The Effect of Islamic Regulations on Women: Evidence from Indonesia

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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 downtown 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.

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I. 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 (Bekhouche et al., 2013) 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*

[1]Throughout this work I use the definition of fundamentalist Islam from Blaydes and Linzer (2008). They define fundamentalism as a belief system that includes both traditionalist views on gender roles and support for implementation of Islamic law.

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.

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

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

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. Blaydes (2014) finds that women experienced better health outcomes in regions of Cairo that were under the control of a militant Islamic group. Meyersson (2014) 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.

II. Background and *Perda Sharia*

A. Political versus Fundamentalist Islam

Blaydes and Linzer (2008) 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%). Blaydes and Linzer (2008) 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.

B. 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. Binzel and Carvalho (2015) use data from Egypt to support a model in which a combination of increasing inequality and decreasing social mobility can lead

[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.

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, Chen (2010) 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.

Blaydes and Linzer (2008) 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.

C. 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 (Sidani, 2005). Sidani explains, "The prevailing cultural norms, which are sometimes of tribal, not religious, ori-

gin, 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, Bahramitash (2002) 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. Meyersson (2014) 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,

[6]Ulama' are Muslim religious scholars.

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.

Godefroy (2014) 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 states where the new laws were being heavily enforced. Godefroy (2014) 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.

D. 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 (Human Rights Watch, 2013). 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 Hofman and Kaiser (2004) 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 (Crouch, 2009). 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 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.

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 (Buehler, 2016). The spatial variation can be seen in figure 1, which shows the number of *perda sharia* in each province as of 2007. Soon after local governments began

[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.

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 (Candraningrum, 2006). However the Indonesian court system has not been responsive to attempts to question the legality of *perda sharia* (Lindsey, 2012).

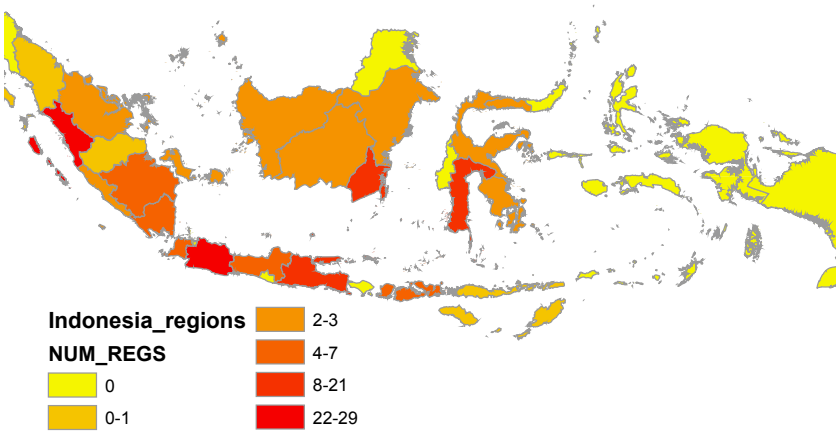

Figure 1. Number of *perda sharia* at province level.

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*, Bush (2008) 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*. Buehler (2008) 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 Blaydes and Linzer (2008). 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. Kuran (1989) 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. Bikhchandani, Hirshleifer and Welch (1992) 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 (Hariyadi, 2008). However, during field work in Cianjur Rif'ah (2014) 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 Iannaccone (1992). Carvalho specifically analyzes veiling in light of what he calls the"new veiling movement" which began in the 1970s (Carvalho, 2013). 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, Smith-Hefner (2007) 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 de-veiling 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 (Buehler and Muhtada, 2016) 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. Rif'ah (2014) 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, Rif'ah (2014) 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 (Rif'ah, 2014).

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. In addition to this direct

economic effect, another potential impact of *zakat* regulations is an increased opportunity for government corruption at the local level (Buehler, 2008). 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 (Crouch, 2009), or Islamic groups can be given implicit permission to extort money from businesses that violate the regulations (Pisani and Buehler, 2017).

