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

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Abstract

We demonstrate that emerging economic opportunities compelling women to step away from their domestic roles have significantly influenced the adoption of religious veiling. We measure the prevalence of veiling among young women across Indonesia's districts for more than two decades by hand-coding around a quarter million photographs attached to Indonesia's public high school yearbooks. Leveraging on exogenous variations from the interaction between international demand for Indonesia's products and sectoral and gender composition of local industries, we show that the relationship is causal. Our findings suggest that veiling serves as a strategy for young women to navigate the dual aspirations of participating in formal labor markets while safeguarding their personal and social image 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 new type of employment typically requires workers to leave their homes to engage in the workplace over an extended period. In societies where women are designated as the primary bulwark of public morality and the traditional family institutions, taking these types of jobs may be costly for one's personal and social image, despite the economic benefits they offer.

In light of this dilemma, some women may devise strategies to lower the cost of participating in this type of employment using culturally compatible tools. Religious veiling appears to be one of these tools. Particularly effective in the context of Indonesia's highly religious society, some women adopt veiling in order to benefit from new economic opportunities while at the same time protecting their dignity and reputation in society.

This study aims to document this phenomenon. In particular, we find 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 more than two decades of the observation period, the fraction of young females adopting religious veiling has evolved hand-in-hand with the fraction of young females participating in formal employment. This is in contrast, for instance, to the participation of young females in informal occupations.

We use an original method to measure the prevalence of veiling among young women by directly observing the portraits of students attached to Indonesia's public high school registers. The main data in this paper is based on human-coding of around a quarter million of these photographs. This data enables us to trace the evolution of veiling across districts for more than two decades. This new measure sets this study apart from previous research which mostly relies on surveys. Survey data on this social practice might not only suffer from reporting and social-desirability bias, but is also not systematically available across space and time. To our knowledge, there is no comparable data on veiling of this scope available to date, and the data collected for this study fills this gap.

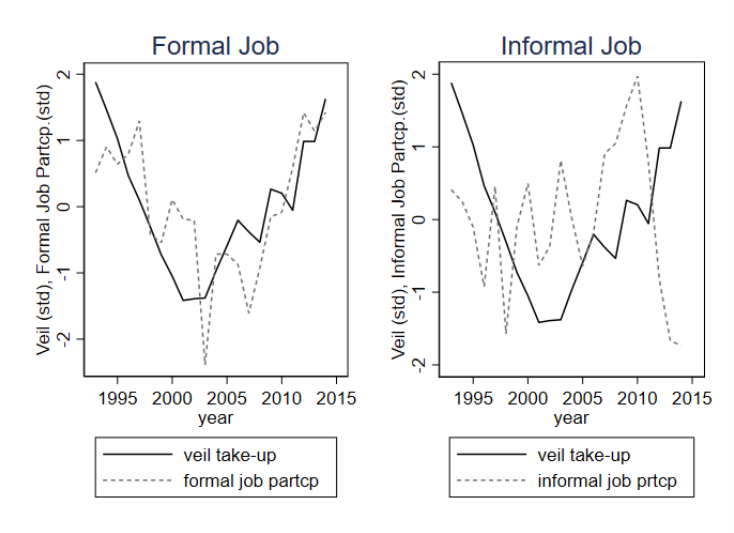

FIGURE 1 – (CO-)EVOLUTION OF VEILING AND FEMALE PARTICIPATION IN DIFFERENT TYPES OF EMPLOYMENT

Note: The graph displays the veiling rate among high school female students alongside the formal and informal employment rates of young women aged 20–24 across all sample districts. To ensure comparability, all variables have been detrended to remove secular time trends and standardized to have a mean of zero and a standard deviation of one.

To estimate the causal effect of economic opportunities on veiling, we build a Bartik-style instrumental variable exploiting exogenous variation generated by the interaction between international demand for Indonesia's products and the sectoral and gender composition of local industries. This instrument creates a plausibly exogenous shock in the availability of economic opportunities for females by assigning a higher "dosage of treatment" to 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, we find that young female participation in formal occupations has a positive, significant effect on veiling. In particular, the 2SLS estimate indicates that every percentage point increase in the formal job participation by young females has caused an increase in veiling by about 2.3 - 2.6 percentage points. This effect is equivalent to about one-eighth of the mean value of veiling in the whole sample. Importantly, the estimates are robust to controlling for district fixed effects, district-specific time trends, as well as additional covariates at the school, district, and national levels.

Our analysis of potential mechanisms strongly suggests that veiling in this context functions as a negotiation tool, enabling women to access expanding opportunities in formal employment while preserving their personal and social image in

society (Carvalho, 2013)[1]. We find that veiling adoption is particularly responsive to types of employment that may jeopardize a woman's personal or social reputation. Specifically, our results show that veiling increases in response to formal, paid work—where workers are typically required to be present at a work site for extended periods—while it does not respond to informal employment. In the Indonesian context, informal work is often home-based or unpaid (e.g., as family labor), allowing women to fulfill domestic responsibilities alongside income-generating activities. Because such work does not entail the same degree of public exposure or reputational risk, it does not elicit similar veiling response.

Additionally, our analysis shows that the veiling response to economic shocks is significantly stronger in environments with low gender segregation. Specifically, the estimated effects in districts below the median of the segregation index distribution are more than twice as large as those in districts above it. When we further disaggregate the sample into quartiles, the effect is most pronounced and statistically significant in districts within the first quartile—where the likelihood of cross-gender interactions is highest. By contrast, the effects in the upper quartiles are smaller and/or statistically imprecise. These findings suggest that veiling functions as a mechanism to mitigate social stigma in contexts where interactions with unrelated male coworkers are more likely.

The evidence also indicates that veiling functions as a signaling mechanism to navigate social norms. Our findings show that that veiling responses are strongest in areas where gender norms are neither highly rigid nor exceptionally flexible, indicates that veiling facilitates negotiation, a process that can only occur or is only necessary when social norms exhibit some degree of ambiguity. Importantly, the impact of veiling is more pronounced in districts with a higher proportion of the Muslim population, suggesting that its role as a social signal is amplified in communities where religious norms exert greater influence. Additionally, independent qualitative studies, along with our analyses of two distinct surveys, consistently reveal a positive correlation between education and veiling in Indonesia. We interpret this as evidence that more educated women, who face higher social stigma and opportunity costs of labor market exclusion, are more likely to adopt veiling as a strategy to facilitate workforce participation. Collectively, these findings provide strong evidence that veiling functions as a strategic adaptation, enabling women to pursue economic opportunities while maintaining their personal and social standing

[1]In Carvalho's (2013) model, veiling serves two key functions: first, as a commitment device, it helps women uphold the values they adhere to; second, as a signaling tool, it communicates the adopter's adherence to social norms, thereby shielding them from potential stigma associated with working outside the domestic sphere.

within the community.

Our analysis considers and systematically rules out several alternative explanations for the observed relationship between economic opportunities and veiling. While religion provides a moral and cultural foundation for veiling, the effect of religiosity seem to work at the communal rather than at the personal level. The evidence shows that while we find inconclusive relationship linking veiling and personal religisity, as previously mentioned, veiling effect is stronger in district with larger fraction of Muslim communities. This reflects the dual function of veiling as means of expression of both personal piety and social signals. The evidence suggests that veiling appears to function as a targeted response to evolving economic opportunities for women, rather than moving in lockstep with other forms of religious expression.

Moreover, we provide evidence showing that veiling does not appear to be a reactionary response or a conservative backlash driven by familial pressures. We also rule out an income-based explanation, as veiling shows no correlation with informal employment, nor do economic shocks in male-dominated sectors affect veiling rates. Furthermore, controlling for female high school enrollment does not alter our results, suggesting that changes in student composition are unlikely to drive the findings. Taken together, these results rule out various alternative explanation for the relationship in question.

In the robustness analysis, we confirm that our main results remain consistent even after accounting for potential outliers and variations in the dataset. Specifically, the estimated coefficients remain stable even when excluding schools where 100% of students wear the veil, as this may reflect institutional mandates rather than individual choices. The findings also hold when removing high-variance observations and using Jackknife resampling, which systematically excludes data from a single year, a single district, or a single sector at a time. Additionally, our results remain robust to alternative instrument specifications, variations in the timing of economic shocks, and the exclusion of the textile-related industries—where Indonesia may act as a price-setter. These robustness checks collectively strengthen the credibility of our empirical strategy.

This study contributes to several strands of social science literature. Our theoretical framework builds on prior work by Carvalho (2013) and Patel (2012), reinforcing their argument that veiling is shaped by identity and reputational concerns in a rapidly modernizing society. Empirically, our findings align with Abdelgadir and Fouka (2020), who show that veiling facilitated Muslim girls' access to education in France, as well as Meyersson (2014) and Corekcioglu (2021), who demonstrate

that accommodating Muslim female preferences in public spaces increased women's participation in Turkey. This study also relates to Obermeyer (2016), who examines veiling and modernization in North Yemen. More broadly, the relationship between economic opportunities and heightened religious commitment has been anticipated by Iannaccone (1992), whose club goods model attributes this link to religious sacrifices rather than labor market integration or response to modernization.

This study engages with the empirical literature on veiling, including Aksoy and Gambetta (2016), who test veiling theories using cross-country survey data but find limited support for certain predictions among less religious women, and Jacquet and Montpetit (2023), who investigate the cost of veiling for Muslim women in France. However, our study is the first to empirically link veiling practices with the transformation of female labor markets in a developing country. Beyond introducing original data, it advances previous work by establishing a causal relationship between economic opportunities and veiling through a credible identification strategy while systematically ruling out alternative mechanisms.

This study contributes to the literature on the evolution of female economic participation, particularly the role of culture and social norms, as emphasized by Boserup (1986), Goldin (1990), and Fernández (2013). Our findings align with this perspective by showing how gender norms interact with economic transformations. Specifically, we build on research on social norms and female labor force participation in Muslim-majority societies (e.g., Bursztyn, González, and Yanagizawa-Drott (2020)), extending this literature by illustrating how existing social norms evolve in response to new economic forces, giving rise to new behavioral patterns. In particular, we show that the increasing adoption of veiling is both a consequence of economic modernization and a reflection of local traditions, highlighting the dynamic interplay between cultural norms and structural economic change.

This study also contributes to the broader debate on the relationship between religion and economic development (e.g., Bénabou, Ticchi, and Vindigni (2015); Binzel and Carvalho (2017); Guiso, Sapienza, and Zingales (2003); Squicciarini (2019)). Specifically, it offers a re-examination of the secularization hypothesis, which associates economic development with declining religiosity. While prior work (e.g., Norris and Inglehart (2004); Voas and Crocket (2005)) finds evidence of declining religiosity in Western Europe, others (Iannaccone (1998); Stark (1999)) challenge this view, arguing that religiosity can persist despite modernization. Our study contributes to this debate by demonstrating that economic modernization does not necessarily lead to secularization or the marginalization of religion.

Focusing on the relationship between female economic outcomes and Muslim

women's religious practices, this study also engages with research on religion and economic outcomes in Indonesia (e.g., Bazzi, Hilmy, and Marx (2020); Bazzi, Koehler-Derrick, and Marx (2019)), India (e.g., Borooah, Dubey, and Iyer (2007); Field, Levinson, Pande, and Visaria (2008); Iyer (2018); Iyer, Velu, and Weeks (2014); Mitra and Ray (2014)), Bangladesh (e.g., Asadullah, Chakrabarti, and Chaudhury (2015); Asadullah and Chaudhury (2010); Devine, Hinks, and Naveed (2017)), and the broader Southeast Asian region (e.g., Ariff (1991); de la Croix and Delavallade (2018); Fischer and Jammes (2019); Koning and Njoto-Feillard (2017); Permani (2011)). By highlighting how veiling adapts to economic change rather than strictly being a marker of religious conservatism, this study provides evidence that religious practices can coexist with economic modernization without being eroded by it.

We discuss the socio-economic background of the study in Section I. The conceptual framework, which outlines the theoretical reasoning of the article is elaborated in Section II. The measurement of veiling and other variables is discussed in Section III. We then elaborate on the empirical framework, the construction of the instrument, as well as the main results in Section IV. We explore several plausible mechanisms in Section V. The discussion on robustness checks is presented in Section VI, while Section VII concludes.

