Essays on Labor and Development Economics

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Abstract

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The increase in political Islam over the past few decades has given rise to concerns that political Islam is oppressive to women. Some of these concerns stem from an existing correlation between low labor force participation and Muslim-majority countries. In the first two chapters of this dissertation, I examine the impact of Islamic regulations in Indonesia on various outcomes for women. I find that regions that pass Islamic regulations had lower female employment rates prior to passing the regulations, but there is no additional negative effect arising from these regulations. I also find that female educational attainment increases significantly in regions that pass mandatory tithing (*zakat*) regulations.

In the third chapter of this dissertation, I create a new data set to analyze the relationship between attendance of a government sponsored employment workshop and subsequent employment outcomes for veterans who are transitioning from the military to civilian life. I find that attendance of the workshop is associated with a shorter duration between separating from the military and finding employment.

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DEDICATION

To my husband, Sean, and my sons, Miles and Merrick, for their support, and to Chris Fendrich for always making me laugh.

Chapter 1

THE EFFECT OF ISLAMIC REGULATIONS ON WOMEN: EVIDENCE FROM INDONESIA

Abstract

It is commonly believed among westerners that fundamentalist Islam is oppressive towards women and limits their economic opportunities. I use Islamic regulations that were passed between 1999 and 2005 in Indonesia to test this hypothesis. These regulations fall into four different categories- veiling, Islamic knowledge, *zakat* (tithing), and social order. Veiling regulations, which convey a message of traditionalist gender roles, are correlated with lower female employment. When controlling for pre-treatment trends via synthetic control, veiling regulations do not have significant effects on employment. I also test for differences between the matrilineal region of West Sumatra and the rest of Indonesia. I find evidence of an economic downturn in West Sumatra based on decreasing employment rates for both men and women. Fertility rates also increase in West Sumatra. In most of Indonesia districts that pass Islamic regulations have lower rates of female employment prior to treatment, but this pattern does not hold for West Sumatra.

1.1 Introduction

It is commonly believed among westerners that Islamic law is oppressive towards women and limits their economic opportunities. These concerns stem in part from the existing correlation between the regions where Islam is practiced and poor outcomes for women. For example, 9 of the 10 lowest-ranking countries in the Global Gender Gap Report produced by the World Economic Forum [14] are majority Muslim. In the past few decades many countries have seen a rise in support for fundamentalist Islam[1], which has led to more research on the possible causal mechanisms linking Islam and female empowerment.

Rigorous testing for a causal relationship between fundamentalist Islam and outcomes for women is challenging due to both endogeneity concerns and the difficulty of defining and measuring fundamentalism. Political Islam on the other hand is easier to measure, and sub-national variation in political Islam in several countries has allowed for more careful analysis of the relationship between political Islam and outcomes for women. However there is still relatively little evidence on the causal relationship between women's empowerment and political Islam.

Indonesia provides a unique opportunity to look at effects of several types of Islamic regulations, some of which are specifically fundamentalist in nature. In 1998, the 31-year dictatorship of Suharto ended, and soon afterward the country underwent a large decentralization of power to the district level. Many districts began passing local regulations that were inspired by *sharia* law, known as *perda sharia*[2]. These regulations differ by content and fall into four main categories - veiling, Islamic knowledge, *zakat* (tithing), and social/moral issues such as banning alcohol or prostitution. These regulations may have an effect on employment through multiple channels including the possible effect of shifting preferences toward fundamentalist beliefs.

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[1] Throughout this work I use the definition of fundamentalist Islam from [19]. They define fundamentalism as a belief system that includes both traditionalist views on gender roles and support for implementation of Islamic law.

[2] *Perda* is short for *peraturan daerah*, meaning local regulation in Indonesian.

In this work I address the question of whether these Islamic regulations affect female employment rates by comparing Indonesian districts that have passed sharia regulations to those that have not. I use the synthetic control method to match pre-treatment trends and account for selection on observables. I also compare the matrilineal Minangkabau (Minang) culture of West Sumatra to the rest of Indonesia to look at whether any effect of Islamic regulations depends on local cultural context and women's bargaining power.

Using a linear probability model, I find a correlation between veiling regulations and lower female employment rates. However, when controlling for pretreatment trends using the synthetic control method I find no evidence that veiling regulations are causing a change in female employment. In West Sumatra there is a significant negative relationship between social regulations and female employment, but this relationship is also present for male employment. These results are therefore more consistent with a general economic downturn in some areas of West Sumatra than with a gendered effect of Islamic regulations.

I also look at the relationship between Islamic regulations and fertility rates. Using synthetic control groups I find a significant increase in fertility for districts of West Sumatra that passed social regulations but no change for the rest of Indonesia. While it is possible that this increase in fertility was caused by Islamic regulations, it may be the case that this change was driven by the decreased opportunity cost of having children due to a lower employment rate for women.

There is a growing body of research that investigates the relationship between women's empowerment and political Islam. [18] finds that women experienced better health outcomes in regions of Cairo that were under the control of a militant Islamic group. [61] finds increased educational attainment for girls in Turkish municipalities that elected an Islamic mayor. I add to this literature by estimating the effect of four types of Islamic regulations on female employment and fertility rates. To the best of my knowledge this is the first paper that attempts to measure a causal effect of political Islam on female employment rates. Given the various Islamic regulations that are implemented in Indonesia, I am able to look at effects for veiling regulations, which are explicitly fundamentalist, versus other types of

regulations that are religious in nature but consistent with non-fundamentalist beliefs. In the next section I discuss existing research on the relationship between Islam and economic outcomes, and the institutional context of *perda sharia* in Indonesia. Section 3 presents my empirical specification, including a description of the synthetic control method and data sources. Results are presented in section 4, and section 5 concludes.

1.2 Background and Perda Sharia

1.2.1 Political versus Fundamentalist Islam

[19] create a succinct and useful definition of fundamentalist Islam by analyzing responses to the World Values Survey (WVS) across the Muslim world. They find that the data are described very well by four belief systems which can be described by agreement or disagreement with two main viewpoints - a traditionalist view of gender roles[3] and the belief that religion should play a role in politics[4]. Those who agree with both of these viewpoints are classified as fundamentalist. While the fundamentalist view was the most common of the four, accounting for approximately 33% of the Muslim survey respondents in the World Values Survey, many Muslims support political Islam but do not hold traditionalist views on women (about 28%). [19] use the term "religious" for this group[5].

It is important to note that political Islam does not directly imply a rise in fundamentalist attitudes. However, given that political Islam is observable, and is clearly correlated with fundamentalist views, it has been the focus of much research that links economic outcomes with Islam.

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[3]WVS questions pertaining to this issue include whether women or men have more right to scarce jobs, whether a university education is more important for a boy than a girl, and whether women should wear the veil.

[4]WVS questions pertaining to this issue include whether political leaders should believe in God, and whether government should implement sharia law.

[5]The four categories in Blaydes and Linzer's classification are fundamentalist, religious, traditional, and secular.

1.2.2 Causes of political Islam

Since the 1970s, many Muslim-majority countries have experienced an Islamic revival for a variety of reasons. These changes have spurred interest in researching the relationship between Islam and economic outcomes. Some recent research focuses on the causes of the increase in religiosity. [17] use data from Egypt to support a model in which a combination of increasing inequality and decreasing social mobility can lead to a religious revival. They use a behavioral economics framework in which religion serves to adjust expectations away from monetary gain in situations where finding a high paying job proves to be more difficult than expected. In Indonesia, [28] finds an increase in religious intensity after the Asian financial crisis. He uses an instrumental variable approach to show that this data is consistent with a theory of religion providing ex post insurance to members. Both of these models show that deteriorating economic conditions can lead to increased religiosity. These results imply that lower employment rates may often occur in conjunction with an increase in religious intensity and therefore causality may be hard to determine. However, neither model suggests a differential effect between male and female employment.

[19] find a strong negative correlation between female employment rates and fundamentalist beliefs among women. They hypothesize that there is a causal relationship running from low female employment to higher prevalence of fundamentalist attitudes among women. The reasoning is that women will adopt fundamentalist views in the absence of economic opportunity because these views have value on the marriage market.

1.2.3 Consequences of political Islam

While the correlation between fundamentalist Islam and poor economic outcomes for women is clear, establishing causality is very difficult. For example, many Arab countries have low literacy rates and labor force participation rates for women, but there are also several Arab countries that have very high female literacy rates [71]. Sidani explains, “The prevailing cultural norms, which are sometimes of tribal, not religious, origin, have put pressures on

women's ability to involve themselves in the economic development of their societies. Sometimes the ulama's[6] strict understanding could be perceived as merely putting a religious impression on various long-standing traditions and practices".

If Islam does affect employment outcomes for women, it is only one of many factors. Broader macroeconomic trends likely play a much larger role in determining female employment rates. In her discussion of Islam and women's employment, [11] points out that employment rates for women have been rising over time in many countries that have experienced Islamic revivals, including in Iran during Ayatollah Khomeni's rule and in Pakistan under General Zia. She does find that female employment in Indonesia has decreased since the end of the Suharto regime, which coincides with an increase in political Islam. Her data is descriptive rather than causal, and Bahramitash specifically notes that it is not possible to distinguish an effect of political Islam from the effect of the Asian financial crisis.

Several recent studies have attempted to isolate the effect of Islam on women from other cultural and economic effects to the extent possible by using within-country variation in political Islam. [61] uses a regression discontinuity design to compare Turkish municipalities in which an Islamic mayor just won versus just lost an election. He finds a large increase in the proportion of women who finish high school in the areas with an Islamic mayor. One explanation offered by Meyersson is that women from conservative Muslim households may be more willing to attend school if they have the option to go to a religious school where they can wear a headscarf, rather than attending a secular state-run school in which the headscarf is banned. He also notes that the Islamist regions saw increased investment in education by private religious charities. This likely increased supply and/or improved quality of educational facilities. This increase in educational attainment is generally interpreted as a positive effect of political Islam on women in Turkey.

[40] uses the introduction of sharia law in several Nigerian states to estimate the impact on fertility. He finds that fertility rates increased significantly for Muslim women in Nigerian

[6]Ulama' are Muslim religious scholars.

states where the new laws were being heavily enforced. [40] argues that the increase in fertility rates was due to a reduction in women's intra-household bargaining power, therefore implying that an increase in political Islam had a negative effect on women in this context.

1.2.4 Introduction of perda sharia in Indonesia

During Suharto's "New Order" regime from 1966-1998, political activity by all groups had been suppressed. All Islamic political parties were forced to merge into the United Development Party or PPP (*Partai Persatuan Pembangunan*), which facilitated close supervision by the Suharto government. The government was willing to resort to extreme measures, even killing Islamic protesters on multiple occasions [48]. The fall of the Suharto government in 1998 unleashed new freedom throughout the country, and with the government no longer suppressing political activity, there was a flourishing of Islamic political parties at both the national and local level. While Islamic parties never gained a majority share of the vote at the national level, they have enjoyed more success at the regional level due to decentralization.

In 1999 the Habibie government began a period of rapid decentralization by passing Regional Autonomy Law 22/1999. This decentralization process was one of the largest and quickest transfers of government power in modern times. It has been described as a "big bang" by [47] and others. The central government handed over to each sub-provincial region[7] the authority to pass regulations on any subject except those explicitly retained at the national level - foreign affairs, national defense, national security, justice, economic policy, and religion [33]. Although religion is included in this list, many districts began passing local regulations (*peraturan daerah*) that were inspired by sharia law. These *peraturan* are known locally as *perda syariah* or *perda sharia*. Although *perda* is short for the term *peraturan daerah*, which specifically means "local regulation", the literature on *perda sharia* typically includes three types of regulation - *peraturan*, Circular Letters (*surat edaran*) and Instructions

[7]Indonesian provinces are subdivided into regencies (*kabupaten*) or municipalities (*kota*) For simplicity I refer to both *kabupaten* and *kota* as districts throughout this work.

from the Mayor (*instruksi walikota*). While Circular Letters and Instructions rank below *peraturan daerah* in the Indonesian legal hierarchy, this distinction would only be pertinent in the case where multiple regulations conflict with one another. Therefore I include all of these types of regulation in this work. The one group of *perda sharia* that are not included in this work are the *perda sharia* passed in Aceh province, known in Aceh as *qanun*. I exclude Aceh from all analysis in this work because it was granted special autonomy in 2001.

A few districts passed sharia-inspired regulations as early as 1999 with more districts adding regulations each year. The prevalence of these regulations was continuing to spread gradually as of 2013 [21]. The spatial variation can be seen in figure 1.1, which shows the number of *perda sharia* in each region as of 2007 (excluding Aceh province).

Soon after local governments began passing *perda sharia*, several women's rights NGOs in Indonesia began expressing concern that many of these regulations are discriminating against women and religious minorities. One of these NGOs, *Komnas Perempuan*, produced a report in 2006 that listed these discriminatory regulations and recommended that they undergo a judicial review [25]. However the Indonesian court system has not been responsive to attempts to question the legality of *perda sharia* [59].

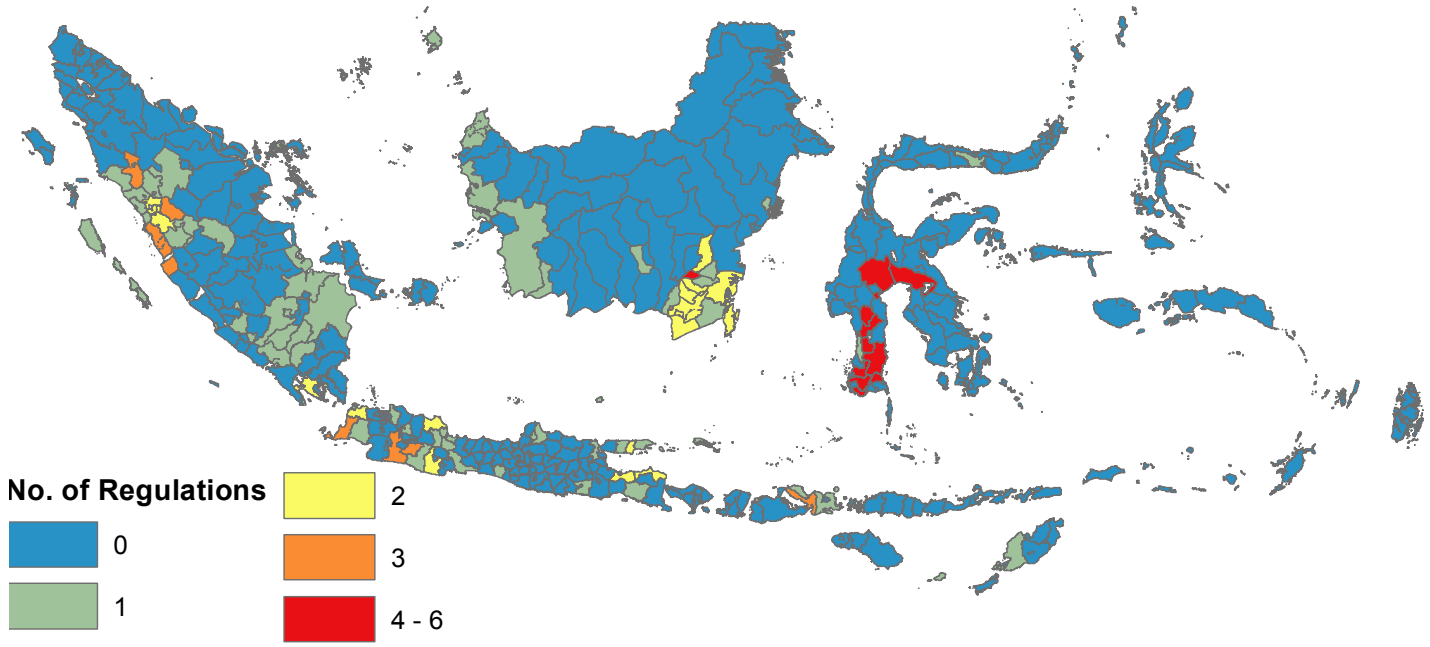

Figure 1.1 Number of *perda sharia* at district level.

The *perda sharia* cover a variety of topics. However, several major themes are common throughout almost all of the *perda*. In one of the first studies of *perda sharia*, [24] groups the regulations into three categories - Muslim clothing, Islamic knowledge and obligations, and social order. In Bush's taxonomy, regulations pertaining to tithing (*zakat*) are included in the Islamic knowledge and obligations category. In this work I consider *zakat* regulations as a separate category, given that the financial obligations create a potential income effect that is not present with the other *perda*. [22] also provides evidence that the local government uses the new revenue stream from *zakat* regulations for favor brokering and machine politics, based on a case study of several regions of South Sulawesi that have implemented *zakat* regulations. Therefore, for this work I use the following four categories for the *perda sharia*:

- Veiling - regulations regarding Muslim dress. They generally require both men and women to adhere to an Islamic dress code, but are seen as being more onerous for women since women must wear a veil.

- Islamic knowledge - regulations requiring memorization of quotes from the Qur'an. This requirement may be instated for school children, government workers, and/or couples who are applying for a marriage license.

- *Zakat* - regulations pertaining to *Zakat*, or tithing, which is one of the five pillars of Islam. These regulations make *zakat* mandatory and in some cases the money is deducted directly from the pay of government workers.

- Social order - regulations banning prostitution, alcohol, drugs, and/or gambling. While these regulations concern morality in a broader sense, they are motivated via Islam and therefore are generally included in the literature on *perda sharia*.

The different categories of *perda sharia* have varying levels of fundamentalist overtones. The *perda* pertaining to veiling are representative of fundamentalist views as defined by

[19]. The *perda* pertaining to Islamic knowledge and *zakat* are consistent with both religious and fundamentalist views.The social/morality laws are generally considered to be only marginally related to Islam since they pertain to public health issues. Prostitution, for example, is banned in many non-Muslim-majority countries. However, banning prostitution is also consistent with a belief system that seeks to implement Islamic law and control the behavior of women.

Whether or not these regulations are enforced heavily, or at all, they provide information about the priorities and beliefs of the government. [56] has shown that preferences can change quickly in light of new information. In Kuran's model, individuals can receive rewards or punishments for their public preferences (due to conformity preference and/or sanctions for deviation) and incur a psychic cost of compromising their integrity if their private preferences do not match their public preferences, and they maximize accordingly. [16] presents a similar model in which individuals have imperfect information about the value of adopting or rejecting some behavior. These agents make the decision to adopt or reject the behavior sequentially, and incorporate the decisions of previous agents into their decision. This sets up what Bikhchandani et. al. call an "informational cascade", which can cause fashions or trends to change quickly.The signal sent by these *perda* provides an opportunity to look for a causal relationship between fundamentalist Islam and female employment rates.

In addition to the *perda sharia* indirectly affecting women's lives through a possible shift in preferences, each type of regulation also has direct effects on people's lives. The veiling regulations are of particular interest with regard to outcomes for women, since these regulations affect women more than men. The veil is also easily observable and therefore veiling regulations may be more easily enforced than the other regulations. Anecdotal evidence suggest that enforcement of veiling regulations is sporadic. A 2008 news article reported that schoolgirls (including non-Muslims) in Padang were being sent home for not wearing the veil [44]. However, during field work in Cianjur, [68] found that enforcement of *perda sharia* appeared to have decreased significantly within a few years of the regulations being enacted. Despite a lack of official sanctions, Rif'ah found that peer pressure from the community

serves to effectively punish those women who do not comply with veiling regulations.

Veiling and other religious norms have received attention from theoretical economists given that such observable signals restrict choice for the individual and are therefore costly. To explain why self-sacrificial behavior may be optimal, religion has been modeled as a club good since [49]. Carvalho specifically analyzes veiling in light of what he calls the"new veiling movement" which began in the 1970s [27]. Starting with Egyptian feminist Huda Shaarawi removing her veil in the 1920s, the trend in most Muslim countries had been decreasing usage of the veil, culminating in the late 1960s when very few women wore the veil in most countries. For example, [72] reports that in the 1970s less than 3% of female Indonesian students wore the veil. However, beginning in the 1970s, veiling became much more prevalent among young, well-educated women in several countries including Egypt, Turkey, and Indonesia.

Carvalho presents the increase in veiling as a puzzle, given that the deveiling movement was led by feminists and re-veiling seems to mark a return to a less progressive time for women. He addresses the puzzle by creating a model in which the veil acts as a commitment device against engaging in a religiously prohibited activity (e.g. drinking alcohol). In Carvahlo's model, agents care about what other members of their community think of them, and religious community members will judge them more harshly for engaging in a prohibited activity if they are wearing the veil. Therefore, as the proportion of religious community members increases, even some secular women (who may receive a positive intrinsic payoff from engaging in the prohibited activity) will decide to veil to avoid the negative societal payoff from such activities.

Carvalho's model provides an explanation for why women were simultaneously becoming more empowered by entering the workforce in large numbers and choosing to re-veil. Entering the labor force meant that women were exposed to more opportunities to engage in prohibited activities, but they responded to this temptation by signaling their religious commitment with the veil. The model implies that compulsory veiling will be suboptimal for some secular women who would gain a higher utility by choosing not to veil. Compulsory veiling would

also decrease the amount of information provided by veiling, and therefore lower its power to act as a public signal of virtue. While this effect would likely be small, it could decrease the number of women who choose to work outside the home.

The impact of Islamic knowledge regulations depends on who is targeted by the regulation, but these regulations seem unlikely to have any immediate economic effects. In the case of *perda* pertaining to school children, these regulations do require that some instructional time is spent on learning Quranic verses. The additional instruction takes place either in the public school system or in religious schools called *madrasah diniyah*. The *madrasah diniyah* are funded through a combination of donations and local government spending [23] and therefore do not place a financial burden on poor families. While it could be the case that this instruction improves the children's' education (perhaps by teaching them more Arabic and/or through increased donations to the *madrasah diniyah*), harms their education by taking time away from other subjects, and/or primes them to become more religious as adults, any of these effects would be occurring over the long run and would be difficult to measure.

The subset of regulations that require knowledge of Quranic verses to receive a marriage license may have a direct financial impact on poor households. [68] found that couples in Bulukumba had to pay additional fees to marry if they were unable to read passages from the Quran. This small one-time fee would be unlikely to result in a measurable income effect. However, [68] hypothesizes that the burden of memorizing Quranic verses (in particular for secular types) could nudge some couples toward a *nikah siri*, or undocumented marriage. An increase in *nikah siri* could have negative long-term effects, since under a *nikah siri*, the marriage is not legally recognized and the couple is not able to obtain birth certificates for their children [68].

