WHY VEIL? RELIGIOUS HEADSCARVES AND THE PUBLIC ROLE OF WOMEN*

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Abstract

I show that new economic opportunities that compel women to abandon their domestic roles have driven the adoption of religious veiling. Using human-coded data of around a quarter million photographs of pupils attached to Indonesian public high school yearbooks, I measure the prevalence of veiling among young women across Indonesian districts for more than two decades. I exploit exogenous variations generated by the interaction between international demand for Indonesia's product and sectoral and gender composition of local industries to show that the relationship is causal. This study demonstrates that veiling represents an effort by young women to reconcile their desire to join the formal labor market and the prevailing social norms in society.

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Economic development has delivered unprecedented opportunities for women, including new, appealing and lucrative jobs, especially for those who are skilled or highly educated. This fact strongly characterizes the Indonesian labor market in the past decades (Schaner & Das, 2016). However, this type of new employment typically requires the workers to leave their homes to engage in the workplace over an extended period. In societies where women are prescribed as the primary bulwark of public morality and traditional family institutions, taking this type of job may be costly for one's personal and social image, despite the economic benefits it offers.

In light of this dilemma, some women may devise strategies to lower the cost of participating in this type of employment by using culturally inspired tools. Religious veiling appears to be one of these tools, which is particularly effective in the context of a highly religious, Muslim majority society like in Indonesia. Some women adopt it so that they can benefit from new economic opportunities but at the same time they can protect their dignity and reputation in society.

I aim at documenting this phenomenon in this study. In particular, I show that the participation of young women in the formal labor market has driven the adoption of veiling. The plot in figure 1 motivates this conjecture: Within the 22 year period of observation, the fraction of young female population who adopt religious veiling has evolved hand-in-hand with the fraction of young female participation in formal employment. This is in contrast, for instance, with the participation of young female population in informal occupations.

I use an original method to measure the prevalence of veiling among young women by directly observing the portrait of students attached to Indonesian public high school registers. The main data in this paper is based on human-coding of around a quarter million photographs of Indonesian pupils, which enable me to trace the evolution of veiling across districts for over more than two decades. This new measure sets apart this study from previous research which mostly relies on surveys. Survey data on this cultural practice might not only suffer from measurement bias but also is not systematically available across space and time. The data collected for this study fills this void.
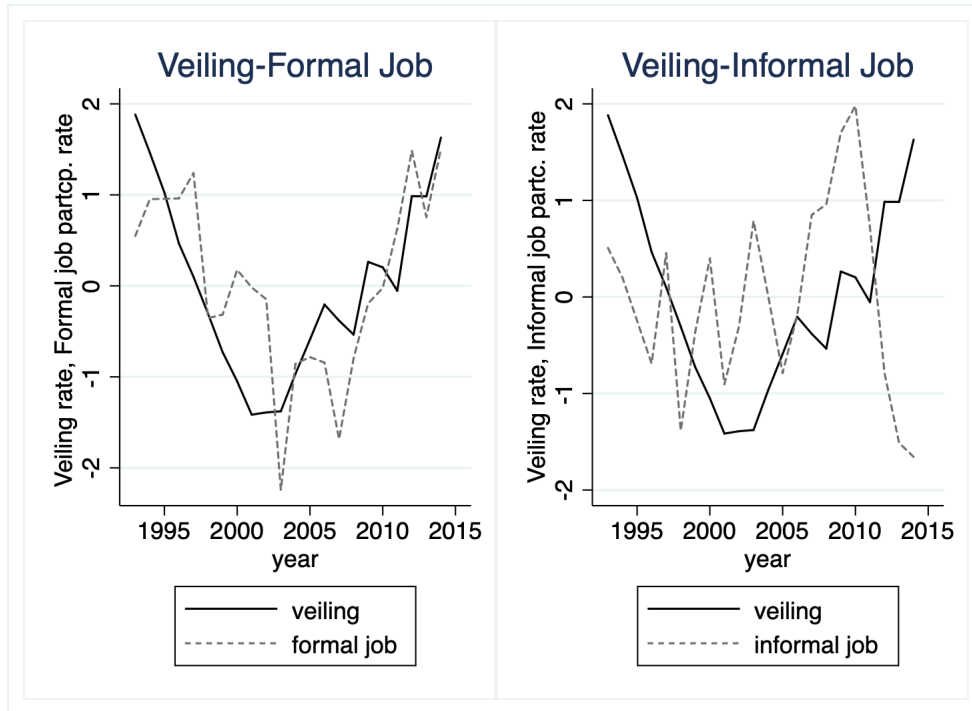
FIGURE 1 – (CO-)EVOLUTION OF VEILING AND FEMALE PARTICIPATION IN
DIFFERENT TYPE OF EMPLOYMENT

Note: The graph shows the evolution of veiling by high-school female pupils
against the evolution of formal and informal work participation by young female
population (age 20-24 years old) aggregated from all observation districts. The
variables presented here are detrended, to partial out the secular time trend, and
standardized, to have a mean of zero and a standard deviation of one so that
the values are more comparable across different variables analyzed.

To estimate the causal effect of female economic opportunity on veiling,
I build a Bartik-style instrumental variable exploiting exogenous variation
generated by the interaction between international demand for Indonesian
products and sectoral and gender composition of local industries. Interna-
tional demand may create a plausibly exogenous shock in the availability
of economic opportunity for females by assigning a higher dosage of "treat-
ment" in districts that specialize in female-intensive industries as opposed
to districts that specialize in male-intensive industries. Hence, it allows the
identification of the causal effect of economic opportunities on veiling.

Using this method, I show that formal job participation by young fe-
males has a positive, significant effect on adoption of religious veiling. The
effect is large: a one percentage point increase in the formal job participa-

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tion by young females has caused increases in religious veiling by about two percentage points. This magnitude is equivalent to about 10 percent of the average veiling rate in the whole sample of this study. This coefficient is robust to controlling for district fixed effects, district-specific time trends, as well as relevant covariates at the school, district, and national levels.

I perform several analyses to explore possible mechanisms. The evidence seems to support the reasoning that the veil is used as a negotiation device that enables young women to take employment outside their homes but also helps to protect their respectability (Carvalho, 2013). First, using two different survey data sources, I show that education positively predicts the likelihood of women wearing a veil. This implies that women who adopt the veil tend to be those who will pay a higher cost for not joining the labor market, by wasting their educational investment. Second, while formal employment has a positive and strong association with veiling, changes in informal sector employment, which typically do not require women to abandon their domestic roles, do not have a relationship with veiling. This implies that it is not just any job, but only jobs that require public engagement by women that drive the adoption of the veil.

An alternative story is that the relationship between economic opportunities for women and veiling over time is explained by a concomitant rise in Muslim religious piety. This reasoning, however, should not be a threat for the argument in this study: First, I show that the positive and significant effect of economic opportunities on veiling does not change after controlling for the vote shares of Islamist parties[1]. Second, drawing information from the Indonesian Family Life Survey (IFLS), I show that there is no significant association (reduced forms) between the instrument used in this study and three different measures of religiosity, i.e. self declared religiosity, the number of prayers performed in a day and the importance of religion and religiosity in affecting political choices. These evidence does not support the proposed alternative mechanism.

There may also be a concern that the main results may be driven by the changes in the composition of student bodies over time. For instance, economic development may increase the general demand for high school ed-

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[1]Vote shares for Islamist parties could be a good measure of preference for outward expression of religiosity, which might be closely related to the preference for veiling.

ucation, including by those from conservative families that otherwise would not send their daughter to school. I show, however, that the instrument used in this study does not a have significant correlation with high school attendance rates. Hence, a compositional effect is unlikely to be the channel for the positive effect of economic opportunities on veiling.

I then present evidence that the positive effects of economic opportunities may not be best understood as a cultural backlash, for instance, due to the pressure from parents/family. Using nationally representative survey data, I show that around 9 out of every 10 veiled women declares that they adopt the veil due to their own desire as opposed to being requested by parents or spouse. Moreover, I show evidence that the women who adopt the veil tend to be those who take the advantage of economic opportunities themselves, not those who stay at home. This implies that veiling may not be understood as an act of protest by coserative women who despise the fact that more and more women are engaged in employment outside the home.

I rule out an alternative account that veiling is driven by personal income effects on the taste for fashion based on the previous evidence that there is no effect of informal job participation on veiling[2]. Moreover, since the positive effect is also robust to controlling for male employment rate, we can also rule out an alternative mechanism where veiling is driven by a general increase in household income[3].

In the robustness analysis, I show that the coefficients in the main analysis do not change with the exclusion of outliers–schools that have 100 percent of students with veil, which may also indicate that the school mandates the students to veil. The results are also robust to the exclusion of observations with higher variance, as well as the exclusion of observations from a single year or a single district (Jackknife resampling estimation).

This study speaks to a broad range of literature in social science. First, the theoretical framework in this study is based on previous work on veiling by Carvalho (2013), which proposes that veiling is an integration strategy

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[2]If the veil is a normal good, an increase in income would increase the adoption of the veil

[3]This mechanism may applies if we assume that family members (both male and female) pooled their income and female family members are entitled to spend from this pool.

that allow women to take up economic opportunities outside the homes and provide protection for women's reputation in society. My study empiricaly tested this hypothesis using a large-scale original dataset backed by revealed preferences of the subject. To my knowledge, there is no comparable data on veiling of this scope available to date.

Second, my study contributes to the literature on the evolution of female participation in the economy (Boserup, 1986; Fernández, 2013; Goldin, 1990). These authors highlight the role of culture and social norms, a perspective which I share. This study is also closely related to the literature on social norms and female labor force participation in conservative societies, e.g. Bursztyn, González, and Yanagizawa-Drott (2020). I contribute to this strand of literature by showing how new cultural norms emerge as a result of an adaptation of the old norms and new forces of economic development. In particular, I show how a new norm of veiling is a result of economic modernization while being shaped by the local culture of gender relations.

This study also contributes to the general debate on the relationship between religion and economic development (Bazzi, Koehler-Derrick, & Marx, 2019; Bénabou, Ticchi, & Vindigni, 2015; Binzel & Carvalho, 2017; Guiso, Sapienza, & Zingales, 2003; Squicciarini, 2019). In particular, it offers a re-examination of the *secularization hypothesis* which associates economic development with decreased religiosity.[4] My contribution to this debate is twofold: first, by focusing on the relationship between female economic outcomes and Muslim women's religious practice, the study targets the heart of widespread curiosity about the position of women within Islamic culture. Second, the study speaks directly to the literature in this field by providing evidence that suggests that economic modernization does not always go hand in hand with secularization and the marginalization of religion.

I discuss the socio-economic background of the Indonesian society in

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[4]For instance, using analysis based on survey data, Norris and Inglehart (2004) and Voas and Crocket (2005) show a declining pattern of religiosity in Western Europe. This hypothesis was largely accepted by sociologists until it was challenged by scholars such as Iannaccone, Stark, and others (Iyer, 2016). Iannaccone (1998) shows that religiosity in the US, arguably one of the most developed countries is much higher than in many less-developed nations. Moreover, Stark (1999) argues that despite rapid modernization, there is no demonstrable long-term decrease of religiosity in Europe.

section I. The conceptual framework which outlines the theoretical reasoning of the article is elaborated in section II. Measurement of veiling and other variables, as well as their descriptives, are reported in section III. I then elaborate on the empirical framework, the construction of the instrument, as well as the main results in section IV. Subsequently, I explore several plausible mechanisms in section V. Discussion on robustness checks is presented in section VI, while section VII concludes.

I   Contextual Background

Indonesia provides an excellent research setting to understand the interaction between religious culture, gender norms, and economic development. First, the country currently hosts more than 230 million Muslims, more than any other country in the world. Moreover, Indonesia is arguably one of the most religious nations on earth.[5] Second, despite enjoying relatively higher autonomy compared to women in the neighboring region of South and East Asia, Indonesian womanhood in the past decades was shaped significantly by the ideology propagated by the New Order regime. Through regular women meetings (PKK-Pemberdayaan Kesejahteraan Keluarga /Family Welfare Empowerment program), the regime emphasized and glorified the domestic role of women and assigned them the role of the guardians of the traditional family institution.[6]

At the same time, the country has charted a robust economic growth in

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[5]The 4th and 5th waves of the World Value Survey (WVS) reveal that over 94 percent stated that religion is "very important" in life. In 2008, a survey by Pew Research Center shows that 80 percent of Indonesian Muslims perform five daily prayers, higher than other Muslim countries covered in the survey, including Egypt, Jordan, Pakistan, and Turkey. Using the Indonesian Family Life Survey (IFLS), Masuda and Yudhistira (2020) shows that the proportion of Muslims who only eat *halal* food in Indonesia is high and stable across periods at over 95 percent.