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 (Perlez, 2006). 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 in a system with weak legal protection has the potential to affect the behavior of risk-averse individuals.

III. Empirical Approach

A. 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 is 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 Mus-

lim 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 Toha (2015).

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. Candraningrum (2006) 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 Bush (2008) and Crouch (2009) count higher numbers of *perda sharia* but do not make their lists publicly available. Recently, Buehler (2016) 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 A13 and A12 list each regulation and the source from which I determined the type of regulation.

Table 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— 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: 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.

Table 2 shows that areas that have passed *perda sharia* have 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 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

Table 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.

treated to untreated regions is problematic give that the entire province of West Sumatra passes a social regulation in 2001. Table 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.

B. 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. $Sharia_{jt}$ 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.

Table 3— Summary statistics - 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.

$$y_{jt} = \alpha_j + \delta_t + \theta X_j + \beta_P sharia_{jt} + \varepsilon_{jt} \quad (1)$$

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

$$y_{jt} = \alpha_j + \delta_t + \theta X_j + \beta_V veil_{jt} + \beta_I Islam_{jt} + \beta_Z zakat_{jt} + \beta_S social_{jt} + \varepsilon_{jt} \quad (2)$$

Specifications 3 and 4 are analogous to 1 and 2 but include an interaction dummy variable (WS) that is equal to 1 if the province is West Sumatra and 0 otherwise.

$$\begin{aligned} y_{jt} =& \alpha_j + \delta_t + \theta X_j + \beta_P sharia_{jt} \\ &+ \beta_M WS + \beta_{MP} WS \times sharia_{jt} + \varepsilon_{jt} \end{aligned} \tag{3}$$

$$\begin{aligned} y_{jt} =& \alpha_j + \delta_t + \theta X_j + \beta_V Veil_{jt} + \beta_I Islam_{jt} + \beta_Z Zakat_{jt} + \beta_S Social_{jt} \\ &+ \beta_M WS + \beta_{MV} WS \times Veil_{jt} + \beta_{MI} WS \times Islam_{jt} \\ &+ \beta_{MZ} WS \times Zakat_{jt} + + \beta_{MS} WS \times social_{jt} \varepsilon_{jt} \end{aligned} \tag{4}$$

The panel difference framework gives an indication of whether the treated regions do experience outcomes that differ from the rest of the country post-treatment. However, the panel difference may not meet the parallel trends assumption. Figure 2 shows female employment rates for untreated regions versus regions that passed veiling regulations in 2001.

Given that the untreated regions of Indonesia may not provide an accurate counterfactual for outcomes in the absence of *perda*, I use the synthetic control method Abadie, Diamond and Hainmueller (2012) which provides a data-driven approach to choosing an optimal comparison group.

C. Synthetic Control

The synthetic control method was introduced in Abadie and Gardeazabal (2003) and refined in Abadie, Diamond and Hainmueller (2012). Synthetic control addresses a longstanding issue of how to best select a region(s)

Figure 2. Female employment rate in untreated regions versus regions that passed a veiling regulation in 2001.

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 (Abadie, Diamond and Hainmueller, 2012). It has been extended to multiple treatment events by Dube and Zipperer (2013) and more recently by Powell (2016). In this work I follow the methodology proposed in Dube and Zipperer (2013). 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. Neumark and Wascher, 2017). 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 Dube and Zipperer (2013) 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 Abadie and Gardeazabal (2003) 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.

$$Y_{it} = Y_{it}^N + \alpha_{it} D_{it} \tag{5}$$

.

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

$$Y_{it}^N = \delta_t + \boldsymbol{\theta_t Z_i} + \lambda_t \mu_i + \varepsilon_{it} \tag{6}$$

.