The regulations with the most obvious financial effect are the *zakat*, or tithing, regulations. In some districts, the *zakat* payments are mandatory, and are deducted automatically from the paychecks of civil servants. The reduced income from automatically deduced *zakat* payments could induce both men and women to increase their labor supply. However the

zakat payments are small and are only easily enforced for government employees, who make up a small fraction of the population.[8] In addition to this direct economic effect, another potential impact of *zakat* regulations is an increased opportunity for government corruption at the local level [22]. The *zakat* payments provide additional revenue for the government with little accountability for how it is spent. While corruption may hamper economic growth in the long-run, there is no reason to suspect that it would have a differential effect on female employment.

The social order regulations are the most commonly implemented but also the most diverse as far as the content of the regulations. Some are vague and prohibit "social vices", while others specifically ban some combination of begging, alcohol, drugs, gambling, and prostitution. In some cases, the government can use these regulations to raise revenue. Begging or gambling may be allowed conditional on obtaining a permit [33], or Islamic groups can be given implicit permission to extort money from businesses that violate the regulations [65].

Anti-prostitution regulations could theoretically have several effects. A decrease in prostitution could result in a decrease in STDs and unwanted pregnancies. An effective ban may also cause a decrease in female employment, although it is unclear whether this effect would be visible in an employment survey. Realistically, it is likely that a ban, if enforced, would merely cause prostitutes to shift locations. One unintended consequence of these regulations has been an increased potential for police to falsely arrest for women who are suspected of being prostitutes. After a 2006 incident in which about 20 women were arrested on suspicion of being prostitutes with no evidence, some women have reported that they now feel the need to be off the street by dusk [64]. Given the vague wording of the regulations and expansive power of local police, women have very little recourse in such a case. Although there is no evidence that these types of arrests are happening often, any probability of being arrested

[8]It should be noted that Indonesia has a very small tax base and does not appear to have a strong ability to enforce income tax collection. Only 10% of Indonesians are registered taxpayers, and less than 1 million of 255 million Indonesian citizens paid their taxes in full in 2014.[73]

in a system with weak legal protection has the potential to affect the behavior of risk-averse individuals.

1.3 Empirical Approach

1.3.1 Data Sources

Data on male and female employment are from the *Survei Angkatan Kerja Nasional* (SAKERNAS) survey which is conducted annually by Indonesia's Statistics Bureau, *Badan Pusat Statistik*. These data cover the years 1990-2007. Regressors used from SAKERNAS include employment status (binary yes or no), urban versus rural classification, household size, highest level of education earned, and age of respondent. The SAKERNAS survey is a repeated cross-section. SAKERNAS data are collected at the district (*kabupaten/kota*) level. One issue that arises when creating a time series with SAKERNAS data is that many *kabupaten* have split since decentralization, creating new *kabupaten*. I therefore use the 1993 *kabupaten* definitions to create a consistent panel. While this adds noise to my data, this measurement error serves to bias the coefficient estimates downward and increase variance, making it less likely to find a statistically significant effect.

Fertility data come from the 2007 wave of the Demographics and Health Surveys (DHS). I use birth histories to construct a panel dataset that also spans 1990-2007. Time series data on variables such as household size, education, etc., cannot be generated from the DHS data since demographic questions are only answered for 2007.

As an approximate measure of initial religiosity, I use vote share for Muslim parties from the first post-Suharto election in 1999. Data on the vote share for Muslim parties is available at the district level in the replication data from [75].

There is not a single comprehensive data source with the locations, dates, and types of *perda sharia* that have been passed in Indoneisa. Although each district is theoretically required to report any new *perda* to the central government, this rule is not enforced in practice. Therefore most counts of *perda sharia* are likely to be underestimates. [25] wrote

one of the earliest papers on *perda sharia*, and she had compiled a list of 49 regulations as of 2006. Later papers such as [24] and [33] count higher numbers of *perda sharia* but do not make their lists publicly available. Recently, [21] published a very extensive list of 443 *perda* that were passed between 1998 and 2013. This list includes the district and year of each regulation, but does not specify the subject matter. I therefore use this list as a master list and attempt to determine the contents of as many of these regulations as possible from other sources.

I consider the treatment to be binary and to persist into the future. Therefore, in cases where a district passes more than one of the same type of regulation (e.g. veiling), I ignore all but the first regulation. Of 139 regulations passed between 1998 and 2006 I am able to find the contents of 98. I categorize the remaining 41 regulations as being of "unknown" type and remove them from analysis. Tables A.13 and A.12 list each regulation and the source from which I determined the type of regulation.

1.3.2 Summary Statistics

Table 1.1 compares summary statistics for the regions with known treatment types versus regions with unknown treatment types. While most observables are similar across these two groups, the urbanicity is much higher in the "missing" regions. It is important to take into consideration that the treated regions used in this work are more rural than the average treated regions and are therefore not representative of all regions that passed *perda sharia* during this time.

Table 1.2 shows that areas that have passed *perda sharia* had lower rates female employment prior to treatment. Female employment rates range from 40.8% to 44.6% in treated regions, versus 51.8% in untreated regions. Male employment on the other hand is almost indistinguishable between various regions, ranging from 80.1% to 80.9% in treated regions, and 81.4% in untreated regions. Other major differences between treated and untreated regions include the level of urbanicity, which is much higher in untreated regions (i.e. treated regions are much more likely to be rural), and the vote share for Muslim parties, which is

Table 1.1 Comparison of districts that passed *perda sharia* of known vs. unknown type.

	Known	Unknown
Female Employment Rate	46.9%	44.2%
Male Employment Rate	81.6%	80.7%
Female Education	1.929	1.998
Male Education	2.134	2.237
Household Size	4.767	4.874
Percent Urban	34.9%	42.3%
Muslim Party Vote Share in 2000	17.4%	16.4%

Notes: Averages over 1990-1998 with 1991 and 1993 excluded for data quality issues. Education is measured as the average level attained. 1 = less than primary, 2 = primary, 3 = junior high, 4 = high school, 5 = higher.

much higher in treated regions.

The pre-existing difference in female employment rates in regions that pass *perda sharia* versus those that remain untreated is striking. It is illustrative to look at whether these patterns hold for West Sumatra, but comparing treated to untreated regions is problematic give that the entire province of West Sumatra passes a social regulation in 2001. Table 1.3 looks at the other three types of regulation - veiling, Islamic knowledge, and *zakat* - and compares regions that passed these types of regulations to those that did not. Interestingly, female employment rates are actually slightly higher in the treated regions of West Sumatra versus the untreated regions.

Table 1.2 Summary statistics by type of treatment.

	Veil	Islam	Zakat	Social	None
Female Employment Rate	43.0%	41.8%	40.8%	44.6%	51.8%
Male Employment Rate	80.8%	80.1%	80.3%	80.9%	81.4%
Female Education	1.931	1.989	1.953	1.949	2.025
Male Education	2.118	2.169	2.166	2.153	2.285
Household Size	4.787	4.846	4.827	4.824	4.765
Percent Urban	31.4%	35.0%	35.6%	37.1%	44.9%
Muslim Party Vote Share in 1999	19.8%	17.4%	19.5%	16.9%	12.2%
Fertility Rate	11.1%	11.0%	11.3%	10.6%	10.3%

Notes: Data is averaged over 1990-1998 with 1991 and 1993 excluded for data quality issues. Education is measured as the average level attained. 1 = less than primary, 2 = primary, 3 = junior high, 4 = high school, 5 = higher.

1.3.3 Event Study

Given that [68] finds an initial spike in enforcement that decreases over time, I use an event study to allow for the possibility that the treatment effect of *perda sharia* varies over time. For each type of treatment I construct the event-time k, such that the treatment occurs at year $k = 0$, and estimate the following regression:

$$y_{jk} = \sum_{k=-5}^{k=5} \beta^k T_k + \theta Z_{jk} + \alpha_j + \varepsilon_{jk} \tag{1.1}$$

Results from the veiling event study are shown in figure 1.2. The event study shows a downward trend prior to treatment. The post-treatment trend continues downward without any obvious break at the time of treatment. The pre-treatment trend indicates that the parallel trends assumption needed for a panel difference-in-difference is not met for this data and motivates the use of synthetic control. Event studies for the other treatment types find

Table 1.3 Pre-treatment Employment Rates - West Sumatra versus Other

West Sumatra

	Female		Male	
	Untreated	Treated	Untreated	Treated
Veil	48.7%	50.1%	77.0%	79.2%
Islam	49.0%	50.2%	78.7%	78.1%
Zakat	48.3%	52.3%	77.3%	80.6%

Rest of Indonesia

	Female		Male	
	Untreated	Treated	Untreated	Treated
Veil	50.1%	41.5%	81.4%	81.1%
Islam	50.2%	40.6%	81.5%	80.4%
Zakat	50.7%	39.9%	81.6%	80.2%

Notes: Data is averaged over 1990-1998 with 1991 and 1993 excluded for data quality issues.

similar patterns and are shown in figures A1, A2, and A3.

1.3.4 Panel Fixed Effects Model

To look at the effect of the treatment on various outcomes, I estimate four regression models. All variables are aggregated to the district level. First, I consider all *perda sharia* to be a homogeneous treatment, denoted *sharia* in equation 1.2. $Sharia_{jt}$ is a treatment dummy that equals 1 for all regions that passed at least one *perda* in years after the *perda* was enacted, and 0 otherwise.

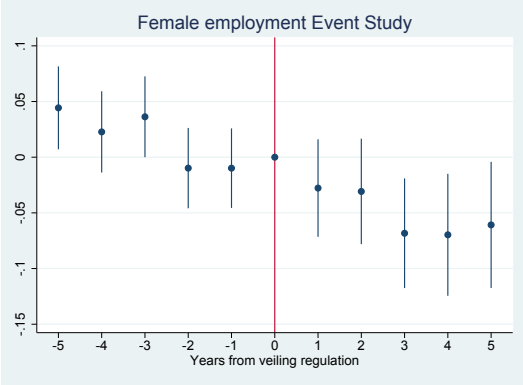

Figure 1.2 Year coefficients in regions that pass veiling regulations. Dependent variable is female employment rate.

- The event study coefficients show a decreasing trend in female employment prior to treatment.

$$y_{jt} = \alpha_j + \delta_t + \theta X_j + \beta_P sharia_{jt} + \varepsilon_{jt} \tag{1.2}$$

The outcome y_{jt} is male or female employment in district j in year t. X_{jt} is a set of observed covariates that assumed to be unaffected by the treatment, and δ_t are time fixed-effects. For male and female employment regressions, α_j are district fixed-effects.

In equation 1.3 I split the treatment into the four previously described categories, denoted *veil*, *islam*, *zakat*, and *social*.

$$y_{jt} = \alpha_j + \delta_t + \theta X_j + \beta_V veil_{jt} + \beta_I Islam_{jt} + \beta_Z zakat_{jt} + \beta_S social_{jt} + \varepsilon_{jt} \tag{1.3}$$

Specifications 1.4 and 1.5 are analogous to 1.2 and 1.3 but include an interaction dummy variable (WS) that is equal to 1 if the province is West Sumatra and 0 otherwise.

$$\begin{aligned} y_{jt} =& \alpha_j + \delta_t + \theta X_j + \beta_P sharia_{jt} \\ &+ \beta_M WS + \beta_{MP} WS \times sharia_{jt} + \varepsilon_{jt} \end{aligned} \tag{1.4}$$

$$\begin{aligned} y_{jt} =& \alpha_j + \delta_t + \theta X_j + \beta_V Veil_{jt} + \beta_I Islam_{jt} + \beta_Z Zakat_{jt} + \beta_S Social_{jt} \\ &+ \beta_M WS + \beta_{MV} WS \times Veil_{jt} + \beta_{MI} WS \times Islam_{jt} \\ &+ \beta_{MZ} WS \times Zakat_{jt} + + \beta_{MS} WS \times social_{jt} \varepsilon_{jt} \end{aligned} \tag{1.5}$$

The panel difference framework gives an indication of whether the treated regions experience outcomes that differ from the rest of the country post-treatment. However, the event study results indicate that the untreated regions of Indonesia do not provide an accurate counterfactual for outcomes in the absence of *perda*, I use the synthetic control method [3] which provides a data-driven approach to choosing an optimal comparison group.

1.3.5 Synthetic Control

The synthetic control method was introduced in [4] and refined in [3]. Synthetic control addresses a longstanding issue of how to best select a region(s) to construct a counterfactual for program evaluation. As the name suggests, synthetic control creates a "synthetic" control group that consists of a weighted average of untreated units. The weights are chosen to minimize the distance between a set of relevant variables in the treated and control units during the pre-treatment period. This model can also be considered a generalization of the difference-in-differences model.

The synthetic control method was originally designed to analyze a single case study event, such as the CA state tobacco tax [3]. It has been extended to multiple treatment events by [36] and more recently by [67]. In this work I follow the methodology proposed in [36]. It should be noted that there has been some debate about whether the synthetic control method as traditionally used is appropriate for studies of multiple treatment events [e.g. 62]. All regions used to create the synthetic control group must be unaffected by the

treatment and therefore regions that have undergone treatment during the relevant panel are excluded. Given that [36] are analyzing minimum wage at the state level, and most states have changed their minimum wage in recent years, the concern is that there are not enough "uncontaminated" donor (non-treated) regions from which to construct a synthetic control group. Fortunately, the number of regions in Indonesia is large and my dataset includes 280 regions thare are never treated during my panel, while only 89 regions are treated. Therefore this dataset is well suited for the use of synthetic control despite the large number of treatment events.

The single treatment event model of synthetic control developed by [4] is as follows. Let the outcome Y_{it} for region i at time t be the sum of the counterfactual outcome Y_{it}^N and a treatment effect α_{it}, where D_{it} is a treatment indicator.

$$Y_{it} = Y_{it}^N + \alpha_{it} D_{it} \tag{1.6}$$

.

Without loss of generality, assume the treatment takes place in region 1 after time T_0. Suppose the counterfactual Y_{it}^N is described by a factor model

$$Y_{it}^N = \delta_t + \boldsymbol{\theta_t} \boldsymbol{Z_i} + \lambda_t \mu_i + \varepsilon_{it} \tag{1.7}$$

.

where δ_t is an unobserved common factor with constant factor loadings across units, $\mathbf{Z_i}$ is a vector of exogenous observed covariates with parameters $\boldsymbol{\theta_t}$, and $\boldsymbol{\lambda_t}$ is a vector of unobserved common factors with factor loadings $\boldsymbol{\mu_i}$. If $\boldsymbol{\lambda_t}$ is constant, equation 1.7 becomes a standard difference-in-difference model.

The synthetic control group is a weighted average of J groups with weights $W = (w_2, ..., w_{J+1})'$, such that all weights are non-negative and sum to 1. The synthetic outcome is then given by

$$\sum_{j=2}^{J+1} w_j Y_{jt} = \delta_t + \boldsymbol{\theta_t} \sum_{j=2}^{J+1} w_j \boldsymbol{Z_j} + \lambda_t \sum_{j=2}^{J+1} w_j \mu_j + \sum_{j=2}^{J+1} w_j \varepsilon_{it} \tag{1.8}$$

and the estimated treatment effect is

$$\hat{\alpha_{1t}} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \tag{1.9}$$

[3] show that if there are weights $(w_2^*, ..., w_{J+1}^*)$ such that

$$\sum_{j=2}^{J+1} w_j^* Y_{j1} = Y_{11} \qquad \sum_{j=2}^{J+1} w_j^* Y_{j2} = Y_{22}$$

$$\sum_{j=2}^{J+1} w_j^* Y_{jT_0} = Y_{1T_0} \qquad \sum_{j=2}^{J+1} w_j^* \boldsymbol{Z_j} = \boldsymbol{Z_1} \tag{1.10}$$

(i.e. the weighted sum of untreated units exactly matches all of the pre-treatment outcomes and the other observed covariates of the treated group), then the difference between the unobserved counterfactual and the synthetic counterfactual goes to zero as the number of preintervention periods increases. Since there may not be a set of weights such that equation 1.10 holds exactly, the goal is to minimize the distance between observed variables $(Y_{11}, ..., Y_{1T_0}, \boldsymbol{Z_1'})$ and their synthetic counterparts. While any distance metric could be used, the RMSPE (root mean squared prediction error) is generally used, following [3].

To measure the statistical significance of each estimated treatment effect, I use the placebo test method which was introduced in [3] and formalized in [36]. The placebo test is a resampling method of estimating the precision of a statistic, in the same genre as bootstrapping or permutation tests. To perform a placebo test, the synthetic control method is applied to many donor (untreated) regions and a placebo treatment effect is calculated. A CDF $\hat{F}_e$ can be estimated from these placebo effects, and the measured effect on the treated region can be placed within this distribution using the percentile rank statistic:

$$p_{e1} = \hat{F}_e(\alpha_{e1}) \tag{1.11}$$

.

The percentile rank is approximately uniformly distributed over the unit interval, so for example I can reject the null of α_{e1} at a 5 percent significance level if $p_{e1} < 0.025$ or $p_{e1} > 0.975$.

To extend the synthetic control model to multiple treatment events, [36] create a test statistic $\bar{p}$ which is the mean of the percentile ranks from E treatment events.

$$\bar{p} = \frac{\sum_{e=1}^{E} p_e}{E} \tag{1.12}$$

The statistic $\bar{p}$ is the sum of E independent uniform variables which follows the Irwin-Hall distribution. Extrema for the Irwin-Hall distribution are found in table A.1 in the appendix.

1.3.6 Model Selection

Synthetic control provides a method to optimally construct a control group that matches a given set of pre-treatment variables. However the selection of variables to match on is still done by the researcher. There is a trade-off between matching the pre-treatment trends very closely and over-fitting so that the post-treatment estimates becomes less reliable. I therefore use the cross-validation approach described in [36] to select a model. Given an assumption that donor regions are unaffected, I can pick a placebo region and construct a synthetic control group using an arbitrary treatment date. There should then be almost no difference between the "treatment" and control group in the post-treatment period.

I perform this cross-validation by randomly selecting 50 donor regions out of the set of regions that are in the balanced panel and are not exposed to any of the treatment types. Using female employment as the outcome I test seven different model specifications and measure their performance on these donor regions using post-treatment mean-squared prediction error (MSPE). The MSPE for each donor region is calculated as follows

$$MSPE_{ej} = \frac{1}{T_e} \sum_{t=2001}^{2007} (Y_{jt} - \sum_{q} w^*_{eq} Y_{qt})^2 \tag{1.13}$$

I construct the average RMSPE (root mean squared prediction error), defined as the average of the square root of 1.13 across the 50 regions used for cross-validation, to allow for a direct comparison between post-treatment prediction and pre-treatment fit, which is also measured as RMSPE. Table A.2 shows the pre-treatment and post-treatment RMSPE values for each of eight different models. The models are all tested using 2001 as the treatment year.

Including the female employment rate for every pre-treatment year results in the best pre-treatment fit (Results of cross-validation can be found in table A.2 in the appendix). However it does not give the best post-treatment fit, most likely due to overfitting. The best fit comes from including pre-treatment values of all covariates (female employment, male employment, urban rate, average education level, average household size, average female age, and average male age) for every other year. Interestingly, including Muslim vote share in 1999 does improve model accuracy when fewer lagged covariates are used (columns 3 and 4 of table A.2) but does not improve the model when the full set of lagged covariates is used.

For fertility I test six model specifications, show in table A.3. Unlike with employment, including fertility rates for every pre-treatment year does not result in over-fitting,and adding a moving average does not improve the model. The best-performing model includes fertility rates for every pre-treatment year, age from every other pre-treatment year, and averages of other covariates (household size, education level, and urban rate), so I use this model for analysis of fertility rates.

Figure 1.3 shows two models tested on a placebo district. The model on the left includes female employment for every pre-treatment year, and has a very close pre-treatment fit. The model on the right includes female employment from every other year and hence has a worse pre-treatment fit. However it does a better job predicting the post-treatment data, indicating that the model on the left may be overfit.

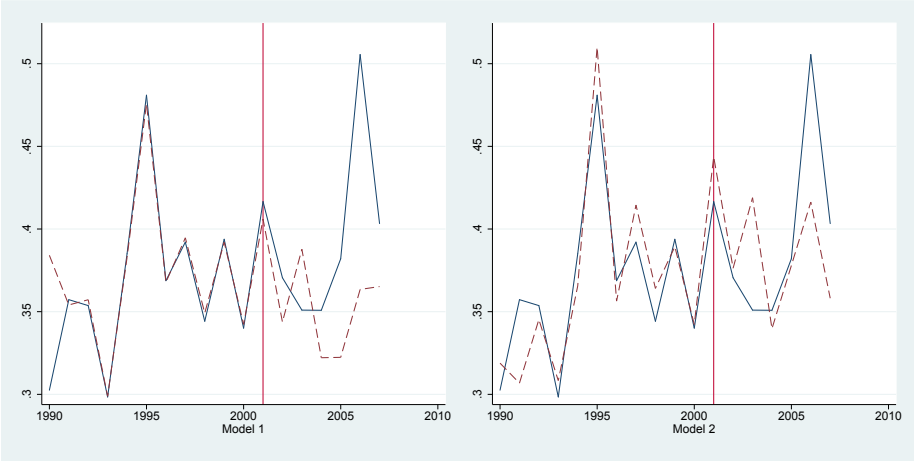

Figure 1.3 Model selection - Dashed line is synthetic district and solid line is placebo district (Jakarta Utara). The model on the right trades off pre-treatment fit for a better post-treatment fit.

1.4 Results

Tables 1.4 and 1.5 show the results of a linear probability model for both female and male employment, respectively. In column 1 of table 1.4, all *perda sharia* are considered a homogeneous treatment. Column 1 shows that *perda sharia* taken as a whole are associated with a negative and marginally significant effect on female employment. Splitting the *perda* into four categories, as shown in column 2, it appears that the entire negative effect of the *perda* is driven by the veiling regulations.

Columns 3 and 4 of table 1.4 shows the results when an interaction term between West Sumatra and *perda sharia* is added. This specification allows for the possibility that the effects of *perda sharia* are different for the population of West Sumatra, which is majority Minangkabau. Column 3 shows that the interaction between *perda sharia* and West Sumatra is negative and highly significant, while outside of West Sumatra the relationship between female employment and *perda sharia* is no longer significant. While columns 2 and 3 imply that the largest correlation between female employment and *perda sharia* should be among veiling regulations in West Sumatra, none of the coefficients in the fully specified model

(column 4) are significant. This may be due to a lack of power given that there are eight possible treatment effects in this specification.