I Contextual Background

Indonesia provides an excellent ground to study the interaction between religious culture, gender norms, and economic development. First, the country currently hosts over 230 million Muslims, more than any other nation on earth. Moreover, Indonesia is arguably one of the most religious nations in the world.[2] Second, despite enjoying relatively higher autonomy compared to women in the neighboring regions 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

[2]The 4th and 5th waves of the World Values Survey (WVS) reveal that over 94 percent of respondents 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%.

institution.[3]

At the same time, Indonesia has experienced strong economic growth over the past decades—with the temporary exception of the East Asian Financial Crisis in 1997–1998. This growth has been accompanied by structural shifts in the economy, including a transition from agriculture to manufacturing and services, as well as broader trends of industrialization and urbanization (Elias & Noone, 2011). In 1999, Indonesia transitioned from a military autocracy to one of Asia's most dynamic emerging democracies. This transformation has driven rapid social and economic changes, including the expansion of universal education (including for girls), a decline in the total fertility rate, and a significant shift in women's participation in the workforce.

Importantly, despite strong social norms regarding women's roles in society (Cameron, Suarez, & Rowell, 2020; Cameron, Suarez, & Setyonaluri, 2024), there has been a clear trend toward the *formalization* of women's participation in the labor force. This process involves two parallel developments: first, younger women, particularly in urban areas, have increasingly entered the formal sector through wage employment. At the same time, younger women in rural areas have withdrawn from informal, unpaid work (Schaner & Das, 2016).[4] This shift is largely driven by the expanding access of young, highly educated women to attractive and well-paying job opportunities. Schaner and Das (2016) also documented a significant narrowing of the gender wage gap: in 1990, the median woman earned only 57 percent of a man's earnings, but by 2011, this figure had risen to 84 percent.

A The practice of veiling in Indonesia

While religion plays a significant role in the lives of Indonesian Muslims, veiling among Muslim women has not historically been a deeply entrenched cultural practice.[5] Moreover, the contemporary practice of veiling in Indonesia, particularly since

[3]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% 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).

[4]Because these two opposing trends offset each other, aggregate statistics show little change in Indonesia's overall female labor force participation during this period (Cameron et al., 2020).

[5]In contrast, veiling has a long tradition among women in the region now referred to as the Middle East. This practice predates Islam, with Jewish and Christian women adopting veiling customs both before and after the emergence of Islam in the 7th century CE (Amer, 2014).

the 1970s, represents a relatively *recent* phenomenon, differing substantially from earlier styles. Traditionally, veiling in regions such as Java often involved translucent fabrics draped over the head, leaving the neck, as well as parts of the hair and ears, visible. In contrast, modern veiling is more encompassing, typically made from opaque materials that cover the hair, neck, and ears, leaving only the face exposed (Brenner, 1996; Smith-Hefner, 2007).[6] Additionally, while veiling in the past was typically limited to a small group of older, traditional women, often residing in rural areas, the modern veil has been widely embraced by young, educated, urban middle-class women (Smith-Hefner, 2007).[7]

These patterns are corroborated by several recent studies. For instance, Fossati, Hui, and Negara (2017) find that the proportion of Muslim women who respond "yes" when asked if they wear a headscarf is higher among those with higher education (94.5 percent) compared to those with lower education levels (78.4 percent). Additionally, the same survey indicates that veiling is more prevalent among high-income individuals (84.9 percent) than among those in lower-income groups (75.6 percent). Similarly, a study by Utomo, Reimondos, Peter, Utomo, and Hull (2018) examining predictors of veiling in the Greater Jakarta area finds a significant positive correlation between veiling and higher education levels. Collectively, these findings suggest that, in the Indonesian context, veiling does not seem to indicate a lack of education or low socioeconomic status.

The Politics of the veil. During its rule, the New Order regime underwent a significant shift in its stance toward veiling. In the early 1980s, the regime viewed the veil as a symbol of political dissent and, consequently, sought to restrict its use. This was evident in policies such as the issuance of a decree regulating high school student uniforms,[8] which discouraged veiling in educational institutions. As a result, many parents disapproved of their daughters adopting the veil. Until the 1990s, veiling remained a marginal practice in Indonesia and was often associated

[6]While the term "veil" in English refers to a fabric covering a woman's hair and, in some cases, her face, veiling practices vary widely across different cultural contexts. In Indonesia, veiling practices resemble those found in other Southeast Asian countries, such as Malaysia and Brunei Darussalam. The headscarves commonly worn in Indonesia often feature colorful patterns, embroidery, or decorative beads, in contrast to styles such as *the Burqa*, worn by women in Taliban-controlled areas of Pakistan and Afghanistan; *the Chador*, a black cloak worn by some women in Iran; or *the Niqab*, a face veil that leaves only the eyes visible, commonly worn in parts of Saudi Arabia.

[7]This shift may seem counterintuitive given prevailing narratives that often associate veiling with female subjugation or religious extremism. Literary critic Said (1979) argues that such perceptions originated during the colonial period as part of the "orientalist" narrative in the West and gained further traction in the aftermath of the 9/11 terrorist attacks.

[8]Decree SK 052/C/Kep/D.82, issued on March 17, 1982 (Johari, 2020).

with an extreme form of religious piety in the eyes of the general public (Brenner, 1996).

However, in the early 1990s, President Suharto shifted his political strategy. While continuing to ban formal political movements based on Islamic ideology, he sought to co-opt various Muslim groups by adopting a more conciliatory approach toward the Muslim community. One notable gesture was the issuance of a regulation in 1991 that lifted the ban on headscarves in public high schools.[9] Following this regulatory change, the stigma surrounding the veil began to fade, and its popularity grew. Veiling became increasingly common, especially among university and high school students, and was gradually adopted by older generations as well.

II Conceptual Framework

To understand how the emergence of new economic opportunities for women may influence veiling, it is essential to first examine the shifts in employment patterns that accompany economic development over time.

As economies develop and become more sophisticated, newly created jobs tend to be more cognitively demanding than physically intensive (Jayachandran, 2020).[10] This shift is often accompanied by the relocation of production sites from households to factories or offices, requiring workers to leave their homes to participate in the labor market.

At the same time, economic development has significantly expanded women's access to education, allowing younger generations to seize new employment opportunities. As a result, an increasing number of educated young women aspire to enter the formal labor market. Taken together, these forces have led to a growing number of women stepping beyond the domestic sphere to pursue professional aspirations, reshaping patterns of female labor force participation.[11]

Unfortunately, social norms often do not evolve at the same pace as economic

[9] The decree, SK No.100/C/Kep/D/1991, was issued in 1991. That same year, Suharto also undertook a pilgrimage to Mecca and, upon his return, changed his official name to Haji Mohammad Suharto.

[10] A typical economic transformation involves a shift from traditional sectors such as agriculture, fisheries, and forestry to manufacturing industries, and eventually to the service sector. Early-stage employment in traditional sectors is often physically demanding (e.g., farming, fishing, and collecting forest harvests). In contrast, as the economy develops, jobs in manufacturing and services—such as tailoring, fine goods crafting, accounting, and administrative services—require more cognitive skills and are thus more accessible to women.

[11] A similar argument was originally proposed by Becker (1981), who posited that the emergence of new economic opportunities for women altered the opportunity cost of remaining at home. This shift encouraged women to join the workforce and, in turn, contributed to declining fertility rates—a trend widely observed in Western countries during the 1970s.

transformation.[12] As a result, women entering these new forms of employment may encounter personal and social stigma. While the degree of these challenges varies across cultural contexts, their common underlying sources are examined here.

First, women who engage in formal employment may experience personal costs, such as feelings of guilt, stemming from the belief that a working mother could negatively impact the intellectual and emotional development of her children (Fernández, 2013) or jeopardize the stability of family life.[13] Second, pursuing formal, high-paying jobs may convey women's ambition and autonomy—traits often perceived negatively in the marriage market (Bursztyn, Fujiwara, & Pallais, 2017). Third, as economies develop and lower-income families become more affluent, a woman's decision to work may imply an inability of her husband or father to adequately provide for the family, thereby creating social stigma (Goldin, 1990). Lastly, in some context, formal employment is sometimes regarded as "dirty" (Jayachandran, 2020), as it requires women to interact with male coworkers who are not family members.[14]

Faced with this dilemma, some women may seek culturally compatible strategies to mitigate the costs of entering the formal labor market. In a religious, Muslim-majority society like Indonesia, wearing the veil appears to be one such solution. The veil can reduce the personal and social costs of working outside the home in at least two ways. First, at the personal level, the veil serves as an anchor—(a *commitment device* in Carvalho's (2013) terms)—for the beliefs and norms that the women highly value. The veil binds sincere believers via their own statement of modesty, which helps them avoid behaviors (or even thoughts) that conflict with religious morality and values (Bénabou & Tirole, 2011; Carvalho, 2013). Second, the veil serves as a signal (albeit an imperfect one) to the broader community about the type of woman who wears it—even if her sincerity varies (Carvalho, 2013; Patel, 2012). Specifically, if the qualities signaled—such as faithfulness, adherence to rules, and femininity—are considered desirable within the prevailing norms, the veil can help counteract the potential stigma associated with women working outside the home. Consequently, *as the economy develops and there are more economic*

[12]In agrarian or traditional economies, employment opportunities for women are typically limited. Within such contexts, it is often considered socially acceptable to adhere to traditional gender norms, where men serve as primary breadwinners while women are confined to domestic roles. However, as economies modernize, a wider range of *respectable* employment opportunities becomes available to women, challenging these established norms.

[13]In the Indonesian context, the women in this study grew up under a regime that idealized women as the guardians of public morality and family institutions—a view heavily promoted during the New Order era from the early 1980s to the late 1990s.

[14]This may also involve commuting on crowded public transportation, increasing their vulnerability to harassment.

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 recognize that negative social attitudes toward working women are not exclusive to Muslim societies; they have also characterized the historical evolution of female labor force participation in the West. For instance, the stigma described by Goldin (1990), Fernández (2013), and Bursztyn et al. (2017) pertains to experiences in the United States. What is particularly noteworthy, however, is how cultural context influences the resolution of the tension between social norms and women's public roles. In the case of Muslim-majority societies like Indonesia, the veil appears to function as an effective negotiation tool, allowing women to navigate this conflict in a culturally compatible manner.

III Data Source and Descriptive Statistics

Data on veiling. Measuring a cultural practice such as veiling is not a simple endeavor. Previous studies rely on surveys to elicit information about veiling by directly asking female respondents whether they wear a veil. Alternatively, veiling is measured by simply observing if the respondent is wearing it during the interview. There are several issues 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.[16] Another major limitation of currently available 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 address these limitations, we measure the adoption of headscarves by directly observing the portraits of female students featured in public high school register books. This approach captures revealed preferences for veiling, supported by official records containing the students' personal details. In Indonesia, public high schools are generally required to maintain student records for approximately 30 years in large register books, each containing 3x4 cm photographs of individual students.

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

[16]This phenomenon has been documented, for instance, in Blaydes and Gillum (2013).

Most students are between 16 and 19 years old, and the photographs are primarily taken for documentation purposes related to the national final examination. As such, these photos are typically captured toward the end of the second year or the beginning of the final year of high school, a time when most students likely have a clear idea of their post-graduation plans, such as pursuing higher education or entering the workforce.[17]

The sample of schools in this study was selected through a two-stage random sampling process. First, 49 districts were randomly chosen from a sampling frame comprising all 267 districts located on the islands of Java and Sumatra.[18] The number of districts sampled in each province was proportional to the province's population, ensuring that the sample was more representative in terms of population distribution. Consequently, provinces with larger populations had a greater number of districts included in the sample. Table 33 in the appendix provides a comparison of the characteristics of sampled and non-sampled districts. Apart from differences in population size, there are no systematic disparities between the sampled and non-sampled groups.