[6]These politically-driven gender norms still have strong impacts in many parts of Indonesia today. A UNDP survey in 2010 revealed that 94 percent thought that women should not work outside the home without prior permission from their husbands. The same survey showed that 95 percent thought that men should be leaders of households. Another poll by CSIS shows that 86.3 percent agreed that "women's primary responsibility was to take care of the household" and 83.6 percent thought that women should not work at night (Robinson, 2018). A recent survey about gender roles in the Indonesian household reveals that only eight percent think that earning a living is part of the ideal role of a wife and 70 percent agree that doing household chores are the wife's responsibility (Jakpat Survey Report, 2020).

the past decades[7] and since 1999, Indonesia has transformed from a military autocracy into one of the most vibrant, fledging democracy in contemporary East Asia. Clearly, this development has delivered swift social and economic changes. These include rapid expansion of universal education (including for girls), reduction in total fertility rate, and a transformation of female participation in the economy.

In particular, there has been a process of "formalization" of female involvement in the labor force in the past decades. Two parallel phenomena accompany this process: first, younger women participate more in the formal sector of the economy (wage employment), especially in urban areas. At the same time, younger women in rural areas opted out of informal, unpaid employment (Schaner & Das, 2016). This trend is explained by the increasing access of young, highly educated female workers to lucrative and appealing jobs. Schaner and Das (2016) also documented that the wage gap between male and female workers had shrunk; in 1990 the median woman earned just 57 percent of what a man earned, but this figure had increased to 84 percent in 2011.

A. The practice of veiling in Indonesia

While Indonesians consider religion as very important in their life, veiling by Muslim women was not a deeply rooted cultural practice.[8] This practice, especially since the 1970s, is arguably "new" since it differs from veiling of the previous era. First, in terms of style, the veil of the previous generation was commonly made from somewhat translucent fabrics which formed a drape that covers the head but still showing the neck and some parts of hair and ears. Meanwhile, the new veil is more enveloping, mainly made from an opaque material and covering hair, neck, and ears while only showing the face (Brenner, 1996; Smith-Hefner, 2007). Second, while veils in the past tend to be adopted by few, commonly older, traditional women who lived in rural areas, the new veil was championed by young, educated, urban middle-class women (Smith-Hefner, 2007).

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[7] With the exception of during the Asian financial crisis year of the late 1990s

[8] In contrast, veiling has a long tradition among women who inhabited the area we call the Middle East today. It was established among Jewish and Christian women before (and after) the birth of Islam in the 7th century CE (Amer, 2014)

I found supports for this latter observation in two different survey data. In table 2 of the appendix, using survey data from a local polling company, Jakpat, I find that the veiling rate tends to be higher among the more educated. Similarly, using data from Pew Reseach, in table 3 of the appendix, I show the socio-demographic characteristics of respondents by veiling status and find that the two groups are very similar to each other except in two attributes: first, veiled women tend to be more educated and two, they are less likely to be married–which may also imply higher financial independence. These differences are even stronger for the younger group of respondents.

This observation is also confirmed by recent studies. Fossati, Hui, and Negara (2017) find the proportion of female Muslim who answer "yes" when asked if they wear a headscarf is higher among the highly educated (94.5 percent) as compared to the low educated (78.4 percent). Moreover, this survey also shows that the prevalence of veil is higher among the high-income group (84.9 percent) as compared to the low-income group (75.6 percent). In another recent study that predicts who wears the veil in the area of greater Jakarta, Utomo, Reimondos, Peter, Utomo, and Hull (2018) shows that veil use is significantly correlated with higher education level.

The Politics of the veil. During its reign, the New Order regime has radically changed its stance toward the veil. In the early 1980s, the regime perceived the veil as a symbol of political threat. Hence, it tended to curb veiling, for instance, by issuing a decree that regulated student uniforms in high school.[9]. These rules induced many parents to disapprove veil adoption by their daughters. Until the 1990s, veiling was a marginal practice which in fact, tended to be identified with an extreme form of religious piety by the general public.

However, president Suharto changed the course of his political strategy in the early 1990s. While consistently banning formal political forces based on Islamic ideology, he attempted to co-opt various Muslim groups by showing more friendly gestures to the Muslim community. For instance, he issued a regulation that lifted the ban on the use of headscarves in pub-

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[9]the decree SK 052/C/Kep/D.82 was issued on March 17 1982 (Johari, 2020)

lic high schools in 1991.[10] Following this change in regulation, the stigma attached to the veil began to fade and its popularity rose. The veil became even more widespread, popular among university and high school students, and also started to be adopted by older generations.

II   Conceptual Framework

In order to understand how the emergence of new economic opportunities for women may be translated to more veiling, we first need to understand the changes in terms of types of employment that accompany economic development overtime. It is commonly observed that, as the economy develops and becomes more sophisticated, newly available jobs tend to be mentally-intensive as oppose to physically-intensive (Jayachandran, 2020)[11], hence highly suitable for women. Moreover, this process has also been accompanied by the shifting of production processes from households to factories or offices. Hence, workers need to leave their home so that they could present at the work place to perform the job. At the same time, development has also delivered advancement in female education and allows younger generations of women to seize these economic opportunities. Taking all of these changes into account, what we obtained is that more and more young and educated women are tempted to join the formal labor market and consequently they abandon their domestic roles since they need to present in offices or companies in order to perform these jobs.[12]

However, many societies abide to social norms that govern the ideal role of different gender. In particular, men are tipically assigned as the family breadwinners, and women are typically assigned to domestic responsbilities. In this kind of environment, taking new types of employment described earlier may generate personal and social cost (stigma). First,

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[10]The decree number is SK.No.100/C/Kep/D/1991. In the same year, he also paid pilgrimage to Mecca and following his return, changed his official name to *Haji Mohammad Suharto*.

[11]The typical transformation involves the shift from agricultural sector–which mainly is phisically intensive–into manufacturing industries and then into services.

[12]A similar line of argument is originally proposed by Becker (1981). He contends that newly available economic opportunities for women have changed the opportunity cost of staying at home, induced women to work, and consequently to have fewer children. This has led to a well-documented trend of declining fertility in the West in the 1970s.

women who take up a formal employment may suffer from personal cost, for instance, because they perceive (which is then seconded by the people around them) that working mothers may have negative consequences on children's intellectual and emotional development (Fernández, 2013); or that this act could jeoperdize the quality and the harmony of family life.[13] Second, taking a formal, high-paying jobs may signal ambition and autonomy[14], female attributes that often perceived negatively in the marriage market (Bursztyn, Fujiwara, & Pallais, 2017). Third, as the economy develops and lower-income families becoming more affluent, working women may suggest the inability of the husband or father to provide for the family (Goldin, 1990), hence create social stigma. Last but not least, taking formal employment is often considered "dirty" (Jayachandran, 2020) since it means that women have to mingle at the work place with other males who are not family members. Sometimes, they may even need to commute using crowded public transportation, which makes them susceptible to harrasment.

Given this dilemma, some women may attempt to adopt culturally-inspired tools in order to lower the cost of joining the formal labor market. In the context of religious, Muslim-majority society like in Indonesia, religious veil appears to be one of these tools. There are at least two ways in which the veil could lower the personal and social cost associated with taking employment outside of the homes. First, at the personal level, the veil serves as an anchor (a *commitment device* in Carvalho's (2013) language) for the set of beliefs and norms that the women highly values. The veil binds sincere believers via their own statement of modesty, thus it helps them avoid conducts (or even thoughts) not in line with religious morality and values (Bénabou & Tirole, 2011; Carvalho, 2013). Second, the veil signals (albeit somewhat noisily) to the public the type of the girl who adopts it–even if she is not sincere (Carvalho, 2013; Patel, 2012). In particular, if the type signalled–e.g. feminine, rule-abiding, faithful–is desirable according to the prevailing norms, then this would help compensat-

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[13]In the Indonesian context specifically, the women of observation in this study has grown up under a political regime that glorified women as the guardians of public morality and the institution of the family. See discussion in section I

[14]In order to secure this kind of jobs, one often needs to pursue very high level of education, as well as additional skill trainings.

ing for the possible stigma attached to working women, such as autonomy, independence, or disregard of traditional morality. Consequently, *as the economy develops and there are more economic opportunities for women, more of them adopt the veil* as they attempt to reconcile their desire to benefit from these opportunities, but at the same time want to avoid the negative personal and social image this act may generate.

It is important to note, however, that negative social attitudes toward working women are not unique to Muslim societies, but have also been a feature of the evolution of female labor participation in the West. The negative stigma documented by Goldin (1990), Fernández (2013), and Bursztyn et al. (2017) refers to the experience of the United States. What is interesting here is that the cultural context shapes differently how the conflict between social norms and the public role of women is resolved. In this case, the veil is a functioning negotiation tool compatible with the setting of Muslim-majority societies like Indonesia.

III   Data Source and Descriptive Statistics

Veil take-up. Measuring a cultural practice such as veiling is not a simple task. Previous studies, e.g. Aksoy and Gambetta (2016), rely on surveys to elicit information about veiling. This is commonly performed by directly asking female respondents whether they wear a veil. Alternatively, veiling is measured by simply observing if the respective respondent is wearing it during the interview. There are several issued associated with these methods. First, they might suffer from measurement error; for instance, if the surveyors are female themselves or if they conduct the survey at home, then a respondent who regularly wears a veil in public may not put the headscarf on during the survey.[15] Second the traditional method may also suffer from reporting bias. For instance, if the surveyor is perceived by the respondents as having a certain degree of religious commitment (e.g. if the surveyor is wearing a headscarf herself), then this may result in biases in respondent answers. This phenomenon has documented, for instance, in Blaydes and Gillum (2013). Another major limitation of currently available

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[15]Commonly, headscarves are only be worn outside the home, where interaction with males who are not part of family members is pertinent.

data is that no source systematically traces the evolution of this practice across regions over time. Most of the surveys are ad-hoc and conducted at different times by different institutions.

To overcome these limitations, I measure the headscarf take-up by directly observing the portrait of female students attached in public high-school register books. The variable measures revealed preference of veiling which is backed by official records of the subject's personal details. Public high schools in Indonesia are typically required to keep around 30 years long record of large books where information on each student, including a 3x4 cm picture, is attached.

As these pupils are between 16 - 19 years old, this variable is meant to capture the general tendency of veiling practice within the young female population. The pictures are taken mainly for the purpose of the national, final high school examination, so they are taken towards the end of the second year of high school or early in the final year, when most of the students may have already had an idea about what to do after graduation, e.g. to continue education, to work, etc.[16].

The sample of schools in this study are selected by randomly choosing schools in randomly chosen districts. In particular, the sampling is performed in two stages: First, 49 districts are randomly chosen from the sample frame of all 267 districts located in the two islands, Java and Sumatera[17]. The number of districts sampled in each province is proportional to the number of population in the provinces so that the sample is more representative in this aspect; hence, provinces with larger number of population have higher number of districts included in the sample. In table 11 of appendix, one could observe the characteristics of sampling and

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[16]There could be a concern that these pictures do not represent the behavior of the student in daily life. For instance, they may sometimes wear the veil and sometimes not or they might strategically use (or not use) the veil during the photo session. I argue, however, that this is not likely since Indonesian public schools require the pupils to wear school uniforms, which means they have a pre-determined set of clothing to wear on each day of the week. Moreover, the portraits are meant for administrative purposes (ID photo), so they should look like what they are in their normal daily life.

[17]The original plan is to sample 50 districts, but one district dropped out of the sample due to challenging logistical problems. This number is chosen based on the limit of bugdet available for this project. The sampling is conducted in only two islands to maximize the efficiency of data collection. According to Statistics Indonesia, in 2010, 78.7 percent of the Indonesian population lives in these two islands.

non-sampling districts. Apart from the number of population, there is no systematic differences between the two groups.

The second stage involves randomly choosing two schools out of the sample frame of all public high schools located in the district selected in the first stage. The sample frame focuses on general public high schools because these are the schools where students have a choice to wear or not to wear a veil as part of their uniform. Hence, the sampling frame excludes public madrasah (public Islamic schools) because all female pupils in public madrasahs wear a veil, so no variation/information gained from these school sample. Similarly, private schools are also excluded from the sample frame because they are mostly religious schools, e.g. Catholic schools–where the veil is a very rare occasion if any–or Islamic schools–where all female pupils wear a headscarf, so no valuable information gained from these schools. The enumerators are given a list of schools that have been randomly ordered and visit the schools based on this order. The complete, step-by-step procedure for data collection is reported in the appendix D. In this supplementary information, I also report the list of the school-district sample, as well as the geographic distribution of districts sampled in this study.

Unless missing, the photograph of female (and male) students attached are of high quality in most books so we could clearly identiy whether the student is wearing a veil of not and we could code veiling status by simply observing these pictures. Based on this information , I construct the measure of veiling rate, which is defined by the fraction of female pupils who wear a veil in a given school in a given graduation year. The evolution of veil take-up by district is presented in figure 2. The graph shows considerable variation across districts not only regarding the starting point of the upward trend but also in terms of the shape of the evolution. Some districts showed an initial increase in the early 1990s, but some others started late, after the year 2000. Some district does not even start at all. Some districts show an evolution that looks like an S shape, while others look like a long-tailed J curve. Finally, in some districts, the prevalence of the practice goes up to 100 percent, while in others, the increase stops before reaching half of the population. One of the contributions of this paper will be to explain part of this variation as a function of economic opportunities.