Table 1.5 shows the same model specifications as table 1.4 but for male employment rates. Unlike table 1.4, columns 2 and 3 in table 1.5 do not show any negative correlations between *perda sharia* and male employment. The full specification in column 4 shows a positive employment effect from Islam regulations but a negative effect for the interaction between Islamic regulations and West Sumatra. Given that there is no known theoretical mechanism by which these Islamic regulations would increase employment, it is likely that these relationships are spurious and highlight the importance of controlling for pretreatment trends.

Table 1.6 shows the output of the synthetic control model for female employment.[9] The negative effect of veiling regulations becomes statistically insignificant when controlling for pre-treatment trends. Out of the the four specifications, the only effect that is significant at the 5% level is the interaction between social regulations and West Sumatra.

The results for male employment, shown in table 1.7 indeed shows a similar pattern with the interaction between social regulations and West Sumatra also having a negative and significant effect. None of the other coefficients were statistically significant. While the effect size for female employment is approximately three times larger (more negative) than the effect size for male employment, these results provide very limited evidence that *perda sharia* are adversely affecting female employment rates. The fact that both male and female employment rates are decreasing indicates that West Sumatra was experiencing an economic downturn, which may have affected women disproportionately for a variety of reasons. More importantly, the negative employment effects in West Sumatra appear to be driven mainly by a few districts, as can be seen in figures A4 and A5.

Two important considerations when interpreting these results are the lack of treatment variation within West Sumatra and the potential for interaction effects between treatment

[9]Synthetic control results at the district level can be found in tables A.4 through A.11 in the appendix.

Table 1.4 Female Employment. Results from panel fixed effects model.

	(1)	(2)	(3)	(4)
sharia	-0.0127*		-0.00428	
	(0.00754)		(0.00716)	
shariaWS			-0.0398**	
veil		-0.0320***		-0.0217*
		(0.0117)		(0.0131)
islam		0.00823		0.00884
		(0.0156)		(0.0183)
zakat		0.00341		0.00808
		(0.0120)		(0.0112)
social		-0.00694		0.00198
		(0.00833)		(0.00858)
WS			-0.240***	-0.243***
			(0.0143)	(0.0142)
veil X WS				-0.0217
				(0.0223)
zakat X WS				-0.0355
				(0.0258)
Islam X WS				-0.000550
				(0.0215)
social X WS				-0.0253
				(0.0192)
urban rate	0.0820***	0.0832***	0.0828***	0.0838***
	(0.0198)	(0.0198)	(0.0199)	(0.0198)
education level	-0.0547***	-0.0540***	-0.0543***	-0.0538***
	(0.0133)	(0.0133)	(0.0133)	(0.0133)
HH size	-0.0214***	-0.0213***	-0.0212***	-0.0210***
	(0.00638)	(0.00638)	(0.00631)	(0.00638)
female age	0.00242	0.00246	0.00243	0.00246
	(0.00152)	(0.00152)	(0.00151)	(0.00151)
Constant	0.795***	0.789***	0.791***	0.786***
	(0.0998)	(0.0997)	(0.0992)	(0.0996)
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4,108	4,108	4,108	4,108
R-squared	0.769	0.769	0.769	0.770

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Data are aggregated to the district level. Dependent variable is fraction of female respondents who are employed. Regions that passed *perda sharia* in 1999 or 2000 are excluded. Years 1991 and 1993 are excluded due to data quality issues.

Table 1.5 Male Employment. Results from panel fixed effects model.

	(1)	(2)	(3)	(4)
sharia	0.000806		0.00256	
	(0.00414)		(0.00410)	
sharia X WS			-0.00833	
			(0.0105)	
veil		-0.00344		0.00188
		(0.00597)		(0.00668)
Islam		0.00690		0.0231***
		(0.00882)		(0.00795)
zakat		-0.00491		-0.0116*
		(0.00667)		(0.00658)
social		0.00460		0.00629
		(0.00441)		(0.00454)
WS			-0.0386***	-0.0405***
			(0.00677)	(0.00674)
veil X WS				-0.0162
				(0.0149)
zakat X WS				0.00561
				(0.0200)
Islam X WS				-0.0366**
				(0.0171)
social X WS				-0.000961
				(0.0119)
urban rate	0.0367***	0.0367***	0.0369***	0.0367***
	(0.0109)	(0.0110)	(0.0110)	(0.0110)
education level	-0.0651***	-0.0651***	-0.0650***	-0.0651***
	(0.00692)	(0.00694)	(0.00692)	(0.00697)
HH size	-0.0341***	-0.0342***	-0.0341***	-0.0339***
	(0.00404)	(0.00404)	(0.00402)	(0.00406)
male age	-0.00143*	-0.00143*	-0.00142*	-0.00141*
	(0.000857)	(0.000858)	(0.000856)	(0.000853)
Constant	1.169***	1.170***	1.168***	1.167***
	(0.0500)	(0.0502)	(0.0498)	(0.0502)
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4,108	4,108	4,108	4,108
R-squared	0.689	0.689	0.689	0.690

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Data are aggregated to the district level. Dependent variable is fraction of male respondents who are employed. Regions that passed *perda sharia* in 1999 or 2000 are excluded. Years 1991 and 1993 are excluded due to data quality issues.

Table 1.6 Female Employment. Results from synthetic control.

	(1)	(2)	(3)	(4)
sharia	-0.011	-0.001		
	(0.447)	(0.494)		
sharia X WS		-0.063***		
		(0.223)		
veil			-0.016	-0.004
			(0.413)	(0.472)
Islam			-0.006	0.013
			(0.449)	(0.549)
social			-0.011	0.002
			(0.445)	(0.497)
zakat			-0.008	0.006
			(0.448)	(0.514)
veil X WS				-0.037
				(0.305)
Islam X WS				-0.045*
				(0.250)
zakat X WS				-0.039
				(0.302)
social X WS				-0.049**
				(0.295)
No. of regions				

Percentile rank in parentheses
*** p<0.01, ** p<0.05, * p<0.1

types. West Sumatra passed a province-wide social regulation in 2001 which means there are no regions in West Sumatra without at least one *perda sharia* after 2001. Eight of the nine West Sumatran regions that are present in the balanced panel have passed more than one *perda*. In the next section I show results of several model variations that serve as robustness checks.

Table 1.7 Male Employment. Results from synthetic control.

	(1)	(2)	(3)	(4)
sharia	-0.004	-0.000		
	(0.495)	(0.531)		
sharia X WS		-0.021*		
		(0.329)		
veil			-0.003	0.009
			(0.503)	(0.612)
Islam			0.000	0.011
			(0.502)	(0.596)
social			-0.003	0.004
			(0.452)	(0.526)
zakat			-0.001	0.001
			(0.537)	(0.548)
veil X WS				-0.027*
				(0.304)
Islam X WS				-0.022
				(0.314)
zakat X WS				-0.005
				(0.514)
social X WS				-0.018**
				(0.293)
Observations				

Percentile rank in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.4.1 Fertility

Table 1.8 shows the treatment effect on fertility rates. These results show that the overall treatment effect was negative and significant. In the full specification (column 4 of table 1.8) that allows for four types of regulations and West Sumatra interaction terms, the social regulations outside of West Sumatra are associated with a significant decrease in the fertility rate. None of the other terms are significant in any of the specifications. This negative relationship is counter to the findings of [40] and [8], both of whom found a positive effect of sharia law on fertility in Nigeria. Table 1.9 shows results with the synthetic control method. The decrease in fertility outside of West Sumatra becomes insignificant, but West Sumatra experiences a significant increase in fertility. The increase in fertility could be due to the effect of Islam encouraging large families [8], but is also coinciding with a decrease in female labor force participation which would lower the opportunity cost of having a child.

1.4.2 Alternate Specifications

An important consideration when interpreting the effects of *perda sharia* is the possible presence of interaction effects between these various types of treatment. There are 11 possible interactions between the 4 types of regulations (considering all combinations of 2,3, or 4 types of regulation), of which 8 are seen in my data. Including all of these interactions in the model would result in a large loss of power and generate coefficients that are difficult to interpret. Instead, I consider a simplistic interpretation of interaction effects, in which each additional regulation adds to the overall treatment effect. I therefore test a specification in which the number of *perda sharia* passed in a given district is captured in an index variable. In this specification, every single regulation is included in the index, including regulations of unknown type and "repeat" regulations in which more than one regulation was passed in the same category. Table 1.10 shows that the results are very similar with this specification.

As another robustness check, I use a logit model on individual-level data. While aggregating to the district level allows for a more direct comparison to the synthetic control

model, it also results in a loss of precision. Tables 1.11 and 1.12 show the results of estimating employment with a logit model. In this specification, both veiling and *zakat* regulations in West Sumatra are associated with significant declines in employment. This is true for both male and female employment. These results differ from the synthetic control results in which only social regulations were associated with a decline in employment. The difference in which interaction terms are significant is likely due to collinearity, but these results follow the same pattern of both male and female employment declining together in West Sumatra.

Table 1.13 show the results of a logit model on fertility rates. In this specification, social regulations in West Sumatra are associated with a significant increase in fertility, while those outside of West Sumatra coincide with a significant decrease in fertility. These results are consistent with results found in tables 1.8 and 1.9.

Table 1.8 Probably of having a birth in the current year. Results from panel fixed effects model.

	(1)	(2)	(3)	(4)
sharia	-0.00616*	-0.00766**		
	(0.00323)	(0.00306)		
sharia X WS		0.00793		
		(0.00980)		
veil			-0.00109	-0.00322
			(0.00653)	(0.00628)
Islam			-0.00223	-0.00376
			(0.00699)	(0.00712)
zakat			-0.00178	-0.00141
			(0.00562)	(0.00625)
social			-0.00598	-0.00799**
			(0.00392)	(0.00353)
WS		0.182		0.160
		(1.385)		(1.388)
veil X WS				0.0114
				(0.0238)
Islam X WS				0.00685
				(0.0217)
zakat X WS				0.00290
				(0.0142)
social X WS				0.00627
				(0.0117)
female Age	0.00939	0.00916	0.00950	0.00917
	(0.0258)	(0.0258)	(0.0258)	(0.0258)
female employment	0.0615	0.0612	0.0641	0.0638
	(0.176)	(0.175)	(0.175)	(0.175)
education level	1.099	1.106	1.104	1.111
	(0.860)	(0.858)	(0.860)	(0.859)
HH size	0.338*	0.338*	0.336*	0.336*
	(0.177)	(0.177)	(0.177)	(0.177)
urban rate	2.169	2.185	2.145	2.158
	(1.658)	(1.657)	(1.660)	(1.661)
Constant	-7.278*	-7.310*	-7.227*	-7.254*
	(4.253)	(4.252)	(4.257)	(4.259)
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	7,592	7,592	7,592	7,592
R-squared	0.315	0.315	0.315	0.316

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.9 Probably of having a birth in the current year. Results from synthetic control.

	(1)	(2)	(3)	(4)
sharia	-0.002	-0.007		
	(0.500)	(0.448)		
sharia X WS		0.010*		
		(0.329)		
veil			-0.001	-0.005
			(0.530)	(0.494)
islam			-0.006	-0.010
			(0.468)	(0.424)
social			-0.002	-0.008
			(0.507)	(0.433)
zakat			-0.005	-0.003
			(0.458)	(0.486)
veil X WS				0.011*
				(0.645)
Islam X WS				0.004
				(0.579)
zakat X WS				-0.013
				(0.344)
social X WS				0.011**
				(0.677)
Observations				

Percentile rank in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.10 Female and male employment. Results from panel fixed effects model.

	Female Employment		Male Employment	
	(1)	(2)	(3)	(4)
index	-0.00757*	-0.000508	0.000893	0.00369
	(0.00444)	(0.00443)	(0.00274)	(0.00240)
WS		-0.243***		-0.0386***
		(0.0139)		(0.00670)
index x WS		-0.0225***		-0.00890*
		(0.00714)		(0.00535)
urbanRate	0.0828***	0.0835***	0.0367***	0.0370***
	(0.0198)	(0.0199)	(0.0110)	(0.0110)
avgEduc	-0.0543***	-0.0541***	-0.0652***	-0.0651***
	(0.0133)	(0.0133)	(0.00693)	(0.00693)
avgHHsize	-0.0212***	-0.0207***	-0.0341***	-0.0340***
	(0.00637)	(0.00632)	(0.00404)	(0.00403)
feAge	0.00245	0.00249		
	(0.00152)	(0.00151)		
maAge			-0.00143*	-0.00141*
			(0.000857)	(0.000853)
Constant	0.790***	0.785***	1.169***	1.167***
	(0.0996)	(0.0991)	(0.0501)	(0.0500)
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4,108	4,108	4,108	4,108
R-squared	0.769	0.770	0.689	0.689

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: WS = West Sumatra. Data are aggregated to the district level. Dependent variable is fraction of female respondents who are employed. Regions that passed *perda sharia* in 1999 or 2000 are excluded. Years 1991 and 1993 are excluded due to data quality issues.

Table 1.11 Female employment. Results from logit model.

	(1)	(2)	(3)	(4)
sharia	-0.0395	-0.0210		
	(0.0378)	(0.0380)		
sharia X WS		-0.154***		
		(0.0325)		
veil			-0.0996*	-0.0420
			(0.0578)	(0.0319)
Islam			-0.0149	-0.0155
			(0.0739)	(0.0910)
social			-0.0175	-0.00476
			(0.0388)	(0.0417)
zakat			-0.00358	0.0191
			(0.0395)	(0.0318)
WS		-0.913***		-0.924***
		(0.0387)		(0.0386)
veil X WS				-0.0958***
				(0.0306)
Islam X WS				0.00421
				(0.0928)
zakat X WS				-0.251***
				(0.0320)
social X WS				-0.0560
				(0.0398)
rural	0.469***	0.469***	0.469***	0.469***
	(0.0749)	(0.0749)	(0.0748)	(0.0749)
primary school	-0.163***	-0.163***	-0.163***	-0.163***
	(0.0268)	(0.0268)	(0.0268)	(0.0268)
junior high	-0.571***	-0.571***	-0.571***	-0.571***
	(0.0442)	(0.0442)	(0.0442)	(0.0442)
high school	-0.164***	-0.164***	-0.164***	-0.164***
	(0.0622)	(0.0622)	(0.0622)	(0.0622)
higher	0.745***	0.745***	0.745***	0.745***
	(0.0834)	(0.0834)	(0.0834)	(0.0834)
age	0.161***	0.161***	0.161***	0.161***
	(0.0113)	(0.0113)	(0.0113)	(0.0113)
age^2	-0.00198***	-0.00198***	-0.00198***	-0.00198***
	(0.000111)	(0.000111)	(0.000111)	(0.000111)
Constant	-1.878***	-1.878***	-1.878***	-1.877***
	(0.240)	(0.240)	(0.241)	(0.240)
HH size dummies	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	1,658,601	1,658,601	1,658,601	1,658,601

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.12 Male employment. Results from logit model.

	(1)	(2)	(3)	(4)
sharia	-0.0299	-0.0299		
	(0.0328)	(0.0373)		
sharia X WS		-0.000356		
		(0.0436)		
veil			-0.0805*	-0.0475
			(0.0446)	(0.0585)
Islam			0.0317	0.0396
			(0.0547)	(0.0703)
social			-0.00614	-0.0129
			(0.0407)	(0.0463)
zakat			-0.0666	-0.0562
			(0.0418)	(0.0416)
WS		-0.448***		-0.456***
		(0.0324)		(0.0317)
veil X WS				-0.115**
				(0.0584)
Islam X WS				-0.0577
				(0.0696)
zakat X WS				-0.152***
				(0.0423)
social X WS				0.0970*
				(0.0557)
rural	0.764***	0.764***	0.764***	0.764***
	(0.0577)	(0.0577)	(0.0576)	(0.0576)
primary school	-0.0883***	-0.0883***	-0.0882***	-0.0883***
	(0.0232)	(0.0233)	(0.0232)	(0.0234)
junior high	-0.757***	-0.757***	-0.757***	-0.757***
	(0.0336)	(0.0336)	(0.0336)	(0.0336)
high school	-0.823***	-0.823***	-0.822***	-0.822***
	(0.0539)	(0.0539)	(0.0539)	(0.0539)
higher	-0.690***	-0.690***	-0.690***	-0.690***
	(0.0560)	(0.0560)	(0.0560)	(0.0560)
age	0.454***	0.454***	0.454***	0.454***
	(0.00835)	(0.00835)	(0.00836)	(0.00836)
age^2	-0.00520***	-0.00520***	-0.00520***	-0.00520***
	(0.000115)	(0.000115)	(0.000116)	(0.000116)
Constant	-6.133***	-6.133***	-6.133***	-6.133***
	(0.157)	(0.157)	(0.157)	(0.157)
HH size dummies	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	1,698,705	1,698,705	1,698,705	1,698,705

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.13 Probably of having a birth in the current year. Results from logit model.

	(1)	(2)	(3)	(4)
sharia	-0.0245	-0.0661***		
	(0.0238)	(0.0253)		
sharia X WS		0.306***		
		(0.0618)		
veil			-0.00640	-0.0383
			(0.0609)	(0.0651)
islam			-0.00124	-0.0248
			(0.0735)	(0.0814)
social			-0.0436	-0.112***
			(0.0336)	(0.0376)
zakat			-0.0427	-0.0423
			(0.0487)	(0.0507)
veil X WS				0.0421
				(0.202)
islam X WS				0.0164
				(0.207)
social X WS				0.306***
				(0.0816)
zakat X WS				0.122
				(0.182)
current age	0.952***	0.952***	0.947***	0.947***
	(0.261)	(0.261)	(0.262)	(0.262)
age^2	-0.0122***	-0.0122***	-0.0122***	-0.0122***
	(0.000100)	(0.000100)	(0.000102)	(0.000102)
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	491,544	491,544	472,495	472,495

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.5 Conclusion

This study uses the proliferation of *perda sharia* after the decentralization of Indonesia to analyze the effects of four types of Islamic regulation. I consider two regions of Indonesia - the matrilineal region of West Sumatra and the rest of the country. A linear probability model shows a correlation between these sharia-inspired regulations and a decrease in female labor force participation. Splitting the regulations into four categories, the negative association between *perda sharia* and female employment rate appears to be strongest in regions that passed veiling regulations. However, an event study indicates that female employment rates in those regions were decreasing prior to implementation of the regulations. Using the synthetic control method to generate parallel trends, there does not appear to be evidence of a causal effect of veiling regulations on female employment rates. This result does not support a hypothesis of fundamentalist Islam causing a decrease in female employment rates.

I do find a significant decrease in female employment in West Sumatran districts that pass social regulations. However, the decline is also present for male employment and therefore is more likely to be driven by a general economic decline rather than a gender-specific effect of political Islam. The fertility results mirror employment results, with social regulations in West Sumatra linked to an increase in fertility. These results indicate a shift away from paid work to increased home production, which is consistent with an economic downturn occurring in West Sumatra.

An important finding is that districts where *perda sharia* are passed have much lower female employment rates prior to passing these regulations. This is consistent with the theory put forward by [19] stating that women with fewer economic opportunities are more likely to support fundamentalist Islam. However that pattern does not hold for West Sumatra. This raises the interesting questions of why and to what extent the women of West Sumatra support *perda sharia*.

The inability to reject the hypothesis that *perda sharia* have no causal effect on female employment rates does not address other concerns that have been raised about the spread

of fundamentalist Islam in Indonesia. Future analysis should consider other measures of women's empowerment as well as the effects on religious minorities.

Chapter 2

EDUCATIONAL ATTAINMENT AND ISLAMIC REGULATIONS: EVIDENCE FROM INDONESIA

Abstract

After decentralization in 1999, many districts in Indonesia began to pass regulations based on sharia law. These Islamic regulations gave rise to concerns over the rights of women and religious minorities. Islamic regulations may lead to a decrease in educational investment for women if they increase fundamentalist views. Alternatively, these regulations may lead to increased educational attainment via income redistribution and/or increased spending on education. I use data from the Indonesian Family Life Survey to analyze the effect of four types of Islamic regulations on educational attainment - veiling, Islamic knowledge, tithing (*zakat*), and social order. A comparison between exposed and non-exposed cohorts shows that tithing regulations significantly increase years of schooling for girls while other types of regulation have no significant effect.

2.1 Introduction

There is a large body of research showing that increased schooling for girls is associated with a wide range of benefits. [53] finds that gender inequality in education lowers economic growth. Women with more education get married later [20], invest more in their children [13], and are more likely to be involved in politics [29]. Educational attainment for girls is considered so critical to development that one of the millennium development goals is to eliminate gender disparities in education.

There are many factors that determine the amount that parents invest in their children's education. While opportunity cost and returns to education play a large role, there are a variety of other barriers that can lead to gender inequality in education. In some areas where students have to travel a long distance to school, parents are less likely to send girls due to safety concerns. Cultural norms such as girls being called upon more often to care for younger siblings or getting married early can also lead to education disparities [69]. Religion has been hypothesized as another channel that can affect educational attainment, but causal effects are difficult to establish given the persistence of religious beliefs and interconnectedness of religion and culture. In a cross-country analysis, [63] find that the proportion of Muslims is a significant predictor of lower educational attainment for women. However, in a recent study, [61] finds that educational attainment increases for girls in Turkish municipalities that narrowly elected an Islamic major.

In Indonesia, many districts passed one or more Islamic regulations, known locally as *perda sharia*, following decentralization in 1999. These regulations provide an opportunity to distinguish between three possible mechanisms linking political Islam and female educational attainment. The first two channels are related to cultural norms. Political Islam may increase schooling for girls via a cultural accommodation effect. [61] attributes the increased schooling in Turkey to a 'de-secularization' of schools in areas with Islamic mayors. Specifically, Islamic mayors have vowed not to uphold the headscarf ban imposed by the national government. Alternatively, political Islam may fuel fundamentalist Islamic beliefs which include support

for traditionalist gender roles[1]. Using data from the World Values Survey, I find that the proportion of Indonesians who agree with the statement "A University education is more important for a boy than a girl" has increased between 2001 and 2006, which is consistent with an increase in fundamentalist Islamic beliefs.

Finally, Islamic regulations pertaining to tithing and/or Islamic knowledge (e.g. Quran reading) may serve to lower the cost of education via redistribution or investment in schools. While there is no reason to expect such an effect to be gender-specific, a decrease in the cost of education could lead to a larger increase in schooling for girls if girls started with fewer years of schooling prior to treatment.

