in 2000 for country i, Z_i is the country's proximity to Mecca, A_j is an age-group indicator for age groups $j = 0, 1, 5, 10, ..., 90$, and ϕ_i is a country-specific fixed effect. This regression specification is informative for comparing long-run age-specific differences between countries depending on how close to Mecca they are, in isolation from any age-invariant effects on mortality.

The coefficients β_j can be seen in the upper graph of Figure 3.4 with the y-axis showing the parameter estimate and the x-axis showing the age-group. All of the age-groups exhibit negative relative female mortality effects of being closer to Mecca, consistent with the results in Table 3.5. There is some variation in how negative the coefficients are, but few of these differences are statistically significant. The lower graph in Figure 3.4 shows the corresponding correlations between the age-specific gender outcomes and income per capita. This reveals that richer countries have higher relative female infant and child mortality rates, lower mortality rates in younger adult ages and insignificant at higher ages. Consequently, while the impact of being closer to Mecca on female relative infant- and child mortality might simply reflect a general development effect, the impact on especially the 15-30-age-group cannot be explained as such.

To summarize, Islam seems to have clear negative impacts on measures of female participation in public institutions, but there is no evidence of corresponding adverse impacts on women's health outcomes. Instead, women seem to live longer relative to men in Muslim countries, mortality is relatively low especially for 15-30-year-olds, and adolescent fertility is unusually low for countries in such income groups.

An interpretation of these results is that Islam, despite a long-run negative impact on female participation in public institutions, has not had the detrimental aggregate health consequences for women so often quoted in the Western press and

easily spotted in basic cross-sectional analyses. This may reflect a selection effect: societies with certain social or cultural characteristics detrimental to female living standards may have converted to Islam, thus giving rise to an adverse association. The true impact seems to have come from Islam improving female health outcomes in societies where women's rights were already weak. To be weighted against this positive impact is the long-run negative impact on participation outcomes such as education, labor, and government.

5 Concluding Remarks

Muslims make up about a quarter of the world's population, and are mostly located in poorer countries. Whether Islam has adverse development consequences is an important research topic in most social sciences. This study has confirmed that at the country level, more Islamic influence has a negative long-run development effect. Using the geographical distance from Islam's religious and geographic midpoint, Mecca, as an instrument for Islamic influence I find impacts on income per capita that are around three times the magnitude of standard OLS estimates. A one standard deviation higher population share of Muslims would have led to half a standard deviation lower income per capita in 2000, making the impact magnitude on par with factors such as distance to equator as well as various continent-specific factors.

An investigation of two related outcomes of interest, religious influence in legal institutions and women's rights, reveal new and somewhat surprising findings. A larger Muslim influence implies more religious influence in legal institutions, as well as lower female relative participation in public institutions such as labor markets, government and education. Yet, there are no corresponding impacts on relative health outcomes for women. Instead, a larger Islamic influence results in longer relative female life expectancies and lower mortality rates, as well as lower adolescent fertility rates.

While the effects on female public participation cannot be distinguished from the overall income effects, the health outcomes do seem distinct and provide somewhat of a puzzle. Why hasn't the same process that spurred lower female participation in public institutions also resulted in worse female health outcomes? Understanding

why women are underrepresented in public institutions thus also requires understanding why women seem relatively healthier than men. One explanation may be that the simple cross-sectional analysis is confounded by selection where societies, with other factors detrimental to women's rights, converted to Islam. The long-run negative participation impacts on labor markets, education, and government thus need to be traded off against the fact that Islam may be responsible for better health outcomes in societies where women's rights were already weak.

The results on the relative health outcomes do not diminish the problem of female underrepresentation in Muslim countries. When one half of a country's population is systematically less involved in labor markets, education, and politics, it should not come as a big surprise if income levels remain lower than in comparable countries where women participate at higher levels. Efforts to improve the incentives for female participation are thus intimately linked to the future economics development of the Muslim World.

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3.A   Appendix: Data and Sources

Log GDP per Capita in 2000 is the logarithm of GDP per Capita in 2000 as reported in the World Development Indicators (For Afghanistan, Iraq, and Somalia, values are taken from the Penn World Tables).

Muslim share of population in 1900: Share of the population classified as Muslims from Barro and McCleary [4]

Distance to Mecca: A country capital's great-circle distance to Mecca in kilometers.[11]   Country capital location data are from Mayer and Zignago [26]

Log Inverse Distance to Mecca: The negative logarithm of Distance to Mecca

Average elevation: average elevation of the country Parker (1997).

Maximum humidity: the average of the maximum afternoon humidity, measured in percent, during the hottest month of the year (Parker 1997).

Minimum temperature: the lowest average monthly temperature measured in degrees Celsius (Parker 1997).

Minimum rainfalll: the average total rainfall, measured in millimeters, in the driest month of the year (Parker 1997).

Log Coastal area: Countries' total coastline, which is used along with land area to calculate ln(coastline/area), is measured in thousands of kilometers (Parker 1997).

Log Land area: The logarithm of country's land area (World Development Indicators)

Island dummy: An indicator variable which is one if Parker (1997) classifies the country as an island.

Desert climate: Share of country's land area in Desert Climate (Parker 1997)

Absolute latitude: Absolute latitudinal distance from the equator to the country capital

Longitude: Longitude of the country capital.

Log oil reserves: Logarithm of oil reserves as reported in the BP Statistical Energy Review 2009

Log gas reserves: Logarithm of natural gas reserves as reported in the BP Statistical Energy Review 2009

Islamic Law: Indicator variable that is one if the CIA Factbook mentions the words "Islamic" or "Sharia" when describing the legal system.

State Religion in 2000: An indicator variable which is one if a country has a state religion and zero otherwise (Barro and McCleary [4])

Islam State Religion in 2000: An indicator variable which is one if a country has Islam as the state religion and zero otherwise (Barro and McCleary [4])

Inheritance laws: Indicator variable which is one if "Laws of inheritance defined by religion" and zero otherwise, from the Religion and State Project.

Blasphemy laws: Indicator variable which is one if legal system exhibits "Blasphemy laws, or any other restriction on speech about religion or religious figures" and zero otherwise from the Religion and State Project.

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[11] This uses the formula $d_{ij} = \arccos\{\sin(La_i)\sin(La_j) + \cos(La_i)\cos(La_j)\cos(Lo_i - Lo_j)\} \times 111.12$

Religious Courts: Indicator variable which is one if legal system exhibit the "Presence of religious courts which have jurisdiction over some matters of law" and zero otherwise from the Religion and State Project.

Religious Legislation: Category variable for the degree of religious influence in the legal system with the following values: 1) No religious laws are legislated as law; 2) Most aspects of the law are secular but there are some isolated instances of religious legislation; 3) A substantial portion of the state's laws are religious or state law is based in great part on religious law but is not 100% religious law; 4) State law is Religious law. Variable is redefined to lie between 0 and 1, with higher values implying more religious influence.

Employment ratio (female/male): The ratio of female employed share of female population to the male employed share of the male populatoin

Education ratio (prim. and sec., f/m): Ratio of, either primary- or secondary school enrolled, female and male students.

Female ministers (%): Female share of ministerial positions

Literacy ratio (f/m): Ratio of female literate and male literate populations

Sex ratio (f/m): Ratio of female to male populations

Life expectancy ratio (f/m): Ratio of female life expectancy to male life expectancy

Adult mortality ratio (f/m): Ratio of female average mortality rate to male average mortality rate

Fertility rate in 2000: Total births per women taken from the World Development Indicators

Adolescent fertility rate in 2000: Births per 1,000 women aged 15-19, taken form the World Development Indicators.

Table 3.1 Summary Statistics

Variable	*Mean*	*Sd*	*Obs*
Log GDP per Capita in 2000	8.49	1.30	176
Muslim share 1900	0.23	0.37	176
Log Inverse Distance to Mecca	-8.50	0.69	176
Distance to Mecca	6120	3957	176
Average elevation	303.05	512.41	176
Maximum humidity	73.69	10.01	176
Minimum temperature	-0.88	16.64	176
Minimum rainfalll	27.15	33.87	176
Log Coastal area	-5.91	3.82	176
Log Land area	11.55	2.47	176
Island dummy	0.23	0.42	176
Desert climate	0.20	0.40	176
Absolute latitude	25.54	16.86	176
Longitude	21.30	64.03	176
Log oil reserves	0.58	1.21	176
Log gas reserves	0.27	0.63	176
Islamic Law	0.18	0.38	176
State Religion in 2000	0.41	0.49	174
Islam State Religion in 2000	0.17	0.37	174
Inheritance laws	0.19	0.40	161
Blasphemy laws	0.23	0.42	161
Religious Courts	0.19	0.39	161
Share Religious Laws	0.38	0.27	161
Employment ratio (female/male)	0.68	0.19	162
Education ratio (prim. and sec., f/m)	0.96	0.11	165
Female ministers (%)	17.40	11.80	165
Literacy ratio (f/m)	0.87	0.17	141
Sex ratio (f/m)	1.00	0.08	168
Life expectancy ratio (f/m)	1.07	0.04	174
Adult mortality ratio (f/m)	0.66	0.17	175
Fertility rate in 2000	3.08	1.58	175
Adolescent fertility rate in 2000	57.70	47.08	170

Table 3.2 Muslim Population Share in 1900 and GDP per Capita in 2000

	(1)	(2)	(3)	(4)
Panel A. OLS regressions. Dependent variable is Log GDP per Capita in 2000				
Muslim share 1900	-0.386	-0.568**	-0.703***	-0.768***
	(0.280)	(0.266)	(0.241)	(0.245)
Adjusted R-squared	0.01	0.58	0.61	0.62
Panel B. Reduced-form regressions. Dependent variable is Log GDP per Capita in 2000				
Log proximity to Mecca	-0.091	-0.631***	-0.728***	-0.747***
	(0.129)	(0.189)	(0.184)	(0.195)
Adjusted R-squared	0.00	0.59	0.63	0.63
Panel C. First-stage regressions. Dependent Variable is Muslim share of Population in 1900				
Log proximity to Mecca	0.299***	0.323***	0.314***	0.325***
	(0.028)	(0.078)	(0.077)	(0.081)
Adjusted R-squared	0.32	0.56	0.57	0.44
Panel D. Second-stage regressions. Dependent variable is Log GDP per Capita in 2000				
Muslim share 1900	-0.302	-1.956***	-2.315***	-2.300***
	(0.475)	(0.722)	(0.735)	(0.716)
F-stat (1st stage)	118.3	17.2	16.7	16.2
Hausman test (p-value)	0.817	0.010	0.003	0.004
Geography controls	No	Yes	Yes	Yes
Natural Resource Controls	No	No	Yes	Yes
Excluding Middle East	No	No	No	Yes
Observations	175	175	175	161

The instrument for Muslim share of population in 1900 is the log proximity to Mecca, defined as the log of the inverse distance from mecca. The *Geography controls set* includes average elevation, lowest monthly rainfall, average maximum humidity, average minimum temperature, the log of coastline divided by land area, an indicator for landlocked country, distance to equator, longitude, an island indicator, log land area, share of land in desert, and regional dummies. The *Natural Resource Controls set* includes, log oil reserves, and log gas reserves. The p-value of the Hausman test is for the Wu–Hausman chi-squared test. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.3 Extensions and Robustness Checks

Specification	Coeff.	S.E	Obs	F-stat
Dep. var. is Log GDP per Capita, indep. var. is Muslim population share				
(1) Baseline	-2.315***	0.808	175	16.7
(2) Excl. 10 % closest/farthest to/from Mecca	-2.734**	1.171	139	6.7
(3) Sub-Saharan Africa and Asia only	-2.347*	1.176	76	4.6
(4) Soil and Irrigation suitability	-1.974**	0.777	150	14.0
(5) Additional geogr. controls	-2.554**	1.08	175	11.0
(6) Cubic covariate polynomial	-2.411**	0.994	175	20.8
(7) Direction (Radian) Controls	-2.574***	0.904	175	20.9
(8) Climate zones	-1.716*	0.905	175	15.9
(9) Additional Resource Controls	-2.130**	0.944	175	11.3
(10) Natural Disaster Risks	-3.029**	1.183	175	11.3
(11) Demographic controls	-2.088***	0.735	167	21.4
(12) Religious controls	-2.211*	1.143	175	7.6
(13) Distances to Rome and NE India	-1.992**	0.898	175	10.0
(14) Muslim ethnicities	-2.159**	0.905	171	12.8
(15) Ethnic fractionalization	-2.487***	0.791	172	21.4
(16) Excluding USSR	-2.282***	0.857	159	14.8
(17) Colonizer Fixed Effects	-2.118**	0.85	175	14.4
(18) Ottoman control	-2.546**	1.046	175	11.1
(19) Legal origins	-2.208***	0.842	172	15.6
(20) Pop. dens 1500 AD control	-2.497***	0.937	135	16.3
(21) Urb. 0 AD control	-2.021***	0.708	129	32.4
(22) State Antiquity	-2.625**	1.071	141	9.7
(23) Wars	-1.700**	0.656	160	20.2
Dep. var. is Log per Capita, Indep. var. is Muslim dummy, instrument is "Close to Mecca" dummy				
(24) Dummy variables	-2.222***	0.81	175	9.6
Dep. var. is Log Infant Mortality, Indep. var. is Muslim population share				
(25) Dep. Var: Log Infant Mortality	1.539***	0.558	173	15.5

Row 1) includes the Geography and Natural Resource sets of controls as described in Table 2. Row 2 excludes countries that are either the ten percent closest to Mecca or the ten percent farthest from Mecca. Row 3 only includes Sub-Saharan Africa and Asia. The additional controls are the following: 4) Share of area that is suitable for any of 6 rainfed crops, share of area that is suitable for irrigation; (5) Additional geography controls; (6) polynomials in continious covariates; (7) radian and whether a country is northwest, northeast, or southwest of Mecca; (8) Share of land area in either of 20 different climate regions; (9) Additional dummy variables for the existence of 20 resources; (10) Indicators for disaster risk of earthquake, flooding, tropical storm, windstorm, drought, volcanism, soil degradation, desertification, ocergrazing, and deforestation; (11) Log population, female share of population, age under 15, age above 64; (12) Christian, Jewish, Hindu, Buddhist, and other religion shares of non-Muslim population, and Religious herfindahl index; (13) Log distance to Rome, Log distance to Northeastern India; (14) Shares of Arab, Turkish, Persian, Hausa, and Malay population; (15) Ethnic fractionalization index, (16) Excluding former USSR countries; (17) Indicators for British, French, Belgian, Spanish, Portuguese, Dutch and German colonization; (18) Former member of Ottoman Empire indicator; (19) Dummies for British, French, and German legal origin; (20) Log Population Density in 1500 AD; (21) Urbanization 0 AD; (22) State Antiquity index until 650 AD; (23) Average years in armed conflict 1960-1990. In row 24 the Muslim share of population and log inverse distance to Mecca variables are redefined as dummy variables, being one if the respective values are in the top third quantile. In row 25 the dependent variable is the log infant mortality measured in 2000. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3.4 Islamic Institutions and Religion in legal systems