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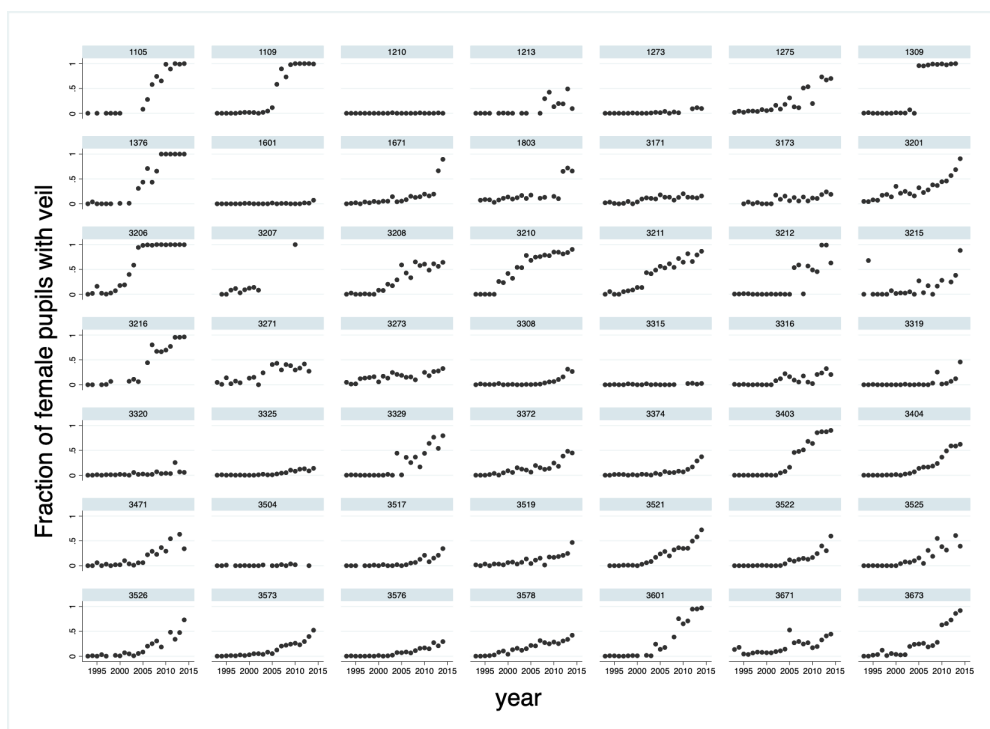
FIGURE 2 – Proportion of female students with veil, by district

Note: The figure displays the evolution of the veiling trend, separated by district. Each dot in the figure represents the fraction of female students who wear a veil in a given district, in a given year.

Labor force information. The data on female (and male) participation in the economy are sourced from the Annual National Labor Force Survey, the SAKERNAS. This survey is performed by Statistik Indonesia and is rich with information related to working, schooling, and other activities performed by respondents representative of the population aged 10 and above. It also records information related to the characteristics of the job performed, e.g. the hours worked, if it is paid, information on personal characteristics of respondents, e.g. age, education level, and marital status, as well as respondents' location and characteristics, e.g. whether the respondent lives in an urban or rural area. This source is used to construct the main variables of interest, including participation rate by female (and male) population in both formal and informal employment.

Formal employment in this paper is defined as those categorized as "worker/employee", while informal employment encompasses the rest of work categories, including family/unpaid workers, self-employed (with or

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without assistance), and casual labor (in agriculture and non-agriculture). This is similar categorization used by Schaner and Das (2016) in their ADB-comissioned technical report. This definition may not precisely capture the formality of the job as workers may also work in informal business. However, for the purpose of this paper, this differentiation is sufficient as it defines the likelihood of protection under the labor law, (in)flexibility in working time and places as well as the integration in the formal sector (Schaner & Das, 2016).[18].

District sectoral and gender composition. These variables are used to construct the instrument and are calculated using the information from the Medium and Large Manufacturing census (the SI-Statistik Industri). This census is performed annually by Statistik Indonesia and covers the universe of firms with at least 20 employees. It provides rich information about industrial establishments including the composition of industrial input: such as the number and gender composition of labor; electricity and fuel used; as well as the detailed composition of products/industrial output categorized by standardized classification (which could be matched to the ISIC–International Standard Industrial Classification). Using the information in this survey, I calculate the industrial composition of a district as well as the gender composition of workers employed in a given industrial sector.

International demand for Indonesian products. I use the information on international trade values to proxy the international demand for Indonesia's products sourced from the UN Comtrade. It allows us to obtain these measures at a different level of aggregation of nomenclatures (standardized industrial classification) which is then matched with the data from Indonesia's industrial census previously introduced to construct the instrumental variable, i.e. the export shock.

In table 1 we can observe the summary statistics of the main variables of interest. The mean value of veil take-up is around 20 percent in the whole sample with a pretty large standard deviation of around 29 percent. The fraction of the female population (age 20-24) who participate in the

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[18]In any case, the "impurity" of this measure should not be a threat for the analysis in this paper, because the direction of the miscoding is such that some of the "treated" observations are actually coded as "untreated", so the effect estimated here is more likely to be conservative.

TABLE 1 – DESCRIPTIVE STATISTICS OF MAIN VARIABLES

VARIABLES	N	mean	sd	min	max
Panel A. Main Variables					
Veil	1,546	0.208	0.292	0	1
Formal job partcp	1,546	0.212	0.140	0	1
Informal job participation	1,546	0.130	0.120	0	1
Export shock	1,546	2.031	1.498	0.168	11.44
Panel B. Components of the instrument					
Value of export	15,290	6.966	12.07	0.298	90.90
Sector share	15,290	0.0705	0.137	0.0003	1
Female score	15,290	0.381	0.195	0.053	0.793

Note: The unit of observation in panel A is school-district-year, while in panel B is industry-district-year. *Veil take-up* is the fraction of female students who wear a veil, *Formal job participation* is the fraction of female population age 20-24 who works in the formal sector, *Informal job participation* is the fraction of female population age 20-24 who works in the informal sector, *Export shock* is the instrument, which component is shown in Panel B; *Value of export* is the normalized real value of export, *Sector share* is the industrial share, *Female score* is the fraction of female labor.

formal sector is 21 percent on average, while the average participation in the informal sector is around 13 percent. These three variables are quite dispersed; they exhibit considerable variations and changes across districts and time. Similarly, Export shock is also highly dispersed around its mean value.

In panel B, I present the components of the instrumental variable: The average real value of exports in the sample is around 7 times its value in 1990 and is very dispersed with a standard deviation of 12. The average share of a single sector is around 7 percent. This implies that the districts covered have a pretty diversified industrial composition. On average, female workers constitute around 38 percent of labor in all units of observation covered in the analysis; the lowest fraction of female labor is employed in iron and stell basic industries (5 percent) and the highest fraction is employed in tobacco manufactures (79 percent).

Independent surveys and other controls. I also perform some analyses using independent survey data from Pew Research Institute, a local marketing polling company, Jakpat; as well as Indonesia Family Life

Survey (IFLS). In the main analysis, I add some additional control variables using data from various other sources, including the World Bank and KPU(Komisi Pemilihan Umum)–National Election Committee. The complete list is reported in appendix C.

IV   Estimating Equations and Empirical Results

A.   OLS Estimates

To explore the the relationship between veiling and young female participation in formal occupations, I estimate the following equation as a starting point:

$$Veil_{sdt} = \beta_1 \ FemJob_{dt} + \mathbf{X}'_{s,d,n;t}\mathbf{\Gamma} + \delta_d + \tau_d T + \epsilon_{sdt} \tag{1}$$

$Veil_{sdt}$ denotes the fraction of female students who wear a veil at school s, in district d, and year t. The main explanatory variable, $FemJob_{dt}$, denotes the fraction of young women (aged 20-24 years) who work in the formal sector. This group is chosen to represent the population of interest, i.e. young females.[19] One may be worried that the measure for veiling rate (the outcome variable) may not be a good proxy for the veil take-up of the working-age group (the main independent variable) since they are of different age categories. However, this should not be a concern since the information I obtained from an independent survey reveals that the rates of veiling are very similar and stable across contiguous age groups. Please refer to table 6 of the appendix for the prevalence rate across different age groups.

$\mathbf{X}'_{s,d,n;t}$ denotes a vector of control variables at different level of observations, which details I will discuss below when presenting the results. These controls including variables at the school ($\mathbf{X}'_s; t$), the district ($\mathbf{X}'_d; t$), and the national level ($\mathbf{X}'_n; t$). The inclusion of this set of variables aimed at

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[19]I do not use the measure for the younger age group (16-19 years old) because this group is mostly still in high school, so the measure will be biased, especially in the current years

controlling for time and unit varying information that may also explain veiling. In order to control for non-time-varying characteristics specific to the districts, I also include district fixed effects, δ_d. Meanwhile $\tau_d T$ is district-specific linear time trend; and ϵ is an error term.

Given this specification, what I exploit is the variation within districts over time, after partialing out the drift from the increasing time trend of veil take-up specific to the district. This specification is motivated by the observation from figure 2 where we observe that different districts experience a different level of (increasing) time trend throughout the observation period. Moreover, since the treatment is applied at the district level, I cluster the standard errors for all regression specifications at the district level.

I refrain from simultaneously controlling for time fixed effects because the "treatment", i.e. the export shock is most likely to take effect in multiple times period and the effect is most likely to be heterogeneous based on the position along which the observation lies on the veiling curve across different points in time. As demonstrated by de Chaisemartin and D'Haultfœuille (2020), Goodman-Bacon (2020), and Imai and Kim (2020) among others, in this setting, using a two-way (unit and time) fixed effect may not represent the best estimation strategy for causal inference.[20].

The main analysis in this study is using a dataset with school-district-year as a unit of analysis, containing 93 schools located in 49 districts within the timespan of 1993 - 2014.[21] The estimates for equation 1 is presented in table 2. The coefficient of β_1 is positive, highly significant, and stable across different model specifications. From the second column onwards, I also control for a vector of confounders at different levels of observations.

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[20] Using time and unit fixed effect in a panel data often is seen as equivalent to difference-in differences estimator. In a setting where the "treatment" is applied in various point in time and where there is heterogeneity in effect, using this technique could lead to a wrong average treatment effects estimates due to possible negative weighting. The studies cited show that the two-way fixed-effects specification for estimating ATE in a panel data structure is best applied in the setting where there are two groups (treatment and control) and two time period (before and after), i.e the most simple setting of panel data)

[21] The reasoning for this period is twofold: first, the information on gender labor composition from the SI statistics is only available from 1993 onwards. This starting year is also good to avoid the censoring effect of the government regulation of public high school uniform which was lifted only in 1991.

At the school level, we might be worried that veiling is related to the ratio of girls and boys in the classroom. This ratio may affect the "competition" among girls for available boys (or vice versa), and thus might then affect how female students dress to influence how they are perceived by their peers at school. When the competition is high, we may expect that female students may want to stand out among their peers, so they may be putting on (or off) veil in order to achieve this goal. Moreover, the size of the student cohorts might also affect veiling. A larger group of student body might reduce the visibility of individual students within the school, hence this might affect the decision to veil. The geographic location of schools may also affect veiling because this defines the climate in the area and hence, influences how people dress to adjust to the weather. Controlling for this set of variable at the school level barely change the magnitude of the effect of interest.

TABLE 2 – OLS ESTIMATES: FORMAL JOB PARTICIPATION AND VEIL TAKE-UP

| | Veil take-up | | | | |
	(1)	(2)	(3)	(4)	(5)
Formal job participation	0.086	0.086	0.080	0.084	0.076
	(0.029)	(0.029)	(0.026)	(0.029)	(0.025)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,546	1,546	1,546	1,546	1,546
R-squared	0.788	0.790	0.792	0.791	0.793

The unit of analysis is school-district-year. All the three main variables are standardized to have a mean of zero and a standard deviation of one. *Veil take-up* is the fraction of female students who wear a veil, *Formal job participation* is the fraction of female population age 20-24 who works in the formal sector. School-level controls include female to male student ratio, the size of student body, the latitute and the longitude of school location; District-level controls include fraction of population who live in urban areas, the fraction of male population age 20-24 who are working, vote share of Islamist parties, and female high-school enrollment rate; National-level control includes economic growth rate. All specifications include district fixed effects and district specific time trends. Standard errors for all regressions are clustered at the district level

Several controls at the district level are also included: First, the fraction of population who live in urban areas may affect veiling through the level of social surveillance experienced by the women in the study. In rural areas,

people may know the members of the community better, so women in rural areas may experience a higher degree of scrutiny over their actions, hence it may affect how they dress and thus their decision to adopt a veil. Moreover, I also control for young male employment because male and female employments may move together. As a consequence, if male employment is the true driver of veiling, then the interpretation of the effect would be very different, as I will discuss further in the next section about the alternative mechanisms. By including this variable in the specification, we are sure that the effect we observe from female employment is free from this effect. In addition, I also control for high-school enrollment rate by female population of the relevant age groups. This variable might capture the effect of socio-economic background and the composition of student body in different district-years. For instance, when schools are more accessible, a higher attendance rate means that the socio-economic composition might be closer to the actual socio-economic characteristics of the population. Meanwhile, this might not be the case in the past, where high school might only be accessible for daughters of families from high socio-economic background. Another control included at the district level is the share of votes for Islamist parties. This variable is meant to capture changing social preferences for outward religious expression that may simultaneously affect the taste of population on veiling. Finally, at the national level, I include the national economic growth rate which controls for possible time-specific confounders from economic growth that affect all district in a similar fashion. For instance, a national economic crisis or years of recovery could affect the year-specific standard of living of the population in all districts. As we could observe, the inclusion of these confounders does not substantially alter the magnitude or the precision of the estimates.