I use a difference-in-difference approach to compare years of schooling in regions that pass four types of Islamic regulations - veiling, Islamic knowledge, tithing, and social order (banning of activities that are forbidden by Islam, e.g. gambling, prostitution). Region of birth is used to avoid endogenous sorting issues. I find that years of schooling increased among a cohort of girls who were exposed to tithing regulations as compared to a non-exposed cohort. A placebo test using older cohorts found no significant effects. I find no significant change in years of schooling for boys.

In the next section I discuss existing research on the relationship between Islam and educational attainment and the institutional context of *perda sharia* in Indonesia. Section 3 presents my empirical specification and data sources. Results are shown in section 4, and section 5 concludes.

2.2 Background

2.2.1 Perda sharia in Indonesia

During the Suharto regime, which lasted from 1967 to 1998, the government was strongly centralized and political Islamists in Indonesia were suppressed. Suharto's successor, President Habibie, passed legislation in 1999 to implement a large-scale decentralization of power.

[1]Fundamentalist Islam as defined by [19] includes a belief in traditionalist gender norms as well as support for the intersection of religion and politics.

Authority over 40% of government revenue was transferred from the central government to district governments [15]. Districts were given control over local resources as well as the ability to pass new legislation and raise revenue. According to the Indonesian constitution, the central government retains sole authority over several areas including religion [33]. However, districts quickly began passing regulations (*perda*) related to Islamic law with no oversight from the central government. These regulations are known as sharia-inspired regulations, or *perda sharia*.

While the term *perda sharia* is broad and the regulations can pertain to any topic related to Islam, they tend to be variations on a small number of themes and can be grouped into three or four categories. In an early study of *perda sharia*, [24] categorizes the regulations as pertaining to Muslim clothing, Islamic knowledge and obligations, or social order. In Bush's grouping, regulations pertaining to tithing (*zakat*) are included in the Islamic knowledge and obligations category. However, others, notably [22], have focused on *zakat* regulations as their own category, given the financial aspects to those regulations. In this work I therefore consider the following four categories of *perda sharia*:

- Veiling - regulations regarding Muslim dress. They generally require both men and women to adhere to an Islamic dress code, but are seen as being more onerous for women since women must wear a veil.

- Islamic knowledge - regulations requiring memorizing or reading from the Qur'an. This requirement may be instated for school children, government workers, and/or couples who are applying for a marriage license.

- *Zakat* - regulations pertaining to *zakat* (alms-giving) which is one of the five pillars of Islam.

- Social order - regulations banning prostitution, alcohol, drugs, and/or gambling. While these regulations concern morality in a broader sense, they are motivated via Islam and are generally included in the literature on *perda sharia*.

Zakat, or tithing/alms-giving, is one of the five pillars of Islam. There are two type types of *zakat* in Islam. *Zakat al-fitr* is a small flat fee that everyone who is able must pay at the end of Ramadan. *Zakat al-mal* is an obligatory pament of 2.5% of one's wealth over a minimum amount, know as *nisab*. While *zakat* is considered mandatory in Islam, other charitable contributions known as *infaq* and *sadaqah* are also encouraged, but are voluntary.

Although the intention of *zakat* is to redistribute income to the poor, [22] argues that *zakat* regulations are put in place mainly for the local government to raise revenue and facilitate machine politics. There is essentially no oversight of the disbursement of *zakat* funds, which is done at the discretion of the regent. Much of the money is given to local imams who are likely to be influential vote brokers. Buehler finds that in some districts the imams must go to the regent's office to collect the *zakat* funds, and argues that this type of process is put in place to serve as a periodic reminder to the imams of the regent's role in providing these funds.

Mandatory *zakat* regulations are in effect an additional income tax. Generally, income taxes would be costly to collect given that the vast majority of Indonesians do not work in the formal sector or pay income tax. However, in a case study of several districts in South Sulawesi, [22] shows that local governments have been able to open up significant new revenue streams for the local government by targeting civil servants and local businesses. The regulations are relatively easy to enforce for civil servants, who have 2.5% of their salary deducted from their paychecks for *zakat al-mal*. Small amounts are also taken out for *sadaqah*, despite *sadaqah* being ostensibly voluntary under Islam. Although the *sadaqah* deductions are very small (approximately UD$0.15 per month) they provide a non-trivial amount of revenue for local governments. In Bulukumba for example, Buehler found that *sadaqah* payments brought in approximately $34,000 per year. The *zakat* regulations also target local businesses - especially establishments such as nightclubs that may be on the edge of legality - and require them to pay 2.5% of their revenue for *zakat*.

2.2.2 Female Educational Attainment and Islam

Historically, there has been an existing negative correlation between Muslim majority countries and gender gaps in employment rates and educational attainment. [39] find that Muslim-majority countries have significantly lower Gender Development Indices[2] after controlling for GDP. [63] find a strong negative association between the proportion of Muslims and female educational attainment in a cross-country analysis. However, other findings have been more nuanced. Research by [66] on sub-Saharan Africa has shown that, while there is a large Muslim-Christian gap in educational attainment, it does not seem to be driven by gender disparities. Platas does not find strong evidence that the education gap is driven by lower educational attainment for females. She finds that the ratio of male to female education varies considerably by country, noting that in several sub-Saharan African countries female Muslims are getting more education than their male counterparts.

In one of the first studies to show a causal relationship between political Islam and educational attainment, [61] uses a regression discontinuity design to compare Turkish municipalities in which an Islamic mayor narrowly won an election to those in which the Islamic party candidate narrowly lost. He finds an increase in educational attainment for girls in regions that elected an Islamic mayor, with no significant change for boys. Meyersson describes an accommodation effect, in which Islamic mayors are able to make changes to the school system to overcome cultural barriers that may prevent conservative parents from sending their daughters to school. One notable issue was Islamic mayors' refusal to uphold the headscarf ban in schools, and other changes included a shift in ownership of school facilities from the public sector to religious charities. Meyersson also mentions the possibility that economic aid to poor families played a role in increasing education for girls but does not explore this issue in detail.

The accommodation effect found by Meyersson occurred in a situation in which political

[2]The Gender Development Index is a ratio of the female and male Human Development Indices (HDI) created by the UN. The HDI is a composite score that includes life expectancy, educational attainment, and income.

Islam leads to increased religious freedom. Depending on the cultural norms previously in place, political Islam could also lead to a decrease in religious freedom, especially if it is fostering fundamentalist views. Unlike in Turkey, where Islamic rule caused a shift from banned veiling to optional veiling, the Indonesian districts that pass veiling regulations are moving from optional to mandatory veiling. Rather than accommodating girls who wish to wear the veil, forced veiling may be off-putting for some girls[3]. More broadly, codifying Islamic beliefs may serve to normalize fundamentalist Islamic views. Fundamentalist Islam as defined by [19] includes a belief in traditionalist gender norms as well as support for the intersection of religion and politics. If *perda sharia* are normalizing these views, parents may decide to invest more in the education of their sons relative to that of their daughters. While decisions about education are typically driven by potential earnings, a club goods model of religion can explain the use of costly signals, including foregone earnings[4].

The World Values Survey (WVS) is often used to assess support for traditionalist gender roles [e.g., 7, 19]. One question in the WVS asks respondents whether they agree with the statement "A University education is more important for a boy than a girl." Indonesia was sampled in the WVS in 2001 and 2006 but the WVS data cannot be matched to districts that have passed Islamic regulations because the location is only given at the province level. However, the WVS data can provide an indication that attitudes are changing quickly in some regions. Three provinces were present in both the 2001 and 2006 waves - Jakarta, Central Java, and West Java. Districts in West Java have passed a total of 20 Islamic regulations, with over half of the districts passing at least one *perda sharia*. By contrast, districts in Central Java have passed only two Islamic regulations and Jakarta has not passed any. I therefore use West Java as a proxy for areas that have passed Islamic regulations.

Table 2.1 shows that the percent of respondents who agree with the statement "A University education is more important for a boy than a girl" has increased slightly for the country

[3]While there is no data on enforcement of these regulations, there is some anecdotal evidence that head scarf regulations have been enforced in schools [44].

[4]As an example, [**?**] notes that orthodox Jewish men study in *yeshiva* (religious seminaries) for many years despite the high rates of poverty among their families.

Table 2.1 All World Values Survey responses to the statement "A University education is more important for a boy than a girl"

	Indonesia		West Java	
	2001	2006	2001	2006
Missing/no ans.	0.0	1.0	0.0	0.6
Dont know	1.8	1.7	2.5	1.7
Agree strongly	2.7	4.1	3.5	7.8
Agree	**13.8**	**15.1**	**13.9**	**26.2**
Disagree	56.7	57.6	67.7	54.1
Strongly disagree	25.0	20.1	12.4	9.3

as a whole, but has almost doubled for West Java. Table 2.2 shows the responses by gender. The increase in 'agree' responses is consistent across men and women, with a slightly larger increase for women. The dramatic change in responses in West Java, one of the provinces that has passed the largest number of Islamic regulations in the country, as compared to the rest of Indonesia provides suggestive evidence that *perda sharia* are correlated with an increase in fundamentalist Islamic views.

Table 2.2 Responses to the statement "A University education is more important for a boy than a girl" by gender

	Men				Women			
	Indonesia		West Java		Indonesia		West Java	
	2001	2006	2001	2006	2001	2006	2001	2006
Missing; Unknown	0.0	0.4	0.0	0.4	0.0	0.2	0.0	0.4
No answer	0.0	1.1	0.0	0.7	0.0	0.	0.0	0.4
Dont know	1.6	1.5	4.0	1.4	2.0	2.0	1.0	2.0
Agree strongly	3.4	5.1	5.0	8.1	2.0	3.0	2.0	7.4
Agree	**15.8**	**16.0**	**15.8**	**23.7**	**11.8**	**14.2**	**12**	**29.0**
Disagree	60.2	59.6	67.3	55.1	53.2	55.4	68.0	52.9
Strongly disagree	19.0	16.2	7.9	10.6	31.0	24.2	17.0	7.8

2.3 Empirical Approach

The goal of this work is to estimate the effect of *perda sharia* on years of schooling. Data on schooling come from the Indonesian Family Life Survey (IFLS), and data on *perda sharia* come from a variety of sources[5]. I construct years of schooling for individuals in IFLS wave 5 (2014) based on their education history. In the main estimating equation, I compare a cohort that was exposed to treatment (i.e. likely to have still been in school at the time *perda sharia* were passed) to a cohort that was not exposed to treatment, following the methodology used by [37]. I assume that children who have already dropped out of school would be unlikely to be induced to re-enter and therefore are considered untreated. Very few regulations were passed before 2001, so I use school attendance in the year 2000 as a baseline measure for the age at which most children finish school. Figure 2.1 shows the percent of children who were still in school for each age group in the year 2000.

Based on figure 2.1, children who were age 14 or under have at least an 80% probability of still attending school. I therefore consider individuals who were aged 9-14 in 2000 to be

[5]The timing and contents of *perda sharia* are gathered from several sources as described in [58].

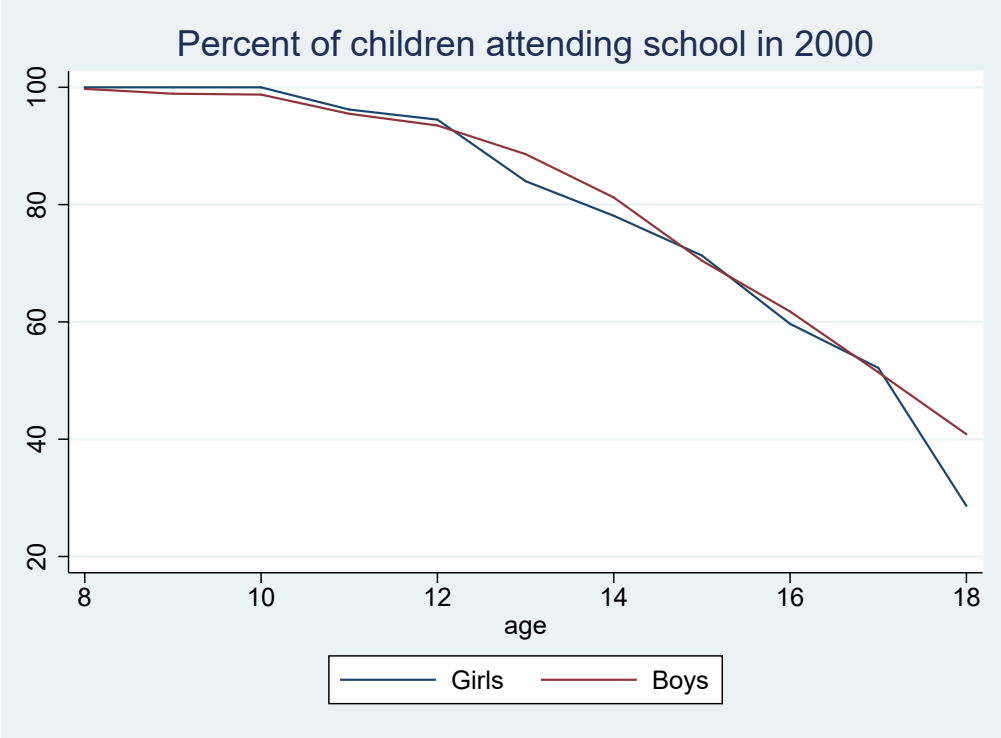

Figure 2.1 Percent of children still in school in the year 2000 (IFLS wave 3).

exposed to treatment, and those who were aged 16-21 to be the non-exposed comparison group. I use region of birth to avoid endogenous sorting issues. The youngest members of the exposed cohort were born in 1991, long before the overthrow of Suharto and subsequent decentralization.

I use a difference-in-differences model with two main specifications for treatment. In equation 2.1 all *perda sharia* are considered to be the same treatment, and in equation 2.2 allows the treatment effect to be different for each of the four categories of regulation. Fixed effects for region and year of birth are captured by α_j and δ_t. The dependent variable is years of education in 2014. Only individuals aged 23-28 (exposed cohort) and 30-35 (non-exposed cohort) are included in the regression.

$$y_i = \alpha_j + \delta_t + \theta exposed_i + \gamma sharia_j + \beta sharia_j * exposed_i + \epsilon_{it} \tag{2.1}$$

$$\begin{aligned} y_i = {} & \alpha_j + \delta_t + \theta exposed_i + \gamma_V Veil_j + \gamma_I Islam_j \\ & + \gamma_Z Zakat_j + \gamma_S Social_j + \beta_V Veil_j * exposed_i + \beta_I Islam_j * exposed_i \\ & + \beta_Z Zakat_j * exposed_i + \beta_S Social_j * exposed_i + \epsilon_{it} \end{aligned} \tag{2.2}$$

To interpret the results from the difference-in-differences model as a causal effect, parallel trends must hold prior to treatment. Figure 2.2 shows the schooling trends in treated (any *perda sharia*) versus untreated districts for girls in 5-year cohorts. Figure 2.3 shows the same trends for boys' schooling. Pre-treatment trends for girls match very closely, while the trends for boys' education are somewhat different. Figures B1 through B4 show the trends for each of the four types of regulations.

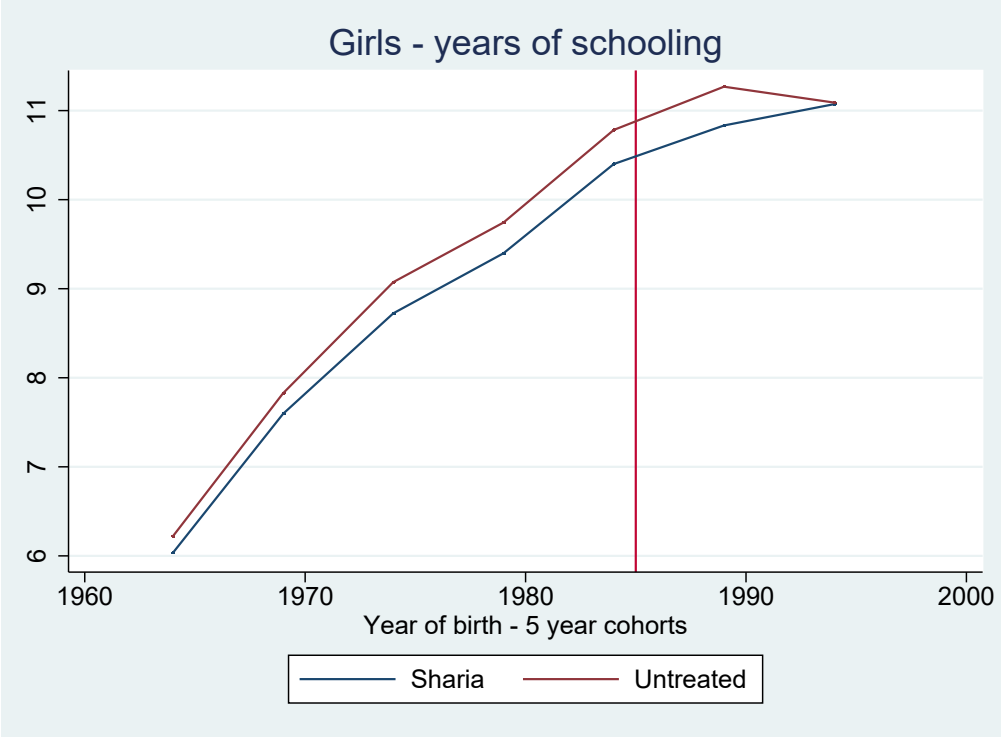

Figure 2.2 Year of schooling for girls in 5-year cohorts.

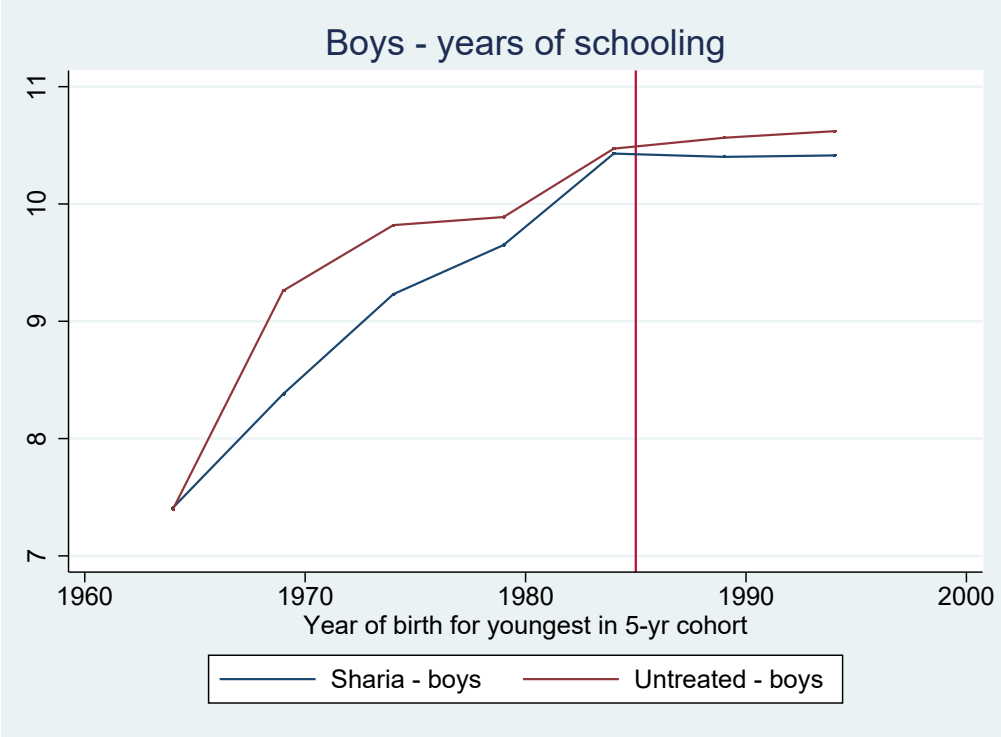

Figure 2.3 Year of schooling for boys in 5-year cohorts.

2.4 Results

Table 2.3 shows the results of the difference-in-differences model that compares the exposed cohort (age 9-14 in 2000) to the non-exposed cohort (age 16-21 in 2000). Girls' education in districts that passed *zakat* regulations increased by over a year on average, while education did not increase for the older cohort or for boys. No significant changes are seen in districts that passed other types of *perda sharia*. One potential threat to identification is the possibility that girls' education in *zakat* districts was already increasing faster than in other districts prior to the regulations being passed. While figure 2.2 shows very similar parallel trends for girls' education, it is possible that the 5-year cohorts are obscuring some differences in the trends. To rule out the possibility that *zakat* regions were experiencing a faster increase in education prior to treatment, I perform a placebo difference-in-difference with older cohorts. Table 2.4 shows the results of a difference-in-differences comparing the placebo treated group (age 16-21 in 2000) to an older placebo control group (age 22 to 27 in 2000). No significant differences in education are found in this specification.

To investigate possible channels through which *zakat* I examine the cost of schooling, use of private schools, and cash assistance received for schooling using the child modules of IFLS wave 3 (2000) and wave 4 (2007). I treat cash assistance as a binary variable based on whether the family reported receiving cash assistance for school or not. Column 1 of table 2.5 shows that families in *zakat* districts are not significantly more likely to receive cash assistance for school compared to other regions. However, column 2 shows that school fees are much lower in *zakat* regions in 2007. Table 2.6 shows that there were huge increases in nominal costs for both private and public school between 2000 and 2007, but districts that passed *zakat* regulations experienced much smaller increases. Column 3 shows that the proportion of students attending private school has decreased significantly in *zakat* regions. Given that the cost of public school increased faster than the cost of private school, public school has become less affordable relative to private school in 2007. Therefore the shift away from private school is not obviously driven by cost. Parents may be more willing to send

Table 2.3 Years of schooling

	(1)	(2)	(3)	(4)
	Boys		Girls	
exposed	0.235	0.330	0.839**	0.694*
	(0.535)	(0.520)	(0.426)	(0.411)
sharia	-2.746		1.720	
	(4.389)		(3.999)	
sharia*exposed	-0.172		0.352	
	(0.323)		(0.312)	
veil		-0.484		6.224
		(4.385)		(3.992)
Islam		-2.754		1.667
		(4.386)		(3.993)
zakat		1.234		-4.373
		(6.108)		(5.851)
social		-4.011*		0.192
		(2.060)		(1.998)
veil*exposed		0.569		0.471
		(0.657)		(0.643)
Islam*exposed		0.801		-0.264
		(0.640)		(0.587)
zakat*exposed		-0.721		1.436***
		(0.473)		(0.444)
social*exposed		-0.693*		0.107
		(0.373)		(0.357)
Region & year FE	yes	yes	yes	yes
Observations	3,199	3,19,9	3,330	3,330

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Regression includes individuals age 23-28 (exposed) and 30-35 (non-exposed). Data is from IFLS wave 5 (2014).