The second stage involves randomly selecting two schools from the sampling frame of all public high schools within each district chosen in the first stage. Public madrasahs (Islamic schools) are excluded from the sampling frame because all female students in these schools wear veils, providing no additional variation that could be utilized in the statistical analysis. Similarly, private schools are excluded, as they are predominantly religious institutions—such as Catholic schools, where veiling is extremely rare, or Islamic schools, where all female students wear headscarves—offering no meaningful variation for this study.[19] Enumerators are provided with a randomly ordered list of schools and are instructed to visit them in sequence. The detailed procedure for data collection is outlined in Appendix VI, which also includes the list of sampled districts and the geographic distribution of

[17]There might be concerns that these photographs do not fully reflect the students' daily behavior. For instance, students may occasionally alternate between wearing a veil and not, or they might strategically choose to wear (or not wear) a veil during the photo session. However, we argue that this is unlikely, as Indonesian public schools mandate school uniforms, which include a consistent dress code for each day of the week. Furthermore, these portraits are intended for official identification purposes, similar to passport or ID photos, and therefore are expected to accurately represent the students' typical appearance.

[18]The initial plan was to sample 50 districts, but one district was dropped due to logistical challenges. The number of districts was determined based on the budget constraints of the project. The focus on Java and Sumatra was intended to maximize the efficiency of data collection, as these islands accounted for 78.7% of Indonesia's population according to the 2010 census by Statistics Indonesia.

[19]Future research could incorporate qualitative studies to understand how the narrative of veiling has changed within these private institutions/Islamic schools, which may affect societal views about the practice.

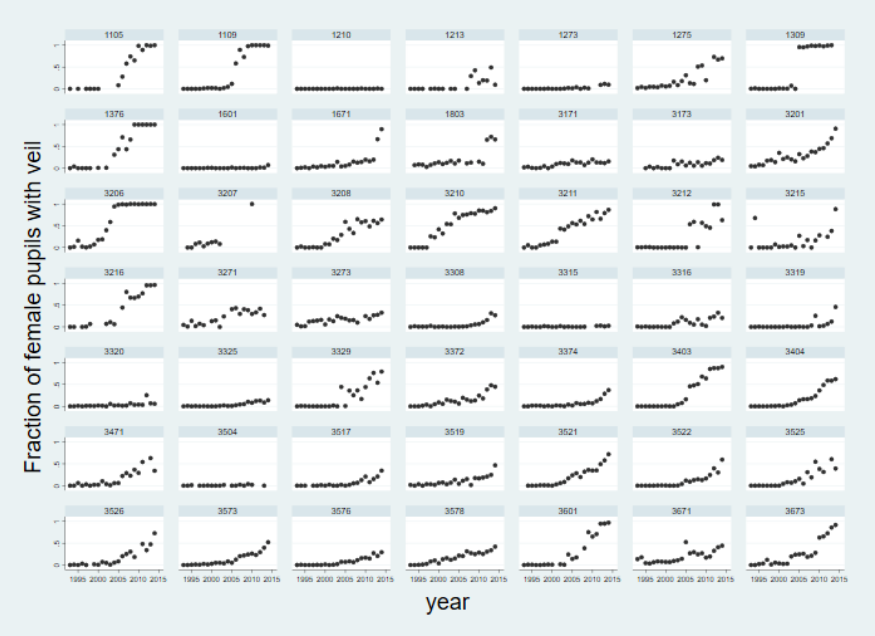

FIGURE 2 – PROPORTION OF FEMALE STUDENTS WITH VEIL, BY DISTRICT

Note: The figure depicts the evolution of veiling across districts, with each dot representing the proportion of female students wearing a veil in a given district and year.

these districts across the study area.

The photographs of female (and male) students attached to the register books are, in most cases, of high quality, allowing us to clearly determine whether a student is wearing a veil. This enables us to reliably code veiling status by directly examining the images. Based on this information, we construct a measure of the veiling rate, defined as the proportion of female students in a given school and graduation year who are wearing a veil.

The evolution of veil adoption by district is depicted in Figure 2. The graph reveals significant variation across districts, not only in the starting point of the upward trend, but also in the trajectory of its progression. Some districts experienced an initial rise in veiling rates as far back as the early 1990s, while others began later, after the year 2000. A few districts show little to no increase. In some districts, veiling prevalence reaches 100%, whereas in others, it plateaus before reaching even half of the female population.[20] A key contribution of this paper is to explain part of this variation in veiling rates as a function of economic opportunities.

[20]Because of this temporal dynamic, the mean veiling rate derived from school data is relatively lower than that from general population surveys. This discrepancy arises because the surveys were conducted in more recent years—when veiling was already widespread in many districts—whereas the school-based average includes data from earlier years, when veiling was still uncommon. However, when comparing veiling rates from school records and general population surveys for the same year, the values are very similar, bolstering our confidence in the reliability of the school data.

Labor force information. The data on female and male participation in the economy are obtained from the Annual National Labor Force Survey (SAKERNAS), conducted by Statistics Indonesia. This survey provides comprehensive information on work, education, and other activities performed by respondents representative of the working-age population. It also includes detailed data on job characteristics, such as hours worked, whether the job is paid, and personal attributes of respondents, including age, education level, and marital status. Additionally, it captures information on respondents' locations and living conditions, such as whether they reside in urban or rural areas. This dataset is used to construct key variables of interest, including female and male participation rates in both formal and informal employment.

In this paper, formal employment is defined as work categorized as "worker/ employee," while informal employment includes all other work categories, such as family/unpaid work, self-employment (with or without assistance), and casual labor in both agricultural and non-agricultural sectors. This categorization aligns with the approach used by Schaner and Das (2016) in their ADB-commissioned technical report. While this definition may not perfectly distinguish formal jobs from informal business operations, it is adequate for the purposes of this study. It effectively captures key dimensions, such as the likelihood of protection under labor laws, the (in)flexibility of working hours and locations, and the degree of integration into the formal sector (Schaner & Das, 2016).[21]

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. This census is performed annually by Statistics 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; and 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 from this survey, we 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. We use the information on international trade values to proxy the international demand for Indonesia's prod-

[21]In any case, the "impurity" of this measure should not pose a threat to the analysis because the direction of the miscoding is such that some of the "treated" observations are actually coded as "untreated" (i.e., some of the people who work in informal sectors are actually workers/employees), so the effect estimated here, if any, is more likely to be conservative.

ucts, sourced from the UN Comtrade. To construct the instrumental variables, the trade values by standardized industrial classification (nomenclature) are matched with the data from the industrial census previously discussed.

In Table 1 of the appendix, we report 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 fairly large standard deviation of around 29 percent.[22] The fraction of the female population (ages 20-24) who participate in the 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 variation across districts and time. Similarly, the export shock is also highly dispersed around its mean value.

Panel B of the table presents 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 relatively 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 steel basic industries (5 percent) and the highest fraction is employed in tobacco manufacturing (79 percent).

Independent surveys and other controls. We also perform some analyses using independent survey data from the Pew Research Institute, the World Values Survey, and a survey by a local polling company (Jakpat polling firm), as well as the Indonesia Family Life Survey (IFLS). In the main analysis, we 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 V.

[22]Please note that this mean is calculated for all observations, meaning that it computes across different years. The mean value across districts in the early years tends to be lower than the mean in the later years. Importantly, this measure is in line with the national survey data: the mean value of veiling at the national level in 2014 based on our data collection from high schools is around 65 percent, which is very close to the value estimated by a recent survey in 2016 at around 70 percent, e.g. Fossati et al. (2017) or the data from Jakpat polling firm in the same year, which will be discussed in the following sections.

IV Estimating Equations and Empirical Results

A OLS Estimates

To explore the the relationship between veiling and young female participation in formal occupations, we 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 in district d, and year t. We do not use the employment measure for the younger age group (16-19 years old) for an obvious reason: this group is mostly still in high school, so the employment measure of this group will be biased, especially in the current years. Importantly, since the picture is taken toward the end of high school, the employment measure we use is the best proxy for job market opportunities for women captured in the pictures.

$\mathbf{X'}_{s,d,n;t}$ denotes a vector of control variables at different levels of observation, the details of which are discussed below, when the results are presented. These controls include variables at the school ($\mathbf{X'}_{st}$), the district ($\mathbf{X'}_{dt}$), and the national level ($\mathbf{X'}_{nt}$). The inclusion of this set of variables aims to control for time- and unit-varying information that may also explain veiling. In order to control for non-time-varying characteristics specific to the districts, we also include district fixed effects, δ_d. Meanwhile, $\tau_d T$ is meant to capture district-specific linear time trends, and ϵ_{sdt} is an error term.

Given this specification, we exploit 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 different levels of (increasing) time trends throughout the observation period. Moreover, since the treatment is applied at the district level, we cluster the standard errors for all regression specifications at the district level.

Since the treatment, i.e., the export shock, is most likely to take effect over multiple time periods, and the effect is likely to be heterogeneous based on the position of the observation along the veiling curve at different points in time, we do not simultaneously control for time fixed effects.[23] As demonstrated by de Chaisemartin

[23]Nonetheless, we also perform a supplementary analysis using an event-study method and firm-

and D'Haultfœuille (2020), Goodman-Bacon (2020), and Imai and Kim (2020), among others, in this setting, using two-way (unit and time) fixed effects may not represent the best estimation strategy for causal inference.[24]

The main analysis in this study uses a dataset with school-district-year as the unit of analysis, containing 93 schools located in 49 districts over the time span of 1993 to 2014.[25] The estimates for equation 1 are presented in Table 1. The coefficient β_1 is positive, highly significant, and stable across different model specifications. From the second column onwards, we also control for a vector of possible confounders at different levels of observations. At the school level, veiling choices may be influenced by the gender composition of the classroom. The proportion of female to male students could shape social dynamics and perceptions among peers, potentially influencing students' decisions on attire. In settings with heightened social engagement, students may be more conscious of their appearance and how they present themselves within their peer group of a different gender. Moreover, the size of the student cohorts might also affect veiling. A larger student body might reduce the visibility of individual students within the school, potentially affecting the decision to veil. The geographic location of schools may also affect veiling because this defines the climate in the area, influencing how people dress to adjust to the weather. Controlling for this set of variables at the school level does not significantly change the magnitude of the effect of interest.

Several controls at the district level are also included: First, the fraction of the population living 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 their community better, so women in these areas might experience a higher degree of scrutiny over their actions. This could affect their decisions regarding attire and whether to adopt the veil. Moreover, we control for young male employment, because male and female employment rates may be correlated. As a consequence, if male employment is the true driver of veiling, then the interpretation of the effect would be different, as discussed in the next section, where alternative

level dataset that control for both year and unit fixed effects, which is elaborated in the following section.

[24]Using time and unit fixed effects in panel data is often seen as equivalent to a difference-in differences estimator. In a setting where the treatment is applied at various points in time and there is heterogeneity in the effect, using this technique could lead to an incorrect average treatment effect estimate 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 simplest setting of panel data (two groups, two time periods).

[25]The reasoning for this period is twofold: first, the information on gender labor composition from the Manufacturing database is only available from 1993 onwards. This starting year also avoids the censoring effect of the government regulation on public high school uniforms, which was lifted only in 1991.

TABLE 1 – OLS ESTIMATES: VEIL AND FORMAL JOB PARTICIPATION

	Veil				
Formal job participation	0.178	0.176	0.166	0.167	0.154
	(0.062)	(0.062)	(0.053)	(0.061)	(0.052)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.762	0.770	0.772	0.772	0.773

Notes: The table reports OLS estimates of equation 1. The unit of analysis is school-district-year. *Veil* is the fraction of female students who wear a veil, *Formal job participation* is the fraction of the female population aged 20-24 working in the formal sector. School-level controls include male to female student ratio, the size of the student body, the latitude and the longitude of school location; district-level controls include fraction of population who live in urban areas, the fraction of male population aged 20-24 who are working, the vote share of Islamist parties, and female high-school enrollment rate; national-level control includes national 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

mechanisms are evaluated. By including this variable in the specification, the effect we observe from female employment is free from the confounding effect of male employment. In addition, we also control for the high school enrollment rate of the female population of the relevant age groups. This variable might capture the effects of socio-economic background and composition of the student body across different district-years. For instance, when schools are more accessible, a higher attendance rate indicates that the socio-economic composition might be closer to the actual socio-economic characteristics of the general population. Meanwhile, this might not have been the case in the past, when high schools were only accessible to daughters of families from high socio-economic backgrounds. 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, which may simultaneously affect the population's views on veiling. Finally, at the national level, we include the national economic growth rate to control for possible time-specific confounders related to economic growth that affects all districts in a similar manner. For instance, a national economic crisis or years of recovery could affect the year-specific standard of living of the population in all districts. The inclusion of these possible 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 unobserved characteristics that cause districts with greater female job opportunities to also have a higher prevalence of veil take-up. For instance, districts with more vibrant economic activity may also be inhabited by more religious individuals, so we simultaneously observe more veiling.