Dependent Variable	(1) Islamic Law indicator	(2) State Religion	(3) Islam is State Religion	(4) Inheritance legislation	(5) Blasphemy legislation	(6) Religious courts	(7) Religious legislation
Outcome mean	0.17	0.41	0.16	0.19	0.23	0.18	0.38
			Ordinary Least Squares				
Muslim share	0.768***	0.538***	0.573***	0.452***	0.428***	0.341***	0.398***
	(0.097)	(0.139)	(0.125)	(0.130)	(0.128)	(0.125)	(0.082)
		2SLS (Share of Muslims in 1900 instrumented by Log Inverse Distance to Mecca)					
Muslim share	0.931***	0.899**	0.631**	0.422*	0.858***	0.588**	0.614***
	(0.201)	(0.402)	(0.277)	(0.254)	(0.328)	(0.239)	(0.220)
F-stat	16.7	15.5	15.5	15.2	15.2	15.2	15.2
Hausman-test (p-value	0.37	0.26	0.64	0.89	0.08	0.26	0.18
		C. Ordinary Least Squares (Regressing legal outcomes on income per capita)					
Log Income per Capita	-0.03	-0.012	-0.024	-0.027	-0.035	-0.013	-0.029
	(0.029)	(0.041)	(0.029)	(0.030)	(0.033)	(0.028)	(0.023)
Observations	175	173	173	160	160	160	160

Each regression includes controls for average elevation, lowest monthly rainfall, average maximum humidity, average minimum temperature, the log of coastline divided by land area, an indicator for landlocked country, distance to equator, longitude, regional dummies, an indicator for island, log oil reserves, log gas reserves, log land area, and share of land in desert. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.5 Gender outcomes

Dependent variable	Employment and Education				Health				
	Employed	Government ministers	Enrollment in prim/sec education	Literate	Sex ratio	Life expectancy	Adult mortality	Fertility rate	Adolescent fertility rate
Unit	F/M ratio	percent female	F/M ratio	F/M ratio	F/M ratio	F/M ratio	F/M ratio	per 1,000	per 1,000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome mean	0.69	28.98	0.96	0.87	1.00	1.07	0.66	3.08	57.76
					A. Ordinary Least Squares				
Share Muslim 1900	-0.115**	-9.386***	-0.051	-0.104**	-0.048***	0.008	-0.023	0.446	-18.075*
	(0.053)	(3.044)	(0.043)	(0.049)	(0.018)	(0.011)	(0.034)	(0.302)	(9.683)
					B. Two-Stage Least Squares				
Share Muslim 1900	-0.273**	-32.827***	-0.197**	-0.215*	0.051	0.059**	-0.093	0.541	-33.514*
	(0.132)	(10.804)	(0.091)	(0.121)	(0.052)	(0.028)	(0.085)	(0.551)	(19.459)
F-stat	12.7	9.7	11.6	17.9	16.7	15.9	16.5	16.5	17.4
Hausman test (p-value)	0.16	0.16	0.07	0.26	0.02	0.02	0.34	0.82	0.36
					C. Ordinary Least Squares (Regressing gender outcome on income per capita)				
Log Income per Capita (in 2000)	0.005	2.836***	0.040***	0.057***	-0.019***	-0.005	-0.024**	-0.510***	-10.872***
	(0.016)	(0.917)	(0.010)	(0.015)	(0.006)	(0.003)	(0.011)	(0.082)	(2.962)
Observations	161	110	164	140	167	173	174	174	169

Each regression includes controls for average elevation, lowest monthly rainfall, average maximum humidity, average minimum temperature, the log of coastline divided by land area, an indicator for landlocked country, distance to equator, longitude, regional dummies, an indicator for island, log oil reserves, log gas reserves, log land area, and share of land in desert. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
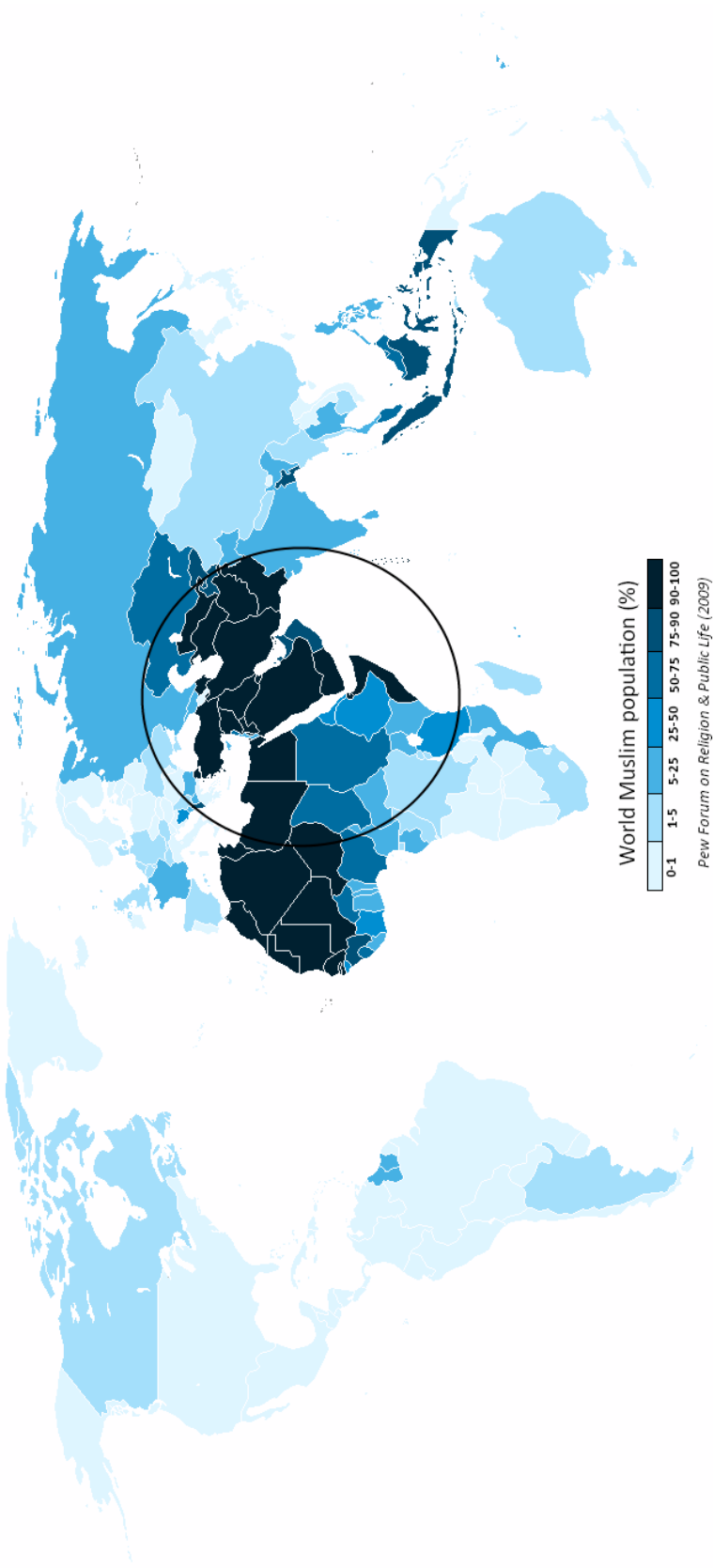
Figure 3.1: **Distribution of the Muslim share of population.**
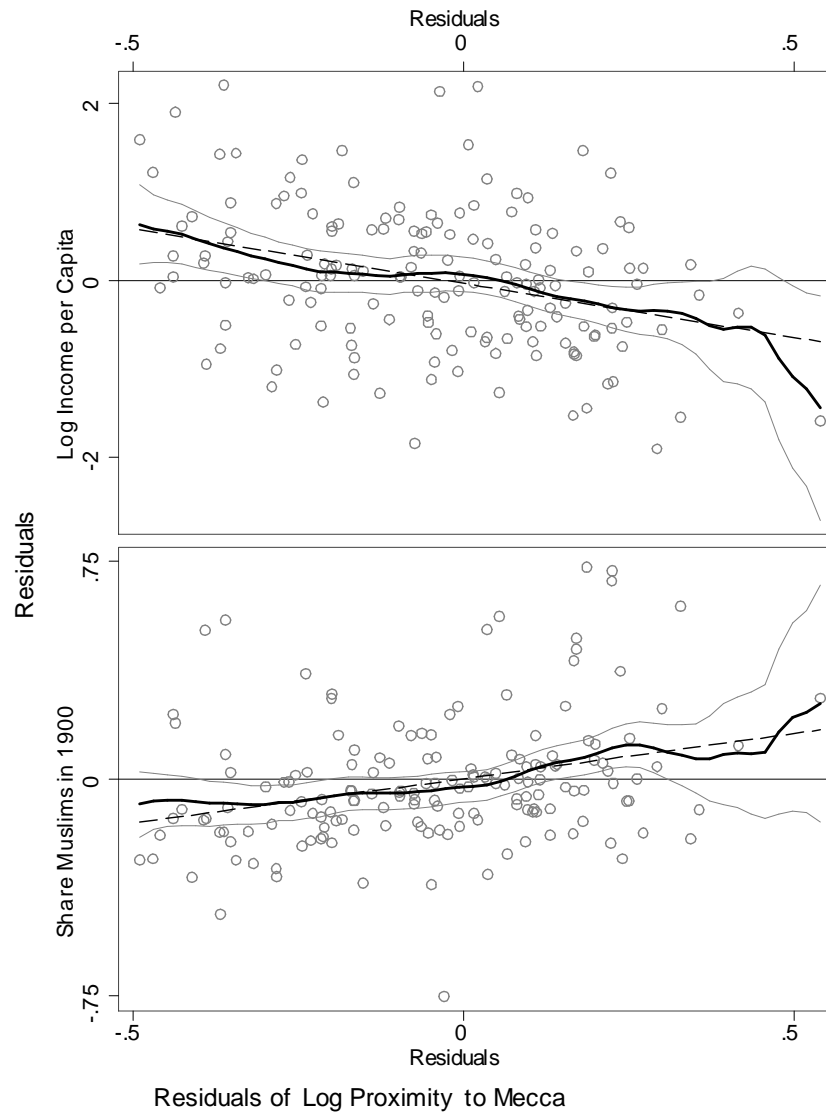
Figure 3.2: **Nonparametric local regressions.** The upper graph shows log income per capita in 2000, while the lower graph shows the share of Muslims in 1900, both plotted against the log proximity to Mecca and conditional on the geography controls described in the text.
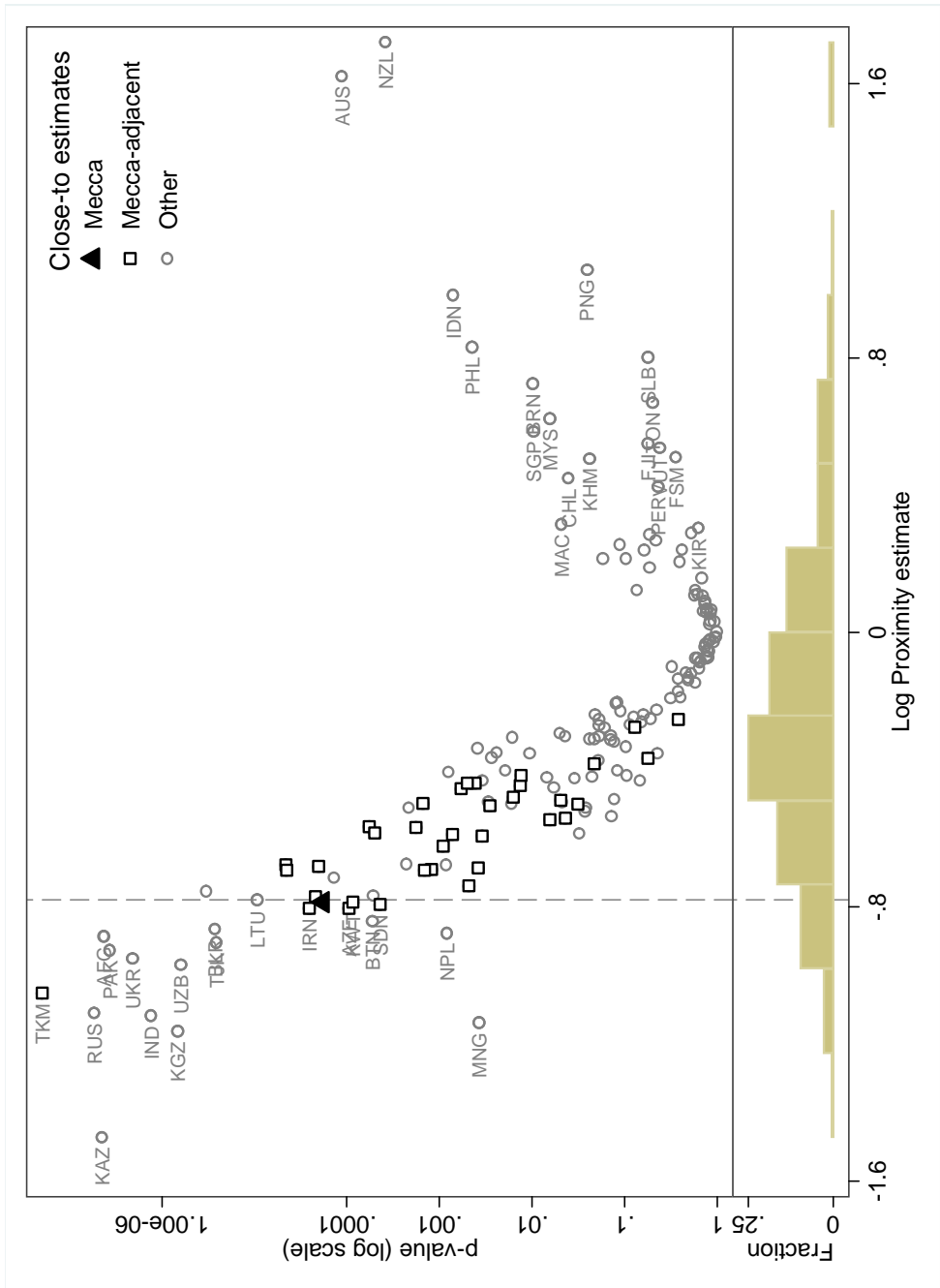
Figure 3.3: **Placebo proximity regressions.** Each dot represents a regression coefficient of log income per capita in 2000 regressed on the log proximity to one of 175 country capitals, controlling for the geography controls described in the text. The value of the estimate is on the x-axis and the corresponding p-value (in log scale) is on the y-axis. The triangle denotes the log proximity to Mecca estimate, and the squares indicate the proximity coefficients of a capital that is also within the tenth closest decile to Mecca. The bottom histogram shows the distribution of the proximity coefficients.
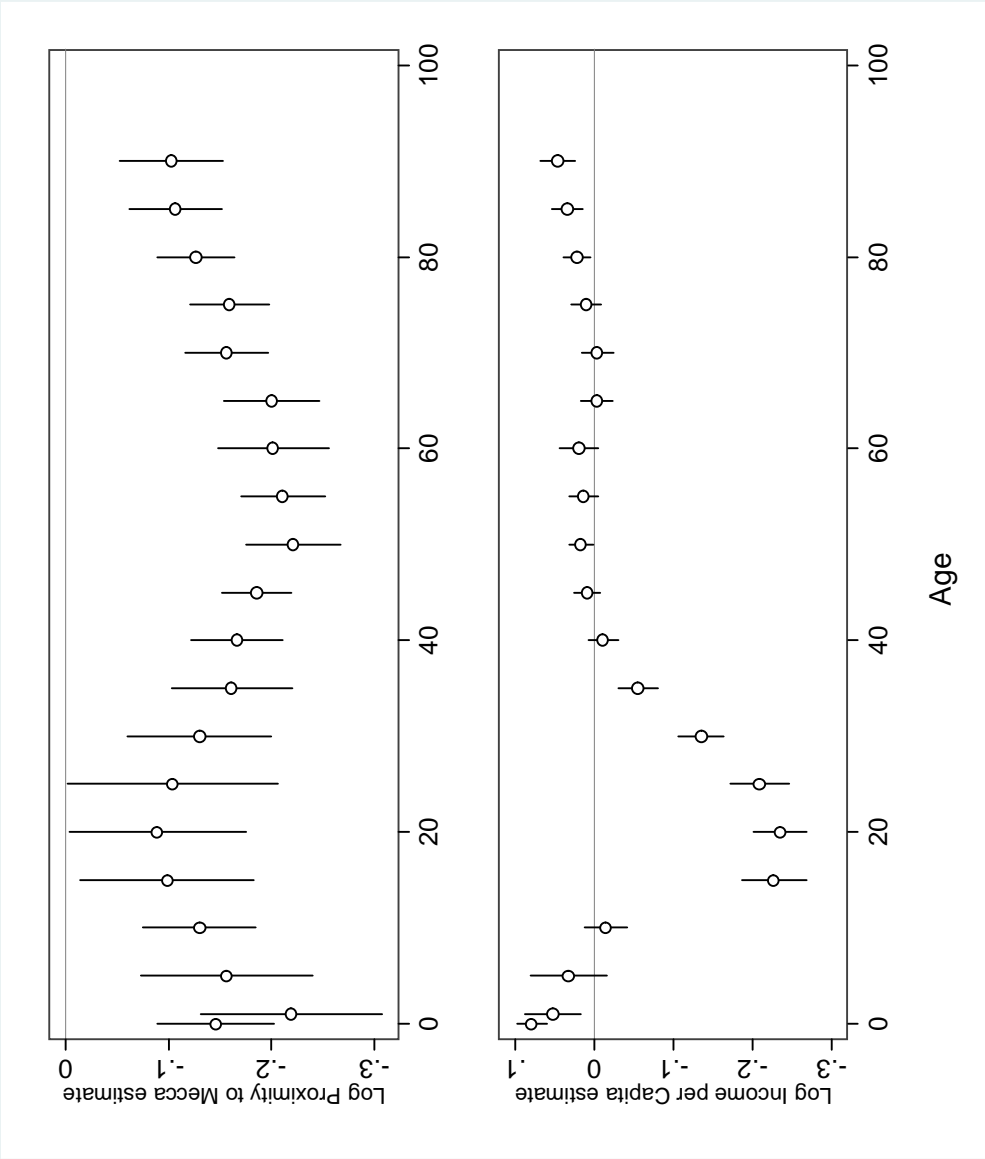
Figure 3.4: **Female-to-Male Mortality Ratio by Age groups.** The upper graph plots the coefficients from a regression of age-group female-to-male mortality ratios against the log proximity to Mecca interacted with age-group specific dummy variables. The lower graph plots coefficients of the same dependent variable against log income per capita interacted with age-group dummy variables. Both regressions include country-specific effects and standard errors clustered by country.