Table 2.4 Years of schooling. Results from placebo test.

	(1)	(2)	(3)	(4)
	Boys		Girls	
placebo exposed	1.217***	1.318***	1.989***	2.069***
	(0.340)	(0.333)	(0.342)	(0.334)
sharia	-1.808		-5.544	
	(4.747)		(5.617)	
sharia*placebo	0.366		0.00669	
	(0.249)		(0.252)	
veil		-0.511		-0.855
		(5.504)		(5.639)
Islam		-1.910		-5.768
		(4.755)		(5.637)
zakat		-2.117		5.586
		(6.541)		(7.265)
social		-0.208		-1.333
		(2.406)		(2.445)
veil*placebo		-0.429		-0.237
		(0.500)		(0.509)
Islam*placebo		0.445		0.146
		(0.478)		(0.477)
zakat*placebo		0.279		-0.202
		(0.388)		(0.383)
social*placebo		0.0810		-0.162
		(0.296)		(0.311)
Constant	11.40***	11.40***	11.42***	11.41***
	(3.884)	(3.885)	(3.978)	(3.979)
Region & year FE	yes	yes	yes	yes
Observations	4,179	4,179	4,295	4,295
R-squared	0.192	0.192	0.240	0.240

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

col 1 and 2 men; col 3 and 4 women

Note: Regression includes individuals age 30-35 (placebo exposed) and 36-41 (placebo control). Data is from IFLS wave 5 (2014).

their children to public school for cultural reasons, similar to the accommodation effect in Turkey described by [61].

Table 2.5 School cost and type

	(1) cash assistance	(2) school fees	(3) private school
veil	-0.177***	-187,347	-0.00819
	(0.0249)	(623,018)	(0.0240)
islam	0.162***	-280,582	-0.0351
	(0.0223)	(556,973)	(0.0216)
zakat	0.0241	-1.068e+06**	-0.0718***
	(0.0190)	(473,831)	(0.0179)
social	-0.102***	-1.186e+06***	-0.0204
	(0.0145)	(362,783)	(0.0141)
private school	-0.0353***	613,260***	
	(0.00840)	(209,948)	
age	0.0110***	55,080*	-0.0480***
	(0.00113)	(28,388)	(0.000771)
urban	-0.0142	217,339	0.0129
	(0.00924)	(230,687)	(0.00900)
Constant	0.00784	-1.473e+06	0.765***
	(0.0454)	(1.139e+06)	(0.0445)
Region & year FE	yes	yes	yes
Observations	13,392	13,325	18,756
R-squared	0.273	0.064	0.357

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.6 Average fees by school type

	zakat		other	
	public	private	public	private
2000	32,875	141,468	61,537	154,995
2007	279,587	509,479	1,487,864	2,480,830
% change	750%	260%	2318%	1501%

2.5 Conclusion

In this work I find a large increase in agreement that a university education is more important for a boy than a girl in regions that have passed many Islamic regulations based on data from the World Values Survey, suggesting a correlation between *perda sharia* and conservative views. Despite this apparent increase in support for traditionalist gender roles, a difference-in-differences model does not show evidence of a negative effect of Islamic regulations on years of schooling. In fact, girls appear to be surpassing boys in terms of years of schooling throughout Indonesia, with the trend being most pronounced in *zakat* regions. The difference-in-differences model shows an average increase in over one year of schooling for girls in districts that passed *zakat* regulations with no significant change in schooling for boys. This large increase in years of schooling for girls is somewhat surprising, given concerns that *zakat* regulations have been put in place mainly to allow regents to engage in vote buying.

There is evidence for two possible mechanisms - direct expenditure on schools and cultural accommodation. While families in *zakat* districts are no more likely to receive cash assistance for school than families in other districts, school fees are increasing at a much slower rate in *zakat* districts. Students in *zakat* districts are also significantly less likely to be attending private school after these regulations were passed. While public school continued to be cheaper than private school in 2007, the cost of public school rose faster than the cost of private school. Therefore, public school has actually become more expensive relative to private school and the shift to public school is consistent with a cultural accommodation story.

Chapter 3

TRACKING TRANSITION OUTCOMES OF RECENT VETERANS

Abstract

One of the services offered to veterans as they transition to civilian life is an employment workshop sponsored by the Department of Labor (DOL). Attendance at the DOL Employment Workshop became mandatory as part of the Veterans Opportunity to Work Act of 2011, however little is known about the relationship between program attendance and post-separation outcomes for servicemembers. In this work I use a newly constructed data set to examine the relationship between DOL Employment Workshop attendance and employment outcomes for soldiers who transitioned out of Joint Base Lewis-McChord from 2010-2014. While I am not able to establish a causal relationship, I find a strong positive association between DOL Employment Workshop attendance and employment rate at 3 months post-separation. Those who attend the DOL Employment Workshop greater than 6 months prior to separation experience the largest gains. These gains are likely driven in part by selection of more motivated individuals into early workshop attendance.

3.1 Introduction

The reintegration of veterans into civilian life after they leave the military is an important and multi-faceted issue. Transitioning out of the military involves not only a career change but also changes to health care benefits, the loss of a community, and often a location change. Benefits that help servicemembers transition to civilian status date back to the introduction of the GI Bill in 1944 and have been modified over time. The Transition Assistance Program (TAP) came into existence when Congress passed the National Defense Authorization Act in 1991 [31]. In 2011, TAP received its first overhaul when Congress passed the VOW (Veterans Opportunity to Work) to Hire Heroes Act ("VOW Act"), aimed at assisting veterans with finding employment. One of the goals of the VOW Act was to improve the existing programs that prepare servicemembers for their transition. These services are known collectively as the Transition Assistance Program and include a job training workshop organized by the Department of Labor (DoL). As part of the VOW Act, attendance at the DoL Employment Workshop became mandatory as of November 2012 for most servicemembers.[1] The purpose of this study is to evaluate the effectiveness of this workshop by looking at employment outcomes for transitioning soldiers.

Accurately assessing the effect of any training or job search assistance program is difficult and has been the subject of an extensive line of research [e.g. 9, 46]. Selection bias is a key concern, with possible effects in both directions. Those who select into the training program may have higher unobserved abilities, such as motivation. Alternatively, those who have private information that they are likely to find a new job quickly may be least likely to attend the training.

This study contributes to the literature on job search assistance programs, as well as the literature on economic outcomes for veterans, by matching information on soldiers' usage of the Transition Assistance Program to their post-separation outcomes. In the next section I

[1]Servicemembers are exempt from this requirement if they are retiring from the military or can document civilian employment or acceptance to an institution of higher education [42].

discuss related literature on the reintegration of veterans and on displaced workers. Section 3 outlines the creation of my new data set. Section 4 describes findings on which soldiers are attending the DoL Employment Workshop. Section 5 details the post-separation outcomes for the soldiers in my data set and the relationship between these outcomes and attendance at the DoL Employment Workshop. I conclude with a discussion of these results and directions for future work.

3.2 Background

Data from the Current Population Survey (CPS) Veterans Supplement show that the overall population of veterans has a very similar unemployment rate to the non-veteran population. However, when veterans are split into pre-9/11 and post-9/11 groups, it becomes apparent that those who served post-9/11 experienced a large increase in unemployment during the 2008-09 recession. The higher unemployment rate for the post-9/11 veterans has persisted through at least 2013, as shown in figure 3.1. While the demographics of veterans are not representative of the population as a whole, [54] finds that post-9/11 veterans have higher unemployment rates than their civilian counterparts across all demographic groups.[2] Most servicemembers are eligible for Unemployment Compensation for Ex-Servicemembers (UCX), and utilization of UCX has gone up along with the unemployment rate. The Department of Defense spent over $1 billion on UCX in 2011 [26].

Several recent studies examine possible reasons for this higher unemployment rate. [54] notes that while veterans are more likely to be unemployed relative to non-veterans, they are also more likely to enroll in college or university. In many states veterans are eligible to continue collecting UCX while they attend school, so veterans' increased rate of educational enrollment may be a contributor to their higher unemployment rate. [60] analyzes several other hypotheses for why unemployment rates for recent veterans have increased so dramatically - poor health, characteristics of those who select into the military, employer

[2] [54] uses CPS data from 2005-2011.

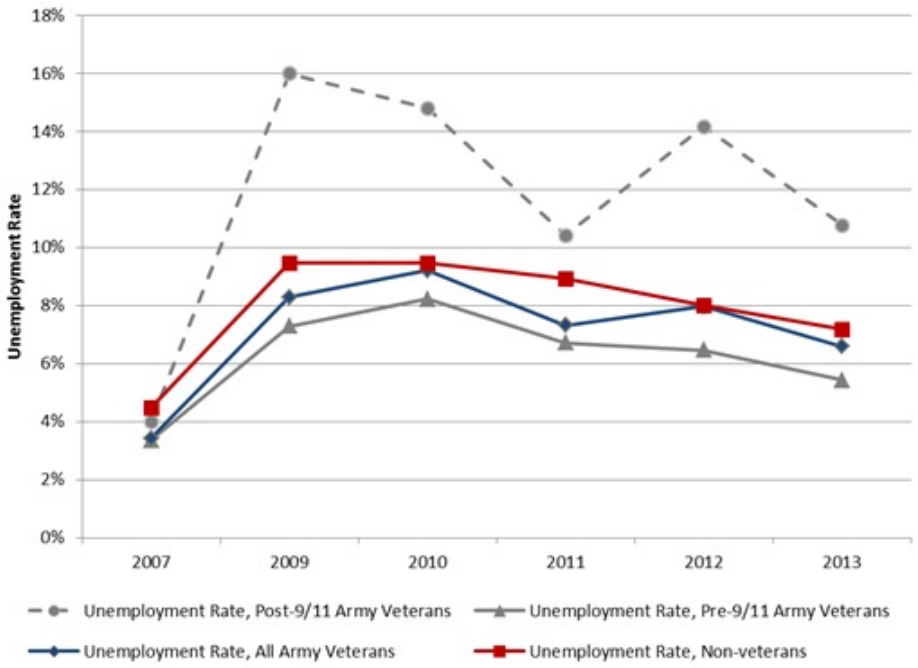

Figure 3.1 NOTE: Unemployment rate is based on the sample of individuals 18 and over in each category. SOURCE: Unpublished RAND research.

discrimination, skills mismatch, and job search due to recently separating from a job. Of these five possible causes, [60] finds the most evidence for the job search hypothesis. ACS data show that veterans who had separated from the military within the past year have higher unemployment rates than veterans who had been separated for over a year.

As [60] points out, veterans by definition have separated from at least one job since becoming veterans. In comparison to the population at large, job search may take longer for veterans because most of them meet the definition of a displaced worker. According to [51], displaced workers meet three criteria - 1) they have not been let go for cause, 2) the separation from their previous job is permanent, and 3) they had strong attachment to their former employer, which is defined by the Bureau of Labor Statistics as having at least three years of job tenure at their last position. Most servicemembers separate from the military after at least one full term of service, meaning they have 4 or more years of job tenure at separation. Length of job tenure plays an important role in earnings losses, even if veterans find a job in the same industry as their military occupation, due to the "internal labor markets" at many firms. Firms often hire from within for more advanced roles, therefore most new hires must start in entry-level positions.

There have been several studies of interventions for displaced workers. During the 1980s, the Buffalo Dislocated Worker Program used a lottery to assign some applicants to programs. All participants received job search assistance, and 18% also received classroom training. Returns from this program were large, with the average participant experiencing a wage increase of 65% [51]. However in the mid-1990s the effects of the Job Search Assistance Demonstration, a similar experiment, were much smaller. Participants in Washington DC saw a 10% increase in wages, while participants in Florida saw no significant increase [34]. While these results are mixed, it appears that job search assistance provides at least some benefit for most participants.

Efforts on both the demand side and supply side can help in reducing the time spent on job search. The VOW Act was a multi-pronged approach to reducing veterans unemployment. The VOW Act incentivizes employers by offering tax credits for hiring veterans, and also

addresses the service members readiness to enter the job market by making changes to the Transition Assistance Program (TAP).

TAP was established in 1991 and provides pre-separation counseling, a DoD core curriculum that includes a financial planning workshop and a military occupation code crosswalk, an employment workshop run by the Department of Labor (DoL), a Veterans Affairs (VA) benefits workshop, and career-specific track tailored for education, technical training, or entrepreneurship. Prior to the VOW Act, pre-separation counseling was the only TAP component that service members were legally required to attend. Under the VOW Act, service members who have completed at least 190 days of continuous active duty must attend the pre-separation counseling, DoD core curriculum, DoL workshop, and VA briefings. However, if they can document their civilian employmnt or acceptance to an institution of higher education or accredited technical training, service members can be exempted from attending the DoL employment workshop.

Data on TAP utilization is collected via the CPS Veterans Supplement, which asks respondents whether they attended any TAP classes but does not break down attendance rates for the various components of TAP. Just under 50 percent of post-9/11 veterans report having taken at least one TAP workshop. However this attendance rate includes all post-9/11 veterans, so an increase in attendance rates in recent years due to the VOW Act would manifest as very small changes to this reported rate.

Another source of data on TAP utilization comes from the recent report Improving the Transition Process for Soldiers Leaving the Regular Army [78], in which RAND Arroyo Center researchers collected data about the attendance rates and perceptions of the TAP program from almost 200 soldiers at four Army installations. Of these soldiers, 70 percent reported having attended at least one TAP workshop. The VA benefits workshop was the most popular with 63 percent attendance, closely followed by the financial planning workshop (62 percent). Given that many of these soldiers had several months left before their separation date, these numbers should be considered a lower bound on the ultimate level of TAP attendance.

In this study I add to the existing research on TAP utilization by collecting individual-level data on TAP attendance from Joint Base Lewis-McChord (JBLM). I then match these data with post-separation data on employment, school enrollment, and unemployment benefit claims. The matched data allow me to address the following questions: which soldiers are attending the DoL Employment Workshop? Is there a difference in employment and educational outcomes between those soldiers who attend the DoL Employment Workshop and those who do not? For those who did attend the DoL Employment Workshop, is there a relationship between the timing of the workshop and employment/educational outcomes? The results of this study add to the current understanding of TAP effectiveness.

3.3 Data description

Pre- and post-separation data for each solider are needed to assess the impact of the DoL Employment Workshop. The data set for this study is compiled from the following sources:

- Washington State Department of Veteran Affairs (WDVA) provided a list of names and separation dates for soldiers who separated from JBLM between 2010 and 2014 and registered with WDVA.

- JBLM provided data from their Army Career and Alumni Program (ACAP) database that tracks utilization of TAP services.

- The Washington State Education Research and Data Center (ERDC) provided post-separation data on unemployment benefit claims, wages, and higher education enrollment for Washington state residents through the second quarter of 2014.

To track soldiers over time, I start with a list of 2,943 soldiers who separated from JBLM between 2010 and 2014 and registered with the VA in Washington State. Servicemembers generally register with the VA in the state in which they are planning to reside. I exclude those who separated after the 1st quarter of 2014, to ensure that I have at least 1 quarter

of post-separation wage data for each soldier. I then search for each of these soldiers in the ACAP database. JBLM uses their internal ACAP database to track soldiers participation in the various components of TAP. Some of the information in the ACAP database is entered by hand in a non-standardized way, making it difficult to access. However, I was able to retrieve dates of attendance for the DoL Employment Workshop and VA Benefits workshop, the reason for separating from the military, paygrade, and military occupational specialty (MOS). Based on the soldier's paygrade and MOS, he/she can be categorized by junior enlisted, senior enlisted, or officer status and by functional occupation group (Combat Arms, Combat Support, and Combat Service Support).[3] In the ACAP database I am able to find 1,805, or 61 percent, of the names provided by the WDVA.

The ERDC provided quarterly data on wages for Washington State residents, which is available through the second quarter of 2014. The wage data do not include wages from federal employers. The ERDC also provided unemployment benefit claims and enrollment in higher education institutions including technical schools, community colleges, and public four year colleges and universities. These data do not include enrollment information for private colleges and universities. Of the 1,805 soldiers in the ACAP database, I am able to find 1,231 in the ERDC data. I therefore have both pre- and post-separation data for only 42 percent of the soldiers listed by the WDVA.

3.4 DoL Employment Workshop attendance

The following results are based on an analysis of the 1,231 soldiers who are accounted for both pre- and post-separation. I first examine whether three characteristics of a soldiers military career — the functional group, reason for leaving, and enlisted/officer status — affect the likelihood that the soldier attends the DoL Employment Workshop.

Averaged across all years, 67 percent of soldiers in my data set attended the DoL Em-

[3]Some examples of military occupational specialties by functional group are: Combat Arms - Infantryman (11B), Cavalry Scout (19D); Combat Support - Military Police (31B), Combat Engineer (12B); Combat Service Support - Health Care Specialist (68W), Unit Supply Specialist (92Y)

ployment Workshop. This number is significantly higher than the 50 percent attendance rate for TAP seen in the CPS Veterans Supplement. However this difference is not surprising given that my data set starts in 2010, versus the post-9/11 veterans in the CPS Veterans Supplement which includes anyone who has separated since 2001. Looking at the data from 2010 and 2011, before the TAP classes became mandatory, the average attendance rate of the DoL Employment Workshop was only 43 percent. By 2014, the attendance rate had risen to 87 percent of the soldiers in our sample.

The data obtained from JBLM's ACAP database allows for disaggregation of DoL Employment Workshop attendance by several different categories. Table 3.1 describes the soldiers in the data set in terms of their reason for leaving, their functional group, and their paygrade group (junior enlisted, senior enlisted, or officer), and what percentage of each group attended the DoL Employment Workshop. Interestingly, soldiers who are retiring are the most likely to attend the DoL Employment Workshop. This is somewhat surprising given that attendance at the DoL Employment Workshop is not mandatory for retirees. Attendance rates are similar among the three functional groups, with Operational Support soldiers having the highest attendance rate. Officers are much less likely to attend the DoL Employment Workshop. This may reflect the fact that all officers have at least a bachelors degree upon being commissioned, and may feel more confident in their job-seeking skills.

Table 3.2 shows the attendance rate at the DoL Employment Workshop by year of separation from the Army. Although the program was voluntary before November 2012 and mandatory afterwards, there was a gradual increase in attendance throughout the time period of the study.

Table 3.3 uses a linear regression to summarize the soldier characteristics that predict if and when the DoL workshop is attended. Column 1 shows predictors for ever attending the DoL workshop. Soldiers who separate involuntarily are significantly less likely to attend the workshop, as are officers. There is no significant difference in attendance between junior and senior enlisted soldiers, nor between functional groups. Column 2 looks at whether a soldier attends the DoL workshop early (6 months or more prior to separation), conditional on ever

Table 3.1 DoL Employment Workshop Attendance by Soldier Characteristics

Reason for Leaving Army	Count	Percent of Sample	Attendance Rate
Voluntary	626	50.8	74.7
Involuntary	265	21.5	67.2
Retiring	160	13 .0	80.6
Functional Group	**Count**	**Percent of Sample**	**Attendance Rate**
Combat Arms	369	30.0	73.4
Combat Support	172	14.0	77.3
Combat Service Support	424	34.4	73.8
Paygrade Group	**Count**	**Percent of Sample**	**Attendance Rate**
Junior Enlisted (E1-E5)	837	68.0	70.8
Senior Enlisted/ Warrant Officer	277	22.5	66.4
Officer	86	7.0	43

Notes: Counts do not add up to 1,231 within each group due to missing data.

Table 3.2 DoL Employment Workshop Attendance by Year of Separation

Separation Year	Count	Attendance Rate
2010	122	38.5
2011	205	45.8
2012	211	64.4
2013	467	74.9
2014	226	86.7

attending the workshop. Among those who attend the workshop, involuntary separators and retirees are significantly less likely to attend early. There is no significant difference in early attendance between the Combat Arms and Combat Support groups, but Combat Service Support soldiers are significantly less likely to attend the workshop early.

Table 3.3 Results of linear probability model. Column 1 shows predictors of ever attending the DoL workshop and column 2 shows predictors of attending the workshop 6 months or more prior to separation.

	(1)	(2)
	DoL attendance	Early attendance
Involuntary Sep.	-0.105***	-0.210***
	(0.0219)	(0.0298)
Retiring	0.0346	-0.367***
	(0.0317)	(0.0415)
Senior Enlisted	-0.00575	-0.0532
	(0.0283)	(0.0370)
Officer	-0.174***	0.0126
	(0.0378)	(0.0546)
Combat Support	0.0327	-0.0539
	(0.0269)	(0.0352)
Combat Service Support	-0.00141	-0.0559**
	(0.0209)	(0.0278)
Constant	0.821***	0.680***
	(0.0176)	(0.0228)
Observations	1,859	1,466
R-squared	0.026	0.106

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.5 Results

I first summarize post-separation outcomes by reason for leaving, functional group, and paygrade group. I then use regression analysis to examine the relationship between attendance and timing of the DoL Employment Workshop and post-separation outcomes for veterans while controlling for their military career characteristics.

3.5.1 Post-separation outcomes

After separation, the veterans in my data set may be working, enrolled in school, collecting unemployment benefits, or any combination of these three activities. Figure 3.2 shows the various outcomes for all soldiers. Table 3.4 shows the outcomes by reason for leaving, functional group, and paygrade group. Retirees and officers are much more likely to be employed within one quarter (three months) of separating from the army, and are less likely to be enrolled in school or collecting unemployment benefits. Employment and school enrollment rates are similar among the three functional groups.