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 6 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

$$\sum_{j=2}^{J+1} w_j Y_{jt} = \delta_t + \boldsymbol{\theta_t} \sum_{j=2}^{J+1} w_j \boldsymbol{Z_j} + \lambda_t \sum_{j=2}^{J+1} w_j \mu_j + \sum_{j=2}^{J+1} w_j \varepsilon_{it} \tag{7}$$

and the estimated treatment effect is

$$\hat{\alpha_{1t}} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \tag{8}$$

Abadie, Diamond and Hainmueller (2012) show that if there are weights $(w_2^*, ..., w_{J+1}^*)$ such that

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

$$\sum_{j=2}^{J+1} w_j^* Y_{jT_0} = Y_{1T_0} \qquad \sum_{j=2}^{J+1} w_j^* \boldsymbol{Z_j} = \boldsymbol{Z_1} \tag{9}$$

(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 9 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 Abadie, Diamond and Hainmueller (2012).

To measure the statistical significance of each estimated treatment effect, I use the placebo test method which was introduced in Abadie, Diamond and Hainmueller (2012) and formalized in Dube and Zipperer (2013). 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:

$$p_{e1} = \hat{F}_e(\alpha_{e1}) \tag{10}$$

.

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, Dube

and Zipperer (2013) create a test statistic $\bar{p}$ which is the mean of the percentile ranks from E treatment events.

$$\bar{p} = \frac{\sum_{e=1}^{E} p_e}{E} \tag{11}$$

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 A1 in the appendix.

D. 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 Dube and Zipperer (2013) 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

$$MSPE_{ej} = \frac{1}{T_e} \sum_{t=2001}^{2007} (Y_{jt} - \sum_{q} w^*_{eq} Y_{qt})^2 \tag{12}$$

I construct the average RMSPE (root mean squared prediction error), defined as the average of the square root of 12 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 A2 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 **??** 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 A2) 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 **??**. 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 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.

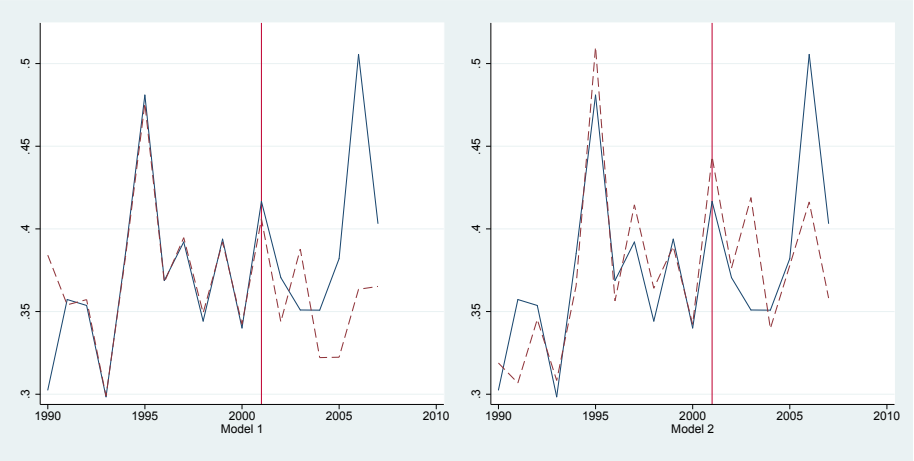

Figure 3. Model selection - Dashed line is synthetic district and solid line is placebo district (Jakarta Utara). The model on the right trades off pre-treatment fit for a better post-treatment fit.

IV. Results

Tables 4 and 5 show the results of a linear probability model for both female and male employment, respectively. In column 1 of table 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 signif-

icant 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 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 *sharia* and West Sumatra is negative and highly significant, while outside of West Sumatra the relationship between female employment and *perda* is no longer significant. While columns 2 and 3 imply that the largest correlation between female employment and *perda* 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 5 shows the same model specifications as table 4 but for male employment rates. Unlike table 4, columns 2 and 3 in table 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 theoretical mechanism by which Islamic regulations would increase employment, it is likely that these relationships are spurious and highlight the importance of controlling for pretreatment trends.