Chapter 4

The Rise of China and the
Natural Resource Curse in Africa[*]

> From South Africa's manganese mines to Niger's uranium pits, from
> Sudan's oil fields to Congo's cobalt mines, China's hunger for resources
> has been a shot in the arm, increasing revenues and helping push some of
> the world's poorest countries further up the ladder of development..."Let
> the Chinese come," said Mahamat Hassan Abakar, a lawyer in Chad, a
> former French colony in central Africa with deepening ties to China.
> "What Africa needs is investment. It needs partners. All of these years
> we have been tied to France. Look what it has brought us."
> – "New Power in Africa: China's Trade in Africa Carries a Price Tag",
> *New York Times* August 21, 2007

1 Introduction

In the early 1990s, Angola was the only country in Sub-Saharan Africa selling oil
to China. By 2008, the number of exporters had risen to 11, and the amount of oil
sold to China had grown from a meager 40 million in 1992 to more than 32 billion
in 2008.[1] As Figure 2.1 shows this increase has meant that today China alone buys
about a fifth of the region's oil exports, a commodity that by itself makes up more
than half of all African exports.

These dramatic changes could have important consequences for the region, be-
cause China's approach to Africa has been sharply different from that of the West.[2]
A strict interpretation of the principle of sovereignty has allowed close contact, in-
vestment, and official development aid to regimes with dubious political, economic

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[1] Measured in constant 2005 US dollars.
[2] As quoted in Alden [5], Chinese diplomats have emphasized that "Non-intervention is our
brand, like intervention is the Americans' brand."

and human rights records. Such dealings have generated accusations against China ranging from the abetting of genocidal regimes to the creation of a "League of Dictators" to serve as a buffer to Western influence in the developing world.[3]

One of the most cited examples is Sudan. In the early 90s, Western oil firms scaled back their operations due to human rights concerns and civil conflict in Southern Sudan. In contrast, China started investing heavily in the country's oil sector in 1996. By 2006, Sudan supplied 10 percent of China's oil imports. Today, its largest foreign supplier of petroleum is Angola, which accounts for around 15 percent of China's total oil imports. In 2004, to combat widespread corruption in Angola, the IMF pressed to include transparency measures as conditions for new loans intended for reconstruction after years of civil war. To the surprise of many observers, the Angolese withdrew from the negotiations and instead accepted a USD 2 billion loan from China that was tied to the supply of oil and construction contracts. The published rates were indeed very favorable to Angola. However, it is likely that the absence of any conditionalities was also extremely palatable.[4]

In short, critics accuse China of not using its growing economic clout to force change unto her trading partners.[5] But it is by no means clear either theoretically or empirically that external force from a foreign power is an effective way to cause political change.[6] Nor is it obvious that potential economic growth caused by trading with China (when no one else is willing to trade) will not have an independent effect in improving domestic African institutions. Given the extensive news coverage this topic has received, there are surprisingly no systematic studies so far evaluating the impact of trading with China on development outcomes in African countries.[7] This study attempts to fill the gap by using a new empirical strategy to estimate the impact of exporting oil to China. The outcomes examined range from economic

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[3] See accusations in Amnesty International [6], Kagan [19] as well as Brookes and Shin [11].

[4] For more details, see Taylor [34] and Alden [4] and [5].

[5] For instance, acclaimed American movie director and producer Steven Spielberg resigned his position as an artistic director for the Beijing Olympics arguing that China should do more to prevent atrocities in the Sudanese region of Darfur. See http://news.bbc.co.uk/2/hi/africa/7261453.stm

[6] On the one hand, many have argued that the end of the Cold War allowed the West to force a wave of democratization in the early 90s (this argument is described in Bratton and van de Walle, [9]). And that the de facto roll back of those reforms is timed with the rise oil exports to China. This is consistent with Jensen and Wantchekon's [17] finding that democratic consolidation only ocurred in resource poor countries. On the other hand, it is not clear that previous attempts at proactive foreign pressure have been highly successful, as the cases of Cuba or Zimbabwe show.

[7] There are a number of descriptive studies on the growing economic relationships. See Broadman [10], Deutsche Bank [15] and Goldstein et al [16].

growth to political institutions and human rights violations. We also compare these effects with those of exporting oil to democracies such as the U.S. as well as the World at large.

The principal contribution of this paper is to estimate the causal impact of exporting oil to China on sub-Saharan African outcomes. Previously, the main empirical difficulty in interpreting a cross-country comparison of outcomes between countries that export to China and those that do not has been that bad countries may choose to deal with China over other countries that pressure them. Simple remedies such as controlling for country fixed effects cannot adequately address this problem if regimes change over time within countries, such that when a regime becomes bad, it switches to trading with China. This switch may reflect the decision of the African regime, or a choice on the part of buyers. For example, Taylor (2006) finds that China systematically approached countries where the presence of Western companies was weak.

Our design conjectures that, as China's demand for oil grows, all countries who have a preexisting significant source endowment of that commodity should increase their exports to China more than countries which do not, and this increase will be orthogonal to the institutional, economic or historic circumstances of the country. Using a similar logic, we instrument for oil exports to the U.S., and the World with the interactions terms of the existence of oil in the African country and the demand for the commodity from those places.

Using data compiled from several existing data sources, we find the following results. First, controlling for the total amount of oil exports, diverting oil to China increases economic growth. For a country that experienced the average increase in oil exports to China of 67 percent, annual growth increased by a third of a percentage point and five-year growth increased by a full percentage point. In a region where the mean annual growth rate was below 1.7 percent, this is a substantial increase. Exporting oil to China also increases the terms of trade, investment in resource-intensive industry sector, while having only a marginal negative impact on labor force participation. Of particular importance is the finding that the large positive growth effects are unique to exporting to China.

Second, we find no evidence that diverting oil exports to China harms democratic institutions in the short-run, and longer-run impacts, while negative, are negligible

and not different from exporting to the rest of the World or the US. Third, we also do not find any evidence that selling oil to China is conducive to human rights violations. If anything, in several specifications, both in the short- and longer-run, selling oil to China has small positive consequences for human rights while selling to the rest of the World often has the opposite effect.

Our findings add to several branches of the political economics and trade literatures. First, this study provides new evidence that characteristics of the trading partner matters for development outcomes. Our estimates suggest that keeping total country production and world prices constant, it makes a difference whether a country exports a barrel of oil to China or to the rest of the world. More generally, strategic objectives, political and otherwise may shape the effects of such trade on political and economic outcomes. These incentives and consequences are typically absent from models of trade and international political economics.[8] Second, we build on the existing studies of the natural resource "curse", which began with cross country evidence from Sachs and Warner (1995, 2001).[9]

Our empirical strategy allows us to provide convincing evidence that exporting oil has no negative effects on either economic growth or the development of manufacturing, although it may increase the level of autocracy of the ruling regime in the longer run. These improvements, however, come with a drawback: because we are interested in the effect of the rise of China, we look at annual data starting in 1990. As a consequence, we can only identify the short- or medium-run impact of an increase in oil exports on economic and political outcomes.[10] Furthermore, the

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[8]   There is a small related literature. Levchenko [23], for instance, discusses the possibility that different institutions might act as sources of comparative advantage, thus shaping trade patterns. He does not consider, however, how institutions might change as a result of trade patterns. Antràs and Padró i Miquel [7] propose a simple model of international influence where political ties might be generated by economic ties.

[9]   The basic approach in this literature is to regress long term growth (typically over two decades or more) on the percentage of oil in a country's exports or GDP at the beginning of the period for a cross-section of countries. The finding that oil intensity is negatively correlated with long-term growth performance is robust to the introduction of many controls such as geographical variables. Any causal inference is, however, impaired by the   fact that oil intensity is hardly exogenous as it depends on the size of the economy and past investment. Moreover, the effect of oil on other determinants of long term growth, such as institutions, complicates the picture even more. Mehlum, Moene and Torvik [24], show that resources are actually a blessing for countries with strong institutions. Furthermore, Sala-i-Martin and Subramanian [31] show that resources directly impact institutional quality, showcasing the example of Nigeria. For a literature review of the huge Natural Resource Curse literature, see Van der Ploeg [37]. These findings echo a line of research in Political Science that has also found in a cross-country setting that oil and mineral wealth reduces the prospects for democracy (see Ross, [27] and Jensen and Wantchekon, [17]).

[10]   Because we are interested in the effect of the rise of China, we look at annual data starting in 1992. As a consequence, we only identify the short-term effects of an increase in the value of

differential effects of exporting to China suggests that aggregate consequences of specialization in, for example oil, may hide heterogeneous experiences that depend on the characteristics of the trade partner.

The rest of the paper is organized as follows. The next section presents the empirical strategy. Section 3 describes the data and produces some descriptive statistics. Section 4 presents and discusses the baseline results, while Section 5 examines the robustness and extends the analysis to longer-run impacts. Section 6 discusses and interprets the results, and Section 7 concludes.

2   Empirical Strategy

The existing literature on the natural resource curse mostly examines cross-country correlations.[11]   Applied to our study, a simple resource-curse specification would examine the cross-country relationship between outcomes and exporting oil to China. Because countries that sell more oil to China are also more likely to sell oil to the world at large, we will control for the latter so as to not confound the two effects. This has the important advantage that the estimates for the effect of exporting to China will not be confounded with any rise in prices that China may induce with its impact on global demand for oil. That effect is captured by the coefficient on the value of total oil exports. The main problem in interpreting this correlation is that countries with certain characteristics (bad economic development policies) may invest more intensively in resource sectors. In this case, a negative correlation between oil export to China (or the world at large) and outcomes such as economic growth will reflect the effect of those policies as well as any causal impact of oil exports. Including country fixed effects with a panel of countries will mitigate this problem to the extent that these characteristics do not change over time. We will

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oil on economic and political outcomes. Deaton and Miller [14] and Raddatz [25], using different techniques as ours, found that an increase in the price of commodities has a positive effect on the countries that produce them. This, of course, is not necessarily surprising, but it seems to stand in contradiction to the Natural Resource Curse literature. In a recent paper, Collier and Goderis [13] reconcile the short term positive effects with the long term disappointing growth performance using panel co-integration techniques.

[11]   For a literature review, see Van der Ploeg [37].

use the following basic regression specification

$$y_{i,t+1} = \alpha + \beta \ln\left(OilExp\_China_{it}\right) + \delta \ln\left(OilExp\_World_{it}\right) \quad (4.1)$$
$$+\mathbf{X}'_{it}\boldsymbol{\gamma} + \rho_i + \varphi_t + \varepsilon_{it}.$$

This equation regresses the outcome $y_{i,t+1}$ for country i in year t on the logarithm of the value of oil exports to China, the same for oil exports to the world , the logarithm of GDP per Capita, the logarithm of population, country-specific fixed effects ρ_i and year-specific fixed effects, φ_t.[12] All standard errors are clustered at the country level. We look at the total (logarithm) value of oil exports and do not scale it by the size of the economy or total exports as the literature normally does. This avoids the introduction of mechanical relationships. Instead, we control for past GDP per capita as it can have a direct effect on growth and maybe also on institutions, according to modernization theories. (Later in the robustness section we also include a control for the logarithm of total trade).

Interpreting the coefficients of this equation as causal becomes problematic in the case of unobserved time-varying factors affecting both the China oil trade and the outcomes of interest. If regimes come to power with some intrinsic characteristic adverse to economic or political development (such as one prone to violation of human rights), they may select into selling more oil to China. In that case the estimates of selling oil to China in equation 4.1 will underestimate the impact of exporting to China on e.g. growth, and the fixed effects strategy will lead to estimates confounding the true effect of selling oil to China with other omitted factors.

To address this problem, we exploit the plausibly exogenous variation in oil exports to China coming from a combination of China's demand for oil on one hand,

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[12] When growth between t and $t+1$ is the dependent variable in equation 4.1 with period t GDP per Capita and a country-specific fixed effect on the right-hand side, this is equivalent to a dynamic equation in levels. As has been noted in the large literature on convergence (see for example Caselli et al [12]) the estimate on the GDP per Capita control will then be inconsistent. This dynamic panel bias is due to its mechanical correlation with the error term. Since we are only interested in consistently estimating the coefficient on oil exports to China, this does not pose a serious problem for several reasons. First, in the dynamic panel econometrics literature, it is not unusual that other explanatory variables than the lagged variable are stable across dynamic panel estimators (and when they do move around, this is just as likely to be driven by varying endogeneity, rather than then dynamic panel, bias). Secondly, research using Monte Carlo simulations to estimate the bias in the lagged dependent variable as well as other explanatory variables, have found that in the latter case potential biases are inconsequential – around one percent for the time dimension used in this panel (see Judson and Owen [18]). Finally, our growth results are robust to using first-differenced GMM estimators addressing the dynamic bias, and these yield the same, sometimes even larger, estimates.

and the predetermined existence of significant deposits of oil in African countries on the other. As can be seen in Figure 4.2, China's imports of oil from Africa have been increasing rapidly over time as well as its GDP (with an elasticity of about 8). The following Figure 4.3 also shows a significant difference from OECD countries. As China's consumption of oil has rapidly increased, its production levels increased at a much slower rate. A striking aspect of this trend is that, as recent as in 1992, China was practically self-sufficient in oil. Thus, while countries like the US and those in the European Union have been dependent on foreign oil for centuries, and have had ample time to develop long-run relationships with suppliers, China's quest for foreign oil is an entirely new endeavor. As a consequence, Western countries, already heavily entrenched in the main world suppliers of oil, may find it easier to meet higher demand for oil in existing suppliers such as those in the Middle East. In contrast, China has had to look for additional supplies and new suppliers, leading it into Africa. We thus expect China's economic rise, proxied by either its GDP or its total oil imports to be a strong predictor of African exports of oil to China, and Western countries like the US and members of the EU to have positive but weaker predictive powers over their respective oil imports from Africa.[13] Using Chinese GDP as a proxy for demand has the benefit that while it arguably drives the demand for oil, it is also more likely to be exogenous to other factors such as world prices of commodities. However, it has the drawback that because Chinese GDP is approximately linear during the period of interest (1992-2008), we will not be able to control for country-level linear time trends in this basic specification. But as later sections will show, the results are robust to other group-specific trends such as that of the World oil price and World GDP, as well as country-specific linear trends once more a more extensive set of instruments, without the linearity restriction, is included.