3.5.2 Relationship Between DoL Employment Workshop and Outcomes

To look at the relationship between attending the DoL Employment Workshop and veterans' post-separation employment outcomes, I first compare outcomes for the group of soldiers who attended the DoL Employment Workshop versus those who did not attend the workshop. I then further split the group who attended the workshop into early attenders, who took the workshop more than 6 months before separating and late attenders, who took the workshop within 6 months of separating. Table 3.5 shows the average outcomes based on whether or not the soldier attended the DoL Employment Workshop. The outcomes shown in this table are:

- Working within 1 quarter of separating (Work)
- Enrolled in school within 1 quarter of separating (School)

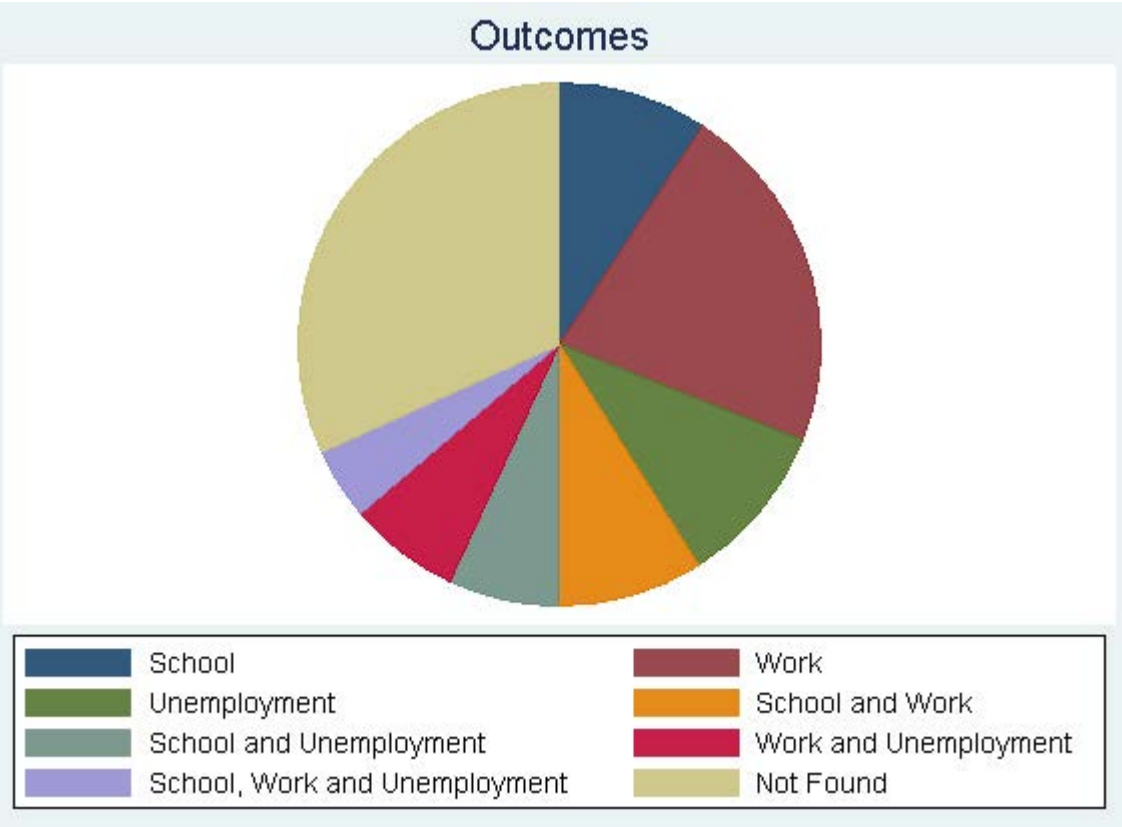

Figure 3.2 Post-separation outcomes for all soldiers

Table 3.4 Post-separation Outcomes by Soldier Characteristics

Reason for Leaving Army	Working	School	Unemployment
Voluntary	33.8	28.1	41.4
Involuntary	31.7	21.1	44.1
Retiring	56.2	14.4	19.4
Functional Group	**Working**	**School**	**Unemployment**
Combat Arms	38.5	24.7	37.4
Combat Support	39.5	21.5	41.3
Combat Service Support	35.6	25.5	39.4
Paygrade Group	**Working**	**School**	**Unemployment**
Junior Enlisted (E1-E5)	32.8	26.7	42.4
Senior Enlisted/ Warrant Officer	46.5	18.1	28.8
Officer	58.1	3.5	23.2

Notes: Table shows the percentage of each group that has experienced the given outcome within one quarter of separating from the army.

- Has claimed unemployment benefits within 1 quarter of separating (UI)
- Number of quarters between separating and finding employment (Time to Work)
- Hourly wage of first post-separation job (Wage)
- Number of consecutive weeks claiming unemployment benefits post-separation (Weeks UI).

Table 3.5 shows that soldiers who attended the DoL Employment Workshop are more likely to find employment, enroll in school, and collect unemployment benefits within one

quarter of separating. This difference is statistically significant for enrolling in school and collecting unemployment benefits, but not for working. The increase across all categories occurs because the outcomes are non-exclusive. Those who attended the DoL Employment Workshop are more likely to engage in two or more of these three activities (working, attending school, and collecting unemployment) than their counterparts who did not attend the workshop. The overlapping outcomes for those who took the DoL Employment Workshop and those who did not are shown in more detail in Figures **??** and **??** in the appendix.

The biggest impact of the DoL Employment Workshop is in reducing the average amount of time needed to find a job after separating. Wages for those who attended the DoL Employment Workshop appear to be lower than for those who do not attend the workshop. This difference may be driven by high-wage earners who had a job lined up prior to separation and were therefore exempt from attending the workshop.

Table 3.6 shows the same outcomes but grouped by soldiers who took the DoL Employment Workshop early (more than 6 months before separating) versus those who took it closer to their separation date. Those who attended the workshop early in their separation process are much more likely to be working within 3 months of separating and much less likely to claim unemployment benefits.

There are several factors that determine when (relative to separation) a soldier will take the DoL workshop. In focus groups held by RAND, many soldiers described some supervisors as being supportive of the DoL workshop and others who were less willing to allow their subordinates to take time away from their current duties, indicating that the attitude of one's supervisor may play a role in the timing of DoL workshop attendance [78]. Deployment schedules may also affect workshop attendance, although soldiers agreed that it was easy to attend the workshop online while deployed.

Despite some exogeneity in the timing of workshop attendance, unobserved characteristics such as organizational skills or motivation to find civilian employment likely play a large role. The reason for separating is also correlated with the timing of workshop attendance, since soldiers separating involuntarily may have less advance notice of their separation date.

Reasons for involuntary separation include medical and disciplinary issues, which may also impact subsequent labor market outcomes. Therefore the improved outcomes for those who attend the workshop early should be interpreted with caution given the presence of selection bias.

Table 3.5 Outcomes by DoL Employment Workshop Attendance.

Variable	Work	School*	UI**	Time to Work***	Wage***	Weeks UI
DoL Employment Workshop	38.1	24.4	39.9	1.6	17.09	13.08
No DoL Employment Workshop	36.8	19.9	33.6	2.7	22.06	14.15

* The difference between means is statistically significant at the 10% level.

** The difference between means is statistically significant at the 5% level.

*** The difference between means is statistically significant at the 1% level.

Table 3.6 Outcomes by Timing of DoL Employment Workshop Attendance.

Variable	Work***	School	UI***	Time to Work***	Wage**	Weeks UI
Early DoL Employment Workshop	44.8	22.9	34.2	1.2	18.37	11.8
Late DoL workshop	34.1	25.3	43.3	1.9	16.25	13.9

* The difference between means is statistically significant at the 10% level.

** The difference between means is statistically significant at the 5% level.

*** The difference between means is statistically significant at the 1% level.

Given that DoL Employment Workshop attendance rates vary based on the soldiers characteristics, I include the soldiers' reason for leaving the military, functional group, and paygrade group in all regression analysis. Tables 3.7 and 3.8 show the relationship between DoL Employment Workshop attendance and the various outcomes of interest. While controlling for these observable characteristics does not provide a causal interpretation, it does decrease some of the bias inherent in comparing attendees and non-attendees. There are two main forms of bias affecting the relationship between the DoL workshop and subsequent outcomes. First, there is a negative bias arising from the fact that all retirees and any soldier who hs a job lined up prior to separating are exempt from attending the workshop. These individuals are likely to have a shorter time to work, spend fewer weeks collecting unemployment benefits, and have readily transferrable skills which result in higher wages. Second, there is a positive bias due to unobervables such as motivation or organization driving selection into training.

The results in table 3.7 show a positive association between workshop attendance and probability of obtaining employment within one quarter of separating. Adding controls for observable characteristics make the association between the DoL workshop and finding employment within one quarter larger and more significant, relative to the results in table 3.5. The stronger positive association between the DoL workshop and finding employment indicates that these controls are accounting for some of the negative bias. For example, officers may be more likely to have a job lined up prior to separating. The results from table 3.7 show that officers and retirees are significantly more likely to be employed within one quarter of separating. Table 3.8 shows that for those soldiers who attended the DoL Employment Workshop, the time between separation and first employment is significantly lower and wages are also significantly lower. There is also a marginally significant decrease in the number of weeks spent collecting unemployment benefits among those soldiers who attended the workshop.

Tables 3.9 and 3.10 show the relationship between the timing of attending the DoL Employment Workshop for those soldiers who ever attended, and the outcomes of interest. Table

Table 3.7 Logistic Regression of DoL Employment Workshop Attendance on Outcomes.

	(1) Work	(2) School	(3) Unemployment
DoL Employment Workshop	1.468**	1.104	1.043
	(0.998)	(0.892)	(0.815)
Senior Enlisted	1.322	0.845	0.883
	(1.058)	(0.908)	(0.865)
Officer	3.264***	0.124***	0.337***
	(2.127)	(0.698)	(0.775)
Involuntary Sep.	1.037	0.651**	1.025
	(0.839)	(0.704)	(0.808)
Retiring	2.024***	0.499**	0.370***
	(1.374)	(0.788)	(0.640)
Combat Support	1.047	0.815	1.143
	(0.918)	(0.872)	(0.933)
Combat Service Support	0.777	1.142	1.195
	(0.681)	(0.881)	(0.844)
Observations	953	953	953

*** p<0.01, ** p<0.05, * p<0.1

Notes: Coefficients are reported as odds ratios. Dependent variables are binary indicators for obtaining work, enrolling in school, and making an unemployment benefit claim within the first quarter of separating.

Table 3.8 Linear Regression of DoL Employment Workshop Attendance on Outcomes.

	(1) Time to Work	(2) Wage	(3) Weeks UI
DoL Employment Workshop	-1.575***	-2.898**	-2.596*
	(0.236)	(1.312)	(1.555)
Senior Enlisted	-0.199	3.511*	-1.529
	(0.329)	(1.838)	(2.064)
Officer	-0.732*	30.53***	-9.355***
	(0.437)	(2.495)	(3.211)
Involuntary Sep.	-0.224	-2.510*	0.762
	(0.261)	(1.455)	(1.596)
Retiring	-0.124	0.788	-4.695**
	(0.353)	(1.960)	(2.329)
Combat Support	0.0044	2.257	1.012
	(0.301)	(1.662)	(1.918)
Combat Service Support	-0.0702	0.801	0.851
	(0.230)	(1.271)	(1.481)
Constant	3.320***	16.87***	16.15***
	(0.225)	(3.278)	(1.712)
Observations	578	570	953

*** p<0.01, ** p<0.05, * p<0.1

Notes: Dependent variables are number of quarters between separating and obtaining work, wages, and number of weeks of unemployment benefit claims.

3.9 shows that every extra month between workshop attendance and separation is associated with a significant increase in the probability of being employed within one quarter of separation. Similarly, table 3.10 shows that every extra month between workshop attendance and separation is associated with a significant decrease in the amount of time spent looking for work. Relative to table 3.5, the results in table 3.9 again show that adding controls reduces negative bias. Table 3.9 shows that the DoL workshop is associated with reduced time to work, a smaller wage differential, and fewer weeks spent collecting unemployment benefits once soldier characteristics are added.

3.5.3 Effect of the VOW Act

As part of the VOW Act, the content of the DoL Employment Workshop was overhauled. I therefore extend my model to allow the effect of the DoL Employment Workshop to be different before and after the VOW Act went into effect. I add an indicator variable that is 1 if the soldier separated after the 4th quarter of 2012, since the VOW Act changes went into effect as of November 21, 2012. Tables 3.11 and 3.12 show the results of this model.

The main result from this extended model is that the effect of the DoL Employment Workshop on securing employment appears to be much stronger before the VOW Act was implemented. There are three main reasons for this. First, the economy was improving around the time the VOW Act went into effect. All soldiers who separated after 2012 are much more likely to find employment within 3 months regardless of whether they attended the DoL Employment Workshop. Second, the attendance rates at the DoL Employment Workshop grew to 86 percent, as seen in Table 2.4. Of those soldiers who separated after the fourth quarter of 2012, only 147 did not attend the DoL Employment Workshop. With so few data points for soldiers who did not attend the DoL Employment Workshop, the model loses some statistical power. Finally, with positive selection bias, the effect of a mandatory program would be smaller than that of a voluntary program. Those who voluntarily attended the workshop before the VOW Act was implemented may have been more conscientious and/or more motivated to find employment.

Table 3.9 Logistic Regression of DoL Employment Workshop Timing on Outcomes.

	(1) Work	(2) School	(3) Unemployment
DoL Timing	1.038**	0.997	0.976
	(0.247)	(0.258)	(0.247)
Senior Enlisted	1.255	0.885	0.943
	(1.104)	(1.007)	(0.976)
Officer	2.160*	0.120**	0.430
	(2.010)	(0.941)	(01.020)
Involuntary Sep.	0.919	0.891	1.074
	(0.860)	(0.875)	(0.905)
Retiring	1.658*	0.469**	0.384***
	(0.1.350)	(0.832)	(0.697)
Combat Support	1.212	0.622*	0.978
	(0.1.036)	(0.817)	(0.941)
Combat Service Support	0.676**	1.026	1.218
	(0.696)	(0.891)	(0.928)
Observations	714	714	714

*** p<0.01, ** p<0.05, * p<0.1

Notes: Coefficients are reported as odds ratios. DoL Timing is defined as the number of months between workshop attendance and separation. Dependent variables are binary indicators for obtaining work, enrolling in school, and making an unemployment benefit claim within the first quarter of separating.

Table 3.10 Linear Regression of DoL Employment Workshop Timing on Outcomes.

	(1) Time to Work	(2) Wage	(3) Weeks UI
DoL Timing	-0.0586***	-0.0534	-0.149
	(0.018)	(0.071)	(0.139)
Senior Enlisted	-0.135	4.371***	-1.36
	(0.327)	(1.329)	(2.289)
Officer	-0.462	21.18***	-7.940*
	(0.489)	(1.995)	(4.078)
Involuntary Sep.	0.212	-1.446	2.061
	(0.267)	(1.071)	(1.844)
Retiring	0.291	0.399	-3.248
	(0.349)	(1.402)	(2.574)
Combat Support	-0.191	0.526	-1.467
	(0.283)	(1.137)	(2.103)
Combat Service Support	0.222	-1.339	0.517
	(0.228)	(0.910)	(1.659)
Constant	-1.844***	15.68***	14.49***
	(0.197)	(0.783)	(1.497)
Observations	418	413	714

*** p<0.01, ** p<0.05, * p<0.1

Notes: DoL Timing is defined as the number of months between workshop attendance and separation. Dependent variables are number of quarters between separating and obtaining work, wages, and number of weeks of unemployment benefit claims.

Table 3.11 Logistic Model with Post-VOW Act Interaction

	(1) Work	(2) School	(3) Unemployment
DoL Employment Workshop	1.520	0.848	0.994
	(1.288)	(0.924)	(0.945)
VOW Act	4.263***	0.531*	0.788
	(2.329)	(0.890)	(0.963)
DoL X VOW	0.553*	2.048*	1.197
	(0.913)	(1.884)	(1.288)
Senior Enlisted	1.252	0.846	0.890
	(1.037)	(0.917)	(0.879)
Officer	3.174***	0.126***	0.342***
	(2.216)	(0.709)	(0.778)
Involuntary Sep.	0.924	0.678**	1.045
	(0.799)	(0.713)	(0.814)
Retiring	2.206***	0.515**	0.370***
	(1.474)	(0.807)	(0.638)
Combat Support	1.016	0.818	1.147
	(0.906)	(0.863)	(0.945)
Combat Service Support	0.733*	1.166	1.204
	(0.679)	(0.887)	(0.853)
Observations	953	953	953

*** p<0.01, ** p<0.05, * p<0.1

Notes: Coefficients are reported as odds ratios. Dependent variables are binary indicators for obtaining work, enrolling in school, and making an unemployment benefit claim within the first quarter of separating.

Table 3.12 Linear Model with Post-VOW Act Interaction

	(1) Time to Work	(2) Wage	(3) Weeks UI
DoL Employment Workshop	-1.537***	-13.21***	-0.23
	(0.287)	(4.195)	(2.136)
VOW Act	-3.276***	-8.775*	-10.47***
	(0.361)	(5.262)	(2.689)
DoL X VOW	1.290***	8.19	1.178
	(0.424)	(6.176)	(3.132)
Senior Enlisted	-0.0554	1.837	-0.894
	(0.291)	(4.284)	(2.017)
Officer	-0.372	30.35***	-8.444***
	(0.387)	(5.759)	(3.138)
Involuntary Sep.	0.109	-5.892*	1.711
	(0.233)	(3.420)	(1.571)
Retiring	-0.171	-1.365	-5.350**
	(0.313)	(4.564)	(2.281)
Combat Support	0.158	3.123	1.291
	(0.266)	(3.883)	(1.873)
Combat Service Support	0.112	6.368**	1.193
	(0.204)	(2.964)	(1.450)
Constant	4.329***	26.61***	19.60***
	(0.255)	(3.707)	(1.897)
Observations	578	570	953

*** p<0.01, ** p<0.05, * p<0.1

3.5.4 Limitations

An important limitation of this study is that I cannot show a causal relationship between attending the DoL Employment Workshop and subsequent outcomes. Those who attend the DoL Employment Workshop may be systematically different than those who do not attend, which can bias any measurement of the effect of taking the workshop. For example, those who already have jobs lined up post-separation may choose not to attend the workshop. Alternatively, those who do attend the workshop may do so because they are more motivated to find employment.

The other important limitation of this study is the inability to track 100 percent of the soldiers in our data set. Some of these missing soldiers moved out of Washington State, some have dropped out of the labor force, and some are likely working for federal employers or attending private colleges or universities. If the missing soldiers are systematically different from the soldiers found in our data, this can also bias our results. Furthermore, the large number of missing soldiers prevents us from calculating any meaningful rates of overall employment for this population.

3.6 Conclusion

This study has provided insight into TAP utilization among soldiers and investigated post-separation outcomes for Army veterans in much more detail than was possible with previously available sources of data. It is important to note that since the conclusion of work on this study, VOW Act compliance rates within the Army have continued to increase. Unemployment compensation for ex-servicemembers (UCX) payments have declined rapidly since the time of this study, indicating continued improvment of employment outcomes for veterans.

I find that DoL Employment Workshop attendance increased steadily throughout the time period of my study, reaching 86.7 percent in 2014. Post-separation data show that retirees and officers are the most likely to find employment within 3 months of separating. These groups are also the least likely to enroll in school within 3 months of separating. There

is a strong correlation between attending the DoL Employment Workshop and the likelihood of finding employment within 3 months of separating, although this relationship is weaker during the time since the VOW Act has gone into effect. I also find that attending the DoL Employment Workshop farther in advance of separating leads to a reduction in time spent searching for civilian employment. Those who attend the workshop earlier may be more motivated or organized, or otherwise have higher unobserved ability, which is suggestive of a positive selection bias in the overall relationship between the workshop and subsequent employment rates.

There are several ways this analysis could be expanded to provide more information about the post-separation outcomes of veterans. First, more wage data could be added from the ERDC as it becomes available. Having a longer time series would allow for analysis of longer-term trends and provide additional insights regarding school completion, wage trajectories, and job tenure. Second, the ability to track 100 percent of the soldiers from a given cohort, perhaps through survey data, would be valuable for estimating overall employment rates as well as the effect of moving out of state. Finally, adding demographic and/or military history variables such as gender, race, deployment schedule, and disability rating would allow for matching techniques to be used to estimate a causal effect of the DoL Employment Workshop.

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Appendix A

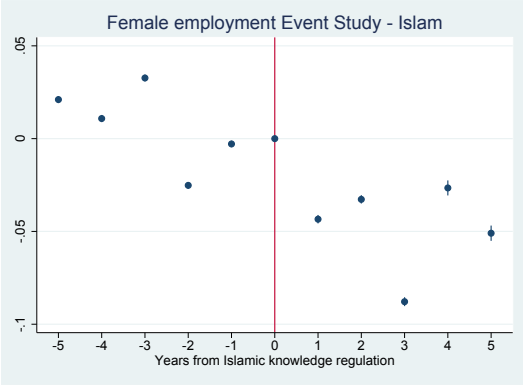

Figure A1 Year coefficients in regions that pass Islamic knowledge regulations. Dependent variable is female employment rate.

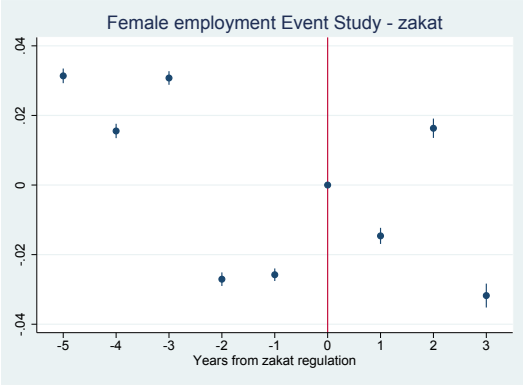

Figure A2 Year coefficients in regions that pass *zakat* regulations. Dependent variable is female employment rate.