B.   Shift-share Instrumental Variable

The estimate of β_1 in equation 1 might be biased due to some unobserved characteristics that caused districts with higher female job opportunities to also have a higher prevalence of veil-take up.[22] For instance, it might be the

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[22]Empirically, there could also be a reverse causation problem, which in this case, is not very relevant. Reverse causation means that higher veil take-up induces higher female participation in the formal sectors. It would basically capture the "supply" side

case that districts with more vibrant economic activity are also inhabited by more religious people, so we simultaneously see more veiling.

To address this problem, I build a Bartik-style instrumental variable (IV) to instrument female participation in the formal sector. This strategy has been widely used in economics and social sciences, for instance by Autor, Dorn, and Hanson (2013) to estimate the effect of import from China to local US labor market; Card (2009) to understand the impact of immigration on the local labor market in the US, and Tabellini (2020) who use this type of IV to identify the political and cultural explanation of the backlash against immigration. The essence of the identification strategy is to use plausibly exogenous shocks coming from international sources to predict their effect on local labor market. In line with the spirit of this strategy, I am using international demand shocks for Indonesia's products, which are weighted by district industrial and gender labor composition to predict female labor demand or more precisely female participation in formal employment.

The logic is the following: assume there is an increase in the demand for tobacco products in international markets. This induces tobacco industries to hire more labor. Importantly, tobacco industries systematically hire more women than men. As a result, districts with a large share of tobacco industry experience higher demand shocks than districts that specialize in other commodities. Since international demand is by and large exogenous, the changes it induces in female labor demand are plausibly also exogenous.

In particular, the instrument, *Export shock*, is calculated as the summation of normalized real values of exports for different industries weighted by their historical gender and industrial composition:

$$Export\ shock_{dt} = \sum_{k=1}^{K} value_{k,t} \underbrace{\frac{L_{k,d,t=1993}}{L_{d,t=1993}}}_{sector\ share_{kd}} \underbrace{\frac{L_{f,k,t=1993}}{L_{k,t=1993}}}_{\text{female score k}} \tag{2}$$

The subscript notation d is the identifier for the district, t is for time, f is for female workers, k is for the sector in the economy and K is the number of sectors in the economy. The first component, $value_{kt}$ is the normalized

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of the story. In this paper, what I am aiming to show is the "demand" side of veiling.

real value of export commodities produced by sector k at time t.[23] Since this variable is measured at the national level, it varies across years but is constant across districts within a given year. The second component, $sector\ share_{kd}$ is the historical share of sector k in district d in 1993 (the base year). This number captures the relative importance of industry k in a given district, hence, its value varies from district to district but stays constant for each district over time. The third component, $female\ score_k$ is an index which captures the relative importance of female as opposed to male labor force in a given industry k. For instance, textile and tobacco manufacture tend to have a higher share (more females); meanwhile, steel and heavy machinery manufacture tend to have a lower share (fewer females). It is calculated as the fraction of female workers in the industry at the base year, 1993. This number is common across districts and time but varies across sectors[24].

Given its structure, *Export shock* affects different districts in different years based on the fluctuation in the international demand which is amplified by the gender characteristics of the industry and the share of that industry in a given district. The summary statistics of the components of the instrument are presented in table 1. The step-by-step calculation process of this instrumental variable is discussed further in appendix C.

In figure 3, I show the scatter plot of the instrument and the two variables of interests. *Export shock* has a positive and significant relationship with formal job opportunities for females. Similarly, export shock is positively and significantly associated with veil take-up. Importantly, these relationships are obtained after partialing out time-invariant district characteristics as well as district-specific time trends.

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[23]This value denotes real increase, so it accounts for inflation rate and it is normalized to have a value of 1 in 1990.

[24]I do not use district-specific female score because it may be endogenous to the characteristics of the labor force of the district; national level score is more exogenous, hence arguably better to use in this case.

FIGURE 3 – THE FIRST STAGE AND REDUCED FORMS
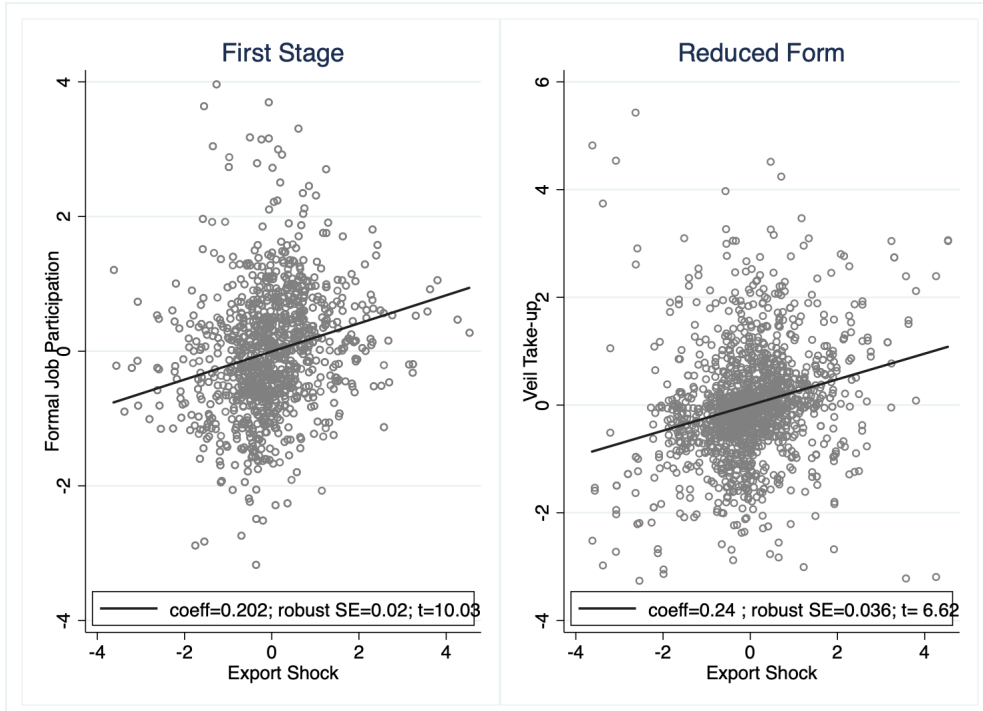
Note: This figure displays relevant correlations for the first stage on the left hand panel and of the reduced form on the right hand panel. The variables are residualized (of district fixed effects and district-specific time trends) and standardized (with a mean of zero and a standard deviation of one) to make the scales comparable across different variables

C. The causal effect of economic opportunities on veiling

To identify the causal effect of shocks in economic opportunity on veil take-up, I estimate the following model with two-stage least squares (2SLS):
First Stage:

$$FemJob_{dt} = \alpha \ Export\_shock_{dt} + \mathbf{X}'_{s;d;t} \ \mathbf{\Omega} + \eta_d + \ \theta_d T + \varepsilon_{dt} \qquad (3)$$

Second Stage

$$Veil_{sdt} = \beta_2 \ \widehat{FemJob}_{dt} + \mathbf{X}'_{s;d;t} \ \mathbf{\Gamma} + \delta_d + \tau_d T + \epsilon_{sdt} \qquad (4)$$

Export shock denotes the instrumental variable introduced earlier, and

the rest of the notation corresponds to equation 1.

Our parameter of interest here is β_2: a positive value indicates that the increase in economic opportunity for women increases the prevalence of veil use. In the analysis, I standardize the main variables of interest to simplify the reading of the effects.[25]

I run the 2SLS regression following model 4 and report the estimates in table 3. The results show that the availability of formal jobs for females has caused an increase in veil take-up. Precisely, a 15 percentage points increase in formal job participation (roughly one standard deviation) is associated with about 30 percentage points increase in veiling (roughly one standard deviation). In other words, for every percentage point increase in female participation in formal employment, we will observe about two percentage point increase in veiling. This latter number is equivalent to around 10 percent of the average veiling rate in the whole sample. This double magnitude effect may not come as a surprise: One could imagine that a single job opening may attract more than one applicant, hence cause multiple veil adoptions.

From the table, the reader may also observe that the first stage relationship is strong and significant: one standard deviation increase in export shock is associated with around 0.3 standard deviation increase in female participation in the formal sector. Meanwhile, the reduced form regression shows that one standard deviation increase in export shock is associated with around 0.3 standard deviation increase in veiling rate. Both the first stage and the reduced forms coefficients are significantly different from zero at the one percent level. Importantly, the reported Kleibergen-Paap Wald F-Statistics are large in all specifications, attesting to the strength of the first stage correlation.

Comparison to OLS estimates. Although similar qualitatively, the magnitude of the coefficient resulting from the two methods differ. These differences could be attributed to several factors: First, *omitted variable bias*. As previously discussed in section B., the estimate of β_1 is likely to

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[25]I standardize three main variables: Veil Take-up ($Veil$), female participation in formal employment ($FemJob$), and the instrument ($Export\ Shock$). A standardized variable has a mean of zero and a standard deviation of one. The unit of the instrument is not easy to interpret since it is the sum of real increases in international demand weighted by industrial specialization and the share of female labor.

TABLE 3 – 2SLS ESTIMATES: FORMAL JOB PARTICIPATION AND VEIL TAKE-UP

Panel A. SECOND-STAGE 2SLS ESTIMATES

	Veil take-up				
	(1)	(2)	(3)	(4)	(5)
Formal job participation	1.012	1.025	1.179	1.030	1.174
	(0.314)	(0.324)	(0.408)	(0.335)	(0.432)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,546	1,546	1,546	1,546	1,546
R-squared	0.539	0.535	0.470	0.532	0.473

Panel B. FIRST-STAGE ESTIMATES

	Formal job participation				
Export shock	0.288	0.287	0.239	0.281	0.233
	(0.059)	(.058)	(.053)	(0.057)	(0.054)
K-P Wald F-statistics	23.87	24.68	20.70	24.28	18.74

Panel C. REDUCED FORMS ESTIMATES

	Veil take-up				
Export shock	0.300	0.303	0.282	0.296	0.274
	(0.058)	(0.060)	(0.068)	(0.063)	(0.071)

The unit of analysis is school-district-year. All the three main variables are standardized to have a mean of zero and a standard deviation of one. *Veil take-up* is the fraction of female students who wear a veil, *Formal job participation* is the fraction of female population age 20-24 who works in the formal sector, *Export shock* is the instrument. School-level controls include female to male student ratio, the size of student body, the latitute and the longitude of school location; District-level controls include fraction of population who live in urban areas, the fraction of male population age 20-24 who are working, vote share of Islamist parties and female high-school enrollment rate, National-level control includes economic growth rate. Panel B and Panel C also include the same set of additional controls (School, District, and National levels) as Panel A. All specifications include district fixed effects and district specific time trends. Standard errors for all regressions are clustered at the district level

be biased due to unobserved characteristics that are strongly correlated to both female participation in the formal sector and veiling rate. One such possible characteristic is the level of religiosity. One may expect that religiosity positively correlates to veiling. At the same time, religiosity may be negatively associated with female labor force participation. The combination of these two correlations results in downward bias in β_1.

Second, *measurement error*. At the theoretical level, the phenomenon we are trying to capture is female labor demand. This is likely to be only noisily measured by female participation in formal jobs. This variable, in fact, is the equilibrium of the demand and the supply of female labor. This supply could be affected, for instance, by the progressive women movement for female emancipation. However, this progressive women movement may be negatively correlated to veiling. Again, this would push the estimate in the OLS specification downward.

Third, *local treatment effect*. The first stage regression analysis reported in supplementary figure 2 shows that there is large heterogeneity among districts. The effect is diluted in the OLS regression since in the OLS estimator, we average over all observations. Meanwhile, the estimate from the 2SLS regression is mostly applied to compliers (local treatment effect), which mainly is the effect of job opportunities that are affected by export-driven "booms" and "busts" in areas that specialize in female-intensive commodities.