To address this problem, we 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 imports from China on local US labor markets, by Card (2009) to understand the impact of immigration on local labor markets in the US, and by Tabellini (2020), who uses this type of IV to identify the political and cultural explanations for the backlash against immigration. The essence of the identification strategy is to exploit plausibly exogenous shocks coming from international sources to predict their effects on local labor markets. In line with the spirit of this strategy, we use international demand shocks for Indonesia's products, weighted by district-specific 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 larger share of tobacco industries experience higher demand shocks than districts that specialize in other commodities. Since international demand is largely exogenous, the resulting changes in female labor demand are also plausibly 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, k refers to the sector in the economy, and K is the total number of sectors in the economy. The first component, $value_{kt}$, is the normalized real value of export commodities

produced by sector k at time t.[26] Since this variable is measured at the national level, it varies across years but is constant across districts in 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 value captures the relative importance of industry k in a given district, so it varies across districts but is 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 in a given industry k. For instance, textile and tobacco manufacturing tend to have a higher female share, while steel and heavy machinery manufacturing tend to have a lower female share. It is calculated as the fraction of female workers in the industry in the base year, 1993. This index is constant across districts and time, but varies across sectors.[27]

Given its structure, *export shock* affects different districts in different years based on the fluctuation in 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 panel B of Table 1. The step-by-step calculation process of this instrumental variable is discussed further in Appendix V.

In Figure 3, we show the scatter plot of the instrument and the two variables of interest. First, *export shock* exhibits a clear positive and significant relationship with formal job participation for females (first-stage). Similarly, *export shock* is positively and significantly associated with veil take-up (reduced form). Importantly, these relationships are obtained after partialing out time-invariant district characteristics and district-specific time trends.

C The causal effect of economic opportunities on veiling

To identify the causal effect of shocks in economic opportunity on veiling, we estimate the following model with two-stage least squares (2SLS):

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

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

[26] This value denotes real increase, as it is adjusted for inflation and normalized to have a value of 1 in 1990.

[27] We do not use district-specific female scores because they may be endogenous to the characteristics of the labor force of the district; national level scores are more exogenous. Regardless, we perform a robustness check with district-specific female scores in Section 26 of the appendix, and this exercise does not change the results.

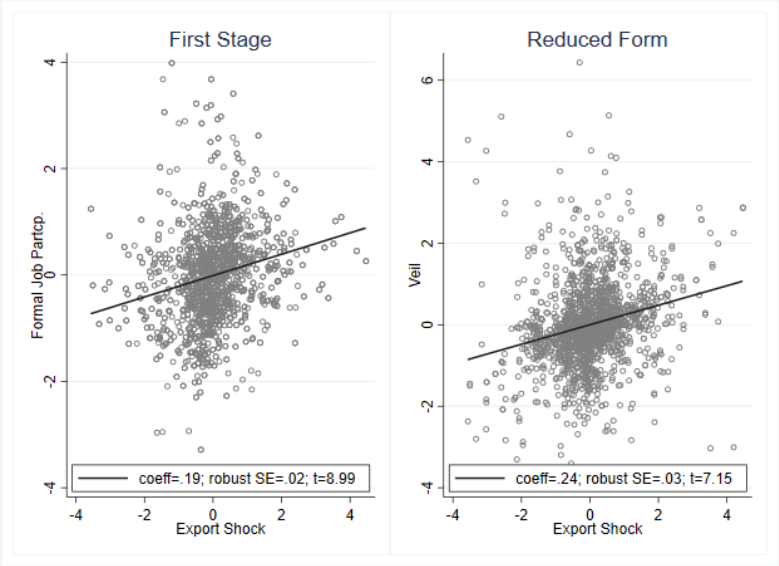

FIGURE 3 – THE FIRST STAGE AND THE REDUCED FORMS

Note: The figure illustrates key correlations: the left panel shows the first-stage relationship, while the right panel presents the reduced-form correlation. All variables are residualized to account for district fixed effects and district-specific time trends, and standardized (mean zero, standard deviation one) to facilitate comparability across measures.

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.

We run the 2SLS regression following model 4 and report the estimates in Table 2. From the table, the reader can observe that the first-stage relationship is strong and significant: when the weighted average of export value increases to twice its value in 1990, formal job participation is expected to increase by about 2.2 - 2.7 percentage points. This represents just under 10% of the average value of female employment in the sample. Meanwhile, the reduced form regression indicates that an increase in the weighted average export value to twice its 1990 value is associated with about a 6.2 percentage point increase in veiling. Moreover, both the first-stage and the reduced form coefficients are significantly different from zero at the one percent level. Importantly, the reported Kleibergen-Paap Wald F-statistics are greater than 10 in all specifications, attesting to the strength of the first-stage regression.

Finally, the 2SLS estimates indicate that, on average, every percentage point increase in formal employment participation by females is associated with about a 2.3 - 2.6 percentage point increase in veiling. These estimates are highly significantly different from zero at 99% confidence interval. To put these numbers in perspective,

TABLE 2 – 2SLS ESTIMATES: VEIL AND FORMAL JOB PARTICIPATION

A. REDUCED FORMS

	Veil				
Export shock	0.062	0.061	0.060	0.059	0.057
	(0.012)	(0.012)	(0.013)	(0.012)	(0.014)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.773	0.782	0.782	0.782	0.783

B. SECOND-STAGE 2SLS

	Veil				
Formal job participation	2.298	2.285	2.615	2.279	2.622
	(0.684)	(0.680)	(0.846)	(0.714)	(0.927)

C. FIRST-STAGE

	Formal job participation				
Export shock	0.027	0.027	0.023	0.026	0.022
	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
K-P Wald F-statistics	22.04	21.80	18.51	21.05	16.01

Notes: The top panel of the table reports reduced-form estimates, while the middle and bottom panels present the second-stage and first-stage 2SLS estimates, corresponding to equations 4 and 3, respectively. *Veil* denotes the fraction of female students who wear a veil, *Formal job participation* refers to the fraction of female population aged 20-24 working in the formal sector, *Export shock* is the instrument. School-level controls include male to female student ratio, the size of the student body, the latitude and the longitude of the school location; district-level controls include the fraction of the population who live in urban areas, the fraction of male population aged 20-24 who are working, the vote share of Islamist parties, and female high-school enrollment rate; national-level control includes national economic growth rate. The second-stage and first-stage specifications (middle and bottom panels) include the same set of school-, district-, and national-level controls as the reduced-form specification in the top panel, and are estimated using the same number of observations. All regressions include district fixed effects and district-specific time trends. Standard errors are clustered at the district level.

this effect is equivalent to about 11 - 13 percent of the average veiling in the sample.[28]

Comparison to OLS Estimates. While the results from the two estimation methods are qualitatively similar, the magnitude of the coefficients differ. Several factors may account for these discrepancies.

First, the aggregation of local treatment effects across districts may contribute to the observed differences. As demonstrated in the first-stage regression analysis (reported in Supplementary Figure 2), there is substantial heterogeneity across districts. This heterogeneity may attenuate the estimated effect in the OLS regression, as OLS averages across all observations. In contrast, the 2SLS estimator primarily captures the local treatment effect, emphasizing the impact of job opportunities driven by export-induced economic fluctuations ("booms" and "busts") in regions specializing in female-intensive industries.

Second, measurement error may play a role. The theoretical construct we aim to capture is female labor demand, which is only imperfectly proxied by female participation in formal employment. This observed variable reflects an equilibrium between labor demand and supply. On the supply side, for example, social movements advocating for women's rights and emancipation could influence female labor participation. However, if such movements are negatively correlated with veiling, this could introduce a downward bias in our estimate of interest.

Finally, omitted variable bias—such as unobserved factors related to religiosity—could also influence the results. However, given the broad range of potential omitted variables, identifying their precise impact remains a challenge.

D Validity of the instrument.

Recent work on Shift-Share Instrumental Variables (SSIV) can be broadly classified into two perspectives. The first argues that SSIV validity primarily depends on exogenous variation from common shocks affecting districts, even if sectoral shares are endogenous (e.g., Adao, Kolesár, and Morales (2019); Borusyak, Hull, and Jaravel (2022)). In contrast, the second perspective asserts that SSIV validity hinges on the exogeneity of sectoral shares (e.g., Goldsmith-Pinkham, Sorkin, and Swift (2020)).

A thorough review of these works suggests that, in our case, it is necessary

[28] We can also gauge the extent of this magnitude by referring to Table 1. From this table, we observe that while the mean values of both veiling and female formal employment are about the same (20 percent), the standard deviation of veiling is twice that of female employment. Therefore, since the breadth of the veiling variable in this sample is about twice as wide as the range of the female employment variable, and they have the same unit, the effect of about 2.5 percentage points is within reasonable estimates.

to make an a priori assumption that the primary source of variation stems from external shocks rather than sectoral composition. Unlike previous studies that use common shocks generated by national production serving local markets as a proxy for labor demand (e.g., Bartik (1991), Blanchard and Katz (1992), Autor and Duggan (2003), and Diamond (2016)), our approach leverages shocks originating from international markets. This source of variation is arguably more exogenous, as it is less susceptible to influence from local market conditions.

To validate this assumption, we conduct two robustness checks. First, in Section IV-Subsection A of the appendix, we substitute export values with global imports of commodities (excluding Indonesia) as an alternative instrument. Since this measure is driven by global demand rather than domestic market conditions, it is more likely to satisfy the exogeneity assumption. Second, in Appendix Table 30, we re-estimate the effect after excluding the textile-related industries, where Indonesia may have some price-setting power.[29] If domestic labor market conditions influence prices in this sector, it could compromise the exogeneity of our instrument. Our results remain robust across both exercises, although the estimated effect is somewhat smaller in the second case due to the expected reduction in the source of variation being exploited.

Furthermore, to ensure the validity of our inferences, we re-estimate our effects using the procedure outlined in Borusyak et al. (2022). This approach restructures the dataset to use industry-level shocks instead of district-level shocks. As elaborated in Borusyak et al. (2022), this estimator addresses potential issues arising from correlations between industry shares across districts, which could otherwise lead to an underestimation of standard errors (see Adao et al. (2019)). The results, presented in Table 28 of the appendix, confirm the robustness of our findings across three different standard error specifications: BHJ robust, clustering at the 3-digit ISIC code, and clustering at the 2-digit ISIC code.

Additionally, since we fix the industrial share at the base year, one might be concerned about the plausibility of the design, where we assume that the export shock is independent of the initial features of the district. This assumption could be violated if certain characteristics of the districts lead them to persistently receive higher (or lower) shocks in the long run due to the initial features of the districts. To gauge the validity of this assumption, we perform several checks:

1. We add several potential confounders at the district level in the main analysis

[29]We also conducted an additional robustness check in which we re-estimate the main results while iteratively excluding one industry at a time. The results, presented in Appendix Table 28, confirm that our results are not sensitive to the exclusion of any particular industry

and show that the estimate of interest remains robust. The goal is to show that the relationship between the instrument and the outcome of interest does not depend on the variation from these pertinent socio-economic features of the district. We report the results in Table 2, from the second column onwards.

2. We show that future export shocks cannot predict past veil take-up. The idea is the following: If there is any systematic correlation between past veil take-up and distant future economic shocks, it would suggest that the instrument is not independent of the initial conditions of the districts, including the local industrial sectoral composition, because it is fixed at the base year. For this purpose, we run both the reduced forms and the 2SLS estimates for the first and the last specification of Table 2, using a lead-instrument. In particular, the lead-instrument is calculated as follows:

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

Here, $value_{kt+10}$ denotes the 10-year 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 experience in 10 years.[30]

We report this analysis in Table 3 of the appendix. The future export shock is not correlated to past veil take-up, both in the reduced form and in the 2SLS regression, despite the fact that the first-stage still holds. The coefficients are tiny and unstable across different specifications, and importantly, they are not statistically different from zero.