Table A.1 Irwin-Hall distribution

N	0.50%	2.50%	5%	50%	95%	97.50%	99.50%
	Percentile						
1	0.005	0.025	0.050	0.500	0.950	0.975	0.995
2	0.050	0.113	0.159	0.500	0.842	0.888	0.950
3	0.103	0.177	0.223	0.500	0.778	0.824	0.897
4	0.148	0.220	0.262	0.500	0.739	0.780	0.853
5	0.180	0.249	0.287	0.500	0.714	0.751	0.820

Continued on next page

Table A.1 – continued from previous page

N	0.50%	2.50%	5%	50%	95%	97.50%	99.50%
6	0.206	0.271	0.306	0.500	0.695	0.730	0.794
7	0.227	0.287	0.320	0.500	0.680	0.713	0.773
8	0.244	0.301	0.332	0.500	0.668	0.699	0.756
9	0.257	0.312	0.341	0.500	0.659	0.688	0.743
10	0.270	0.322	0.350	0.500	0.651	0.678	0.731
11	0.279	0.330	0.357	0.500	0.643	0.670	0.721
12	0.289	0.337	0.363	0.500	0.637	0.663	0.712
13	0.297	0.343	0.368	0.500	0.632	0.657	0.703
14	0.304	0.349	0.373	0.500	0.627	0.651	0.696
15	0.310	0.354	0.377	0.500	0.623	0.646	0.690
16	0.316	0.359	0.381	0.500	0.619	0.641	0.684
17	0.322	0.363	0.385	0.500	0.615	0.637	0.679
18	0.326	0.367	0.388	0.500	0.612	0.633	0.674
19	0.331	0.370	0.391	0.500	0.609	0.630	0.669
20	0.336	0.374	0.394	0.500	0.606	0.626	0.665
21	0.339	0.377	0.396	0.500	0.604	0.623	0.662
22	0.343	0.380	0.398	0.500	0.601	0.621	0.658
23	0.346	0.382	0.401	0.500	0.599	0.618	0.654
24	0.349	0.385	0.403	0.500	0.597	0.615	0.651
25	0.352	0.387	0.405	0.500	0.595	0.613	0.648
26	0.355	0.389	0.407	0.500	0.593	0.611	0.645
27	0.358	0.391	0.408	0.500	0.592	0.609	0.643
28	0.360	0.393	0.410	0.500	0.590	0.607	0.640
29	0.363	0.395	0.412	0.500	0.588	0.605	0.637
30	0.365	0.397	0.413	0.500	0.587	0.603	0.635
31	0.367	0.398	0.415	0.500	0.585	0.602	0.633
32	0.369	0.400	0.416	0.500	0.584	0.600	0.631
33	0.371	0.402	0.417	0.500	0.583	0.599	0.629
34	0.373	0.403	0.418	0.500	0.582	0.597	0.627
35	0.375	0.404	0.420	0.500	0.580	0.596	0.625
36	0.377	0.406	0.421	0.500	0.579	0.594	0.624
37	0.378	0.407	0.422	0.500	0.578	0.593	0.622
38	0.380	0.408	0.423	0.500	0.577	0.592	0.620
39	0.381	0.409	0.424	0.500	0.576	0.591	0.619
40	0.383	0.410	0.425	0.500	0.575	0.590	0.618
41	0.384	0.412	0.426	0.500	0.574	0.588	0.616
42	0.386	0.413	0.427	0.500	0.573	0.587	0.614
43	0.387	0.414	0.428	0.500	0.572	0.586	0.613
44	0.388	0.415	0.428	0.500	0.572	0.585	0.612

Continued on next page

Table A.1 – continued from previous page

N	0.50%	2.50%	5%	50%	95%	97.50%	99.50%
45	0.389	0.416	0.429	0.500	0.571	0.584	0.611
46	0.391	0.417	0.430	0.500	0.570	0.583	0.609
47	0.392	0.418	0.431	0.500	0.569	0.583	0.608
48	0.393	0.419	0.431	0.500	0.569	0.582	0.607
49	0.394	0.419	0.432	0.500	0.568	0.581	0.606
50	0.395	0.420	0.433	0.500	0.567	0.580	0.605
51	0.396	0.421	0.434	0.500	0.567	0.579	0.604
52	0.397	0.422	0.434	0.500	0.566	0.579	0.603
53	0.398	0.422	0.435	0.500	0.565	0.578	0.602
54	0.399	0.423	0.435	0.500	0.565	0.577	0.601
55	0.400	0.424	0.436	0.500	0.564	0.576	0.600
56	0.401	0.424	0.437	0.500	0.564	0.576	0.599
57	0.402	0.425	0.437	0.500	0.563	0.575	0.598
58	0.402	0.426	0.438	0.500	0.562	0.574	0.598
59	0.403	0.426	0.438	0.500	0.562	0.574	0.597
60	0.404	0.427	0.439	0.500	0.561	0.573	0.596

Mean of N random variables uniformly distributed on the interval [0,1]. Simulated using 1,000,000 draws.

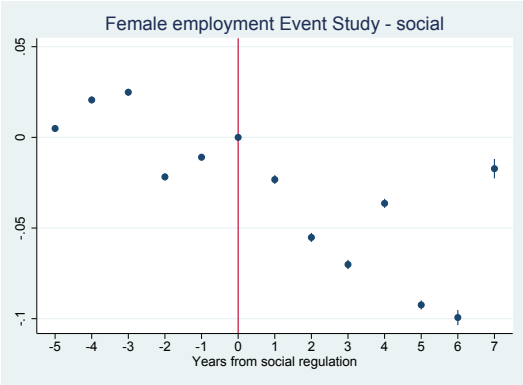

Figure A3 Year coefficients in regions that pass social regulations. Dependent variable is female employment rate.

Table A.2 Cross-validation results for employment model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-treatment	0.0276	0.0943	0.0537	0.0524	0.051	0.0642	0.053	0.053
Post-treatment	0.0083	0.0214	0.008	0.0078	0.0091	0.0168	0.0066	0.0066
Predictors								
Annual employment lags	X							
Biennial employment lags		X	X	X			X	X
Employment lags - 2 year MA					X	X		
Other covariates - averages			X	X		X		
Other covariates - biennial lags							X	X
Muslim vote share				X				X

Notes: Pre-treatment fit measured as root mean squared prediction error. Post-treatment fit measured as mean squared prediction error. MA = moving average. Other covariates are urban rate, education level, household size, and age.

Table A.3 Cross-validation results for fertility model

	(1)	(2)	(3)	(4)	(5)	(6)
Pre-treatment	0.0417	0.0437	0.0263	0.0125	0.0125	0.0126
Post-treatment	0.0040	0.0049	0.0043	0.0021	0.0023	0.0020
Predictors						
Fertility rate - annual lags				X	X	X
Fertility rate - biennial lags (5)	X		X			
Fertility rate - 2 year MA		X	X		X	
Other covariates - averages	X	X	X	X	X	X
Average female age	X	X	X	X	X	X
Average female age - biennial lags (5)	X	X	X	X	X	X
Muslim vote share						X

Notes: Pre-treatment fit measured as root mean squared prediction error. Post-treatment fit measured as mean squared prediction error. MA = moving average. Other covariates are urban rate, education level, and household size.

Table A.13 All Regional Treatments

Regency	Province	Regulation type	Source	year
Cianjur	West Java	islam	Candraningrum (2006)	2001
Kabupaten Solok	West Sumatra	islam	Candraningrum (2006)	2001
Taskimalaya	West Java	islam	Buehler and Muhtada (2016)	2001
Indramayu	West Java	islam	Buehler and Muhtada (2016)	2001
Pamekasan	East Java	islam	Candraningrum (2006)	2002
Bulukumba	S. Sulawesi	islam	Buehler and Muhtada (2016)	2003
Gowa	S. Sulawesi	islam	Buehler and Muhtada (2016)	2003
Kota Padang	West Sumatra	islam	Buehler and Muhtada (2016)	2003
Pasaman	West Sumatra	islam	Buehler and Muhtada (2016)	2003

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Table A.13 – continued from previous page

District	Province	Reg type	Source	year
Sawahlunto/Sijunjung	West Sumatra	islam	Buehler and Muhtada (2016)	2003
Banjar	S. Kalimantan	islam	Buehler and Muhtada (2016)	2004
Cirebon	West Java	islam	Buehler and Muhtada (2016)	2004
Dompu	West Nusa Tenggara	islam	Buehler and Muhtada (2016)	2004
Kota Bengkulu	Bengkulu	islam	Candraningrum (2006)	2004
Pesisir Selatan	West Sumatra	islam	Buehler and Muhtada (2016)	2004
Agam	West Sumatra	islam	Buehler and Muhtada (2016)	2005
Dompu	W. Nusa Tenggara	islam	Buehler and Muhtada (2016)	2005
Kota Kendari	SE Sulawesi	islam	Buehler and Muhtada (2016)	2005
Maros	S. Sulawesi	islam	Buehler and Muhtada (2016)	2005
Hulu Sungai Utara	S. Kalimantan	islam	online[1]	2003
Indramayu	West Java	social	Candraningrum (2006)	1999
Kupang	E. Nusa Tenggara	social	Lindsey (2012)	1999
Cianjur	West Java	social	Bush (2008)	2000
Cilacap	Central Java	social	Crouch (2009)	2000
Cirebon	West Java	social	online[1]	2000
Garut	West Java	social	Candraningrum (2006)	2000
Hulu Sungai Utara	S. Kalimantan	social	online[1]	2000
Kota Bengkulu	Bengkulu	social	Candraningrum (2006)	2000
Kota Bukittinggi	West Sumatra	social	online[1]	2000
Taskimalaya	West Java	social	online[1]	2000
Bandung	West Java	social	online[1]	2001
Jember	East Java	social	Candraningrum (2006)	2001
Kuningan	West Java	social	Buehler and Muhtada (2016)	2001
Way Kanan	Lampung	social	online[1]	2001
Bandar Lampung	Lampung	social	online[1]	2002
Batam	Riau Islands	social	Candraningrum (2006)	2002
Bekasi	West Java	social	online[1]	2002
Bulukumba	S. Sulawesi	social	Candraningrum (2006)	2002
Gresik	East Java	social	online[1]	2002

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Table A.13 – continued from previous page

District	Province	Reg type	Source	year
Lahat	S. Sumatra	social	online[1]	2002
Majalengka	West Java	social	online2	2002
Mataram	W. Nusa Tenggara	social	Candraningrum (2006)	2002
Pontianak	W. Kalimantan	social	Lindsey (2012)	2002
Sumenep	East Java	social	online[1]	2002
Cilacap	Central Java	social	Crouch (2009)	2003
Gorontolo	Gorontolo	social	Candraningrum (2006)	2003
Ketapang	W. Kalimantan	social	online[1]	2003
Medan	North Sumatra	social	Crouch (2009)	2003
Pandeglang	Banten	social	online3	2003
Pasuruan	East Java	social	Buehler (20080	2003
Tebo	Jambi	social	online4	2003
Kudus	Central Java	social	Crouch (2009)	2004
Lampung Selatan	Lampung	social	online5	2004
Sambas	W. Kalimantan	social	Lindsey (2012)	2004
Situbondo	East Java	social	online6	2004
Malang	East Java	social	online5	2005
Probolinggo	East Java	social	online5	2005
Sukabumi	West Java	social	online5	2005
Tangerang	Banten	social	Candraningrum (2006)	2005
Tanah Datar	West Sumatra	veil	online[1]	2001
Indramayu	West Java	veil	Candraningrum (2006)	2001
Solok district	West Sumatra	veil	Candraningrum (2006)	2002
Bulukumba	S. Sulawesi	veil	Candraningrum (2006)	2003
Lima Puluh Kota	West Sumatra	veil	Crouch (2009)	2003
Pasaman	West Sumatra	veil	Crouch (2009)	2003
Sawahlunto/Sijunjung	West Sumatra	veil	Crouch (2009)	2003
Pandeglang	Banten	veil	online5	2004
Sukabumi	West Java	veil	online5	2004
Enrekang	S. Sulawesi	veil	Candraningrum (2006)	2005

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Table A.13 – continued from previous page

District	Province	Reg type	Source	year
Kota Padang	West Sumatra	veil	Candraningrum (2006)	2005
Maros	S. Sulawesi	veil	Candraningrum (2006)	2005
Cilegon	West Java	zakat	Buehler and Muhtada (2016)	2001
Bandung	West Java	zakat	Buehler and Muhtada (2016)	2002
Bima	W. Nusa Tenggara	zakat	Buehler and Muhtada (2016)	2002
Lombok Timur	W. Nusa Tenggara	zakat	Buehler and Muhtada (2016)	2002
Banjar	S. Kalimantan	zakat	Buehler and Muhtada (2016)	2003
Bulukumba	S. Sulawesi	zakat	Buehler and Muhtada (2016)	2003
Dompu	W. Nusa Tenggara	zakat	Buehler and Muhtada (2016)	2003
Garut	West Java	zakat	Buehler and Muhtada (2016)	2003
Kapubaten Solok	West Sumatra	zakat	Buehler and Muhtada (2016)	2003
Kota Solok	West Sumatra	zakat	Buehler and Muhtada (2016)	2003
Lima Puluh Kota	West Sumatra	zakat	Buehler and Muhtada (2016)	2003
Lombok Timur	W. Nusa Tenggara	zakat	Buehler and Muhtada (2016)	2003
Pesisir Selatan	West Sumatra	zakat	Crouch (2009)	2003
Banjarmasin	S. Kalimantan	zakat	Crouch (2009)	2004
Bukittingggi	West Sumatra	zakat	Buehler and Muhtada (2016)	2004
Cianjur	West Java	zakat	Buehler and Muhtada (2016)	2004
Hulu Sungai Utara	S. Kalimantan	zakat	Buehler and Muhtada (2016)	2005
Jeneponto	S. Sulawesi	zakat	Buehler and Muhtada (2016)	2005
Maros	S. Sulawesi	zakat	Buehler and Muhtada (2016)	2005
Sidoarjo	East Java	zakat	Buehler and Muhtada (2016)	2005
Sukabumi	West Java	zakat	Buehler and Muhtada (2016)	2005
Banjar	S. Kalimantan	unknown		2001
Barru	S. Sulawesi	unknown		2001
Gowa	S. Sulawesi	unknown		2001
Maros	S. Sulawesi	unknown		2001
Samarinda	East Kalimantan	unknown		2001
Banjarbaru	S. Kalimantan	unknown		2002
Banjarnegara	Central Java	unknown		2002

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Table A.13 – continued from previous page

District	Province	Reg type	Source	year
Blitar	East Java	unknown		2002
Maros	S. Sulawesi	unknown		2002
Palangkaraya	C. Kalimantan	unknown		2002
Pati	Central Java	unknown		2002
Sampang	East Java	unknown		2002
Berau	E. Kalimantan	unknown		2003
Kolaka	S.E. Sulawesi	unknown		2003
Makassar	S. Sulawesi	unknown		2003
Payakumbuh	West Sumatra	unknown		2003
Tanggamus	Lampung	unknown		2003
Metro	Lampung	unknown		2004
Padang Panjang	West Sumatra	unknown		2004
Palembang	South Sumatra	unknown		2004
Palu	Central Sulawesi	unknown		2004
Pamekasan	East Java	unknown		2004
Barru	S. Sulawesi	unknown		2005
Kota Bogor	West Java	unknown		2005
Luwu Utara	S. Sulawesi	unknown		2005
Musi Banyuasin	South Sumatra	unknown		2005
Natuna	Riau Islands	unknown		2005
Tanggamus	Lampung	unknown		2005
Bangka	Bangka Belitung	unknown		2006
Kampar	Riau	unknown		2006
Kota Tegal	Central Java	unknown		2006
Lampung Utara	Lampung	unknown		2006
Palembang	South Sumatra	unknown		2006
Palu	Central Sulawesi	unknown		2006
Pangkal Pinang	Bangka Belitung	unknown		2006
Purworejo	Central Java	unknown		2006
Serang	Banten	unknown		2006

Continued on next page

Table A.13 – continued from previous page

District	Province	Reg type	Source	year
Sukamara	Central Kalimantan	unknown		2006

1 http://www.pustakaguru.com/2012/08/daftar-perda-syariah-di-seluruh.html

2 http://portalcirebon.blogspot.com/2009/09/perda-no-06-tahun-2002-majalengka.html

3 http://www.jdihukum.pandeglangkab.go.id/hukum/index.php?page=4&tipe=2&xtipe=6

4 http://www.jdih.setjen.kemendagri.go.id/semua.php?KWil=1509

5 https://tinyurl.com/yae5rexp

6 http://kabsitubondo.jdih.jatimprov.go.id/?page_id=799

Table A.4 Synthetic control results - effect of veiling regulations on female employment rates

West Sumatra			
District	RMSPE	Treatment Effect	Percentile Rank
Pesisir Selatan	0.074	-0.062	0.198
Solok	0.045	-0.099	0.059
Sawahlunto	0.064	0.003	0.515
Tanah Datar	0.031	-0.043	0.228
Lima Puluh Kota	0.041	-0.012	0.396
Padang	0.033	-0.01	0.436
Other Provinces			
District	RMSPE	Treatment Effect	Percentile Rank
Sukabumi, West Java	0.029	0.027	0.644
Indramayu, West Java	0.038	-0.034	0.257
Tanah Laut, S. Kalimantan	0.057	0.029	0.743
Kota Baru, S. Kalimantan	0.038	-0.033	0.267
Barito Kuala, S. Kalimantan	0.075	-0.038	0.248
Tapin, S. Kalimantan	0.049	0.047	0.812
Hulu Sungai Selatan, S. Kalimantan	0.037	0.016	0.693
Hulu Sungai Tengah, S. Kalimantan	0.059	-0.096	0.040
Tabalong, S. Kalimantan	0.043	-0.02	0.347
Bulukumba, S. Sulawesi	0.031	-0.023	0.010
Enrekang, S. Sulawesi	0.118	-0.057	0.198

Notes: Root mean squared prediction error (RMSPE) gives a measure of goodness of pre-treatment fit of the synthetic control group.

Table A.5 Synthetic control results - effect of Islamic knowledge regulations on female employment rates

West Sumatra				
District	year	RMSPE	Treatment Effect	Percentile Rank
Solok	2001	0.045	-0.067	0.119
Pesisir Selatan	2003	0.075	-0.098	0.040
Padang	2003	0.032	-0.033	0.267
Agam	2005	0.047	0.019	0.574
Other Provinces				
District	year	RMSPE	Treatment Effect	Percentile Rank
Tasikmalaya, West Java	2001	0.043	0.026	0.733
Cianjur, West Java	2001	0.061	-0.019	0.366
Indramayu, West Java	2001	0.038	-0.034	0.257
Bulukumba, S. Sulawesi	2003	0.053	0.113	0.950
Kota Bengkulu, Bengkulu	2004	0.068	0.035	0.653
Cirebon, West Java	2004	0.05	-0.039	0.297
Dompu, West Nusa Tenggara	2005	0.06	0.024	0.614
Kendari, S.E. Sulawesi	2005	0.041	0	0.525

Notes: Root mean squared prediction error (RMSPE) gives a measure of goodness of pre-treatment fit of the synthetic control group.

Table A.6 Synthetic control results - effect of zakat regulations on female employment rates

West Sumatra				
District	year	RMSPE	Treatment effect	Percentile rank
Pesisir Selatan	2003	0.075	-0.098	0.039604
Solok	2003	0.043	-0.075	0.128713
Lima Puluh Kota	2003	0.041	-0.012	0.39604
Bukittinggi	2004	0.094	0.028	0.643564
Other Provinces				
District	year	RMSPE	Treatment effect	Percentile rank
Sukabumi, West Java	2005	0.028	0.039	0.673267
Cianjur, West Java	2004	0.054	-0.034	0.306931
Tangerang, West Java	2004	0.029	0.01	0.564356
Serang,West Java	2001	0.03	-0.067	0.118812
Sidoarjo, East Java	2005	0.018	-0.027	0.326733
Lombok, West Nusa Tenggara	2002	0.028	0.021	0.673267
Dompu, West Nusa Tenggara	2003	0.061	0.009	0.544554
Bima, West Nusa Tenggara	2002	0.055	-0.008	0.465347
Bukukumba, S. Sulawesi	2003	0.053	0.113	0.950495

Notes: Root mean squared prediction error (RMSPE) gives a measure of goodness of pre-treatment fit of the synthetic control group.

Table A.7 Synthetic control results - effect of social regulations on female employment rates

West Sumatra				
District	year	RMSPE	Treatment effect	Percentile rank
Pesisir Selatan	2001	0.062	-0.115	0.020
Solok	2001	0.045	-0.067	0.119
Sawahlunto	2001	0.034	-0.191	0.010
Tanah Datar	2001	0.031	-0.043	0.228
Padang Pariaman	2001	0.031	-0.003	0.495
Agam	2001	0.034	-0.015	0.386
Lima Puluh Kota	2001	0.046	-0.046	0.198
Padang	2001	0.03	-0.026	0.327
Other Provinces				
District	year	RMSPE	Treatment effect	Percentile rank
Jember, East Java	2001	0.031	-0.028	0.327
Ogan Komering Ulu, South Sumatra	2002	0.052	0.015	0.594
Ogan Komering Ilir, South Sumatra	2002	0.051	0.003	0.535
Muara Enim, South Sumatra	2002	0.042	0.023	0.703
Musi Rawas, South Sumatra	2002	0.034	0.008	0.574
Kota Bandar Lampung, Lampung	2002	0.024	-0.033	0.267
Majalengka, West Java	2002	0.049	-0.034	0.257
Gresik, East Java	2002	0.018	-0.067	0.168
Sumenep, East Java	2002	0.033	-0.017	0.376
Pontianak, West Kalimantan	2002	0.043	0.062	0.861
Bulukumba, S. Sulawesi	2002	0.05	0.094	0.941
Medan, North Sumatra	2003	0.038	-0.015	0.366
Ketapand, West Kalimantan	2003	0.099	0.031	0.693
Kudus, Central Java	2004	0.052	0.109	0.941
Sambas, West Kalimantan	2004	0.073	0.042	0.693
Sukabumi, West Java	2005	0.028	0.039	0.673
Tangerang, West Java	2005	0.03	-0.007	0.455
Malang, East Java	2005	0.023	-0.02	0.356

Notes: Root mean squared prediction error (RMSPE) gives a measure of goodness of pre-treatment fit of the synthetic control group.