Table 6 shows the output of the synthetic control model for female em-

ployment.[8] 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 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 A1 and A2.

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

[8]Synthetic control results at the district level can be found in tables A4 through A11 in the appendix.

A. *Fertility*

Table 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 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 Godefroy (2014) and Alfano et al. (2017), both of whom found a positive effect of sharia law on fertility in Nigeria. Table 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 (Alfano et al., 2017), but is also coinciding with a decrease in female labor force participation which would lower the opportunity cost of having a child.

B. *Robustness Checks*

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 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 11 and 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 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 8 and 9.

Table 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)
			(0.0183)	
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 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 6— Female Employment. Results from synthetic control.

	(1)	(2)	(3)	(4)
sharia	-0.011	-0.001		
	(0.447)	(0.494)		
sharia X Minang		-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

Table 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

Table 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 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 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 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 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 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 Minang		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 Minang				0.0421
				(0.202)
islam X Minang				0.0164
				(0.207)
social X Minang				0.306***
				(0.0816)
zakat X Minang				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

V. 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 driven by veiling regulations. However, using the synthetic control method to generate parallel trends, there does not appear to be evidence of any 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 Blaydes and Linzer (2008) 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.

REFERENCES

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2012. "Synthetic control methods for comparative case studies: Estimating the effect of Californias tobacco control program." *Journal of the American statistical Association*.

Abadie, Alberto, and Javier Gardeazabal. 2003. "The economic costs of conflict: A case study of the Basque Country." *The American Economic Review*, 93(1): 113–132.

Alfano, Marco, et al. 2017. "Islamic Law and Investments in Children: Evidence from the Sharia Introduction in Nigeria." Centre for Research and Analysis of Migration (CReAM), Department of Economics, University College London.

Bahramitash, Roksana. 2002. "Islamic fundamentalism and women's employment in Indonesia." *International Journal of Politics, Culture, and Society*, 16(2): 255–272.

Bekhouche, Yasmina, Ricardo Hausmann, LD Tyson, and Saadia Zahidi. 2013. "The global gender gap report 2013." Geneva Switzerland World Economic Forum 2013.

Bikhchandani, Sushil, David Hirshleifer, and Ivo Welch. 1992. "A theory of fads, fashion, custom, and cultural change as informational cascades." *Journal of political Economy*, 100(5): 992–1026.

Binzel, Christine, and Jean-Paul Carvalho. 2015. "Education, social mobility and religious movements: The Islamic revival in Egypt."

Blaydes, Lisa. 2014. "How Does Islamist Local Governance Affect the Lives of Women?" *Governance*, 27(3): 489–509.

Blaydes, Lisa, and Drew A Linzer. 2008. "The political economy of women's support for fundamentalist Islam." *World Politics*, 60(4): 576–609.

Buehler, M. 2016. *The Politics of Shari'a Law: Islamist Activists and the State in Democratizing Indonesia.* Cambridge University Press.

Buehler, Michael. 2008. "The rise of shari'a by-laws in Indonesian districts An indication for changing patterns of power accumulation and political corruption." *South East Asia Research*, 16(2): 255–285.

Buehler, Michael, and Dani Muhtada. 2016. "Democratization and the Diffusion of Shari'a Law: Comparative Insights from Indonesia." *South East Asia Research*, 24(2).

Bush, Robin. 2008. "Regional sharia regulations in Indonesia: anomaly or symptom?" In *Expressing Islam: Religious life and politics in Indone-*

sia. , ed. Greg Fealy and Sally White, Chapter 10, 174–191. Institute of Southeast Asian Studies.

Candraningrum, Dewi. 2006. "Perda Sharia and the Indonesian Women's Critical Perspectives." *Neue Willkür gegen Frauen in Indonesien. Kontroversen um die Umsetzung der Sharia-Gesetz*, 11.

Carvalho, Jean-Paul. 2013. "Veiling." *The Quarterly Journal of Economics*, 128(1): 337–370.