The second component of the empirical strategy is pairing the time-varying Chinese demand for oil with an indicator for African countries with significant oil deposits. The focus on measures based on *existence* instead of those based on *dependence* common in the resource curse literature (for example, share of oil exports out of all exports or GDP) allows us to give proper weight to countries that are endowed

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[13] Chinese GDP growth arguably is the main driving factor of her increasing demand for oil (Alden, [4], [5]; Taylor, [34]).

with oil versus those that tend to become dependent on oil. We use two types of indicators, one based on the average share of all African oil produced and one based on the average share all African oil exported, both in the period 1992-2008. (These two indicators will be described in more detail in the next section).

Interacting the trend of China's demand for oil with the indicator for whether a country has a significant oil endowment yields an instrument for oil exports to China, and the first-stage equation is the following:

$$
\begin{aligned}
\ln\left(OilExp\_China_{it}\right) \;=\; & \alpha_C + \theta_C \ln(GDP\_China_t) * d_i^{Oil} \qquad (4.2)\\
& +\phi_C \ln\left(OilExp\_World_{it}\right) + \mathbf{X}_{it}'\boldsymbol{\zeta}\\
& +\varpi_i + \nu_t + \eta_{it}
\end{aligned}
$$

where the dependent variable is logarithm of oil exports to China regressed on the logarithm of China's GDP, $\ln(GDP\_China_t)$, interacted with whether the country has a significant oil endowment, d_i^{Oil} and similar controls as in equation 4.1. In later sections we will use alternative instruments both with regards to China's oil demand trend as well as the oil endowment indicator, and we will also allow oil exports to the world to be endogenous in the equation by instrumenting in the corresponding fashion.

In a nutshell, identification relies on the assumption that there were no resource-specific, secular, and non-linear trends beyond that induced by China's GDP or, as will be shown later, World GDP or the oil price. If during the period of China's rapid economic growth and increase in oil demand, oil-rich countries deteriorated economically and politically for reasons unrelated to exporting to oil to China and the world, then the identification strategy would be invalid. In the absence of such process, the instruments are valid and useful because they exclude any determinant of oil trade that is related to political and economic institutions and past historical experience. We predict oil trade based exclusively on the interaction of two arguably exogenous measures of supply and demand.

3   Data and Descriptive Statistics

This study uses data from several sources and matches the data at the year and country level. Because China's role in Africa is likely to be very different during the Cold War, we restrict the sample to be post-Cold War. The matched data set contains data for 46 Sub-Saharan African countries over 17 years (1992-2008).[14] We exclude South Africa from the sample as it is the only country with a significant industrial base and a very different political structure. The data for exports come from the United Nations Conference on Trade and Development's (UNCTAD) Commodity Trade Statistics Database (COMTRADE). Similar to previous work using this data, we use data on African trade reported by its trade partners, and the data referring to exports to China is thus data reported by China and not by the African countries themselves. Exports of oil are drawn from the third version SITC code 33, which includes both "Crude petroleum and oils obtained from bituminous minerals" as well as "refined petroleum products", and are denominated in CPI-deflated US constant dollars.

The first indicator for whether a country has a significant oil endowment uses a very simple rule. It assigns a value of one to the eight countries that appear in the BP Statistical Energy Review's 2009 list of oil producers in Sub-Saharan African and zero otherwise. These eight countries, in order of their 2009 production levels, are Nigeria, Angola, the Republic of Congo (Brazzaville), Sudan, Equatorial Guinea, Gabon, Chad, and Cameroon, and constitute more than 98 percent of all oil produced in Sub-Saharan Africa in a given year. Figure 4.4 shows the timing of when these countries started selling oil to China and ranks them in order of the Chinese share of their oil exports. Figure 6 shows several other oil-related statistics for these eight countries. This definition of a significant oil producer excludes a couple of African countries with some oil production, namely Cote d'Ivoire, the Democratic Republic of Congo, Ghana, Benin, Kenya, and Senegal. The alternative indicator therefore uses a different method, namely average oil export shares out of all African oil exports, and assigns the indicator a value of one if a country's average African oil export share is in the 75th percentile, or approximately larger than 0.25 percent. With this measure, the number of oil countries is expanded to 11, adding

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[14]   1992 is the first year for which we have Chinese trade data using the third revision of SITC codes.

Cote d'Ivoire, Kenya, and the Democratic Republic of Congo. Again, this group accounts for more around 97 percent of all oil exported from the region.

Economic outcomes data are sourced from the World Development Indicators. GDP per capita is reported in constant international (PPP) dollars, and growth in GDP per capita is defined as the difference between the log of GDP per Capita in period $t+s$ minus log GDP per Capita in period t, where the time periods examined are annual, three-year, and five-year growth rates ($s = 1, 3, 5$). Table 4.1 shows the average per capita growth rates, in percent. Even taking into account the African growth acceleration from 2000, the average growth rate is below 1.7 percent for the period. It also shows that, on average, 27 percent of total GDP is produced by value added industries. Industry, however, might be a misleading category because it includes extractive industries. Past studies on the natural resource curse have speculated that exporting oil may retard the development of manufacturing sectors even if the overall effect on growth is positive. This would be reflected in a decrease in manufacturing as a share of total GDP, and not so much on value added industries. Indeed, in our dataset Manufacturing value added amounts for only 11 percent of GDP.

Given China's relatively recent appearance in Africa in search for oil we are interested in whether there could be some difference in the terms of how China trades with African countries relative to Western countries, and therefore include the terms of trade as an outcome. Some observers have also commented on the fact that China is using a mainly Chinese labor force for its infrastructure projects in Africa. To find a possible crowding out effect, we examine labor force participation.

The data on political and human rights outcomes comes from the Freedom House dataset, the CIRI data set, and the Polity IV project. The Political Rights index from Freedom House range from 1 to 7, with 1 representing the highest and 7 the lowest level of freedom corresponds to a range of total points. For example, in 2005, China, Zambia and the U.S. had political rights ratings of 7, 4 and 1, respectively. A detailed description of the construction of these indices is included in the Data Appendix. We take the Polity 2 institutional index from the Polity IV database. This index measures the extent to which institutions in a country resemble a stylized definition of a democracy. It ranges from -10 (strongly autocratic) to +10 (strongly democratic). In 2005, China, Zambia and the US had a score of -7, 5 and 10,

respectively.

The Physical Integrity Rights Index reported by CIRI is an additive index constructed from the Torture, Extra-judicial Killing, Political Imprisonment, and Disappearance indicators (see Data Appendix for details). It ranges from 0 (no government respect for these four rights) to 8 (full government respect for these four rights). For example, in 2005, China, Zambia and the U.S. had ratings of 1, 4 and 5. From this same database we also include a measure, Free Speech, indicating the extent to which freedoms of speech and press are affected by government censorship, including ownership of media outlets. This measure ranges from 0 to 2 with higher values indicating more freedom of speech.

The Political Terror index, from the Political Terror Scale database, is an index of human rights violations using sources from the US State Department. It ranges from 1 to 5. Level 1 is for countries under a secure rule of law, people are not imprisoned for their view, and torture is rare and exceptional. Political murders are extremely rare. Level 5 include countries where murders, disappearances, and torture are a common part of life for the whole population and the leaders of these societies place no limits on the means or thoroughness with which they pursue personal or ideological goals. In 2005, China and Zambia were reported to have ratings of 4 and 3, respectively.

For ease of comparison in the analysis we, similar to Acemoglu et al. [2], normalize all of the indices to range between zero and one and such that higher values imply more desired outcomes, i.e. less human rights violations and more political rights etc. Table 4.1 show that, with the exception of the CIRI torture index where the mean is around 0.25, the other indices have very similar means and standard deviations when normalized.

To set the stage for the later regression analysis, we group countries together by whether they can be called a country that sold oil to China versus those that did not and plot the time trends for these two groups in terms of the outcome variables. At this point, we are only interested in a descriptive analysis so we simply define a country as selling oil to China by whether it is in the 75th percentile (or half a percentage) of the variable average oil sold to China out of all African oil exports. Figure 4.5 shows these trends for the outcomes annual growth in GDP per Capita, terms of trade, as well as the Polity2, Civil liberties, Torture, and Political Terror

indices. The solid line shows the trend for the group selling oil to China and the dashed line shows the corresponding trend for the others.

The two economic outcomes show a clear positive development for the countries selling oil to China vis-a-vis those that do not. Growth is clearly higher and the terms of trade show a marked improvement in the former. For the two democracy-related outcomes, both show more or less a deterioration of the group selling oil to China versus the others – despite the group not selling oil to China is on a higher average level the group of interest, countries that sold oil to China have seen a smaller increase in the average democracy level over time. With regards to the human rights outcomes, the group selling oil to China typically has larger variance in human rights records. In the torture index a worrying sign is the large dip for the same, while in the graph showing the Political Terror index, there seems to be a modest improvement relative to countries not selling oil to China.

4   Results

4.1   OLS

Table 4.2 reports basic OLS correlations between Oil exports to China and the above described outcomes. Panels A and B show estimates from outcomes regressed on oil exports to China and controls described in equation 4.1, the former without and the latter including, country fixed effects. The first row of the table reports outcome means.

In the growth regression in column 1, the estimate of 0.1 means that a ten percent increase in oil exports to China is correlated with a 0.01 percentage point higher annual growth rate. Given that the average growth in oil exports to China during the period was around 67 percent, this a modest but non-trivial correlation. Including or not including fixed effects in this column has little bearing on the estimate. The estimate of exporting oil to the World is not statistically significant in any of the two specifications and the point estimate is similar to that of selling oil to China in the fixed-effects specification. Column 2 shows the correlations with the logarithm of terms of trade. A ten percent increase in oil exports to China results in a 0.07 percent increase in the terms of trade without, and 0.17 percent with, fixed effects. Corresponding estimates from exporting oil to the world are similar in

magnitude but negative significant, suggesting trade with China is associated with more generous trade deals. Regarding the manufacturing share of GDP in column 3, the correlation with exporting oil to China is negative but when fixed effects are included the estimate becomes small and statistically insignificant.

For the five institutions and human rights outcomes examined the correlations with oil exports to China are all negative in panel A. These estimates are statistically significant and moderate in terms of magnitude. Countries that sell oil to China are thus those that have worse institutions and human rights records. However, including country-specific fixed effects renders all of these very close to zero and statistically insignificant. Interestingly for the outcome Political Rights in column 5 the estimate for oil exports to the world is negative and significant while the estimate for oil exports to China is marginally positive.

The takeaway from Table 4.2 is thus that selling oil to China is associated with higher growth and improved terms of trade at the expense of the manufacturing sector, and deteriorating institutions and human rights outcomes. Yet when, for the period, permanent factors are taken into account most of the detrimental associations wash away leaving significant only the growth and terms of trade correlations. Although fixed effects are no panacea for establishing causality, this exercise is useful in suggesting a significant selection effect where countries shunned and ostracized from the international community choose to trade with China. Having made this point we turn to a more thorough exercise in establishing the causal development impact of selling oil to China in the next section using instrumental variables.

4.2 Instrumental Variables Results

The first-stage results of the IV are reported in columns 1 through 4 in Table 4.3 for a range of specifications. Taking the first-stage estimate that will be used as the baseline from column 2, a one percent increase in China's GDP resulted in a ten percent increase in the oil exports going to China. As can be seen including or excluding total oil exports or total trade has little bearing on the elasticity. Columns 5 through 8 report reduced-form estimates. These show similarly stable estimates where, again taking the baseline estimate from column 6, a ten percent increase in China's GDP (the period's average annual growth rate of China's GDP) resulted in half a percentage point increase in the growth rate.

Panel A of Table 4.4 reports the second-stage results from the IV regressions where the logarithm of oil exports to China is instrumented by China's GDP interacted with the significant oil dummy based on production data described in section 3. All regressions include controls for oil exports to the world, GDP per Capita, population, as well as country- and year-specific effects. In column 1 the point estimate is 0.55, larger than the OLS estimates from Table 2. Thus a ten percent increase in the oil exported to China had an impact of raising the annual growth rate by 0.053 percentage points. Using the average change in oil exports to China this 67-percent change corresponds to a third of a percentage point increase per year. For a group of countries that had an average growth in GDP per Capita of just under 1.7 percent, this is an economically large impact.

In column 2 the main findings from Table 4.2 holds up – exporting oil to China has had a positive impact on the terms of trade while exporting oil to the rest of the world is still negatively correlated with the outcome. Again the magnitude of the coefficient on exporting to China is larger. Column 3 also shows a large positive impact on the industry value-added as a share of GDP, suggesting that much of the growth may have come from this capital- and resource-intensive sector. In contrast, the IV estimate in column 4 shows no significant impact on the manufacturing share of GDP nor on the labor force participation share in column 5 although the estimates are still negative.

For the institutions and human rights outcomes, the results are essentially the same as those from the OLS specifications including fixed effects. Exporting oil to China has had no significant impact, either economically or statistically, on these measures. Interestingly, in the results in column 7 regarding the Political Rights measure, the IV estimate of exporting oil to China is essentially zero while the correlation with exporting oil to the world is negative significant (although the estimate is small in terms of magnitude). Important to note, is that not only are the estimates very close to zero but these also allow us to reject quite small negative impacts as well. For example, taking the estimate from column 6 using the Polity2 indicator as the outcome, for a 67-percent increase in oil exports to China we can reject a negative impact as small as 0.008 units, or 1.6 percent. Panel B reports results using the more expansive export-based oil dummy as described in section 3, and the IV estimates in this specification are essentially identical to those in Panel

A while exhibiting first-stage F-statistics of around two-thirds of those in the above panel.

These baseline results again stand in contrast to the cross-sectional correlations from Panel A in Table 4.2 in that they reveal no detrimental impacts on institutional or human rights outcomes. Moreover, in contrast to the within-country correlations from Panel B in the same table, the IV estimates show significantly larger positive impacts on growth, the terms of trade, and the industry share of GDP.[15] This is once again consistent with a selection story explaining why African countries selling oil to China have worse institutional and human rights outcomes. Given the larger IV estimates vis-a-vis the within estimates, these results also suggest that those countries that during the period came to sell more oil to China may have also been those that experienced worsening growth prospects.

5 Robustness Checks

5.1 Alternative specifications

Table 4.5 reports a wider range of different specifications for the annual growth regression, with the first column showing the baseline result from the same column in Table 4.4. Columns 2 and 3 use three-year and five-year growth respectively as the dependent variable. As the length of the growth period increases the impact becomes larger as one would expect. The growth effect is thus not simply a one-year effect but has consequences also for more medium-run periods.