D.   Validity of the instrument.

Several recent works argue that the validity of Shift-Share IV mainly hinges on the assumption that there is exogenous variation coming from either the share of the sector, e.g. Goldsmith-Pinkham, Sorkin, and Swift (2020) or from the common shock received by the district while allowing the shares to be endogenous, e.g. Adão, Kolesár, and Morales (2019) and Borusyak, Hull, and Jaravel (2018). The latter scenario is very likely to be satisfied in the setting of this study since I am not using a common shock generated by national production that serves the local markets. What I am exploiting instead, are the shocks that are coming from international demand, by excluding the local demand (Indonesian market) from the pool. Hence,

this source of variation is plausibly exogenous since it is less likely to be affected by local market conditions.

Meanwhile, the scenario in Goldsmith-Pinkham et al. (2020) is more likely, for instance, when the design emphasizes a two-industry setting or emphasize shocks to specific industries as the central element of the design. However, in this paper, I use more than two dozen industrial sectors, a third of which has more than half female share in their labor force (please refer to appendix 10 for the complete list). Hence, the analysis of this study is less likely to depend on a few specific industries.

Moreover, since I fix the industrial share at the base year, the plausibility of the design assumes that export shock should be independent of the initial features of the district. This assumption could be violated if there are some characteristics of the districts which make them systematically receive higher (or lower) shocks in the subsequent periods. To gauge the validity of this assumption, I perform several checks:

1. I add several possible confounders at the district level in the main analysis and show that the estimate of interest is robust. The idea is to show that the relationship between the instrument and the outcome of interest does not depend on the variation coming from these pertinent socio-economic features of the district. I report the results in table 3 from the second column onwards.

2. I show that future export shocks cannot predict past veil take-up. The idea is the following: If there is some systematic correlation between past veil take-up and future economic shocks, then one may suspect that the instrument is not independent of the initial condition of the districts, including the local industrial sectoral composition, because it is fixed at the base year. For this purpose, I run both the reduced forms and the 2SLS estimates for the first and the last specification of table 3, but using lead-instrument. In particular, the lead-instrument is calculated as follows:

$$Export\_shock_{d,t+10} = \sum_{k=1}^{K} value_{kt+10} \underbrace{\frac{L_{kd,t=1993}}{L_{d,t=1993}}}_{sector\_share_{kd}} \underbrace{\frac{L_{fk,t=1993}}{L_{k,t=1993}}}_{\text{female score\_k}} \quad (5)$$

Here, $value_{kt+10}$ denotes 10-years-lead of normalized real values of national exports, while the rest of the notation follow equation 2. In essence, this lead instrument captures the future economic shocks that the district would receive in 10 years.

I report this analysis in table 4 of the appendix and it shows that future export shock is not correlated to past veil take-up. The coefficients are tiny and unstable across different specifications and importantly, they are not statistically different from zero.

3. I show that economic shocks are balanced on several past characteristics of the district. The intuition of this exercise is to show that future economic shock is not correlated to the initial characteristics of the district. I report the results in supplementary table 5 and show that there is no systematic correlation between future shocks and the initial characteristics of the district, such as the gender balance in the population, the male participation in the labor force, fraction of population who live in urban areas, the log of population and female high school attendance rate.

These results strengthen the argument that the instrument is plausibly exogenous.

V   Mechanisms

Thus far, I have shown that exogenous shock in the availability of female formal job opportunities has a causal impact on the adoption of veiling. In this section, I attempt to gauge several possible mechanisms and provide several pieces of evidence in favor or against these reasonings.

A.   Veil as a negotiation device

As elaborated in section II, the veil could serve as a negotiation device that is effective in the context of religious, Muslim-majority society, like in Indonesia. In particular, this device is used to deal with the dilemma regarding the public and domestic role of women. Below I present several pieces of evidence that support this argument. First, using two different

TABLE 4 – LOGIT REGRESSION OF VEIL USE ON EDUCATION ATTAINMENT

	Pew Survey		Jakpat Survey	
	age <41	age <31	age <41	age <31
	veil (yes=1)		veil (yes=1)	
education level	0.257	0.486	0.45	0.44
	(0.124)	(0.189)	(0.11)	(0.13)
Observations	658	385	970	859

Note: The table reports logistics regression of whether the respondent is wearing a veil or not on education attainment. For Jakpat survey: SE is clustered at the district level and all regression is controlling for age and dummies for spending group (proxy for income). For Pew survey: all regression also control for age and dummies for income group. I rescale the coding for education category so that they are comparable between different surveys.

survey datasets, one from Pew Research and one from a local polling institution, I show that education attainment increases the likelihood of women wearing a veil. I run logistic regressions of veiling status (1=yes) on education attainment, and the results are presented in table 4. The coefficient of education is positive and highly significant in both datasets, the values of the coefficients are indeed quite comparable to each other. The results suggest that women who tend the veil are those who will pay a higher cost of not joining the labor market, i.e. by wasting their educational investment. This also indicate that the veil might be more useful, hence adopted more, by those women who are better equipped to access new economic opportunities in the formal labor market.

Second, I run a placebo analysis to show that veiling is not sensitive to just any kind of job, but only to those jobs that typically require the workers to leave behind their domestic roles (formal employment). For this purpose, I run OLS regressions of veiling on the fraction of young female population (age 20-24) who participate in informal occupations. To count for the fact that formal and informal job opportunities may move together, in each specification, I also control for the formal job participation by young females. This exercise will make the comparison of the placebo and the main effects much easier. I present the results of this analysis in table 5. From column 4 onwards, I include the instrument instead, as it provides an

alternative (more exogenous) measure for female formal job opportunities.

The results strongly support the above idea: The coefficients on informal job participation are very small and none of them is significant. Meanwhile, the coefficients of formal job participation and the instrument do not differ much from the OLS and the reduced form coefficients respectively, are stable and highly significant.

These two pieces of evidence are in line with the general theoretical framework outlined in section II, where religious veiling is used so that the women could access new economic opportunities, especially when taking these opportunities means that they have to abandon their domestic responsibilities.

TABLE 5 – PLACEBO: INFORMAL JOB PARTICIPATION AND VEIL TAKE-UP

	Veil take-up					
	(1)	(2)	(3)	(4)	(5)	(6)
Informal job participation	0.011	0.005	0.003	0.004	0.002	0.001
	(0.035)	(0.033)	(0.031)	(0.034)	(0.032)	(0.031)
Formal job participation	0.087	0.080	0.077			
	(0.029)	(0.027)	(0.026)			
Export-shock				0.292	0.282	0.274
				(0.060)	(0.067)	(0.070)
School-level controls		✓	✓		✓	✓
District-level controls		✓	✓		✓	✓
National-level controls			✓			✓
Observations	1,546	1,546	1,546	1,546	1,546	1,546
R-squared	0.788	0.792	0.793	0.798	0.801	0.802

The table reports OLS estimates with school-district-year as the unit of analysis. All variables are standaridized. *Informal job participation* is the fraction of female population age 20-24 who works in the informal sector and the rest of variables are defined as in table 3. All specifications include district fixed effects and district specific time trends. Standard errors for all regressions are clustered at the district level.

B. Concomitant increase in religiosity

A possible scenario is that economic shock may also correlate with the level of religiosity and religiosity is expected to correlate with veiling. Hence, the

increase in veiling may actually be driven by a concomitant rise in Islamic piety, not by the availability of new economic opportunities.

TABLE 6 – THE EFFECT OF ECONOMIC SHOCKS ON VARIOUS MEASURES OF RELIGIOSITY

| | Religiosity | | Num. of Prayers | | Relig. politics | |
	(1)	(2)	(1)	(2)	(1)	(2)
Export shock	0.008	0.007	0.017	0.015	-0.070	-0.071
	(0.030)	(0.028)	(0.027)	(0.025)	(0.050)	(0.050)
Observations	13,656	13,655	12,663	12,662	13,374	13,373
R-squared	0.031	0.064	0.038	0.072	0.109	0.113

The table reports OLS estimates of three different measures of religiosity on the instrument. All variable of interests are standardized to have a mean of zero and a standard deviation of one. The first two column take self-reported religiosity as dependent variable. The value of this variable goes from 1=*not religious* to 4 = *very religious*. The two middle columns take the number of prayers performed in a day as dependent variable; and the last two columns use the importance of religion and religiosity in influencing repondents' choice of political candidates. It takes value 0=*not important at all* to 10=*very important*. The data source is wave 4 and 5 of IFLS (Indonesian Family Life Survey) and the unit of analysis is individuals surveyed in those waves who are resident of the districts sampled in the main analysis of this paper. All regressions includes district and wave fixed effects. Each of the specification numbered (2) also control for age, age-squared, a dummy varibale for sex and marriage status. Standard errors for all regressions are clustered at the district level

I perform two exercises to address this concern, first, I include the vote share of Islamist parties in some specifications of the main analysis and show that the coefficient of interest does not change. Second, I perform an analysis drawing the information from IFLS (Indonesian Family Life Survey) to understand if there is a strong association between the instrument I used in the main analysis and various measures of religiosity.[26] The three measures used are a self-reported level of religiosity, the number of prayers performed in a day, and the importance of religion and religiosity in influencing preferences for political candidates.

The results are reported in table 6. The correlations between the instrument and each of the three different measures of religiosity are neither different from zero nor statistically significant. The sign is even negative

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[26]These measures are not available in the earlier waves, hence the analysis is performed using the data from the last two waves.

for the last measure of religious politics. These results undermine the alternative mechanism through an increase in religious piety.[27]

C. Cultural backlash

As there are more economic opportunities that compel more women to abandon their traditional roles; there may be a cultural backlash from conservative groups in society. Below, I discuss and assess the likelihood of this mechanism by presenting some pieces of evidence.

Parental Pressures. It might be the case that the women I sampled in this study adopt the veil because they are still very young and therefore, highly influenced by the pressures to put on a veil either from their parents or their family. The evidence does not seem to support this reasoning, however. In table 7, I show a nationally representative survey which reveals that 90 percent of women respondents who wear a veil declare that they adopt the veil because of their own will despite alternative options of "requested by parents" or "requested by spouse" available in the survey.[28]

Protest by Conservative Women. A possible form of backlash might be manifested by conservative groups of women who purposely veil to express their opposition toward the fact that more women are leaving their homes to work. If this is the case, then we would expect that veil adopters are more likely to be those who are staying at home (because they despise women who abandon their traditional roles) and not those who are taking the economic opportunity themselves. The evidence, however, does not seem to support this scenario: First, as previously shown in table 4, two different surveys confirm that education has a positive association with the probability of female respondents wearing a veil. This implies that veil adopters tend to be those who would pay the higher cost of staying at

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[27]This is not saying, however, that religiosity does have predictive power on the adoption of veiling. What these results suggest is that religiosity does not intervene with the effect of economic opportunity on veiling, the main argument of this study.

[28]There might be a concern that the answer is biased, for instance, because the respondents are under the surveillance of their parents or husbands when responding to this question. However, this should not be a concern because this survey is not conducted face-to-face, but is done using a mobile phone app where anonymity is more expected and social desirability bias is minimal.

TABLE 7 – THE REASONS TO VEIL

Reason to veil	Education Attainment				Total
	1	2	3	4	
Requested by parents	9.09	0.00	4.59	1.14	2.69
Requested by spouse	0.00	0.00	0.66	0.57	0.57
Respondent's own will	90.91	90.24	87.21	90.00	**88.83**
Following trend	0.00	0.00	0.98	0.57	0.71
Others	0.00	9.76	6.56	7.71	7.21
Total	100	100	100	100	100

Note:The values are in percentage and is sourced from Jakpat Poll on the trend of religious headscarf, conducted in 2016. Education category 1 = elementary school, 2= junior High school, 3 = senior high school, 4 = university and above. The survey question is "What is your reason to wear *Hijab* (a religious headscarf)?" Answer category "Others" include answers such as "commanded by the Quran", "fear of God's punishment", etc.

home (wasting their educational investment).

Second, I run a logistic regression of the binary variable for whether the respondent wears a veil on different dummies for working status . The result of this analysis is presented in table 8. Relative to women who are working (or going to school), women who are not working, are significantly less likely to wear a headscarf. These analyses show that this alternative mechanism does not find support in empirical patterns.

D. Compositional effect

One may be concerned that the effects we observed above are due to the composition of the student body in different years. It could be the case that as the economy develops and there are more economic opportunities, there is an increase in the demand for female education. As a result, girls who previously were staying at home, begin to attend high schools. If these girls happen to be positively selected from conservative religious families, then what we observe is simply a compositional effect. To address this concern, I perform a reduced form regression where the dependent variable is the fraction of the high-school-age female population who is attending schools. The idea is that this compositional effect could be important if high school participation were positively and significantly driven by the economic opportunities measured by the instrument. The results are reported

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TABLE 8 – LOGIT REGRESSION OF VEIL USE ON WORKING STATUS

VARIABLES	Age group			All ages
	< 21	21-30	>30	
	Dep. var: veil(yes=1)			
Base category : Not working				
Cat. 2 : working	-0.94	0.36	0.53	0.30
	(0.46)	(0.14)	(0.20)	(0.11)
Cat. 3: student	0.95	0.37		0.51
	(0.45)	(0.23)		(0.18)
Observations	215	651	130	996

Note: The table shows logistics regression of veiling on working status using the data from Jakpat Poll in 2016. Standard error is clustered at the province level. The unit of analysis is individual respondent. Dependent variable is a dummy valued 1 if wearing a veil. The main variable of interest is working status category. All regression is controlling for age and socio economic status variables.

in table 9. The magnitude of the effect of the instrument on female high school attendance rates is between 10 to 15 times smaller than the effect on veil take-up in the main analysis. Importantly, none of these coefficients is significantly different from zero. Thus, the compositional effect cannot be a significant channel that explains the relationship between economic opportunities and veiling.