3. We show that economic shocks are balanced across several past characteristics of the district. The intuition behind this exercise is to show that future economic shocks are not correlated with the initial characteristics of the district. We report the results in Supplementary Table 4 and show that there is no systematic correlation between future shocks and the initial characteristics

[30]The main aim of this exercise is to examine if there are unobserved characteristics of the district in the base year that persist in the long run, such that future shocks become correlated with these past characteristics. To test this, we need to use a sufficiently long time span (e.g., 10 years or more) to ensure that any such dependencies (if any) do not carry through into the distant future. Using a shorter time span for the lead instrument would not be ideal, since companies typically use short- to medium-term plans for their activities (e.g., over 3 or 5 year ranges), there might be stickiness, as firms may need to follow the prescribed plans within this time span.

of the district, such as the fraction of the population living in urban areas, female high school attendance rate, male job participation, votes for Islamist parties, gender ratio in the population, etc.

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

E Alternative analysis with firm level data

In order to support the robustness of our conclusions, we also perform a supplementary analysis using event-study method and firm-level data. In this analysis, we define firm entry and existence as the treatment or "event". Specifically, firms are coded as existing from their initial entry into the district until their record is no longer present in the dataset.[31] Our specification is as follows:

$$Veil_{dt} = \zeta_1 Exist_{idt} + \mathbf{X'}_{dt}\xi + \nu_i + \theta_t + \epsilon_{dt} \tag{6}$$

Where $Veil_{dt}$ represents the fraction of veiled students in district d at time t, $Exist_{idt}$ is an indicator variable denoting whether firm i is operating in district d at time t, and $\mathbf{X'}_{dt}$ is a vector of controls at the district level. Additionally, we control for firm fixed effects (ν_i), which account for time-invariant unobserved characteristics of the firm, as well as year fixed effects (θ_t), which capture time-varying unobservable factors that affect all firms uniformly in a given year. In the regression, we cluster the standard errors at the district level to address the possibility that the errors are correlated within the same district.

The results presented in Table 17 of the appendix indicate a positive and statistically significant correlation between firm presence and veiling, with an estimated effect size of around 1.5 percentage points, which vary depending on the share of female workers employed in the plant. Notably, while the overall effect across all firms is only marginally significant, it becomes particularly pronounced and statistically significant in firms with a higher proportion of female workers. This outcome is a natural consequence of the fact that veiling is exclusively applied by female workers.

When comparing the magnitude of this effect to the estimates presented in the main analysis, we find that it is generally smaller. A plausible explanation for this difference is that this supplementary analysis primarily captures the **extensive**

[31] We do not employ the canonical event study model due to the substantial number of firms that enter and exit within the observation period. Canonical event study methodologies typically assume that once an event occurs, the treatment persists for the remainder of the year. Instead, our analysis follows a similar framework, but treats "firm existence" as the treatment variable.

margin of firm existence—namely, the impact of new firm entry and operation. In contrast, the main analysis also considers the **intensive margin**, which includes the expansion of existing firms as they create additional employment opportunities to meet growing international market demand, even without establishing new facilities. Nonetheless, the findings from the supplementary analysis further reinforce the conclusions of the main analysis, providing additional support for its overall results.

V Potential Mechanisms

Thus far, we have provided evidence indicating that an exogenous increase in the availability of formal job opportunities for women has a causal effect on the adoption of religious veiling across districts in Indonesia. In this section, we present additional evidence to investigate several potential underlying mechanisms driving this relationship.

A Veil as a negotiation device

As outlined in Section II, the veil may serve as a negotiation tool for addressing the tension between women's public and domestic roles within a rapidly modernizing yet deeply religious society. By triangulating multiple sources of evidence, we identify this as the most plausible underlying mechanism driving the observed patterns.

Specifically, our findings reveal that *the adoption of veiling is more pronounced in response to types of employment that may jeopardize women's personal and social reputation.* The underlying mechanism, as discussed in Carvalho (2013) and Patel (2012), revolves around maintaining respectability while participating in public spaces. In the realm of paid employment, veiling serves as a visible marker to the community, signaling that women engaged in financially rewarding occupations do so through "legitimate" means that uphold their dignity.

A compelling illustration of this function is provided by Lindquist (2004), whose ethnographic study in Batam, Indonesia—a rapidly industrializing region—examines the experiences of young female workers in the manufacturing sector. Lindquist argues that these young women wear veils to delineate moral boundaries in their workplace, distinguishing themselves from commercial sex workers. The stigma associated with young working women being misidentified as prostitutes is further supported by ethnographic research conducted in an export processing zone in South Sulawesi (Silvey, 2000). These studies underscore the role of veiling as a strategic response to the reputational challenges faced by women in emerging labor markets.

TABLE 3 – VEILING AND DIFFERENT TYPES OF FEMALE JOBS

A. All informal jobs

	Veil			
Informal job participation	0.011	-0.009	-0.013	-0.018
	(0.077)	(0.068)	(0.076)	(0.069)
Formal job participation	0.179	0.153		
	(0.061)	(0.052)		
Export shock			0.062	0.057
			(0.012)	(0.013)
Observations	1,772	1,772	1,772	1,772
R-squared	0.762	0.773	0.773	0.783

B. Family workers

	Veil			
Family worker	0.016	0.020	-0.028	-0.017
	(0.050)	(0.049)	(0.045)	(0.048)
Formal job participation	0.179	0.156		
	(0.063)	(0.053)		
Export shock			0.062	0.057
			(0.012)	(0.013)
Observations	1,772	1,772	1,772	1,772
R-squared	0.762	0.773	0.773	0.783

Notes: The table reports OLS and reduced-form estimates of the relationship between veiling and various types of female occupations. In the bottom rows of each panel, Formal job participation is replaced by the instrumental variable (Export shock). *Veil* is the fraction of female pupils wearing a headscarf, *Formal job participation* is the fraction of the female population aged 20-24 working in the formal sector, *Informal job partcp.* is the fraction of female population aged 20-24 working in informal sector. *Family worker* denotes the fraction of female population aged 20-24 working as family workers. *Export shock* is the instrument. Each specification in the second and fourth columns includes the same set of school-, district-, and national-level controls used in the main specification. All regressions report standard errors clustered at the district level.

To test this hypothesis, we conduct several analyses. *First*, we demonstrate that veiling is responsive exclusively to formal employment and not to informal work.[32] Informal employment may not trigger a veiling response for two key reasons: a) such jobs often do not require women to leave their domestic compound, and b) particularly in the case of family workers, the absence of monetary exchange eliminates concerns about undignified economic transactions. Table 3 presents the comparison between formal and informal employment. Both the OLS (columns 1 and 2) and reduced form (columns 3 and 4) specifications reveal a stark contrast between the estimates for formal jobs in the main tables and those for informal occupations. The coefficients for informal and family worker participation are consistently small, statistically insignificant, and, in some cases, negative. Conversely, the estimates for formal job participation (and export shocks) remain consistently positive, stable, and highly significant across all specifications.[33]

Second, we perform a heterogeneity analysis based on the level of gender segregation in the workplace. In work environments with low gender segregation, female workers are more likely to adopt veiling due to the increased likelihood of interacting with male coworkers who are not family members. To quantify this dynamic, we construct a gender segregation index to estimate the probability of such interactions.[34] A higher value of the index corresponds to a lower likelihood of female workers encountering male coworkers in the workplace.

The results of this analysis, presented in Table 4, indicate that the veiling response to economic shocks is more than twice as strong in districts below the median segregation index compared to those above it. To further explore this pattern, the

[32]In the Indonesian context, informal work performed by women typically takes place in or around the home, enabling them to balance domestic responsibilities—such as childcare and household chores—with income-generating activities (Robinson, 2009). While some forms of informal work may require leaving the house, such as selling food in a nearby market, the key assumption here is that formal employment is significantly more likely to necessitate travel away from home. To validate this assumption, Table 13 of the Appendix uses data from the 2014 Sakernas to show that formal jobs are more frequently associated with the use of transportation to commute (as opposed to walking) and involve longer travel distances. Additionally, we also analyze the family worker category, a type of work that is often unpaid and typically performed in close proximity to the home or other family members (Robinson, 2009). Sakernas codes family workers differently across years: as category 5 before 2001 and category 7 thereafter, though both are defined as "Family/unpaid workers."

[33]Additionally, we conduct a heterogeneity analysis by occupational field and find that veiling responses tend to be strongest and statistically significant in the construction and transportation sectors. This aligns with the notion that veiling is more prevalent in occupations where women spend substantial time away from home as required in construction and transportation sector. Due to space constraints and the lack of precision of the measures, this analysis is included in Appendix Table 16. Nevertheless, the observed pattern in this supplementary analysis further underscores the relationship between public exposure and veiling, reinforcing the broader implications of gendered dynamics in formal employment.

[34]Details on the construction of this index are provided in Appendix II.

bottom panel of Table 4 divides the analysis into quartiles. The findings consistently support the interpretation that lower levels of gender segregation are associated with stronger veiling effects. Specifically, the effect is most pronounced and statistically significant in districts within the first quartile of the segregation index distribution, where the likelihood of mingling across different sexes is the highest. By contrast, in the upper quartiles, the effects are smaller and/or lack precision.

To further clarify this pattern, we triangulate these findings with observations from several studies, which consistently highlight that the contemporary trend of veiling in Indonesia has been initiated and championed by young, urban, educated, middle-class women (Brenner, 1996; Fossati et al., 2017; Smith-Hefner, 2007; Utomo et al., 2018).[35] Although these findings are observational in nature, the consistency across multiple studies and analyses strongly suggests that this trend aligns with the veiling model proposed by Carvalho (2013). Consistent with the model, this group of women faces the strongest incentives to adopt veiling practices for two key reasons: a) As higher earners, they are more likely to attract social stigma, creating a stronger incentive to adopt veiling as a signal of respectability and moral standing. b) They face the highest opportunity cost of not participating in the labor force, as it would mean underutilizing their educational investment and forfeiting access to higher-paying jobs.

This alignment between theoretical predictions and empirical findings—which demonstrate that veiling is more pronounced in occupations that may pose a higher risk to women's personal and social reputation—reinforces the hypothesis that veiling functions as a strategic adaptation to the nature of women's employment.

B Veiling and social norms

Building on the evidence presented in the previous section, we find further support for the hypothesis that veiling functions as a signaling mechanism for navigating social norms. Consistent with signaling theory, we propose that the signaling value of veiling varies depending on the prevailing strength of gender norms in a given area.

[35]To substantiate this observation, we conducted logistic regression analyses using data from two sources: one collected by a local polling firm and another by an American-based polling firm. Both analyses reveal a strong positive correlation between educational attainment and the likelihood of wearing a veil in Indonesia. Table 5 in the appendix shows that the education coefficients are positive and highly significant across both datasets, with comparable coefficient values. Furthermore, Table 10 in the appendix illustrates veiling rates among women with varying levels of education, using data from the local polling firm. Additionally, Table 2 in the appendix compares veiled and non-veiled respondents from Pew Research on several sociodemographic characteristics. The two groups are broadly similar, except for two notable differences: veiled women tend to be more educated and less likely to be married, which may imply higher financial independence. These differences are even more pronounced among younger respondents.

TABLE 4 – HETEROGENEITY ANALYSIS: GENDER OCCUPATIONAL SEGREGATION

District Gender Segregation	$\leq$ Median	$\leq$ Median	$>$ Median	$>$ Median
			Veil	
Formal job participation	3.814	3.250	1.474	1.387
	(1.334)	(1.075)	(0.732)	(0.557)
Set of controls	yes	no	yes	no
Observations	934	934	838	838
R-squared	-0.046	0.031	0.699	0.689
District Gender Segregation	Quartile 1	Quartile 2	Quartile 3	Quartile 4
			Veil	
Formal job participation	3.611	2.175	1.167	1.704
	(1.286)	(1.145)	(0.505)	(1.238)
Observations	517	417	404	434
R-squared	0.345	-0.514	0.651	0.670

Notes: The upper panel of the table presents 2SLS estimates from the main instrumental variable specification, stratified by whether a district's gender segregation index falls above or below the median. The set of control variables is similar to those used in the main specification, incorporating covariates at the school, district, and national levels. The lower panel extends this heterogeneity analysis by splitting the sample into quartiles based on the gender segregation index. This index is computed as the weighted average of sector-specific segregation indices within each district, using sectoral employment shares from the 1993 baseline. Further details on the construction of the segregation index can be found in Appendix II. Like in the main specification, all regressions control for district fixed effects and district-specific time trends. Standard errors are clustered at the district level.