Columns 4 and 5 add two controls to the specification with annual growth. The first includes the logarithm of total trade to control for the possibility that the IV estimate is driven simply by the expansion of trade. The second includes an oil-country specific trend that is the logarithm of the world oil price interacted with the oil country dummy. This is to control for the possibility that the finding in Table 4 is a result of the oil price trend. None of these additional controls meaningfully alter the IV estimate. Column 6 uses an alternative time-varying component of the instrument, using the logarithm of China's total imports of oil instead of GDP, yielding almost an identical estimate. Column 7 uses yet another alternative time-varying

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[15] For all these three outcomes, Hausman tests reveal significantly different IV estimates from the OLS fixed effects estimates.

component of the instrument, namely growth in GDP, again yielding a similar yet slightly less precise, estimate. As mentioned before, the baseline specification is identified under the assumption of no other secular trends specific to oil countries than those included in the specification, but this could potentially just capture a linear oil-specific trend. We therefore, in column 8, include all the instruments for oil exports to China; Chinese GDP, growth, and total oil imports, each interacted with the oil existence dummy, and in addition add controls for country-specific linear trends. Even this rather demanding robustness check results in an economically similar estimate with slightly lower precision than the baseline.

Up until now we have treated oil exports to the rest of the world as a control variable, but we can also treat this as endogenous and employ a corresponding instrument for this variable. Columns 9 through 11 are thus multiple IV regressions where both oil exports to China and oil exports to the world are instrumented for. In the first of these columns the baseline specification is used with oil exports to the World instrumented by World GDP interacted with the significant oil dummy. While the instrument for China is still strong, the one for World oil exports is weak with an F-statistic less than one. Therefore columns 10 and 11 employ the same specification except that in the first World oil exports is instead instrumented with total OECD imports of oil interacted with the oil dummy, and in the second both oil exports to China and the World are instrumented with total oil imports for China and OECD respectively. Neither of these produce a satisfactorily strong instrument for oil exports to the world. This weaker relation between world GDP and OECD oil imports to African oil exports is perhaps not so surprising given the discussion in section 2. First, China's recent growth is much driven by oil-intensive industry sectors whereas in other major oil consumers, for example the US and the European Union, growth comes less from such sectors. Second, the latter countries' relationships with large non-African producers could mean that additional demand is more or less easily met by existing suppliers, such as the Middle East or Latin America. Therefore we think of the multiple IV exercise as a useful robustness check, since the IV estimate on oil exports to China remains stable throughout the specification variations in Table 4.5.

5.2 China versus the US

As a further robustness check and given that another major oil consumer in the region is the US, we employ the multiple IV specification to also allow for a specific effect of selling oil to the US in addition to selling such to China and the world. Table 4.6 reports the results for the same outcomes as in Table 4 instrumenting for all three of oil exports to China, the US, and the World, using the total imports of China, the US, and the OECD respectively interacted with the significant oil dummy. As in Table 5, the instruments for the US and the OECD are weak and as a result do not yield precise IV estimates. The instrument for oil exports to China remains relatively strong and especially the estimates on growth and the terms of trade yield quite identical estimates to those in Table 4.4.

For the Polity2 and Physical Integrity indices the oil exports to China estimates are now negative and in the first case even somewhat larger than the corresponding cross-sectional correlation in Table 4.2. Yet this needs to weighed against the fact that the impact on the Political Rights index is of similar magnitude but positive. And moreover, the estimates on the other two human rights outcomes, Free Speech and Political Terror are uniquely positive for selling oil to China and negative for selling oil to the world. Given the lack of precision for the estimates of exporting to the US and the World, we refrain from interpreting these estimates as causal and instead think of this as a useful robustness check to the estimate that is more precisely identified, namely exporting oil to China. Thus even allowing for oil exports to other countries, we fail to find clear and meaningful detrimental impacts on African countries institutions and human rights records. Once again, it is the positive growth and terms of trade impacts that stand out.

5.3 Medium-run Results

Up until now a limitation of our analysis has been that, with the exception of the growth results, only short-run relationships have been investigated. Because of the slow-moving nature and persistence of institutions it may be that longer-run effects exist even when short-run effects do not. For this purpose we examine five- and eight-year panels, or in other words, we use only observations in every fifth or eighth year respectively. This is still not as satisfactory as if we could observe longer

periods, such as 25- or 50-year panels. But given the concern expressed in some of the sources described in section 1 about developments during the period examined, this exercise will further expand the analysis.

Table 4.7 reports results in Panels A and B, the first for the five-year panel and the second for the eight-year panel.[16] We also include additional outcome variables including, among others, some of the sub-indices used to construct the composite indices such as the Polity2 and Physical Integrity index. Specifications are single-IV where the oil exports to China variable is instrumented using China's GDP interacted with the oil existence dummy, and including the baseline controls as well as country-specific fixed effects, just as in Table 4.4. Due to the lower amount of observations in these longer panel datasets the first-stage is now somewhat weaker with F-statistics in between 6 and 12.

These medium-run results show a slightly more cohesive picture than the short-run ones. Regarding the effects on institutions, the IV estimates of selling oil to China are now all negative but only significant for the Democracy and Civil Liberties indices, and not significantly different from the coefficients on selling oil to the World. Using the estimate from the eight-year panel in column 5 for the latter outcome, a 200-percent increase in oil exports to China (which is also the mean growth in such exports for this panel) on average lowered the Civil Liberties index by 0.007 units or 1.5 percent. For all the institutional outcomes the negative IV estimates of selling oil to China are very similar to the coefficients on selling oil to the World.

For the human rights outcomes the impact of selling oil to China tends to be positive for several outcomes, including the Physical Integrity Index, Political Imprisonment, and the Political Terror index from the US State Department. For example, selling 200 percent more oil to China on average improved the Physical Integrity index by 0.012 points, or 5 percent. Moreover, for several outcomes such as Free Speech and the Political Terror index by Amnesty, the coefficient on selling oil to the rest of the World is negative significant and of non-trivial economic importance.

In short, we fail to find large negative institutional and human rights-related impacts even in the longer run. For those outcomes where we do find negative

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[16] Following Acemoglu et al. [2] we prefer using every n-th observation instead of averaging over n periods which may increase serial correlation, making inference and estimation more difficult.

impacts, they are modest in magnitude and do not seem different from selling oil to the rest of the World. Moreover, some human rights outcomes actually seem to modestly improve over the medium-run as a country sells more oil to China instead of alternative buyers.

6   Interpretation

The comparison of OLS estimates with and without country fixed effects shows that most of the cross-sectional correlation that can be used as evidence for the adverse effects of exporting oil to China (and the natural resource curse more generally) is generated by confounding factors. Moreover, the finding that the IV estimates for the positive effects of exporting to China on economic outcomes such as growth are larger than the within estimates suggest that the selection of worsening regimes into trading with China is also causing those estimates to be biased. However, for the institutional and human rights outcomes the IV and fixed effects estimates are not markedly different from each other. This suggests that while underlying factors affecting the growth prospects of countries selling oil to China may have changed, corresponding factors affecting the institutional outcomes have not. This is consistent with China acting as a buyer of last resort to countries facing sanctions from the international community.

While the data limits our empirical investigation of the mechanisms underlying the effect on economic growth, anecdotal evidence and our results together allow us to speculate. Our results suggest that investment in the extractive industries is an important channel. China seems to direct more capital to the improvement of resource-intense sectors than other trade partners. There are many reasons why this might be so. There is some anecdotal evidence that Chinese oil companies receive capital from the Chinese government at a subsidized rate (from their huge foreign reserves, and typically through the ExIm bank). Furthermore, Chinese oil companies use Chinese labor which greatly reduces labor costs compared to their Western counterparts. Therefore, these companies enjoy cheaper inputs which allows them to develop fields faster. Indeed, some analysts maintain that in some cases, Chinese companies are bidding for concessions at levels that would make Western companies operate at a loss. Moreover, the Chinese government is directing soft loans and

other forms of foreign aid to countries in which Chinese extraction companies operate. Some of this aid includes transfer "in kind," such as agreements for Chinese companies to build infrastructure items such as roads, hospitals, presidential palaces and football stadiums. These transfers also have a comparative advantage due to low labor costs.[17] All in all, it might well be that African countries are obtaining on average a better effective price for their oil when they divert trade to China, as suggested by the impact on their terms of trade. Moreover, an inspection of the average unit prices of selling oil to China versus selling oil to the US reveals that China on average has paid ten percent more than the US.

Our results do not support the popular speculation that exporting oil to China has had adverse effects on human rights records or institutions. Practically for all these outcomes the estimates are essentially zero and sometimes even positive with exporting to, for example, the rest of the World or the US having negative estimates. This does not mean that selling oil to China will not have any long-run institutional effects the true long-run impact of selling oil to China cannot yet be investigated due to the limited time period. However, at this point we can say that the short-to-medium-run economic effects are positive and large while the widely anticipated human rights abuse caused by having China as a trade partner has failed to materialize.

7   Concluding Remarks

China's supposed negative influence in Africa has been one of the most commonly reported stories in popular media such as The Economist in the past few years. Absent systematic evidence, anecdotal examples such as the conflict in Darfur in Sudan has been used to galvanize world opinion. This paper uses a unique empirical strategy to provide novel evidence that perhaps, these commonly proclaimed beliefs are not wholly true.

We find that exporting oil to China has positive effects on economic growth, the terms of trade and the development of the resource-intensive industry sector. A 67-percent increase in oil exports to China increased annual growth by a third of a

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[17] See Alden [5] for a discussion of these issues. Note that some of these points are consistent with the reduction, although of relatively small magnitude, in labor force participation that oil trade with China seems to cause.

percentage point, and five-year growth by nearly a full percentage point. Given that the countries examined grew by a meager 1.67 percent during the sample period, the Chinese oil trade has served as a large, and much-needed, growth injection to African economies.

The much publicized and feared detrimental consequences on institutions and respect for human rights caused by the Chinese oil trade has so far failed to materialize, as indicated by our results. We can reject very minor negative short-run impacts of selling oil to China on widely used indices, a finding robust to a host of specification variations and other robustness checks. We do find some marginal negative impacts on institutions in the medium-run, although these are not meaningfully different from selling to other major oil buyers, and in these cases respect for human rights actually improve, rather than deteriorate. As such, evaluating the consequences of trading oil with China needs to weigh the large positive growth effects and improvements in countries' terms of trade on one side, against a marginal deterioration in democratic institutions, a similarly small improvement in respect for human rights, as well as increased investment in, and further dependence on, resource-intensive sectors of the economy.

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4.A   Appendix

4.A.1   Trade Data

Oil Exports to China is the logarithm of all oil exports from the country exported to China as reported by the latter. *Oil exports to the World and the US* are calculated in similar fashion. *Total trade* is the logarithm of the sum of all exports and all imports as recorded by trade partners. *Oil Imports by China, US, and the OECD* is the total imports from all countries as recorded by these countries and country group.

Exports and Imports by SITC Rev. 3, as reported by trade partners, in constant US Dollars from UNCTAD's COMTRADE database

Source: http://comtrade.un.org/

4.A.2   Existence of Oil Indicator

Significant oil existence dummy (from production data) is an indicator that takes on the value one if the country is included as a named oil producer in the 2009 BP Statistical Energy Review and zero otherwise. This includes Nigeria, Angola, the Republic of Congo (Brazzaville), Sudan, Equatorial Guinea, Gabon, Chad, and Cameroon. *Significant oil existence dummy (from exports data)* is an indicator that takes on the value one if a country was in the 75th percentile (circa 0.25 percent) of those who on average exported most oil out of Sub-Saharan Africa between 1992-2008. The countries assigned positive values by this indicator are the same as the previous one as well as the countries Cote d'Ivoire, Kenya, and the Democratic Republic of Congo.

4.A.3   Economic Data

GDP and *GDP per Capita* is measured in constant international dollars and *Growth in GDP per Capita* is the difference between GDP per Capita at $t + s$ and GDP per Capita in period t. The terms of trade is defined as the logarithm of Net Barter terms of trade. *Industry and Manufacturing shares of GDP* are calculated as valued added as a percentage of GDP. The *Labor force participation* rate is the percentage of the total population in the age group 15-64 active in the labor force.

Source: World Development Indicators, World Bank.

4.A.4   Political and Human Rights Data

Below are brief descriptions of each of the variables used along with the original sources. In addition, examples of values for China, the United States and Zambia are provided.

Political Terror Scale (US State Dept, Amnesty Intl)   The Political Terror Indices were constructed by Mark Gibney and Matthew Dalton and assigns human rights scores on a 1 to 5 scale.

- Level 1: Countries under a secure rule of law, people are not imprisoned for their view, and torture is rare and exceptional. Political murders are extremely rare.

- Level 2: There is a limited amount of imprisonment for nonviolent political activity. However, few persons are affected, torture and beatings are exceptional. Political murder is rare.

- Level 3: There is extensive political imprisonment, or a recent history of such imprisonment. Execution or political murders and brutality may be common. Unlimited detention, with or without trial, for political view is accepted.

- Level 4: The practices of level 3 are expanded to larger number. Murders, disappearances, and torture are a common part of life. In spite of its generality, on this level terror affects those who interest themselves in politics or ideas.

- Level 5: – The terrors of level 4 have been expanded to the whole population. The leaders of these societies place no limits on the means or thoroughness with which they pursue personal or ideological goals.

Examples of values in 2005 (State Dept): China (4), the United States (n/a), Zambia. (3)

Examples of values in 2005 (Amnesty Intl): China (4), the United States (3), Zambia. (3)

Source: http://www.politicalterrorscale.org/

Polity2 The polity2 score is computed by subtracting two indices, Institutionalized Autocracy (autoc) from the Institutionalized Democracy (democ) scores. "Democ" is composed of three essential, interdependent elements. One is the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders. Second is the existence of institutionalized constraints on the exercise of power by the executive. Third are guarantees of civil liberties to all citizens in their daily lives and in acts of political participation. Other aspects of plural democracy, such as the rule of law, systems of checks and balances, freedom of the press, and so on are means to, or specific, manifestations of these general principles.

Autoc is a measure of the degree of an "Authoritarian regime", defined by the coders in terms of the presence of a distinctive set of political characteristics. In practice this measure is a combination of degrees of competitiveness and restrictions of executive recruitment, constraints on the executive, regulation and competitiveness of participation.

The resulting unified Polity2 score ranges from +10 (strongly democratic) to -10 (strongly autocratic). See below for detailed composition.

Examples of values in 2005: China (-7), the United States (10), Zambia (5).

Source: http://www.cidcm.umd.edu/inscr/polity/

Political Rights, Civil Liberties Indices (Freedom House) Raw Points – The ratings process is based on a checklist of 10 political rights questions and 15 civil liberties questions. The political rights questions are grouped into the three sub-categories: Electoral Process (3 questions), Political Pluralism and Participation (4), and Functioning of Government (3). The civil liberties questions are grouped into four sub-categories: Freedom of Expression and Belief (4 questions), Associational and Organizational Rights (3), Rule of Law (4), and Personal Autonomy and Individual Rights (4). Raw points are awarded to each of these questions on a scale of 0 to 4, where 0 points represents the smallest degree and 4 the greatest degree of rights or liberties present. The political rights section also contains two additional discretionary questions: question A (For traditional monarchies that have no parties or electoral process, does the system provide for genuine, meaningful consultation with the people, encourage public discussion of policy choices, and allow the right

to petition the ruler?) and question B (Is the government or occupying power deliberately changing the ethnic composition of a country or territory so as to destroy a culture or tip the political balance in favor of another group?). For additional discretionary question A, 1 to 4 points may be added, as applicable, while for discretionary question B, 1 to 4 points may be subtracted (the worse the situation, the more points that may be subtracted). The highest number of points that can be awarded to the political rights checklist is 40 (or a total of up to 4 points for each of the 10 questions). The highest number of points that can be awarded to the civil liberties checklist is 60 (or a total of up to 4 points for each of the 15 questions).