Chen, Daniel L. 2010. "Club goods and group identity: Evidence from Islamic resurgence during the Indonesian financial crisis." *Journal of Political Economy*, 118(2): 300–354.

Crouch, Melissa. 2009. "Religious regulations in Indonesia: Failing vulnerable groups?" *Review of Indonesian and Malaysian Affairs*, 43(2).

Dube, Arindrajit, and Ben Zipperer. 2013. "Pooled synthetic control estimates for recurring treatments: an application to minimum wage case studies." *Unpublished paper.*

Godefroy, Raphael. 2014. "How Womens Legal Protection from Physical Harm Affects Fertility: Evidence from Nigeria."

Hariyadi, Mathias. 2008. "In Padang, Islamic law is now imposed on all." [Online; accessed 01-August-2017].

Hofman, Bert, and Kai Kaiser. 2004. "The making of the Big Bang and its aftermath: a political economy perspective." *Reforming Intergovernmental Fiscal Relations and the Rebuilding of Indonesia: The'Big Bang'Program and Its Economic Consequences, ed. James Alm, Jorge Martinez-Vazquez and Sri Mulyani Indrawati*, 15–46.

Human Rights Watch. 2013. "In Religion's Name: Abuses against Religious Minorities in Indonesia."

Iannaccone, Laurence R. 1992. "Sacrifice and stigma: reducing free-riding in cults, communes, and other collectives." *Journal of political Economy*, 271–291.

Kuran, Timur. 1989. "Sparks and prairie fires: A theory of unanticipated political revolution." *Public choice*, 61(1): 41–74.

Lindsey, T. 2012. *Islam, Law and the State in Southeast Asia.* I.B. Tauris & Co Ltd.

Meyersson, Erik. 2014. "Islamic rule and the empowerment of the poor and pious." *Econometrica*, 82(1): 229–269.

Neumark, David, and William Wascher. 2017. "Reply to Credible Research Designs for Minimum Wage Studies." *ILR Review*, 70(3): 593–609.

Perlez, Jane. 2006. "Spread of Islamic Law in Indonesia Takes Toll on Women." [Online; posted 27-June-2006].

Pisani, Elizabeth, and Michael Buehler. 2017. "Why do Indonesian politicians promote sharia laws? An analytic framework for Muslim-majority democracies." *Third World Quarterly*, 38(3): 734–752.

Powell, David. 2016. "Synthetic control estimation beyond case studies: Does the minimum wage reduce employment?"

Rif'ah, Nur Erwin. 2014. "Women under Sharia: case studies in the implementation of Sharia-influenced regional regulations (Perda Sharia) in Indonesia." PhD diss. Victoria University.

Sidani, Yusuf. 2005. "Women, work, and Islam in Arab societies." *Women in Management Review*, 20(7): 498–512.

Smith-Hefner, Nancy J. 2007. "Javanese women and the veil in post-Soeharto Indonesia." *The Journal of Asian Studies*, 66(02): 389–420.

Toha, Risa. 2015. "Replication Data for "Political Competition and Ethnic Riots in New Democracies: A Lesson from Indonesia"."

Appendix

Table A1— Irwin-Hall distribution

	Percentile						
N	0.50%	2.50%	5%	50%	95%	97.50%	99.50%
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
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
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

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

Table A2— 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 A3— 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 A13— 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
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

Continued on next page

Table A13 – continued from previous page

District	Province	Reg type	Source	year
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
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

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Table A13 – continued from previous page

District	Province	Reg type	Source	year
Enrekang	S. Sulawesi	veil	Candraningrum (2006)	2005
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
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

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Table A13 – continued from previous page

District	Province	Reg type	Source	year
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
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 A4— 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 A5— 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 A6— 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 A7— 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 A8— My caption

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 A9— 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 A10— 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 A11— 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 A1. 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.

Table A12— 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

Figure A2. 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.