Another compositional effect may come from the fact that economic opportunities may compel high school pupils to drop out of their school to obtain the newly available jobs. As a consequence, if the students who are staying at school are positively selected from conservative religious backgrounds, then I may capture this compositional effect instead. However, this scenario is very unlikely in the Indonesian context since the data from Statistics Indonesia shows that the average national dropout rate for general high school attendance is very low, i.e. less than 2 percent. Moreover, the chance of obtaining formal employment for a high-school drop-out is really low for most formal jobs, even blue-collar types, like in manufacturing industries. Therefore, this latter scenario is very unlikely to happen.

TABLE 9 – THE EFFECT OF ECONOMIC SHOCKS ON FEMALE HIGH SCHOOL ATTENDANCE

| | Female high-school enrollment rate | | | | |
	(1)	(2)	(3)	(4)	(5)
Export shock	0.019	0.017	0.012	0.009	0.039
	(0.072)	(0.071)	(0.069)	(0.066)	(0.067)
Percent urban		✓	✓	✓	✓
Islamist vote			✓	✓	✓
Economic growth				✓	✓
Log Population					✓
Observations	1,027	1,027	1,027	1,027	1,027
R-squared	0.628	0.629	0.629	0.629	0.632

The table reports OLS regressions of female high-school attendance (fraction of female population age 15-19 who is attending school) on the instrument. The unit of analysis is district-year. Both variables of interest are standardized to have a mean of zero and a standard deviation of one. From the second column onwards additional covariates are added: fraction of population live in urban areas, vote share of Islamist parties, national economic growth and log of population. All regressions includes district fixed effects and district specific time trends. Standard errors for all regressions are clustered at the district level

E. Income effect on the taste for fashion

An alternative reading is that the positive effect of economic opportunities on veiling could simply be the consequence of income effect on the taste for fashion in the female population. As the economy develops and the female population experiences improvement in income, they might start to think about expenditures beyond necessity, such as fashion. If the veil is considered a fashionable normal good, then its consumption increases as income increases. I argue, however, that this is not likely to be the case. Based on the analysis presented in table 5 above, increases in income per se (from informal jobs, that typically dot not require women to significantly alter their domestic responsibilities) do not increase the adoption of the veil.

This income effect may also be channeled through household income. If family income is pooled, and female subjects are permitted to spend from this pool, then the increase in veiling may be due to the household income effect, e.g. from increasing income of male family members. This does not seem to be the case, however. As shown in the main results of table 2 and

3, the inclusion of male employment, which increase male income, does not change the coefficient of interest. Moreover, the coefficient on male employment is not significantly different from zero.

VI   Robustness analyses

In this section, I summarize several robustness checks to support the validity of the analyses. The corresponding tables are in appendix B.

Removing outliers.   One may be concerned that some districts may mandate female pupils to wear headscarves, e.g. some districts apply *sharia* law that requires public servants and female pupils in public schools to wear headscarves on Fridays. If these areas happen to also display high economic participation in the formal sector, we may pick up the effect of these regulations instead. To address this concern, in table 7, I rerun the analysis of table 3 removing the district-years that have one hundred percent of female pupils with a veil. This is a good proxy of the existence of mandatory veil regulation in the school/district, and also a way to trim off the outliers in our sample. The results are robust to the exclusion of these observations. In fact, the coefficient of interest is actually larger.

Removing observations with higher variance. Because in some districts I could only collect the data from a single high school, this may cause higher uncertainty on the veil take-up data from these districts. To address this, I perform the analysis without including district-years observation with only one high school and report the results in table 8. The estimates are very similar to the ones resulting from the main analysis.

Jackknife resampling estimation.   Finally, I perform a Jackknife resampling procedure to make sure that the results observed above are not driven by any single district or any single year of observation. This procedure is performed by iteratively estimating the main model leaving one set of observations out of the sample (i.e., all observations from a given district or a given year). I present the results in figures 3 and 4 of the appendix for removal of observations along the district dimension and year dimension, respectively. This analysis corroborates the main results: the coefficients are similar to the main results, stable, and systematically different from

zero.

VII Discussion and conclusions

Economic development has delivered unprecedented opportunities for women in the form of appealing and well-paid employment, especially for those who are skilled and highly educated. However, prevailing social norms, especially those that govern the division of labor between men and women, inside and outside the house, may create a barrier for these women in accessing these new jobs.

In the face of this dilemma, religious veiling may provide an effective, culturally compatible tool in the context of a highly religious, Muslim-majority society like in Indonesia. It could serve as a negotiation tool that enables women to join the formal sector, but it also protects them from the possible personal and social stigma generated by taking employment outside the home which alter the traditional social norms that draw a clear demarcation between the domestic and the public roles of women.

In this paper, I documented this phenomenon by collecting new, original data on veiling based on revealed preferences data from photographs of public high school pupils. This method enables me to trace the evolution of veiling across districts in the country over more than two decades. Using a Bartik-style instrument, I show that female participation in the formal sector has driven the adoption of religious veiling. The instrument takes advantage of the historical district industrial composition, the female labor composition of sectors, as well as plausibly exogenous shocks in international demand, and it allows me to identify the causal effect of shocks in economic opportunities for women on veil take-up. Moreover, I show that this effect is not likely to be the result of a concomitant increase in religiosity, compositional effect of the student body, a cultural backlash or the effect of a general increase in income on the taste for fashion.

The results in this study may shed some light on the general observation of the increased popularity of veiling in Indonesia in particular and in other Muslim-majority countries in general. I do not aim at convincing the reader that female employment is the only driver of the popularity of veiling. What I demonstrate in this paper is simply that in the context of highly religious,

rapidly modernizing societies like Indonesia, economic development that creates new opportunities for women has a causal effect on the adoption of the veil which might be reflect a negotiation process between modernity and the prevailing social norms. The results may also provide an alternative reading on the meanings and motivations of this religious practice and perhaps some reference in designing relevant policies in the advanced world, e.g. on assimilation or integration of minority groups. Importantly, cultural values and social norms might shape the process of economic development in ways that seem counter-intuitive at a first glance.

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Appendix-For Online Publication

Appendix A   Supplementary tables and figures

TABLE 1 – Summary statistics

VARIABLES	N	mean	sd	min	max
Main Vars of interest					
Veil	1,546	0.208	0.292	0	1
Veil(std)	1,546	0	1.000	-0.711	2.709
Formal job partcp	1,546	0.212	0.140	0	1
Formal job partcp(std)	1,546	0	1.000	-1.513	5.611
Export shock	1,546	2.031	1.498	0.168	11.44
Export shock(std)	1,546	0	1.000	-1.244	6.282
Other outcomes					
Informal job participation	1,546	0.130	0.120	0	1
Informaljob participation(std)	1,546	0	1.000	-1.084	7.230
Male job	1,546	0.603	0.159	0.100	1
Male job(std)	1,546	0	1.000	-3.153	2.491
Additional covariates					
Fraction urban	1,546	0.529	0.347	0	1
Islamist votes	1,546	17.07	7.794	4	35
Economic growth	1,546	4.467	4.184	-13.13	7.818
Female school attendance	1,546	0.534	0.162	0	1
Num. of student	1,546	275.2	94.77	81	792
Latitude	1,546	-5.675	3.424	-8.076	5.358
Longitude	1,546	108.1	4.257	95.94	112.8
Female/Male ratio	1,546	0.892	0.319	0.00922	2.667
Components of the instrument					
Value of export	15,290	6.966	12.07	0.298	90.90
Sector share	15,290	0.0705	0.137	0.000298	1
Female score	15,290	0.381	0.195	0.0534	0.793

TABLE 2 – PREVALENCE OF VEILING BY EDUCATION LEVEL

Wearing a veil?	Education Attainment				Total
	Elementary	Secondary 1	Secondary 2	Tertiary	
Yes	64.71	59.42	68.54	76.42	**71.49**
No, but I definitely will	5.88	7.25	9.21	7.86	8.39
No, but maybe I will	17.65	7.25	6.97	8.52	7.89
Sometimes	11.76	21.74	12.58	5.46	9.91
No, and I will not	0.00	4.35	2.70	1.75	2.33
Total	100	100	100	100	100

Source: Author's calculation based on Jakpat Poll on the trend of religious headscarf, conducted in 2016. The question is "Are you personally wearing *Hijab* (a religious headscarf)?"
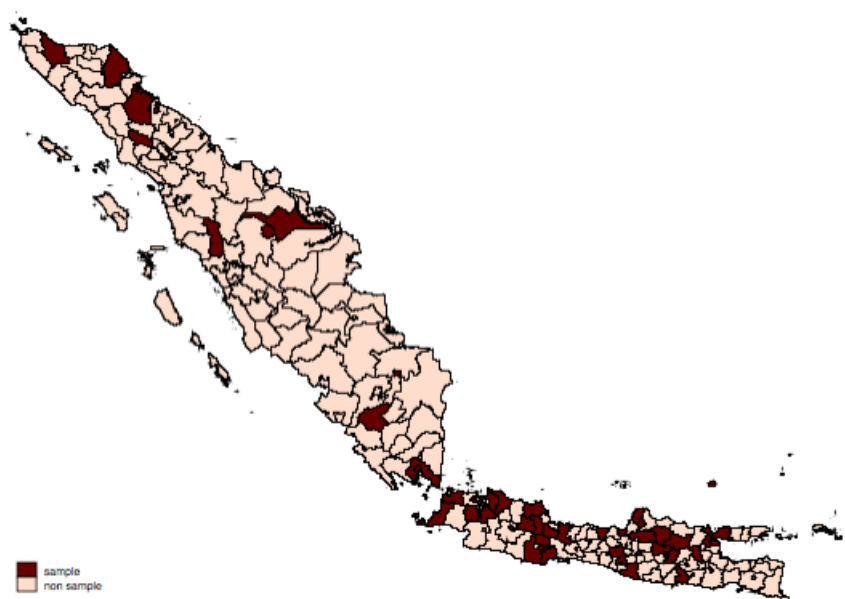

FIGURE 1 – GEOGRAPHIC DISTRIBUTION OF SAMPLE DISTRICS

Note: The figure displays the location of districts sampled spread over two islands: Java and Sumatera. Since the number of districts sample is proportional to the population in the province, more districts are sampled in Java (bottom right) than in Sumatera (top left)

TABLE 3 – SOCIO ECONOMIC CHARACTERISTICS, BY VEIL STATUS–PEW SURVEY

Characteristics	Age: 18 - 40			Age:18 - 30		
	No Veil	Veil	Difference	No Veil	Veil	Difference
age	29.06	29.74	-0.68	24.83	24.55	0.28
			(-0.59)			(0.48)
married	0.82	0.75	**0.07****	0.74	0.61	**0.13****
			(0.04)			(0.06)
education level	5.34	5.66	**-0.31***	5.47	6.02	**-.56****
			(0.17)			(0.22)
income level	6.14	6.21	-0.06	6.05	5.9	0.14
			(0.28)			(0.37)
num. of children	1.79	1.86	-0.06	1.4	1.5	-.09
			(0.12)			(.17)
access internet?	1.86	1.8	0.05	1.83	1.76	.07
			(0.03)			(.049)
access facebook?	1.08	1.04	0.04	1.02	1	.019
			(0.06)			(.033)
own cellphone?	2.01	2	0.01	2.02	2	.018
			(0.02)			(.038)
own landline?	1.97	1.97	0.003	1.98	1.97	.009
			(0.014)			(.017)
num. of daily prayer	7.18	7.21	-.035	7.12	7.15	-.033
			(0.138)			(0.19)
support Islamist party?	0.29	0.3	-.006	0.27	0.31	-.037
			(.0547)			(0.07)
urban	0.47	0.38	.085*	0.45	0.39	.062
			(.046)			(0.06)
Observation	513	149		307	80	

The table presents socio-economic characteristics of respondents grouped by their veil status. The unit of analysis is individual and the data source is The Muslim World Survey, 2012 by Pew Research Institute. *Note*: Standard error in parentheses. *** p<0.01, ** p<0.05, *p<0.1. Veil in this survey is coded based on surveyors' observation about the repondents during the interview, hence the number of respondent with veil is most likely understated.