The raw points from the previous survey edition are used as a benchmark for the current year under review. In general, a change in raw points is made only if there has been a real world development during the year that warrants a change (e.g., a crackdown on the media, the country's first free and fair elections) and is reflected accordingly in the narrative.

In answering both the political rights and civil liberties questions, Freedom House does not equate constitutional or other legal guarantees of rights with the on-the-ground fulfillment of these rights. While both laws and actual practices are factored into the ratings decisions, greater emphasis is placed on the latter.

In addition, for states and territories with small populations, the absence of pluralism in the political system or civil society is not necessarily viewed as a negative situation unless the government or other centers of domination are deliberately blocking its establishment or operation. For example, a small country without diverse political parties or media outlets or significant trade unions are not penalized if these limitations are determined to be a function of size and not overt restrictions.

Political Rights and Civil Liberties Ratings – The total number of points awarded to the political rights and civil liberties checklists determines the political rights and civil liberties ratings. Each rating of 1 through 7, with 1 representing the highest and 7 the lowest level of freedom corresponds to a range of total points.

Examples of values in 2005 (Political Rights): China (7), the United States (1), Zambia. (4)

Examples of values in 2005 (Civil Liberties): China (6), the United States (1), Zambia. (4)

Source: Freedom House, http://www.freedomhouse.org

Physical integrity Rights Index   This is an additive index constructed from the Torture, Extrajudicial Killing, Political Imprisonment, and Disappearance indicators. It ranges from 0 (no government respect for these four rights) to 8 (full government respect for these four rights). Details on its construction and use can be found in: David L. Cingranelli and David L. Richards. 1999. "Measuring the Level, Pattern, and Sequence of Government Respect for Physical Integrity Rights." International Studies Quarterly, Vol 43.2: 407-18.

Examples of values in 2005: China (1), the United States (5), Zambia. (4)

Source: CIRI Human Rights, http://ciri.binghamton.edu/

Electoral Self-Determination   This variable indicates to what extent citizens enjoy freedom of political choice and the legal right and ability in practice to change the laws and officials that govern them through free and fair elections. This right is sometimes known as the right to self-determination. A score of 0 indicates that the right to self-determination through free and fair elections did not exist in law or practice during the year in question. A score of 1 indicates that while citizens had the legal right to self-determination, there were some limitations to the fulfillment of this right in practice. Therefore, in states receiving a 1, political participation was only moderately free and open. A score of 2 indicates that political participation was very free and open during the year in question and citizens had the right to self-determination through free and fair elections in both law and practice.

Examples of values in 2005: China (0), the United States (2), Zambia. (1)

Source: CIRI Human Rights, http://ciri.binghamton.edu/

Disappearance   Disappearances are cases in which people have disappeared, political motivation appears likely, and the victims have not been found. Knowledge of the whereabouts of the disappeared is, by definition, not public knowledge. However, while there is typically no way of knowing where victims are, it is typically known by whom they were taken and under what circumstances. A score of 0 indicates that disappearances have occurred frequently in a given year; a score of 1 indicates that disappearances occasionally occurred; and a score of 2 indicates that disappearances did not occur in a given year.

Examples of values in 2005: China (1), the United States (1), Zambia. (2)

Source: CIRI Human Rights, http://ciri.binghamton.edu/

Extrajudicial killing   Extrajudicial killings are killings by government officials without due process of law. They include murders by private groups if instigated by government. These killings may result from the deliberate, illegal, and excessive use of lethal force by the police, security forces, or other agents of the state whether against criminal suspects, detainees, prisoners, or others. A score of 0 indicates that extrajudicial killings were practiced frequently in a given year; a score of 1 indicates that extrajudicial killings were practiced occasionally; and a score of 2 indicates that such killings did not occur in a given year.

Examples of values in 2005: China (0), the United States (1), Zambia. (1)

Source: CIRI Human Rights, http://ciri.binghamton.edu/

Political Imprisonment   Political imprisonment refers to the incarceration of people by government officials because of: their speech; their non-violent opposition to government policies or leaders; their religious beliefs; their non-violent religious practices including proselytizing; or their membership in a group, including an ethnic or racial group. A score of 0 indicates that there were many people imprisoned because of their religious, political, or other beliefs in a given year; a score of 1 indicates that a few people were imprisoned; and a score of 2 indicates that no persons were imprisoned for any of the above reasons in a given year.

Examples of values in 2005: China (0), the United States (2), Zambia. (1)

Source: CIRI Human Rights, http://ciri.binghamton.edu/

Torture   Torture refers to the purposeful inflicting of extreme pain, whether mental or physical, by government officials or by private individuals at the instigation of government officials. Torture includes the use of physical and other force by police and prison guards that is cruel, inhuman, or degrading. This also includes deaths in custody due to negligence by government officials. A score of 0 indicates that torture was practiced frequently in a given year; a score of 1 indicates that torture was practiced occasionally; and a score of 2 indicates that torture did not occur in a given year.

Examples of values in 2005: China (0), the United States (1), Zambia. (0)

Source: CIRI Human Rights, http://ciri.binghamton.edu/

Freedom of Speech   This variable indicates the extent to which freedoms of speech and press are affected by government censorship, including ownership of media outlets. Censorship is any form of restriction that is placed on freedom of the press, speech or expression. Expression may be in the form of art or music. A score of 0 indicates that government censorship of the media was complete; a score of 1 indicates that there was some government censorship of the media; and a score of 2 indicates that there was no government censorship of the media in a given year.

Examples of values in 2005: China (0), the United States (2), Zambia. (1)

Source: CIRI Human Rights, http://ciri.binghamton.edu/

Table 4.1 Summary Statistics

Variable Name	Mean	Std. dev.	Min	Max	Obs
Growth in GDP per Capita (1-yr)	1.68	7.24	-63.29	64.26	707
Growth in GDP per Capita (3-yr)	5.62	15.14	-65.19	98.82	617
Growth in GDP per Capita (5-yr)	9.52	22.28	-41.05	153.72	527
Net Barter Terms of Trade	105.91	32.96	21.40	321.64	670
Industry share of GDP	26.95	15.88	1.88	95.70	717
Manufacturing share of GDP	10.55	6.93	1.42	44.35	695
Labor force participation rate	76.61	10.32	53.30	96.06	765
Polity2	0.52	0.26	0	1	730
Political Rights (FH)	0.41	0.31	0	1	781
Physical Integrity Index (CIRI)	0.27	0.13	0	0.5	691
Free Speech	0.39	0.32	0	1	729
Political Terror (State Dept.)	0.52	0.29	0	1	778
Log GDP per Capita	7.17	1.01	5.02	10.35	752
Log Oil Exports to China	2.66	6.62	0	23.73	749
Log Oil Exports	13.62	6.77	0	24.99	749
Oil Share of Exports	0.15	0.28	0	0.98	749
China-bound Oil Share of Oil Exports	0.03	0.12	0	1	650

Table 4.2 Basic OLS Correlations

Outcome variable	GDP per Capita Growth (1-yr, %)	Terms of Trade (log)	Manufacturing share of GDP (%)	Polity2	Political Rights	Physical Integrity	Free Speech	Political Terror (State Dept.)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Outcome mean	1.68	4.62	10.55	0.52	0.41	0.26	0.50	0.52
Panel A. OLS								
China Oil Exports	0.118*	0.007***	-0.365***	-0.010**	-0.018***	-0.006***	-0.009**	-0.013***
	(0.065)	(0.003)	(0.089)	(0.005)	(0.005)	(0.002)	(0.004)	(0.003)
World Oil Exports	0.026	-0.009*	0.041	0.000	-0.005	0.001	-0.004	-0.003
	(0.085)	(0.004)	(0.088)	(0.005)	(0.005)	(0.002)	(0.005)	(0.004)
Panel B. OLS with country-specific fixed effects								
China Oil Exports	0.100**	0.017***	-0.038	0.002	0.001	0.000	0.001	0.000
	(0.044)	(0.005)	(0.031)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)
World Oil Exports	0.117	-0.010***	-0.040	-0.002	-0.005**	0.000	-0.001	-0.001
	(0.102)	(0.004)	(0.035)	(0.002)	(0.002)	(0.001)	(0.004)	(0.002)
Observations	674	599	619	637	676	639	638	676

Controls include log GDP per Capita and log population. All regressions include time-specific fixed effects. Controls include log GDP per Capita and log population. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.3 First-stage and reduced-form results

Outcome variable	Log Oil Exports to China				Annual Growth in GDP per Capita			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log China GDP * Oil dummy	10.481***	10.364***	9.403***	14.550***	6.010**	5.897**	6.276*	9.765*
	(1.949)	(1.755)	(1.727)	(3.607)	(2.728)	(2.723)	(3.144)	(5.249)
Log GDP per Capita	2.598**	2.068*	0.23	2.141*	-9.267***	-9.434***	-8.652***	-9.336***
	(1.209)	(1.198)	(1.125)	(1.118)	(2.875)	(2.852)	(2.879)	(2.818)
Log Population	-2.193	-1.117	-1.32	-1.356	5.027	5.612	5.538	5.312
	(3.691)	(3.481)	(2.755)	(3.600)	(7.151)	(7.955)	(8.393)	(7.870)
Log Oil Exports to World		0.135**	0.113*	0.142**		0.075	0.084	0.082
		(0.067)	(0.058)	(0.064)		(0.102)	(0.096)	(0.106)
Log Total Trade			1.806**				-0.757	
			(0.845)				(2.114)	
World Oil Price * Oil dummy				-3.702				-3.791
				(2.587)				(3.369)
Observations	719	719	719	719	707	674	674	674

All regressions include time-specific fixed effects. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.4 Instrumental Variables Results

Outcome variable	GDP per Capita Growth (1-yr, %)	Terms of Trade (log)	Industry share of GDP (%)	Manufacturing share of GDP (%)	Labor force part.(%)	Polity2	Political Rights	Physical Integrity	Free Speech	Political Terror (State Dept)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

*Panel A. China Oil Exports instrumented with China GDP * Significant Oil-Producer dummy*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
China Oil Exports	0.554**	0.073***	1.363***	-0.118	-0.021	-0.002	0.000	0.004	-0.003	0.010
	(0.274)	(0.016)	(0.369)	(0.086)	(0.048)	(0.007)	(0.007)	(0.003)	(0.009)	(0.007)
World Oil Exports	0.005	-0.015**	0.003	-0.012	-0.007	-0.002	-0.005**	-0.001	-0.001	-0.002
	(0.116)	(0.006)	(0.107)	(0.037)	(0.016)	(0.003)	(0.002)	(0.001)	(0.004)	(0.002)
First-stage F-statisti	26.1	17.3	22.4	22.5	25.0	24.3	25.2	22.8	23.3	25.2

*Panel B. China Oil Exports instrumented with China GDP * Significant Oil exporter dummy*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
China Oil Exports	0.528*	0.087***	1.598***	-0.026	-0.019	0.001	-0.001	0.002	0.000	0.007
	(0.279)	(0.022)	(0.408)	(0.121)	(0.057)	(0.012)	(0.009)	(0.004)	(0.012)	(0.009)
World Oil Exports	0.009	-0.016**	-0.034	-0.027	-0.007	-0.003	-0.005**	0.000	-0.002	-0.001
	(0.115)	(0.008)	(0.119)	(0.042)	(0.017)	(0.003)	(0.002)	(0.001)	(0.004)	(0.002)
First-stage F-statisti	16.8	11.4	13.9	12.8	15.7	15.2	15.8	13.2	12.9	15.8
Observations	674	599	640	619	660	637	676	620	639	676

Log Oil Exports to China instrumented with China GDP interacted with significant existence of oil indicator In Panel A the value of the indicator is one if a country is recorded as a producer in the BP Statistical Energy Review. In Panel B the dummy is one if the country's share of African oil exports to the world is in the 75th percentile (approx. above 0.25 percent of the country's average share of African oil exports between 1988-2008). Controls include log GDP per Capita and log population. All regressions include time-specific and country-specific fixed effects. Robust standard errors clustered by country in parentheses. *** p<0.01, **

Table 4.5 Robustness checks

Specification	Growth (Annual)	Growth (3-year)	Growth (5-year)	Total trade ctrl	Incl. oil price trend	Alt inst.: China Oil Imports	Alt. inst: China Growth	Three instr. + lin. trend	Multiple IV 1	Multiple IV 2	Multiple IV 3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
China Oil Exports	0.554**	1.345**	1.989*	0.651*	0.675*	0.544**	0.375	0.319	0.755	0.571*	0.506
	(0.274)	(0.634)	(1.051)	(0.336)	(0.390)	(0.275)	(0.466)	(0.509)	(0.746)	(0.305)	(0.463)
World Oil Exports	0.005	-0.07	0.003	0.019	-0.008	0.007	0.032	0.095	-2.719	-0.234	0.234
	(0.116)	(0.191)	(0.219)	(0.112)	(0.117)	(0.119)	(0.117)	(0.086)	(3.537)	(0.873)	(2.663)
F-stat (China)	26.1	20.8	15.9	22.1	16.0	24.7	4.6	4.8	12.8	12.7	15.5
F-stat (World)									0.5	0.8	2.0
Instr. (China)	GDP*Oil	GDP*Oil	GDP*Oil	GDP*Oil	GDP*Oil	China Oil Imports * Oil	Growth * Oil	Imp.*Oil, GDP*Oil, Growth*Oil	China GDP *Oil	China GDP *Oil	China Oil Imports * Oil
Instr. (World)									World GDP*Oil	OECD Oil Imports * Oil	OECD Oil Imports * Oil
Overid. Test (p-value)								0.768			
Observations	674	584	494	674	674	674	635	635	674	674	674

Column 1 is the baseline specification where annual growth is regressed on log oil exports to China instrumented by China's log GDP interacted with the oil existence dummy, and controls described in the text. Columns 2 and 3 have three-year and five-year growth respectively as the outcome. Column 4 adds a control for the log total value of imports plus export of the country, and column 5 includes a control for the world oil price interacted with oil existence. Columns 6 uses total Chinese oil imports interacted with oil as an alternative instrument, and column 8 uses Chinese growth in GDP interacted with oil as the instrument. Column 8 uses the full set of instruments China GDP*Oil, China Oil Imports *Oil, and China GDP growth *Oil, and in addition adds controls for country-linear time. Columns 9 through 11 uses various combinations of instruments to also instrument for log oil exports to the World. All regressions include time-specific fixed effects. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.6 Impact of oil exports to China, US, and the World