To test this, we used data from the base year (1993) to calculate the proportion of male respondents who reported performing housework in the past week. Districts were then categorized into quintiles based on this measure, and reduced form regressions were re-estimated for each quintile group. The results offer valuable insights into how veiling behavior adapts to different levels of gender norm rigidity, reinforcing the idea that social context plays a critical role in shaping veiling practices.[36]

The estimates are presented in Figure 4, with detailed regression results available in Appendix Table 14. The pattern observed follows an inverse U-shape, where the effects of veiling are most pronounced in districts with moderate gender norms—neither the most restrictive nor the most lenient. Specifically, the benefits of veiling as a signaling device appear to be maximized when gender norms are ambiguous, offering room for negotiation in women's public and domestic roles. Interestingly, while modest, there is evidence of a positive veiling effect even in areas with the strictest gender norms. This finding indicates that, despite increased economic opportunities for women, societal rigidity limits the number of women who can capitalize on these opportunities. In contrast, in districts with the most relaxed gender norms, the analysis shows that veiling has little to no effect; the estimate for the top quintile of the gender norms distribution is effectively zero. This result highlights that when gender role segregation is not deeply embedded in society, veiling as a signaling mechanism may not be needed in the first place.[37]

C Veiling and Religiosity

A central question in this context concerns the role of religion—and behaviors typically associated with "genuine" religiosity—in the veiling phenomenon. While it

[36] In many societies, including Indonesia, housework is traditionally regarded as a female responsibility. Therefore, the proportion of male respondents reporting housework can serve as a useful proxy for the flexibility of gender norms. However, it is important to note that the range of this variable in the sample is narrow, between 0 and 2.4 percent. Consequently, findings based on this measure should be interpreted with caution, as there is likely severe under-reporting. The low values and limited variation may suggest that housework carried significant stigma for men during this period, leading many to refrain from reporting their participation, even when unemployed.

[37] We also find that veiling behavior aligns with the logic of signaling: as veiling becomes more widespread, its role as a distinctive social signal weakens, as it no longer serves to differentiate individuals. This suggests that the impact of economic shocks on veiling should decline as its prevalence increases, eventually becoming negligible once veiled women constitute the majority. Figure 3 of the appendix illustrates this relationship by plotting the marginal effects of economic shocks against the prior period's veiling prevalence. The results show that as more women adopt the veil, the effect of economic shocks diminishes. Notably, when the proportion of veiled students in the previous period reaches approximately 60%, export shocks no longer have a significant impact. In essence, once veiling becomes widespread, its function as a social differentiator fades within the community.

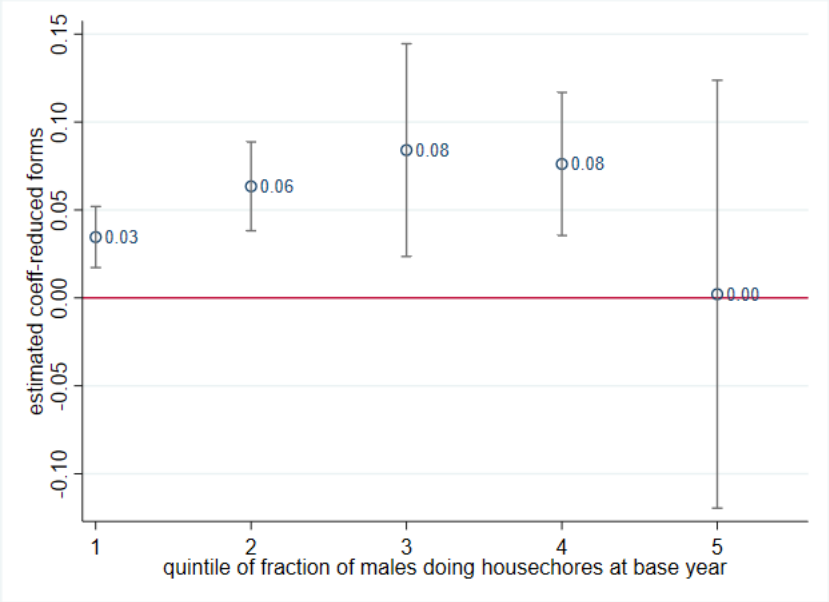

FIGURE 4 – HETEROGENEITY BASED ON THE INITIAL GENDER NORMS IN THE DISTRICT

Note: The figure displays the estimates of the reduced form coefficient following the main specification, run at different quintiles of the original strength of gender norms in each district. The strength is proxied by the percentage of young male population (aged 15 - 39) who declared performing house chores as their main activity in the previous week. The hollow dots represent the estimated marginal effect, while the vertical lines represent the 95% confidence intervals.

is essential to recognize that religion provides the underlying moral and cultural framework for veiling, our analysis suggests that the rise in veiling in our study is not primarily driven by shifts in personal religiosity. Instead, veiling appears to be shaped by broader economic and social changes. Its effectiveness as a signaling mechanism derives in part from the strong communal attachment to religious values and ideals. Yet the decision to adopt the veil is better understood as a response to environmental pressures rather than a direct reflection of deepening religious belief.[38]

First, the evidence indicates that personal religiosity is not a strong predictor of veiling. For example, Appendix Table 2 shows no significant differences in daily prayers or support for Islamist parties between veiled and non-veiled respondents. This is in-line with the idea that veiling can serve as both a personal expression of piety and a social signal. Crucially, even non-religious individuals (non-sincere adopters) may adopt the veil if they perceive social or economic benefits, such as greater acceptance or respectability.

[38]This does not mean, however, that veiling does not reflect one's attachment to religious values. For example, Carvalho (2013)'s model does not require an increase in personal religiosity for veiling to occur. Instead, what matters is the shift in the socio-economic environment, which prompts religious individuals to visibly signal their identity and demonstrate their commitment to the values they uphold.

Second, we control for vote shares of Islamist parties—another proxy for outward religiosity—and find that this inclusion does not meaningfully alter the estimated effects of veiling. We further examine multiple alternative measures of religiosity using data from the Indonesian Family Life Survey (IFLS). As shown in Appendix Table 7, there is no significant correlation between economic shocks and a range of religiosity indicators, including self-reported religiosity, frequency of daily prayers, and preferences for religious candidates. These findings cast doubt on the hypothesis that increased veiling merely reflects a broader rise in religiosity triggered by economic shocks.

Despite inconclusive evidence linking veiling to personal religiosity, interestingly, we find that veil adoption is significantly influenced by the religious composition of the community. Specifically, as shown in Table 5, the effect of veiling is more pronounced in districts with a higher share of Muslims. In such settings, veiling signals adherence to shared moral norms and is associated with greater social rewards. This pattern aligns with the interpretation of veiling as a social signal, particularly in environments where community norms and approval strongly shape individual behavior (Carvalho, 2013).

Taken together, these findings suggest that religiosity matters more at the communal than at the personal level. This distinction reflects the dual nature of veiling—it conveys both personal values and perceptions of its social significance. Thus, individual religiosity is not a necessary condition for veiling, so long as the practice is perceived to carry social value within the broader community.

Moreover, we argue that veiling, as a form of religious behavior, constitutes a context-dependent response to specific socio-economic transformations. Prior research has shown that religious expression is often shaped by context. For example, negative economic shocks can lead to increased participation in religious gatherings, which may function as informal insurance mechanism (Chen, 2010). Similarly, disasters or unpredictable life events often trigger a rise in private religious practices, such as prayer, as a psychological coping mechanism (Bentzen, 2019, 2021).[39]

In a similar vein, the adoption of the veil appears to be a targeted response to the emergence of new economic opportunities, rather than evidence of a broader shift in religious behavior.[40] Unlike other forms of religious expression—such as prayer

[39]While economic shocks and religiosity are sometimes positively correlated—as in Buser (2015)—other studies, such as Bentzen (2019, 2021) and Chen (2010), find a negative relationship. The mechanisms vary and, importantly, are not necessarily stable across cultural or institutional contexts; Bettendorf and Dijkgraaf (2010) provides a useful overview of these heterogeneous patterns.

[40]As discussed earlier, our estimates remain robust when controlling for Islamist party vote shares. In addition, economic shocks do not significantly predict support for Islamist parties.

TABLE 5 – HETEROGENEITY ANALYSIS: SHARE OF MUSLIMS IN THE DISTRICT

Muslim share	< 0.5	0.5 - 0.9	≥ 0.9	< 0.5	0.5 - 0.9	≥ 0.9
	Veil			*Veil*		
Formal job participation	0.01	0.14	0.15	0.31	0.81	3.34
	(0.01)	(0.08)	(0.06)	(0.01)	(0.44)	(1.33)
Set of controls	all	all	all	all	all	all
Observations	64	480	1,292	64	480	1,292
R-squared	0.693	0.746	0.774	-0.793	0.659	0.270

Notes: The first three columns of the table report OLS estimates from regressions of veiling on formal employment, stratified by the district-level share of Muslims. The final three columns present corresponding estimates from the 2SLS specification. All models include district fixed effects, district-specific time trends, and the full set of control variables used in the main analysis, encompassing covariates at the school, district, and national levels. Standard errors are clustered at the district level.

frequency or voting for religious parties—veiling operates as a specific signaling mechanism to convey moral standing and respectability in environments where such traits are socially or economically rewarded.

In conclusion, veiling reflects a sophisticated interplay between religiosity, social norms, and economic dynamics. While religion provides the cultural foundation for veiling, its adoption is largely triggered by external factors, such as economic opportunities and community-level expectations. These findings highlight that veiling operates as a strategic, context-dependent response, rather than simply a direct expression of increasing personal religiosity. This underscores the diverse ways in which religious norms interact with societal change.

D Cultural backlash

As more economic opportunities emerge, compelling more women to abandon their traditional roles, there may be a cultural backlash from conservative groups in society. Below, we discuss evidence related to this mechanism.

Backlash by the family. While part of the mechanism we propose involves young women adopting the veil as a means of gaining community approval, the evidence does not suggest that this behavior is primarily driven by direct backlash

These patterns suggest that political expressions of religiosity may be driven by distinct factors, such as institutional dynamics or state-religion relations (Bazzi et al., 2020).

from spouses or parents, e.g. due to the shifts in intrahousehold bargaining power. First, as shown in Appendix Table 19 and Table 20, male and female employment tend to move in tandem in response to economic changes. There is no indication that women are systematically displacing men in the workforce during the observation period. Second, data from a nationally representative survey (Table 8) show that approximately 90% of veiled women report doing so by personal choice, even when given explicit alternatives such as "requested by parents" or "requested by spouse".[41] Together, these findings suggest that the increase in veiling is less likely to be the result of coercion within the household, and more plausibly reflects individual strategies to navigate social expectations in the context of rapid economic change.

Additionally, as shown in Table 9, data from the same survey indicate that veiling prevalence is relatively similar across age groups. While this finding is suggestive rather than conclusive, it does not support the argument that veiling is primarily driven by familial pressure. If that were the case, we would expect veiling to be significantly lower among older women, who tend to have greater autonomy and agency over personal decisions.[42]

Protest by Conservative Women. A potential form of backlash could come from conservative groups of women who purposely veil to express their disapproval of more women leaving their homes to work. If this were the case, we would expect veil adopters to be more likely to be those staying at home (because they disagree with women who abandon their traditional roles) rather than those who are taking advantage of economic opportunities themselves. However, there is no strong evidence to support this reasoning. First, as previously shown in Table 5, two different surveys confirm that education is positive associated with the probability of female respondents wearing a veil. This implies that veil adopters tend to be those who would face higher costs for staying at home. Second, an analysis presented in

[41] A potential concern is that responses may be biased if women feel pressured to answer in a socially desirable way, particularly if they are under the surveillance of parents or husbands. However, this is unlikely to be a significant issue since the survey was conducted via a mobile phone app, ensuring anonymity and minimizing social desirability bias.