TABLE 4 – OLS REDUCED FORMS AND 2SLS WITH LEAD INSTRUMENT

| | Veil take-up$_{sdt}$ | | | |
| | Reduced form | | 2SLS | |
	(1)	(2)	(3)	(4)
Export shock$_{sd,t+10}$	0.009	0.017		
	(0.059)	(0.062)		
Formal job partcp$_{dt}$			0.073	0.135
			(0.419)	(0.404)
School-level controls		✓		✓
District-level controls		✓		✓
National-level controls		✓		✓
Observations	688	688	688	688
R-squared	0.661	0.673	0.660	0.652

The unit of analysis is school-district-year. The first two columns of the table report the reduced form regressions of veiling rate on 10 years lead instruments, while the last two columns present the 2SLS regressions of veiling rate on female participation in formal employment, instrumented the latter by 10 years lead export shock. All three variables of interest are standardized. All specifications includes district fixed effects and district specific time trends. Standard errors for all regressions are clustered at the district level.

TABLE 5 – BALANCE TESTS

VARIABLES	(1) Share female$_t$	(2) Job male$_t$	(3) Percent urban$_t$	(4) Log population$_t$	(5) Female school enrollment$_t$
export shock$_{t+10}$	0.001	0.009	-0.007	-0.028	-0.010
	(0.005)	(0.020)	(0.016)	(0.027)	(0.019)
Observations	1,023	1,021	1,023	1,023	1,023
R-squared	0.243	0.644	0.933	0.901	0.667

The table displays the OLS regression of various characteristics of districts on 10 years lead of instruments. All regressions includes district fixed effects and district specific time trends and standard errors are clustered at the district level.; *** p<0.01, ** p<0.05, * p<0.1
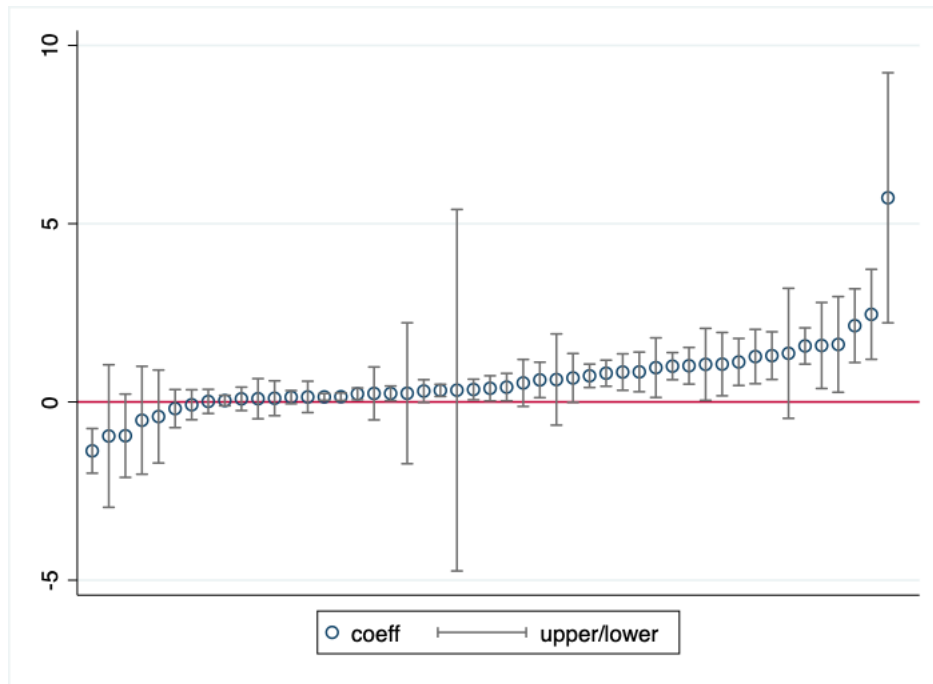
FIGURE 2 – FIRST-STAGE HETEROGENEITY EFFECT

Note: The figure display the heterogeneity of the coefficients of the first stage regressions. Each dot represents the coefficient of the OLS estimate (within 95% Confidence Interval) of female formal job participation (standardized) on export shock (standardized) by district

TABLE 6 – VEILING PREVALENCE ACROSS DIFFERENT AGE GROUPS

Wearing a veil?	Age group					Total
	16-19	20-24	25-29	30-34	35-39	
Yes	68.42	72.39	74.41	67.00	67.44	71.59
No	31.58	27.61	25.59	33.00	32.56	28.41
Total	100	100	100	100	100	100

Note: The values are in percentage and is sourced from Jakpat Poll on the trend of religious headscarf, conducted in 2016. The question is "Are you personally wearing *Hijab* (a religious headscarf)?" The respond answers are recoded into Yes when the respond is "yes" and No for other responses

Appendix B   Robustness checks

TABLE 7 – TRIMMING OFF OUTLIERS

	Veil take-up				
	(1)	(2)	(3)	(4)	(5)
Formal job participation	1.101	1.108	1.275	1.117	1.276
	(0.301)	(0.313)	(0.396)	(0.322)	(0.419)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,511	1,511	1,511	1,511	1,511
R-squared	0.398	0.396	0.306	0.390	0.306

The table presents 2SLS estimates corresponding to the results in Panel A of table 3, but excluding observations with 100 percent female pupils with headscarves

TABLE 8 – TRIMMING OFF OBSERVATION WITH LOWER PRECISION OF OUT-COMES

	Veil take-up				
	(1)	(2)	(3)	(4)	(5)
Formal job participation	0.934	0.948	1.079	0.949	1.068
	(0.296)	(0.306)	(0.379)	(0.315)	(0.400)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,463	1,463	1,463	1,463	1,463
R-squared	0.587	0.587	0.587	0.587	0.587

The table presents 2SLS estimates corresponding to the results in Panel A of table 3, but excluding observations from district with only one school sample

FIGURE 3 – Jackknife resampling estimates by district
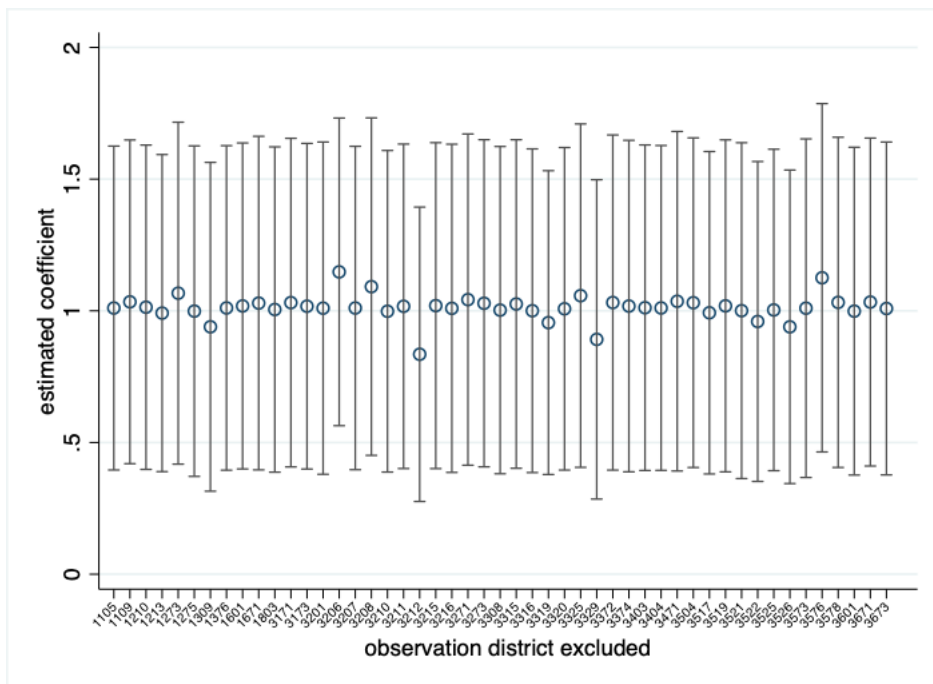
(a) *Note*: This figure displays the re-estimation of the coefficient (within 95 percent confidence interval) in the main regression presented in table 3–model 1, using a jackknife resampling method over district dimension.

FIGURE 4 – Jackknife resampling estimates by year
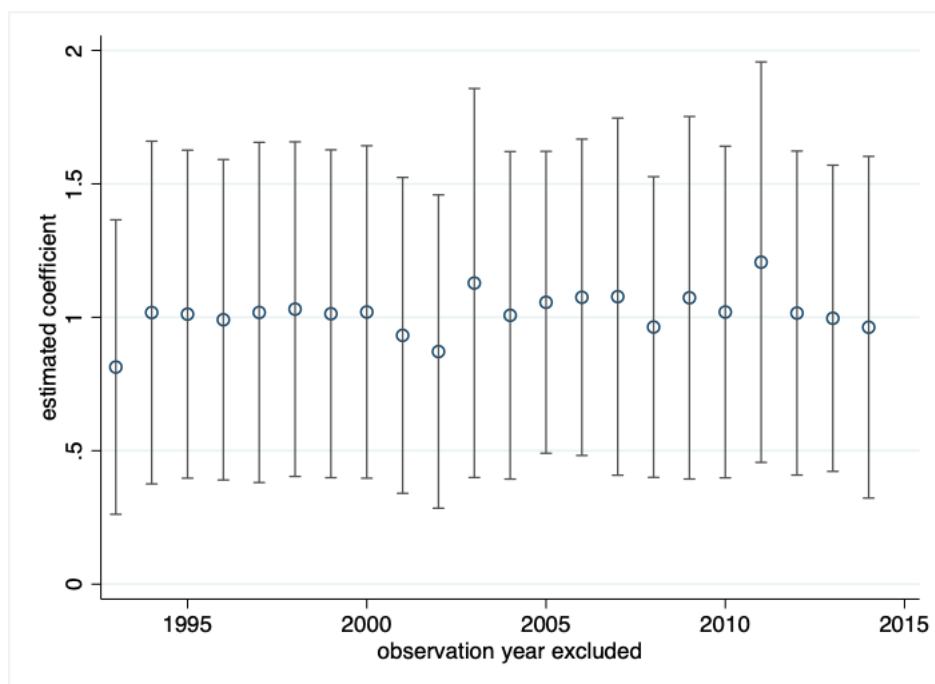
(a) *Note*: This figure displays the re-estimation of the coefficient (within 95 percent confidence interval) in the main regression presented in table 3–model 1, using a jackknife resampling method over year dimension.

Appendix C   Variable definition, calculation and data source

Table 9 reported short description of the variables used. While more detailed explanation of calculation of variable Export shock follows

A.   International trade data

The first component of variable used to measure **the international demand shock** for Indonesian product is sourced from UN-COMTRADE database which is available through **World Integrated Trade Solution (WITS)** and can be accessed at `https://wits.worldbank.org/`. This interface allows the user to customize the query, for instance by choosing the reporting country, trade partner, the year of report, as well as the nomenclature of product classification. The nomenclature used for the variable in this paper is ISIC Revision 2 at 3 digits level, which could be matched to the industrial classification of Statistics Indonesia for Large and Medium Industry census in 1993.

The trading values acquired is then transformed into its constant value in 1990 USD using GDP deflator for the United States downloaded from **Penn World Table-international comparisons of production, income and prices 9.1** which could be accessed at `https://febpwt.webhosting.rug.nl/`.

After deflated so that the value are comparable across years, these numbers are then normalized to 1 in 1990 so that they are comparable across different industrial sector. This way, what we essentially capturing is the real increase in the demand for specific product across different time period.

B.   District sectoral composition and industrial female scores

The second and the third component of variabale *Export_Shock* are the female score of the industry and district Industrial composition. They are calculated using the Medium and Large Manufacturing census by Statistics Indonesia (Badan Pusat Statistik-BPS) which is conducted annually. The

census provides information about the location, output/product classification, and since 1993, the breakdown of male and female labor used in the production of the firm.

The historical sectoral composition is calculated as the ratio of labor force who work in a given sector in a given district and the total worker of of manufacturing sector in the district in the base year, i.e. year 1993. In figure 5, one could observe the variation in historical industrial composition for districts included in the sample.