Outcome variable	GDP per Capita Growth (1-yr, %) (1)	Terms of Trade (log) (2)	Industry share of GDP (%) (3)	Manufacturing share of GDP (%) (4)	Labor force participation share (%) (5)	Polity2 (6)	Political Rights (7)	Physical Integrity (8)	Free Speech (9)	Political Terror (State Dept.) (10)
China Oil Exports	0.452 (1.276)	0.106** (0.042)	0.971 (1.580)	0.128 (0.402)	-0.008 (0.069)	-0.017 (0.018)	0.012 (0.019)	-0.006 (0.018)	0.023 (0.045)	0.047 (0.048)
USA Oil Exports	0.15 (2.571)	-0.236 (0.454)	1.757 (2.343)	-0.567 (0.636)	-0.054 (0.075)	0.028 (0.029)	-0.032 (0.042)	0.015 (0.041)	-0.046 (0.077)	-0.065 (0.103)
World Oil Exports	0.254 (2.940)	-0.280 (0.341)	-1.368 (3.018)	-0.196 (0.557)	0.019 (0.093)	0.017 (0.035)	-0.015 (0.037)	0.025 (0.043)	-0.041 (0.090)	-0.084 (0.122)
F-stat (China)	10.4	7.4	9.2	10.0	10.1	9.6	10.3	9.3	9.4	10.3
F-stat (USA)	2.2	2.6	1.8	1.4	2.3	2.3	2.2	2.8	2.5	2.2
F-stat (World)	2.3	3.6	1.9	2.2	2.1	2.2	2.4	2.4	2.0	2.4
Observations	674	599	640	619	660	637	676	639	638	532

Log Oil Exports to China instrumented with log Chinese imports of oil, Log Oil Exports to USA instrumented with log US imports of oil, and Log Oil Exports to the World instrumented with log OECD oil imports, each respectively interacted with oil dummy. Controls include log GDP per Capita and log population. All regressions include time-specific and country-specific fixed effects. Robust standard errors clustered by country in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4.7 Medium-Run IV Results

	Polity2	Executive Constraints	Democracy	Political Rights	Civil Liberties	Physical Integrity	Disappearance	Extrajud. Killings	Torture	Free Speech	Political Imprison.	Electoral Self-det.	Pol. Terror (A)	Pol. Terror (US)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A. Five-year panel														
China Oil Exports	-0.003	-0.003	-0.010	0.001	-0.006	0.011**	0.004	0.024	0.017	0.000	0.022**	0.009	0.017	0.014*
	(0.007)	(0.014)	(0.010)	(0.009)	(0.007)	(0.004)	(0.011)	(0.015)	(0.013)	(0.014)	(0.011)	(0.013)	(0.012)	(0.007)
World Oil Exports	-0.001	0.003	0.001	0.003	0.002	0.001	0.007	-0.003	0.005	-0.011*	-0.005	0.015**	-0.006	-0.002
	(0.004)	(0.006)	(0.005)	(0.004)	(0.002)	(0.003)	(0.007)	(0.010)	(0.007)	(0.005)	(0.008)	(0.007)	(0.006)	(0.005)
F-statistic	7.9	6.1	6.1	8.2	8.2	7.5	7.1	7.1	7.1	7.1	7.1	7.1	8.0	8.2
Observations	117	111	111	124	124	114	116	116	116	116	116	116	98	124
Panel B. Eight-year panel														
China Oil Exports	-0.002	-0.006	-0.008**	-0.005	-0.006**	0.003	0.013	-0.008	-0.007	-0.006	0.007	0.001	-0.007	0.006
	(0.003)	(0.005)	(0.004)	(0.005)	(0.003)	(0.003)	(0.008)	(0.009)	(0.007)	(0.009)	(0.011)	(0.013)	(0.011)	(0.008)
World Oil Exports	-0.004	-0.004	-0.006*	-0.004	-0.004	-0.002	-0.010	-0.011	0.008	-0.009	-0.003	0.011	-0.012*	0.002
	(0.003)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)	(0.009)	(0.009)	(0.006)	(0.009)	(0.007)	(0.009)	(0.007)	(0.007)
F-statistic	11.5	8.1	8.1	12.1	12.1	10.2	9.4	9.4	9.4	9.4	9.4	9.4	7.6	12.1
Observations	79	76	76	83	83	77	79	79	79	79	79	79	67	83

Panel A report results from a five-year panel where the dependent variable at period t+5 is regressed on variables at t. Panel B reports results from an eight-year panel where outcomes in period t+8 are regressed on variables in period t. Log Oil Exports to China is instrumented with China GDP interacted with significant existence of oil indicator. Controls include log GDP per Capita and log population. All regressions include time-specific and country-specific fixed effects. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1

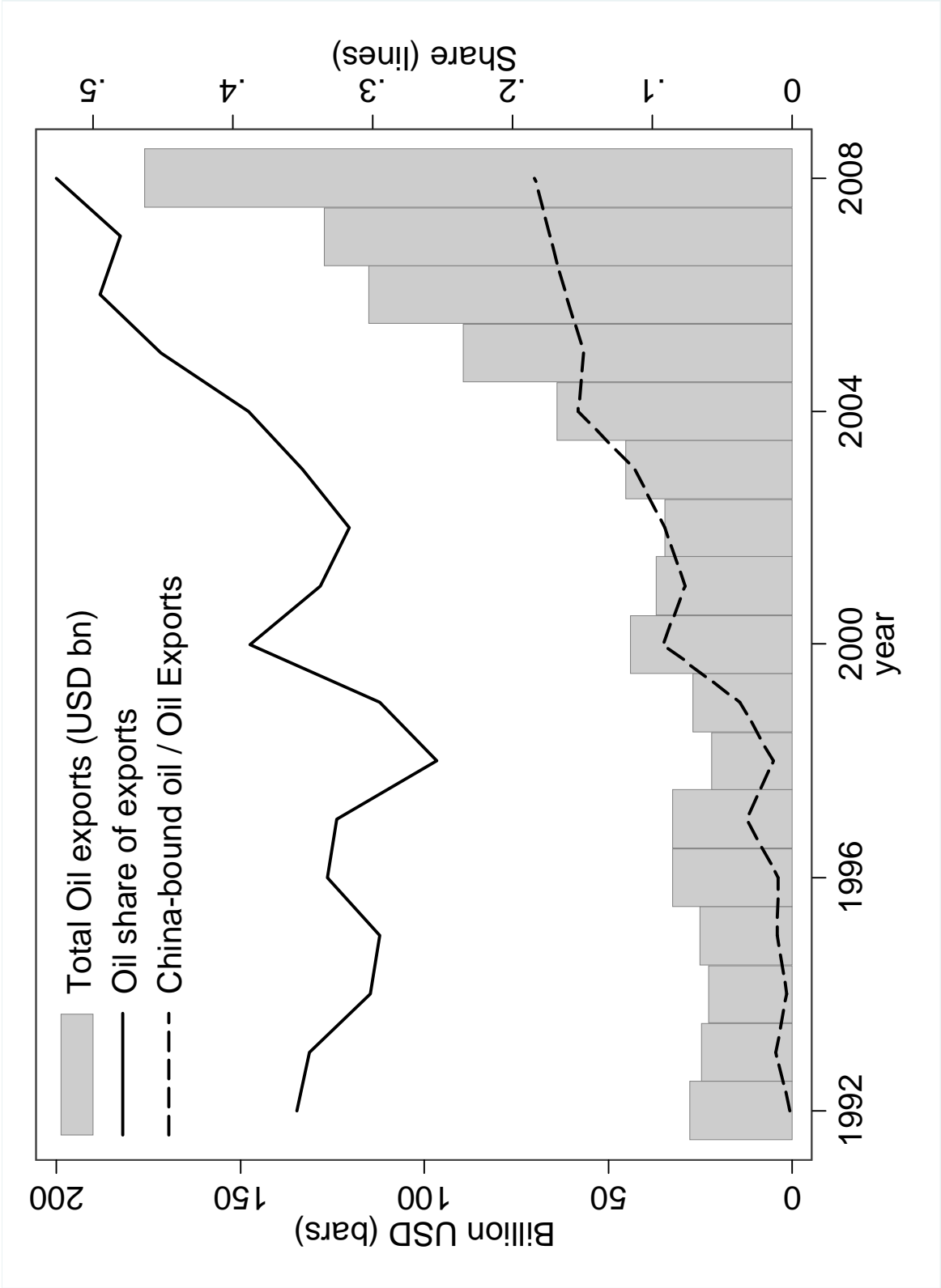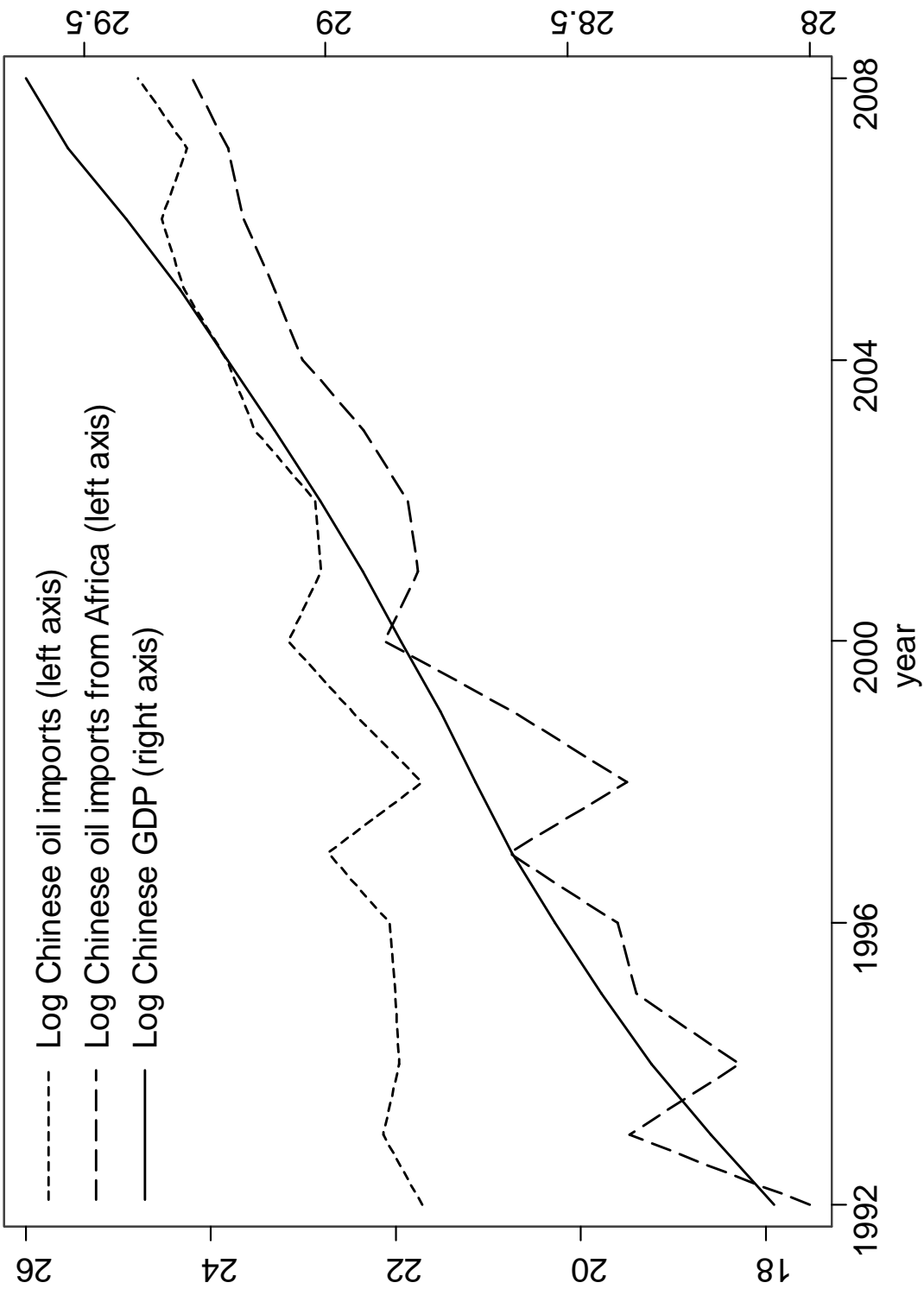Figure 4.1: Oil Export Trends for Sub-Saharan Africa