[42] To further examine parental attitudes toward female employment and veiling, we analyze multiple rounds of the World Values Survey (WVS). As presented in Table 15 in the appendix, our findings indicate that while being a parent is associated with more traditional views on gender roles, these views are primarily driven by concerns about children's well-being rather than power dynamics within the household. Notably, both male and female parents do not express strong opposition to wives earning more than their husbands, nor do they overwhelmingly endorse the belief that being a housewife is as socially fulfilling as paid work. Importantly, parents are not more likely to consider veiling an essential trait for women. This suggests that while parents may hold more conservative views on female employment due to concerns about their off-springs, their views on gender roles within the household and veiling itself do not appear to be significantly more traditional than non-parent respondents.

Table 6 of the appendix shows that, relative to women who are working or going to school, women who stay at home are significantly less likely to wear a headscarf. These analyses show that this alternative mechanism lacks strong support in empirical patterns.

E Compositional effect

An alternative mechanism that could explain the observed pattern is a compositional effect. Several recent studies, e.g., Heath and Mobarak (2015); Jensen (2012), have documented that increasing economic opportunities will induce an increase in the demand for female education. As a result, girls who were previously staying at home begin to attend high schools. If these girls are positively selected from conservative religious families, we would observe a compositional effect, with more girls from religious families attending public high school.

Unfortunately, our data do not contain information about the religiosity of the students or their families. Hence, direct evidence for this reasoning is difficult to obtain.[43] However, several analyses do not support this interpretation. First, in some specifications of the main analyses, we include the female high school enrollment rate, and its inclusion does not change the main effect.[44] Second, in Appendix Table 11, we show that veiling does not have a significantly positive corelation with female high school attendance. If it were true that the increase in veiling is simply a consequence of an ex-ante selection from religious families into high school, we should see a correlation between veiling and female high school attendance, with higher attendance rates associated with higher levels of veiling.[45] The evidence, however, does not support this reasoning. Third, if this type of compositional effect were the primary driver of veiling, we should not see "conversion" into veiling among the older generation of women, since they are already out of high school. From the survey data presented in Table 9 of the appendix, we see that veiling is also an observable phenomenon among the older cohort of women. It is unlikely

[43]The IFLS contains information about the educational history of respondents. Unfortunately, there are not enough observations in the data to construct a reliable measure of the fraction of public high school attendees who have an Islamic educational history (e.g., Islamic elementary or Islamic junior high school) at the cohort-district-year level and gender.

[44]A higher enrollment rate means that the composition of the student body is closer to the socio-economic composition of the population. This implies that the composition of students in terms of religiosity changes with the enrollment rate.

[45]In contrast, the results in the table from the second column onwards include the main variable of interest, i.e., female formal job participation and export shocks. The analysis shows that when combined, the coefficients for the female high school enrollment rate are unstable and not different from zero, while the main variables of interest remain positive and significantly different from zero across different specifications.

that veiling among these groups of older women would be driven by self-selection into high school.

Another possible compositional effect may come from the fact that economic opportunities might compel high school pupils to drop out in order to take advantage of newly available jobs. Consequently, if the students who remain in school are positively selected from conservative religious backgrounds, our estimates may capture this compositional effect instead. However, this scenario is highly unlikely in the Indonesian context. Data from Statistics Indonesia shows that the average national dropout rate for general high school attendance is very low, under 2 percent. Moreover, the likelihood of obtaining formal employment for a high school dropout is very low for most formal jobs, including blue-collar occupations, such as those in manufacturing industries (Robinson, 2009). Therefore, we can rule out the possibility that our main results are driven by this type of confounding.

F Income effect on the taste for fashion

An alternative explanation is that the positive effect of economic opportunities on veiling could simply be the consequence of income effects on women's preferences for fashion. As the economy develops and women's incomes improve, they may begin to prioritize expenditures beyond necessities, such as fashion. If the veil is considered a normal good, its consumption would increase as income increases. Alternatively, income effects might also be channeled through household income. If family income is pooled, and women are permitted to spend from this pool, the increase in veiling may be due to the household income effect, e.g., from the increasing income of male family members.

To address this concern, we performed the following exercises. First, we added a measure of economic growth in some of the main specifications. This inclusion does not significantly alter the coefficient of interest, supporting the interpretation that veiling is not driven by increases in general income or wealth. Second, the analysis presented in Table 3 shows that veiling has no correlation with informal job participation. This suggests that an increase in women's income per se (via informal employment, which typically does not require women to leave their domestic compound) does not necessarily induce adoption of the veil. Third, in some specifications of the main analyses, we also control for young male labor force participation, and this inclusion does not change the main estimates. Moreover, in Table 12, we show estimates of male labor force participation on veiling. Despite a relatively strong first stage effect, the second stage effect of male labor force participation on veiling is not only much smaller, but is also not significantly different

from zero. This is consistent with the interpretation that an income increase for male members of the household, which potentially increases the disposable income for women, does not have a similar effect on veiling.

VI Robustness analyses

In this section, we summarize several robustness checks to support the validity of the analyses. The corresponding tables can be found in the appendix.

Removing outliers. A potential concern is that some districts may mandate female pupils to wear headscarves, such as under *sharia* law, which requires public servants and female pupils in public schools to wear headscarves on Fridays. If these areas also display high economic participation in the formal sector, we might be capturing the effect of these regulations instead. To address this concern, in Table 23, we reran the analysis from Table 2, removing the district-years where 100 percent of female pupils wear a veil. This serves as a good proxy for the existence of mandatory veil regulations in schools or districts, and helps remove outliers from our sample. The results are robust to the exclusion of these observations, with the coefficient of interest actually increasing.

Removing observations with higher variance. In some districts, where data was collected from a single high school, there is greater variance in the veiling measure. To address this, we perform the analysis excluding district-year observations with only one high school and report the results in Table 24. The estimates are very similar to those in the main analysis.

Jackknife resampling estimation. We perform a jackknife re-sampling procedure to ensure that the results reported above are not driven by a single district or year of observation. This procedure is performed by iteratively estimating the main model while leaving one set of observations out of the sample (i.e., all observations from a given district or year). We present the results in Figures 5 and 6 of the appendix. This analysis corroborates the main results: the coefficients are similar to the main results, stable, and systematically different from zero. Moreover, we also perform a robustness where we iteratively remove the source of export shocks from each industrial sector in the sample. This exercise aims at ensuring that the results are not driven by a single sector in the observation sample. The results are presented in Appendix table 29 and we can see that the results are also robust to this exercise.

Timing. In the main model, we assume that the response to labor market shocks

happens simultaneously.[46] However, there may be a delay in the response to the economic shocks. As a robustness check, in Table 25 of the appendix, we show that the relationship still holds with the lagged value of export shocks. However, the estimates become weaker and less significant as the lag increases.

Instrument with district-specific female score. The instrument used in the main analysis is the female score, which is constant across districts, i.e., using national-level scores. One might be concerned that this approach overlooks heterogeneity coming from different levels of technological advancement across districts when using a national-level female score index. As a robustness check, we run the main 2SLS regression using a district-specific female score index, and the results are presented in Table 26 of the appendix. There is no significant change both in terms of the magnitude and the significance of the results.

Alternative IV with global imports. The IV in the main analysis uses the value of Indonesia's export as the main element of the common economic shock. As discussed in Section D, the validity assumption requires that this element of the IV is exogenous. This assumption is likely to be satisfied since we exploit variation from international markets. We conduct a robustness check by running the analysis using an alternative IV based on global imports, instead of the country's export value. The details of the alternative IV and the results are reported in Subsection A of Appendix IV. The results are robust to this alternative instrument.

VII Discussion and conclusions

Economic development has delivered unprecedented opportunities for women in the form of appealing and lucrative employment. However, prevailing social norms, especially those that govern the division of labor between men and women both inside and outside the home, may create hurdles for women in taking advantage of these opportunities.

In the face of this dilemma, religious veiling may provide an effective and culturally compatible solution in a highly religious society like Indonesia. It could serve as a negotiation tool that enables women to join the formal sector of the economy, while also protecting them from potential personal and social stigma associated with working outside the home.

In this paper, we document this phenomenon by collecting new and innovative data on veiling based on revealed preferences from photographs of public high

[46] Veiling is neither a very costly act nor time-consuming, like building a school. Therefore, one can respond to the incentives as soon as the opportunity arises.

school students. This method makes it possible to trace the evolution of veiling across districts in the country over more than two decades. We use a Bartik-style instrument to show that female participation in the formal sector has driven the adoption of veiling. The instrument leverages historical district industrial composition, the female labor composition of sectors, and plausibly exogenous shocks in international demand, allowing us to identify the causal effect of shocks in economic opportunities for women on veiling.

Our analysis of potential mechanisms strongly suggests that veiling, in this context, functions as a negotiation device, enabling women to access expanding formal employment opportunities while maintaining their personal and social image in a religious society. Moreover, we show that this effect is unlikely to be the result of concomitant increases in religiosity, income effects on fashion preferences, compositional effects of the student body, or a conservative backlash.

There remain open questions that our design cannot address directly. Our data cannot trace the relationship between veiling and life-cycle decisions of women. For instance, our data does not allow us to determine whether women who veil are more likely to delay marriage, have fewer children, or maintain employment. Are they more likely to exit the labor market once they have children or get married, as they signal more commitment to family life? Future studies can focus on understanding these decisions made by women at later stages in life.

Nevertheless, the results in this paper may shed some light on the increased popularity of veiling in Indonesia in particular, and in other Muslim-majority countries in general. However, our aim is not to convince readers that female employment is the only driver of veiling among women in contemporary Muslim societies. Indeed, there are multiple interpretations and motivations behind why Muslim women choose to veil. What we document in this paper is a phenomenon highlighting that veiling may operate as a strategic response to economic modernization, rather than simply a direct expression of increasing personal religiosity. This illustrates the various ways in which religious norms interact with societal change.

Finally, the results presented in this paper may provide an alternative perspective on the meanings and motivations behind this religious practice, and potentially serve as a reference for designing relevant policies in the developed world, such as those related to the assimilation or integration of minority groups. Importantly, cultural values and social norms might shape the process of economic development in ways that appear counter-intuitive at first glance.

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Appendix

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Appendix I Supplementary tables and figures

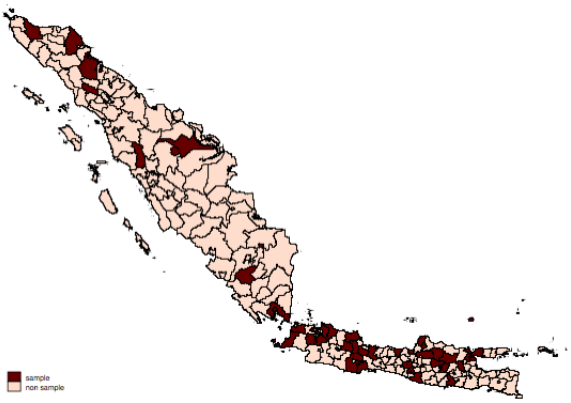

FIGURE 1 – GEOGRAPHIC DISTRIBUTION OF SAMPLE DISTRICTS

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

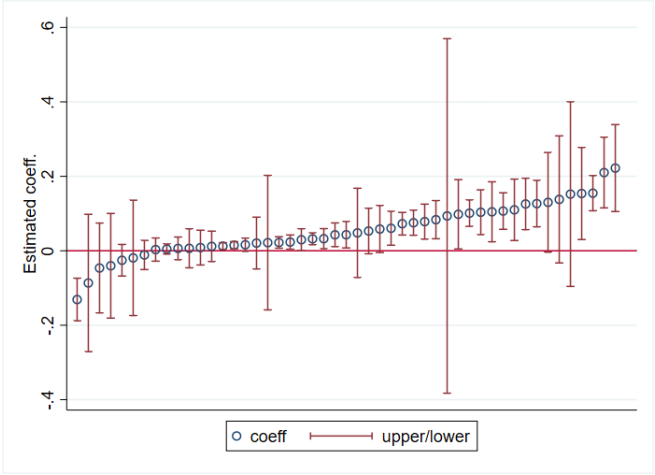

FIGURE 2 – FIRST-STAGE HETEROGENEITY EFFECT

Note: The figure displays the heterogeneity of the coefficients in the first stage regressions. Each dot represents the coefficient of the OLS estimate (within a 95% confidence interval) of female formal job participation on export shock by district.