While **industrial female score** is calculated by the ratio of female worker and the total worker in a given industry at the national level. This is also calculated for the base year, ie. the year 1993. The value of this scores could be observed in table 10
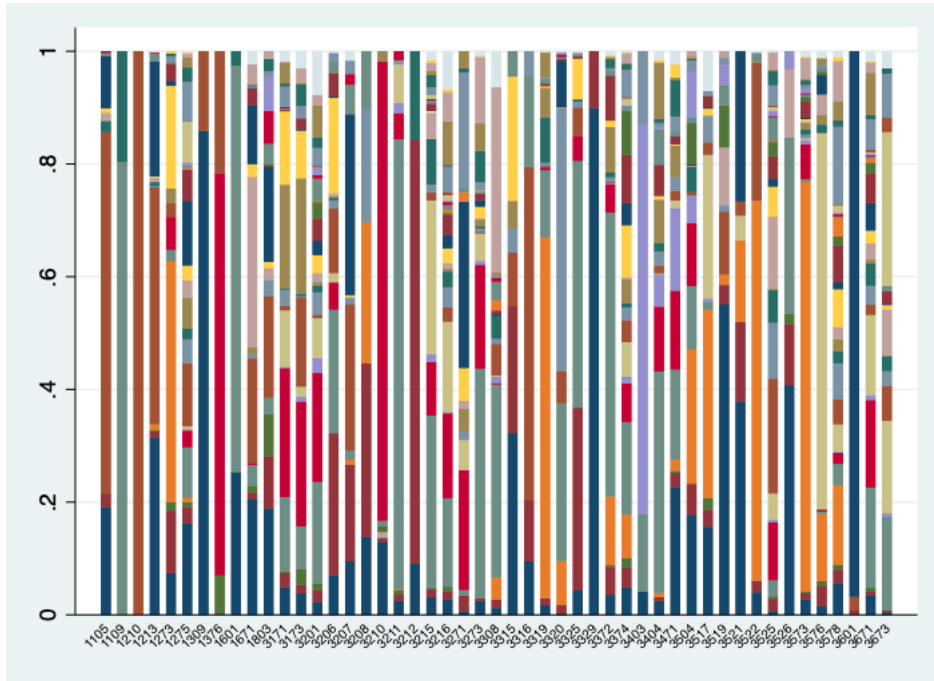

FIGURE 5 – Historical industrial compostion by district

Note: The figure shows the industrical composition in each district (district code in x axis) at the base year (1993) disaggregated by 3 digit ISIC Rev.2 industrical classification. Each color represent one industrial sector

TABLE 9 – Variable definition

VARIABLES	Details	Source
Veil take-up	Fraction of female pupils who wear a headscarf in school book pictures in a given school-district-year	School book, see details in part D below
Formal job partcp	Fraction of female aged 20-24 who held a formal job. Holding a formal job is defined as satistifying two criteria: 1. Working is the activities taking most time in the previous week. 2.Occupation status is employee = code 4 in SAKERNAS coding	SAKERNAS
Export Shock	Demand shock for the product produced by Indonesian based firms in international market	See text section B. and appendix C below
Informal job partcp	Share of female aged 20-24 who held an informal job. An informal job is defined as satisfying two criteria: 1. Working is the activities taking most time in the previous week. 2. Occupation status do not fall into category 4 (employee). This includes independent workers (with or without employees), casual workers (in agriculture or non agricultural sector) and (unpaid) family workers	SAKERNAS
Job male	Fraction of male population aged 20-24 who hold a job. This is defined as declaring working as the main activity in the previous week	SAKERNAS
Percent urban	Fraction of population aged 10 and above who live in urban areas	SAKERNAS
Female/Male ratio	The ratio of female students to male students in a given school-district-year	School book
Num. of student	The total number of students in a given school-district-year	School book
Latitude, Longitude	The geographic coordinate of school location	http://sekolah.data.kemdikbud.go.id/
Islamist vote	Vote shares of Islamist party (PPP, PKS, PBB) at the electoral college level	KPU (Election Comission)
Economic growth	Economic growth at the national level	The World Bank
Log population	The log value of the number of population aged 10 and above	SAKERNAS
Share female	Fraction of female in the population aged 10 and above	SAKERNAS
Female school partcp	Fraction of female population aged 15-19 years old whos main activities is going to school in the previous week	SAKERNAS
Female score	The share of female labor in sector k in the base year,1993	Medium and Large Manuf. Census
Sector share	The share of sector k in district d in the base year,1993	Medium and Large Manuf. Census
Value of export	The value of Indonesian export in sector k in year t	UN Comtrade

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TABLE 10 – Industry score (share of female workers) at 3 digit ISIC Rev.2

Code	Description	Female Share
371	Iron and steel basic industries	.053
369	Manufacture of other non-metallic mineral products	.099
363	Manufacture of other non-metallic mineral products	.100
354	Manufacture of miscellaneous products of petroleum and coal	.108
384	Manufacture of transport equipment	.119
382	Manufacture of machinery except electrical	.124
351	Manufacture of industrial chemicals	.198
372	Non-ferrous metal basic industries	.216
381	Manufacture of fabricated metal products, except machinery and equipment	.238
341	Manufacture of paper and paper products	.239
362	Manufacture of glass and glass products	.240
355	Manufacture of rubber products	.249
342	Printing, publishing and allied industries	.309
332	Manufacture of furniture and fixtures, except primarily of metal	.322
361	Manufacture of pottery, china and earthenware	.373
331	Manufacture of wood and wood and cork products, except furniture	.374
313	Beverage industries	.374
311	Food manufacturing	.378
323	Manufacture of leather and products of leather, leather substitutes and fur, except footwear and wearing apparel	.378
312	Food manufacturing	.423
364	Manufacture of other non-metallic mineral products	.464
385	Manufacture of professional and scientific, and measuring and controlling equipment not elsewhere classified, and of photographic and optical goods	.480
356	Manufacture of plastic products not elsewhere classified	.506
352	Manufacture of other chemical products	.510
383	Manufacture of electrical machinery apparatus, appliances and supplies	.519
321	Manufacture of textiles	.531
390	Other Manufacturing Industries	.686
324	Manufacture of footwear, except vulcanized or moulded rubber or plastic footwear	.739
322	Manufacture of wearing apparel, except footwear	.763
314	Tobacco manufactures	.793

Appendix D Veil take-up : Data collection procedure

The data on veil take-up is obtained by calculating the number of female pupils who wear a headscarf the high-school book pictures as a proportion of all female pupils. This book is a register, a document normally kept by administrative office of public schools in Indonesia. Examples of pages from this document is presented in figure 6

FIGURE 6 – EXAMPLE OF HIGH SCHOOL BOOK PAGES

A. Sampling

The sample frame is all districts (total number is 267) located in Java and Sumatera (two main islands in Indonesia). The data collection is performed

between March - August 2017. The number of districts included in the original sample is 50. They are randomly chosen with the number proportional to the size of population inhabited the province in 2014. In table 11, one could observe the characteristics of non-sampling and sampling districts. Apart from the number of population, there is no significant differences between the two group. From each of the district chosen in the sample, two schools are randomly selected. Out of 50 districts originally planned, 1 district dropped due to logistical problem, no reliable enumerator is found to perform data collection in this district. Out of 49 district successfully sampled, 5 districts only resulting in single school. The list of the district samples and the number of schools sampled is reported in table 12, meanwhile, the geographic distribution the district sample could be observed in figure 1

TABLE 11 – Sampling vs. Non-sampling districts

Variables (2014)	Java		Sumatra	
	Non-sample mean	Difference	Non-sample mean	Difference
Development indicators				
Access to electricity	99.744	0.072	94.966	2.318
		(0.068)		(2.416)
Access to safe sanitation	71.722	1.980	71.532	1.433
		(2.438)		1.433
Percapita expenditure (log)	13.432	0.094	13.446	0.048
		(0.065)		(0.085)
Percapita expenditure–poorest 20%(log)	12.567	0.051	12.693	0.041
		(0.046)		(0.070)
Birth attended by professional (%)	92.447	-0.312	88.662	4.573
		(2.039)		(3.350)
Poverty rate	11.446	-1.100		-0.138
		(0.972)	11.984	(1.835)
Education indicators				
Human Development Index	68.961	1.712	67.304	2.445
		(1.102)		(1.491)
Literacy rate	94.036	1.213	97.509	0.964
		(0.922)		(0.990)
Enrollment rate: primary school	96.763	0.589	97.122	-0.097
		(0.403)		(0.656)
Enrollment rate : junior secondary	80.091	1.862	78.061	3.091
		(1.308)		(2.169)
Enrollment rate : senior secondary	60.308	0.558	64.592	-1.230
		(1.878)		(2.897)
Population and Labor market				
Labor force participation rate	0.510	(0.002)	0.471	-0.005
		(0.010)		(0.019)
Employment rate	0.481	-0.004	0.446	-0.013
		(0.011)		(0.021)
Unemployment rate	0.029	0.002	0.025	0.008*
		(0.002)		(0.004)
Underemployment rate	0.140	0.000	0.177	-0.022
		(0.013)		(0.022)
Population (million)	1.086	0.283*	0.329	0.379***
		(0.162)		(0.097)
Morbidity rate (percent)	30.695	1.422	27.095	-0.923
		(1.422)		(2.319)
Local governance indicators				
Local finance audit score	2.744	0.173	2.162	0.656
		(0.318)		(0.426)
Government transfer – DAK	24.637	0.043	24.538	0.041
		(0.176)		(0.217)

The table shows the difference in various outcome variables between sample and non-sample districts (sample values - non sample values) in each of island, Java and Sumatra. Data source: Indo-DAPOER, the World Bank, Jakarta; analysis by the author. Standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

TABLE 12 – List of sample districts

No	District code	District name	Province name	# schools sampled
1	1105	Aceh Timur, Kab.	Aceh	2
2	1109	Pidie, Kab.	Aceh	2
3	1210	Dairi, Kab.	Sumatera Utara	2
4	1213	Langkat, Kab.	Sumatera Utara	2
5	1273	Pematang Siantar, Kota	Sumatera Utara	2
6	1275	Medan, Kota	Sumatera Utara	2
7	1309	Pasaman, Kab.	Sumatera Barat	2
8	1376	Payakumbuh, Kota	Sumatera Barat	2
9	1471	Pekanbaru, Kota	Riau	dropped
10	1601	Ogan Komering Ulu, Kab.	Sumatera Selatan	2
11	1671	Palembang, Kota	Sumatera Selatan	2
12	1803	Lampung Selatan, Kab.	Lampung	1
13	3171	Jakarta Selatan, Kota	DKI Jakarta	2
14	3173	Jakarta Pusat.	DKI Jakarta	1
15	3201	Bogor, Kab.	Jawa Barat	2
16	3206	Tasikmalaya, Kab.	Jawa Barat	2
17	3207	Ciamis, Kab.	Jawa Barat	1
18	3208	Kuningan, Kab.	Jawa Barat	2
19	3210	Majalengka, Kab.	Jawa Barat	2
20	3211	Sumedang, Kab.	Jawa Barat	2
21	3212	Indramayu, Kab.	Jawa Barat	2
22	3215	Karawang, Kab.	Jawa Barat	2
23	3216	Bekasi, Kab.	Jawa Barat	2
24	3271	Bogor, Kota	Jawa Barat	2
25	3273	Bandung, Kota	Jawa Barat	2
26	3308	Magelang, Kab.	Jawa Tengah	2
27	3315	Grobogan, Kab.	Jawa Tengah	2
28	3316	Blora, Kab.	Jawa Tengah	2
29	3319	Kudus, Kab.	Jawa Tengah	1
30	3320	Jepara, Kab.	Jawa Tengah	2
31	3325	Batang, Kab.	Jawa Tengah	2
32	3329	Brebes, Kab.	Jawa Tengah	2
33	3372	Surakarta, Kota	Jawa Tengah	2
34	3374	Semarang, Kota	Jawa Tengah	2
35	3403	Gunung Kidul, Kab.	D.I. Yogyakarta	2
36	3404	Sleman, Kab.	D.I. Yogyakarta	2
37	3471	Yogyakarta, Kota	D.I. Yogyakarta	2
38	3504	Tulungagung, Kab.	Jawa Timur	2
39	3517	Jombang, Kab.	Jawa Timur	1
40	3519	Madiun, Kab.	Jawa Timur	2
41	3521	Ngawi, Kab.	Jawa Timur	2
42	3522	Bojonegoro, Kab.	Jawa Timur	2
43	3525	Gresik, Kab.	Jawa Timur	2
44	3526	Bangkalan, Kab.	Jawa Timur	2
45	3573	Malang, Kota	Jawa Timur	2
46	3576	Mojokerto, Kota	Jawa Timur	2
47	3578	Surabaya, Kota	Jawa Timur	2
48	3601	Pandeglang, Kab.	Banten	2
49	3671	Tangerang, Kota	Banten	2
50	3673	Serang, Kab.	Banten	2

B. Data collection procedure

Enumerators are given a randomly ordered list of schools and visit the schools based on the order. The sample frame of this study does not include Islamic schools (public Madrasahs). This is done in purpose because all female pupils in Madrasahs wear a head scarf, hence there is no information to obtain from these religious schools.

The instruction procedure of data collection at the school level is as follows:

1. Obtain permission from school administration to collect data by showing the necessary documents from the PI and the government authorities.

2. Check if the quality of register book pass the standard (readable, fairly organized and available for many cohort years). If the quality of material below standard, go to the next school in the list, otherwise, go to the next step.

3. Count the number of students in each cohort, male and female and register them in the data collection sheets provided by PI.

4. Count the number of female students who wear a headscarf and register them in the data collection sheets provided by PI.

5. Scan/take pictures of randomly selected pages of the register book. Enumerators takes scans of every other page of the available books, to ease the work, PI set the rules that odd pages are to be taken for odd year cohorts and even pages are to be taken for even year cohort.

6. Upload all information collected and the pictures/scan in the dedicated online server.

7. Data quality control by PI and team, approval if quality is accepted and the scans matched the information in the data collection sheets.

8. Amend or collect the missing information/data if necessary.

9. Repeat the procedure for the next school.