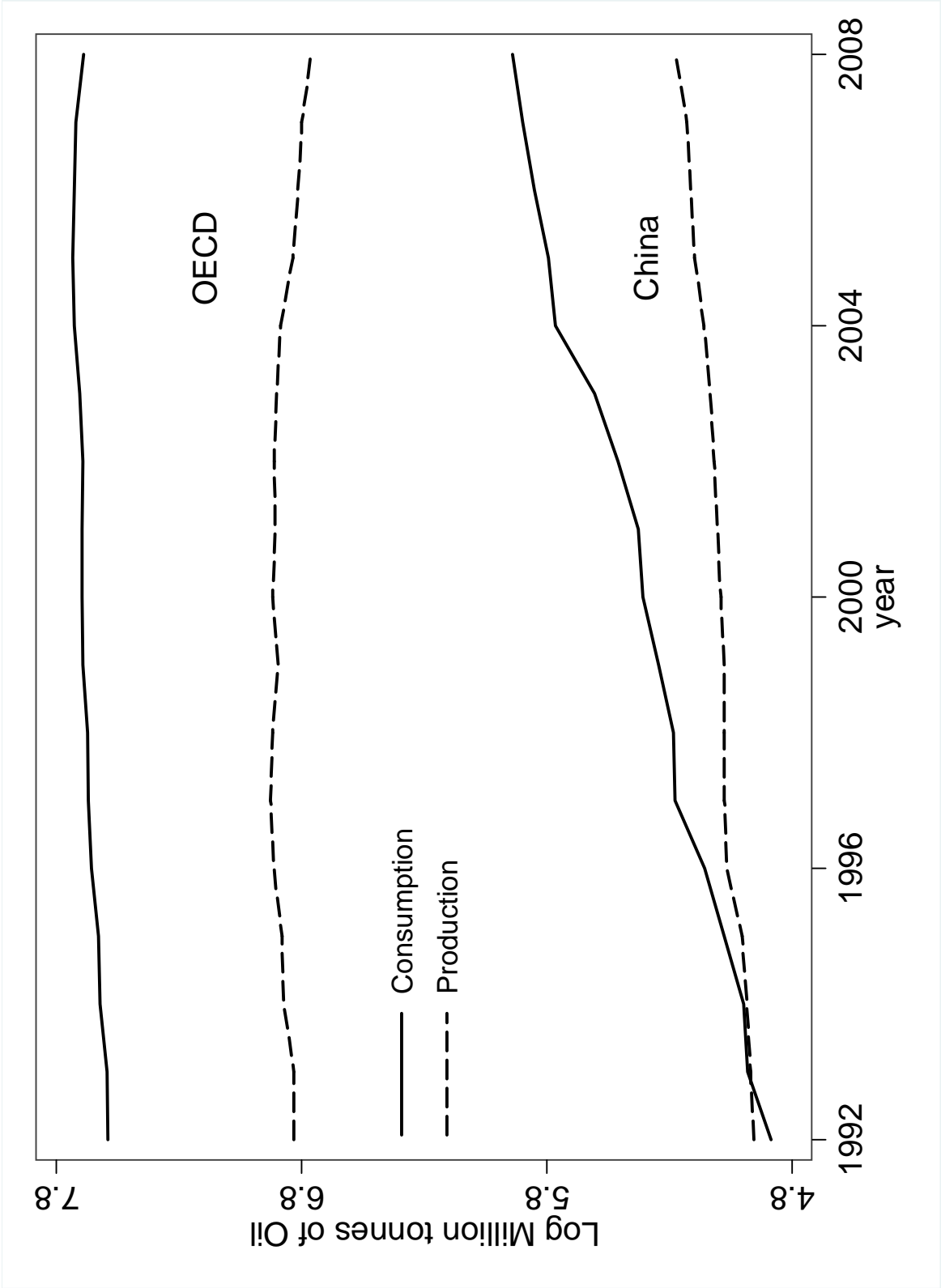Figure 4.2: **China's GDP and Oil Imports**
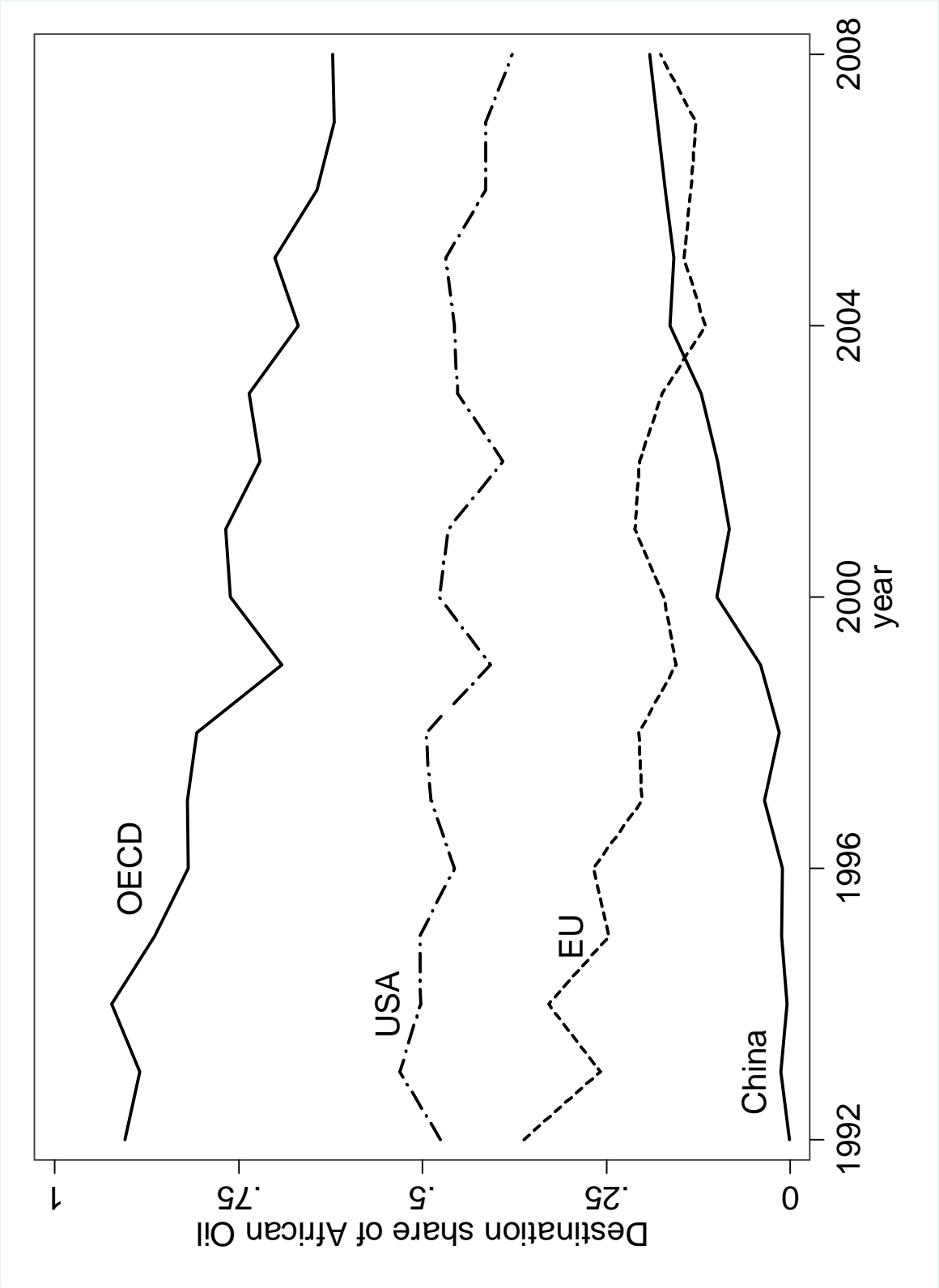
Figure 4.3: Chinese Oil Demand.
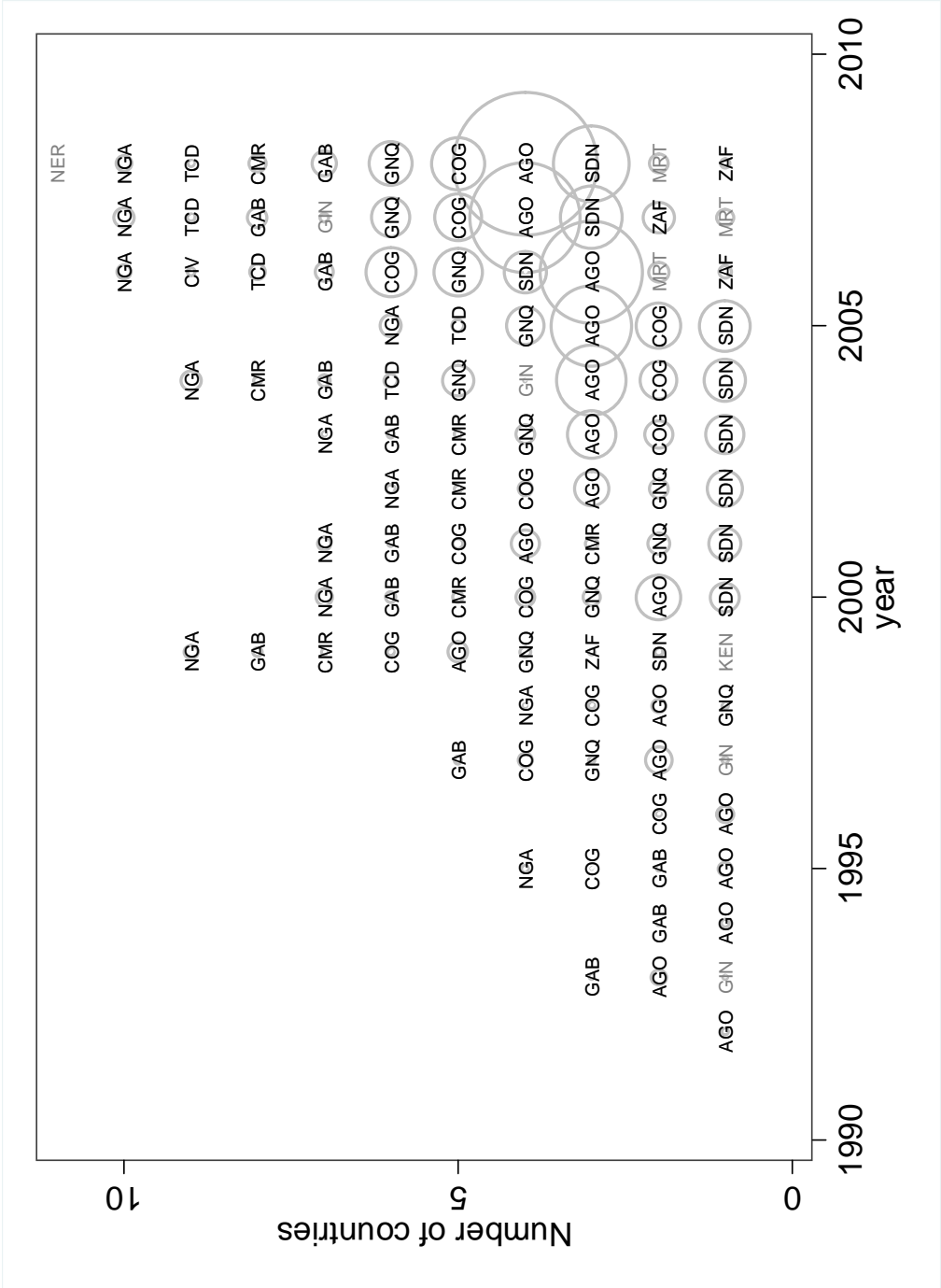
Figure 4.4: African Oil Exports by Destination.

Figure 4.5: **Which Countries Sell Oil to China?** Within each year, countries are sorted by oil share sold to China out of all country exports (highest share at bottom). Gray circles are proportional to total oil sold to China. Countries that sell oil to China but are not considered significant oil producers have country codes in gray.
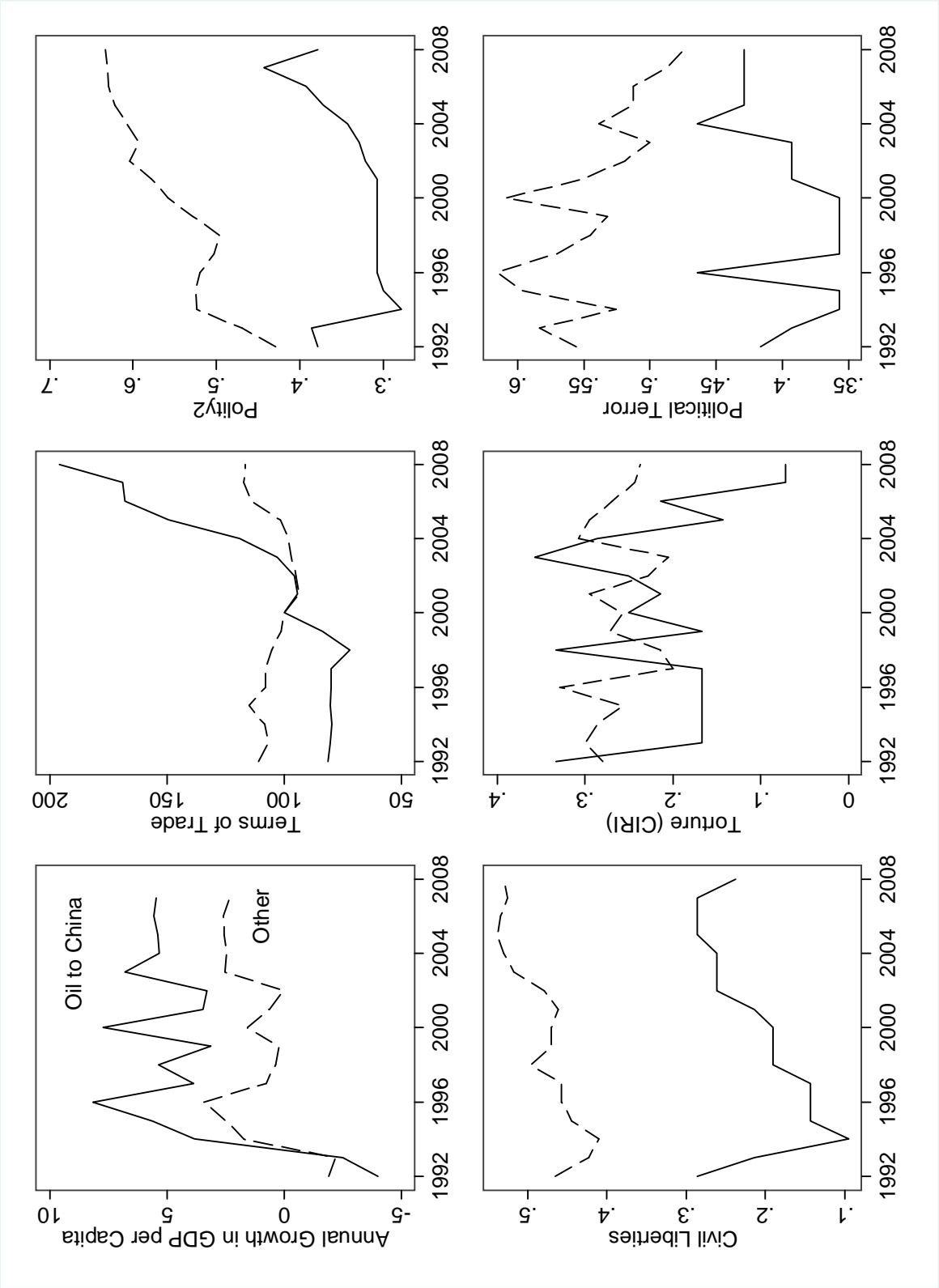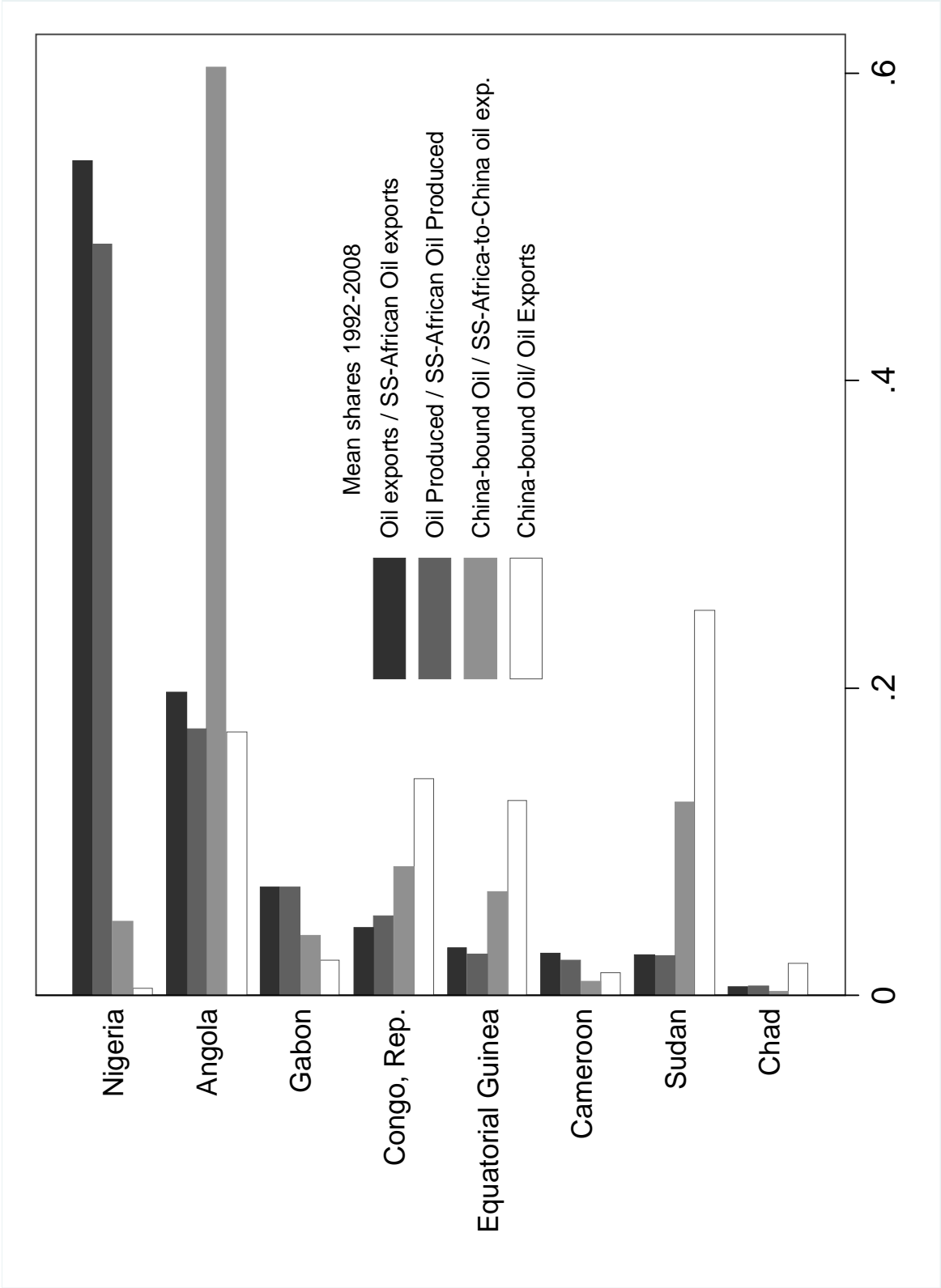
Figure 4.7: **Summary Statistics of Significant Sub-Saharan African Oil Producers.**

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