Table A.8 Synthetic control results - effect of veiling regulations on male employment rates

West Sumatra				
District	year	RMSPE	Treatment effect	Percentile rank
Pesisir Selatan	0.038	-0.031	0.227723	percentileRank
Solok	2002	0.031	-0.08	0.039604
Sawahlunto	2003	0.023	-0.031	0.19802
Tanah Datar	2001	0.038	-0.025	0.227723
Lima Puluh Kota	2003	0.023	0.014	0.683168
Padang	2005	0.034	-0.007	0.445545
Other Provinces				
District	year	RMSPE	Treatment effect	Percentile rank
Sukabumi, West Java	2004	0.028	0.033	0.80198
Indramayu, West Java	2001	0.027	-0.023	0.257426
Tanah Laut, S. Kalimantan	2001	0.019	0.008	0.653465
Kota Baru, S. Kalimantan	2001	0.022	0.005	0.623762
Barito Kuala, S. Kalimantan	2001	0.039	0.022	0.742574
Tapin, S. Kalimantan	2001	0.049	0.009	0.663366
Hulu Sungai Selatan, S. Kalimantan	2001	0.02	0.024	0.792079
Hulu Sungai Tengah, S. Kalimantan	2001	0.024	-0.056	0.079208
Tabalong, S. Kalimantan	2001	0.027	-0.016	0.316832
Bulukumba, S. Sulawesi	2001	0.052	0.07	0.950495
Enrekang, S. Sulawesi	2005	0.065	0.029	0.851485

Table A.9 Synthetic control results - effect of Islamic knowledge regulations on male employment rates

West Sumatra				
District	year	RMSPE	gap	percentileRank
Solok	2001	0.037	-0.013	0.386
Pesisir Selatan	2003	0.016	-0.048	0.119
Padang	2003	0.047	-0.005	0.495
Agam	2005	0.032	-0.022	0.257
Other Provinnces				
District	year	RMSPE	Treatment Effect	Percentile Rank
Tasikmalaya, West Java	2001	0.041	0.03	0.822
Cianjur, West Java	2001	0.044	0.02	0.733
Indramayu, West Java	2001	0.027	-0.023	0.257
Bulukumba, S. Sulawesi	2003	0.052	0.07	0.950
Kota Bengkulu, Bengkulu	2004	0.045	0.007	0.673
Cirebon, West Java	2004	0.037	-0.021	0.257
Dompu, West Nusa Tenggara	2005	0.05	-0.025	0.238
Kendari, S.E. Sulawesi	2005	0.029	0.027	0.842

Table A.10 Synthetic control results - effect of zakat regulations on male employment rates

West Sumatra				
District		RMSPE	gap	percentileRank
Pesisir Selatan	2003	0.037	-0.013	0.386
Solok	2003	0.03	-0.086	0.040
Lima Puluh Kota	2003	0.023	0.014	0.683
Bukittinggi	2004	0.086	0.063	0.950
Other Provinces				
District	year	RMSPE	Treatment effect	Percentile rank
Sukabumi, West Java	2005	0.028	0.035	0.871
Cianjur, West Java	2004	0.04	0.022	0.762
Tangerang, West Java	2004	0.019	0	0.604
Serang,West Java	2001	0.039	-0.056	0.099
Sidoarjo, East Java	2005	0.014	0.007	0.653
Lombok, West Nusa Tenggara	2002	0.013	-0.021	0.317
Dompu, West Nusa Tenggara	2003	0.044	-0.053	0.099
Bima, West Nusa Tenggara	2002	0.03	0.005	0.574
Bukukumba, S. Sulawesi	2003	0.052	0.07	0.950

Table A.11 Synthetic control results - effect of social regulations on male employment rates

West Sumatra				
District	year	RMSPE	gap	percentileRank
Pesisir Selatan	2001	0.036	-0.048	0.109
Solok	2001	0.016	-0.048	0.119
Sawahlunto	2001	0.023	-0.029	0.208
Tanah Datar	2001	0.038	-0.025	0.228
Padang Pariaman	2001	0.031	-0.003	0.465
Agam	2001	0.043	0.016	0.723
Lima Puluh Kota	2001	0.023	0.008	0.653
Padang	2001	0.032	-0.038	0.129
Other Provinces				
District	year	RMSPE	gap	percentileRank
Jember, East Java	2001	0.015	-0.011	0.39604
Ogan Komering Ulu, South Sumatra	2002	0.013	0.003	0.564356
Ogan Komering Ilir, South Sumatra	2002	0.008	0.016	0.693069
Muara Enim, South Sumatra	2002	0.017	0.018	0.712871
Musi Rawas, South Sumatra	2002	0.021	-0.018	0.326733
Kota Bandar Lampung, Lampung	2002	0.018	-0.019	0.326733
Majalengka, West Java	2002	0.015	-0.031	0.19802
Gresik, East Java	2002	0.01	-0.011	0.376238
Sumenep, East Java	2002	0.019	0.007	0.613861
Pontianak, West Kalimantan	2002	0.018	0.002	0.564356
Bulukumba, S. Sulawesi	2002	0.055	0.059	0.940594
Medan, North Sumatra	2003	0.012	0.021	0.752475
Ketapand, West Kalimantan	2003	0.029	0	0.534653
Kudus, Central Java	2004	0.025	0.037	0.871287
Sambas, West Kalimantan	2004	0.035	-0.005	0.50495
Sukabumi, West Java	2005	0.028	0.035	0.871287
Tangerang, West Java	2005	0.021	0.005	0.643564
Malang, East Java	2005	0.019	-0.039	0.108911

Notes: Root mean squared prediction error (RMSPE) gives a measure of goodness of pre-treatment fit of the synthetic control group.

Figure A4 Synthetic control results for social regulations in Minang region. Outcome is female employment rate. Treated regions are shown with solid lines and synthetic regions with dashed lines.

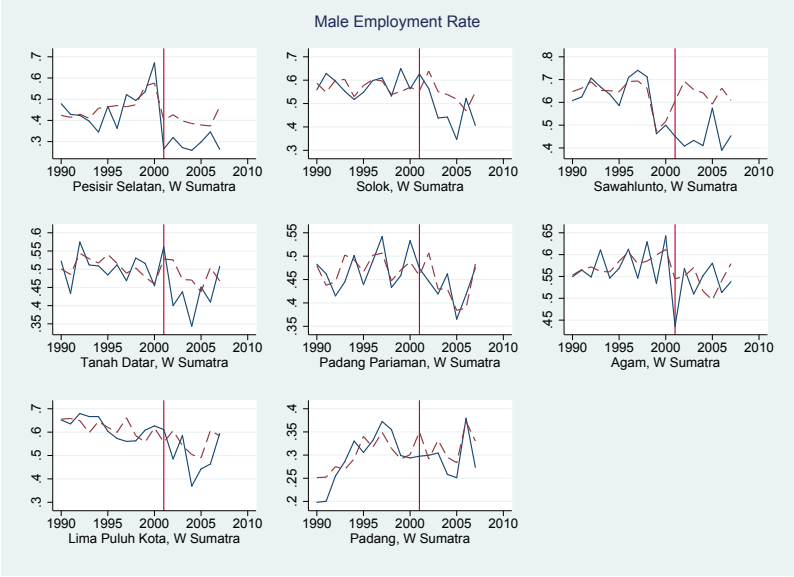

Figure A5 Synthetic control results for social regulations in Minang region. Outcome is male employment rate. Treated regions are shown with solid lines and synthetic regions with dashed lines.

Table A.12 Province level regulations

Province	Regulation type	Source	year
Gorontolo	islam	Buehler and Muhtada (2016)	2005
West Sumatra	social	Candraningrum (2006)	2001
S. Sumatra	social	Candraningrum (2006)	2002
S. Kalimantan	veil	online[1]	2001
Banten	zakat	Buehler and Muhtada (2016)	2004

1 http://www.pustakaguru.com/2012/08/daftar-perda-syariah-di-seluruh.html

Appendix B

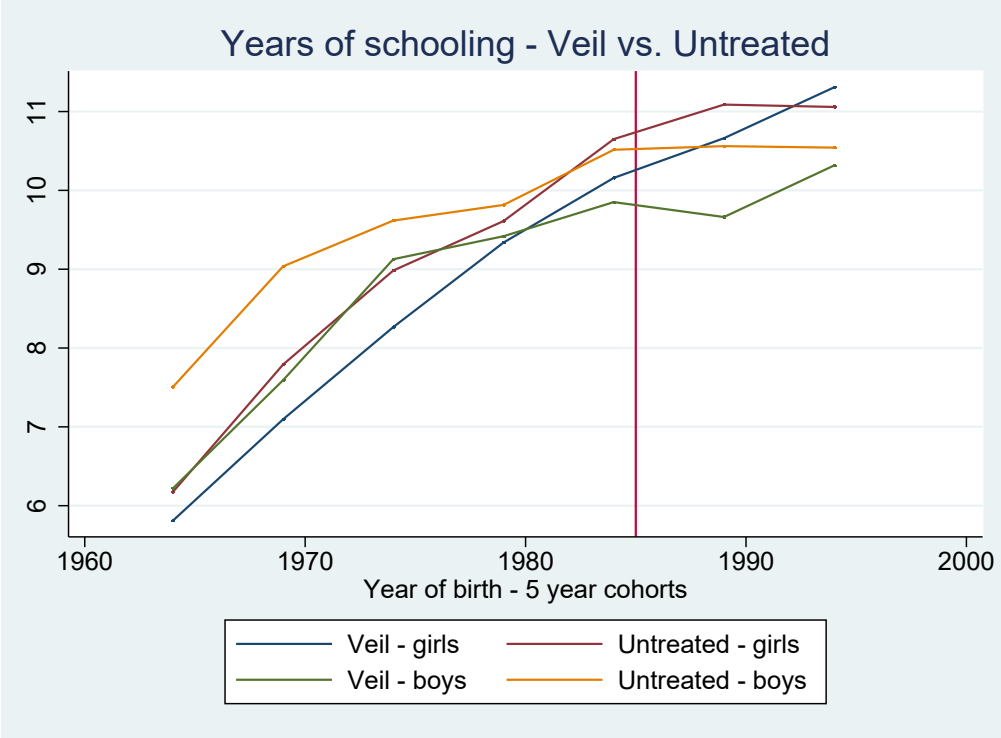

Figure B1 Years of schooling for 5-year cohorts - veil districts versus untreated districts.

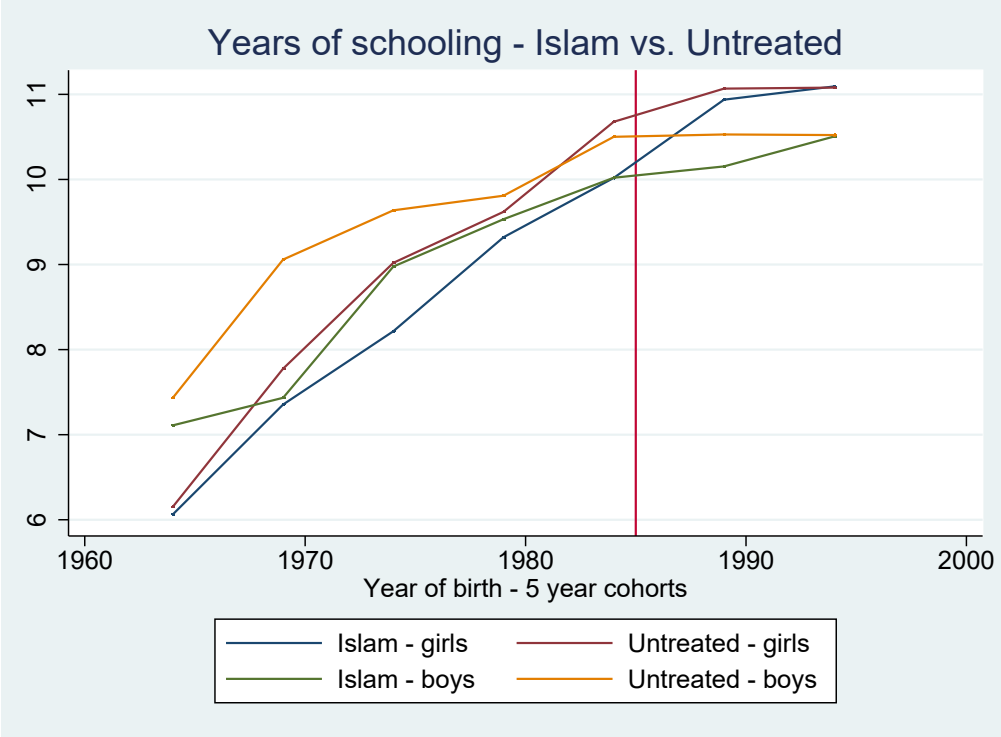

Figure B2 Years of schooling for 5-year cohorts - Islam districts versus untreated districts.

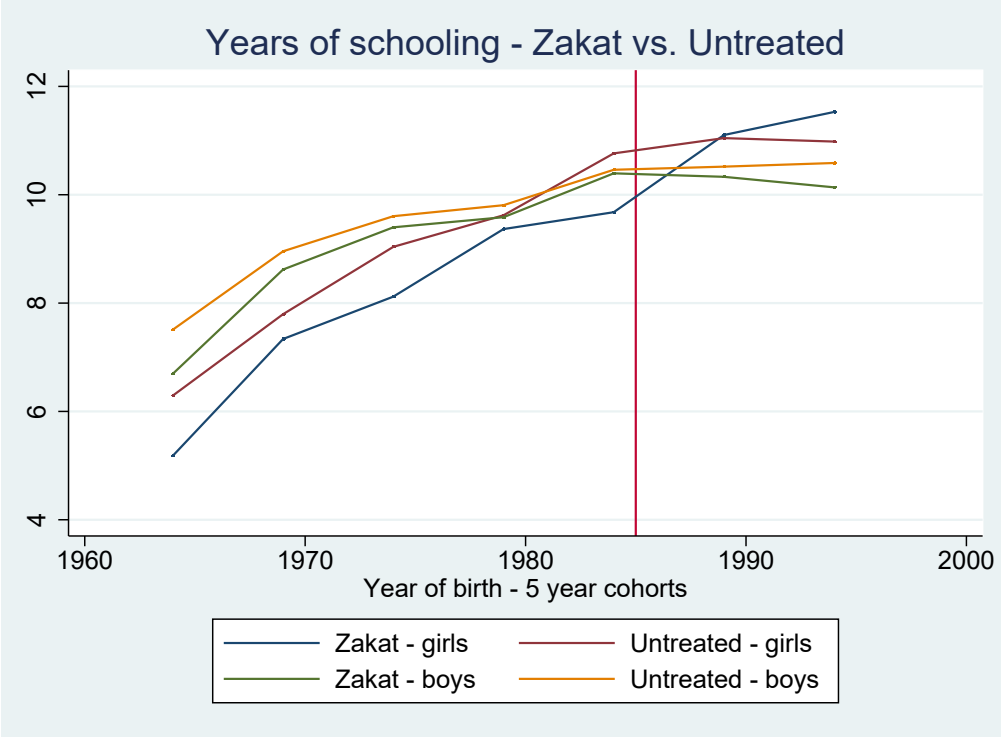

Figure B3 Years of schooling for 5-year cohorts - zakat districts versus untreated districts.

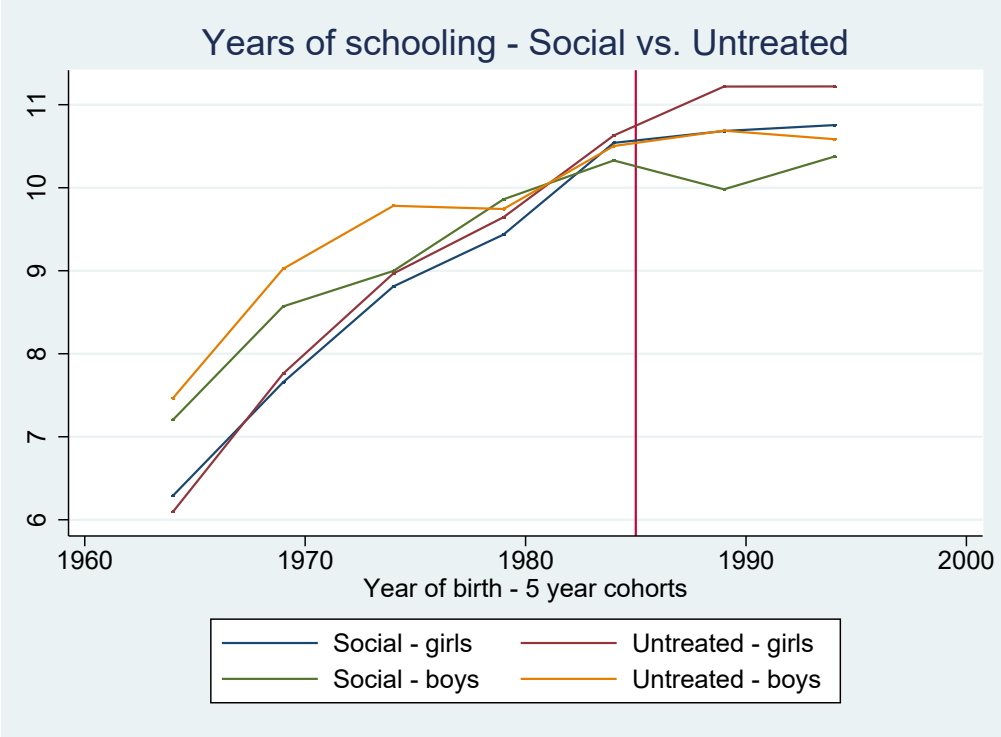

Figure B4 Years of schooling for 5-year cohorts - social districts versus untreated districts.

Appendix C

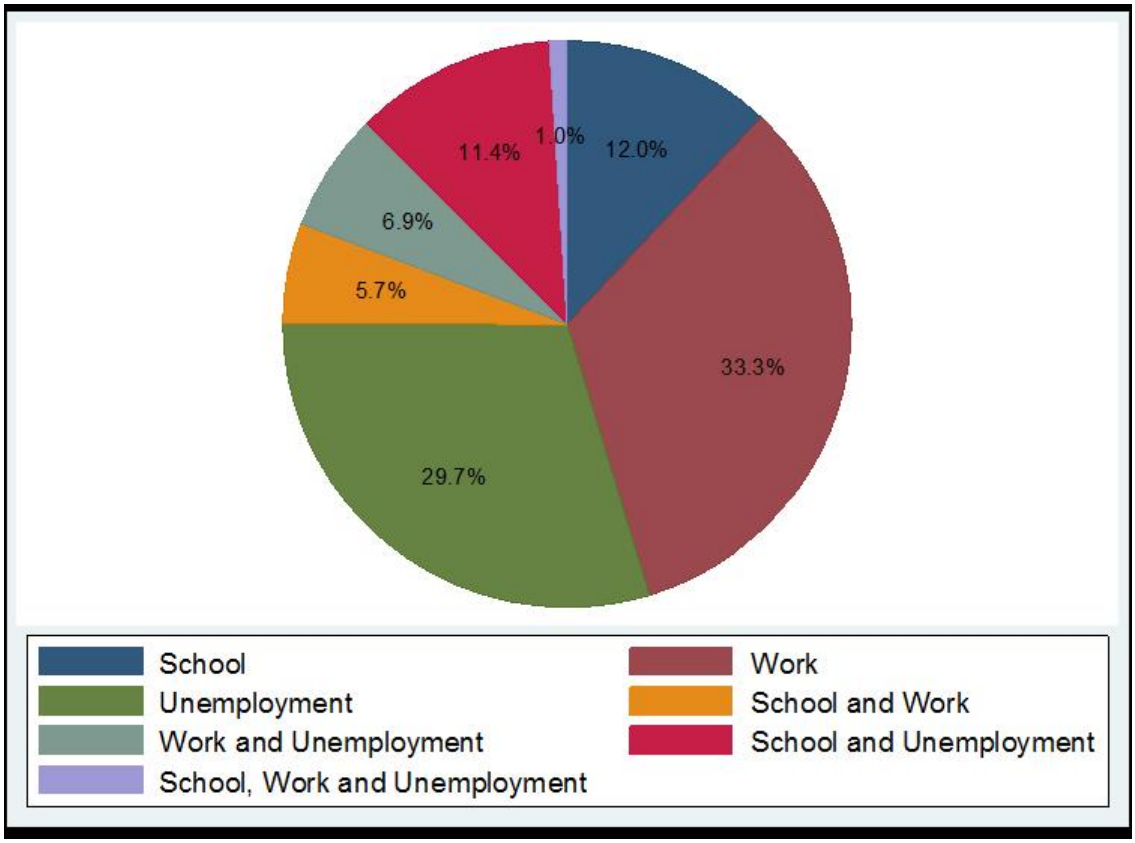

Figure C1 Outcomes among soldiers who attended the DOL Workshop

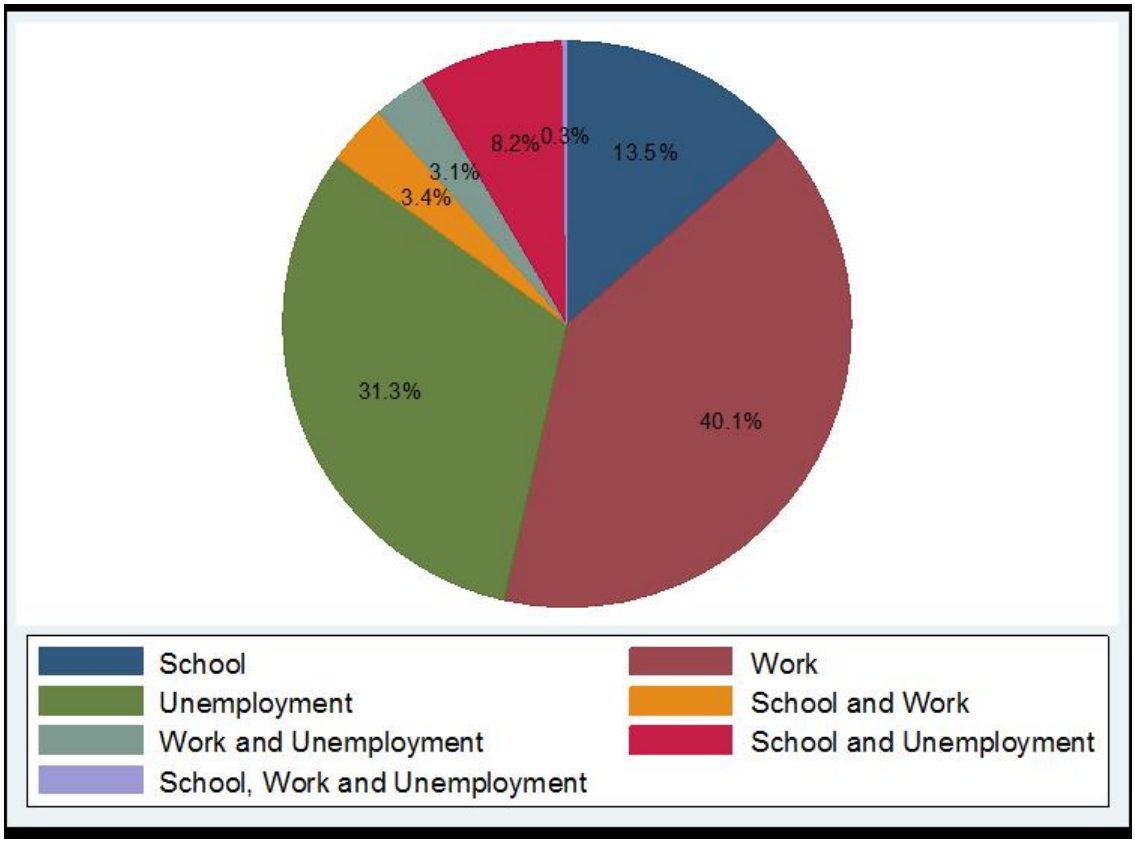

Figure C2 Outcomes among soldiers who did not attend the DOL Workshop