TABLE 1 – SUMMARY STATISTICS

VARIABLES	N	mean	sd	min	max
A. Main dataset					
Main Vars of interest					
Veil	1,772	0.195	0.289	0	1
Formal job partcp.	1,772	0.208	0.140	0	1
Export shock	1,772	1.953	1.467	0.168	11.439
Other outcomes					
Informal job participation	1,772	0.131	0.123	0	1
Family worker	1,772	0.068	0.095	0	1
Male job partcp.	1,772	0.605	0.158	0.100	1
Additional covariates					
Fraction urban	1,772	0.517	0.348	0	1
Islamist votes	1,772	17.479	7.803	4	35
Economic growth	1,772	4.623	4.237	-13.127	8.220
Female HS enrollment	1,772	0.529	0.162	0	1
Num. of student	1,772	261.998	102.960	20	792
Latitude	1,772	-5.423	3.676	-8.076	5.358
Longitude	1,772	107.794	4.476	95.942	112.759
Male/female ratio	1,772	0.943	0.933	0.009	37
B. Components of the instrument					
Value of export	14,630	7.199	12.29	0.298	90.90
Sector share	14,630	0.074	0.141	0.000298	1
Female score	14,630	0.393	0.186	0.0534	0.793
C. Religiosity measures					
Religiosity	13,656	2.819	0.623	1	4
Num. of Prayers	12,663	4.512	2.528	0	81
Relig. politics	13,374	6.075	1.682	0	8
D. Jakpat polling survey (2016)					
Veil	996	0.714	0.452	0	1
Education level	986	3.361	0.687	1	4
Working status	996	2.051	0.787	1	3
Age	996	24.57	5.768	14	56
Spending group	996	2.150	1.188	1	6
Socio-Economic Status	996	3.988	1.537	1	6
E. Pew survey (2012)					
Veil	662	0.225	0.418	0	1
Age	662	29.21	6.355	18	40
Education level	662	2.275	0.905	1	4
Income group	662	6.159	2.959	1	18
F. World Values Survey					
Parent	6,215	0.765	0.424	0	1
Female	6,215	0.517	0.500	0	1
Gender norm	6,215	0.640	0.480	0	1
Women need children	983	0.932	0.252	0	1
Mom work relation	6,215	0.056	0.230	0	1
Wife fulfilling	6,159	0.686	0.464	0	1
Problem wife earns more	3,198	0.376	0.484	0	1
Veil important	982	0.704	0.457	0	1

Notes: The unit of observation in panel A is school-district-year; in panel B, industry-district-year; in panel C, individuals surveyed in IFLS waves 4 and 5 who are residents of districts included in the sample; in panel D and E, female respondents surveyed in the respective surveys; and in panel F, individuals surveyed in the World Values Survey Indonesia.

TABLE 2 – SOCIO ECONOMIC CHARACTERISTICS: VEIL VS. NON-VEIL

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	6.03	**-0.56**
			(0.17)			(0.22)
income level	6.14	6.21	-0.06	6.05	5.91	0.14
			(0.28)			(0.37)
num. of children	1.80	1.86	-0.07	1.41	1.50	-0.09
			(0.12)			(0.17)
access internet?	1.87	1.82	0.05	1.83	1.76	0.07
			(0.03)			(0.05)
access facebook?	1.08	1.04	0.04	1.02	1.00	0.02
			(0.06)			(0.03)
own cellphone?	2.01	2.00	0.01	2.02	2.00	0.02
			(0.02)			(0.04)
own landline?	1.98	1.97	0.00	1.98	1.97	0.01
			(0.01)			(0.02)
num. of daily prayer	7.18	7.21	-0.04	7.12	7.15	-0.03
			(0.14)			(0.19)
support Islamist party?	0.30	0.30	-0.01	0.27	0.31	-0.04
			(0.05)			(0.07)
urban	0.47	0.38	0.09	0.45	0.39	0.06
			(0.05)			(0.06)
Observation	513	149		307	80	

Notes: 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 the Pew Research Institute. Standard errors are in parentheses. Veiling in this survey is coded based on surveyors' observations about the respondents during the interview, so the number of respondents with a veil is most likely understated.

TABLE 3 – OLS REDUCED FORMS AND 2SLS WITH LEAD INSTRUMENT

	Reduced form		2SLS	
	$Veil_{sdt}$		$Veil_{sdt}$	
$Export\ shock_{d,t+10}$	-0.004	-0.001		
	(0.012)	(0.012)		
$Formal\ job\ partcp._{d,t+10}$			-0.283	-0.100
			(0.850)	(0.787)
School-level controls		✓		✓
District-level controls		✓		✓
National-level controls		✓		✓
Observations	866	866	866	866
R-squared	0.542	0.615	0.522	0.613
			First Stage	
			$Formal\ job\ partcp._{d,t+10}$	
$Export\ shock_{d,t+10}$			0.014	0.014
			(0.008)	(0.008)

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

TABLE 4 – BALANCE TESTS

	Share urban$_t$	Female HS enrollment$_t$	Male job$_t$	Islamist votes$_t$	Log population$_t$
Export shock$_{d,t+10}$	0.000	-0.002	-0.006	-0.559	-0.046
	(0.013)	(0.013)	(0.014)	(0.737)	(0.018)
Observations	866	866	866	866	790
R-squared	0.939	0.721	0.650	0.563	0.908
	Share fem popul$_t$	Informal job$_t$	Family worker$_t$	Num of student$_t$	Male to female ratio$_t$
Export shock$_{d,t+10}$	0.012	0.000	0.002	-6.075	0.023
	(0.014)	(0.015)	(0.011)	(5.637)	(0.039)
Observations	790	866	866	866	886
R-squared	0.260	0.682	0.596	0.580	0.084

Notes: The table displays the OLS regressions of various district characteristics on a 10-year lead of instruments. All regressions include district fixed effects and district-specific time trends, and standard errors are clustered at the district level.

TABLE 5 – LOGIT REGRESSION OF VEIL 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

Notes: The raw data sources are surveys by the Pew Research Institute in 2012 and Jakpat polling in 2016. The table reports logistic regressions of whether the respondent is wearing a veil or not on educational attainment. For Jakpat survey: SE is clustered at the district level and all regressions control for age and dummies for spending group (proxy for income). For Pew survey: all regressions also control for age and dummies for income group. The coding for education category is rescaled so that they are comparable between different surveys.

TABLE 6 – 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

Notes: The table shows logistic regression estimates of veiling on working status using data from the Jakpat Poll in 2016. Standard errors are clustered at the province level. The unit of analysis is individual respondents. The dependent variable is a dummy variable valued at 1 if the respondent wears a veil. The main variable of interest is the working status category. All regressions control for age and socio-economic status variables.

TABLE 7 – THE EFFECT OF ECONOMIC SHOCKS ON VARIOUS MEASURES OF RELIGIOSITY

	Religiosity		*Num.of Prayers*		*Relig.politics*	
	(1)	(2)	(1)	(2)	(1)	(2)
Export shock	0.003	0.002	0.026	0.023	-0.074	-0.075
	(0.011)	(0.011)	(0.041)	(0.039)	(0.051)	(0.051)
Observations	13,656	13,655	12,663	12,662	13,374	13,373
R-squared	0.031	0.070	0.038	0.079	0.109	0.113

Notes: The table reports OLS estimates of three different measures of religiosity on the instrument. The first two columns use self-reported religiosity as the dependent variable, where values range from 1 = *not religious* to 4 = *very religious*. The two middle columns take the number of prayers performed in a day as the dependent variable; and the last two columns use the importance of religion and religiosity in influencing respondents' choice of political candidates, with values ranging from 0 = *not important at all* to 10 = *very important*. The data source is waves 4 and 5 of the IFLS (Indonesian Family Life Survey), and the unit of analysis is individuals surveyed in those waves who are residents of the districts sampled in the main analysis of this paper. All regressions include district and wave fixed effects. Each specification numbered (2) also controls for age, age-squared, and dummy variables for sex and marital status. Standard errors for all regressions are clustered at the district level.

TABLE 8 – THE REASONS TO VEIL

Reasons	Age group					Total
	16-19	20-24	25-29	30-34	35-39	
Requested by parents	1.10	3.53	2.65	0.00	3.45	2.62
Requested by spouse	0.00	0.32	0.53	2.99	0.00	0.58
Respondent's own will	92.31	86.54	89.95	89.55	93.10	**88.81**
Following trend	0.00	1.28	0.53	0.00	0.00	0.73
Others	6.59	8.33	6.35	7.46	3.45	7.27
Total	100	100	100	100	100	100

Notes: The values are in percentages and are sourced from the Jakpat Poll on the trend of religious headscarves, conducted in 2016. The question asked was, "What is your reason to wear the *Hijab* (a religious headscarf)?" The answer category "Others" includes responses such as "Commanded by the Qur'an," "Fear of God's punishment," etc.

TABLE 9 – VEILING PREVALENCE ACROSS 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

Notes: The values are in percentages and are sourced from the Jakpat Poll on the trend of religious headscarves, conducted in 2016. The question asked was "Are you personally wearing *Hijab* (a religious headscarf)?" The responses are recoded into "Yes" when the response is "yes" and "No" for all other responses.

TABLE 10 – VEILING PREVALENCE ACROSS EDUCATION LEVELS

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

Notes: The values are in percentages and are sourced from the Jakpat Poll on the trend of religious headscarves, conducted in 2016. The question asked was "Are you personally wearing *Hijab* (a religious headscarf)?"

TABLE 11 – VEILING AND FEMALE HIGH SCHOOL ATTENDANCE RATE

	Veil				
Female HS enrollment	0.001	0.013	-0.007	0.016	-0.005
	(0.052)	(0.052)	(0.050)	(0.055)	(0.052)
Formal job partcp.		0.179		0.154	
		(0.061)		(0.052)	
Export shock			0.062		0.057
			(0.012)		(0.014)
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.759	0.762	0.773	0.773	0.783

Notes: The table reports OLS estimates of the correlation between veiling and female high school enrollment rate. *Veil* is the fraction of female pupils wearing a headscarf, *Female HS enrollment rate* is the fraction of high-school-age female population attending high school, and *Formal job participation* is the fraction of female population aged 20-24 working in the formal sector. Each specification in columns (4) and (5) also includes controls at the school, district, and national levels. School-level controls include the male-to-female student ratio, the size of the student body, the latitude and the longitude of the school location. District-level controls include the fraction of the population who live in urban areas, the fraction of the male population aged 20-24 who are working, and the vote share of Islamist parties. National-level controls include the economic growth rate. All regressions include district fixed effects and district-specific time trends. Standard errors for all regressions are clustered at the district level.

TABLE 12 – FAMILY INCOME EFFECT

A. SECOND-STAGE ESTIMATES

	Veil				
Male job partcp.	1.224	1.220	1.240	1.198	1.205
	(0.657)	(0.649)	(0.749)	(0.717)	(0.842)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.601	0.610	0.606	0.616	0.616

B. FIRST-STAGE ESTIMATES

	Male job participation				
Export shock (male)	0.022	0.022	0.020	0.021	0.018
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
K-P Wald F-statistics	19.42	19.31	15.61	17.08	12.65

Notes: The table presents 2SLS estimates corresponding to the results in Table 2, but using male employment as the endogenous variable. The instrument is constructed using similar components of the main instrument, except for the female score index, which is replaced by the male score index. School-level controls include the male-to-female student ratio, the size of the student body, the latitude and the longitude of the school location. District-level controls include the fraction of the population who live in urban areas, the fraction of the female population aged 20-24 who are working in the formal sector, the vote share of Islamist parties, and the female high school enrollment rate. National-level controls include the 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.

TABLE 13 – MEANS OF TRANSPORTATION AND DISTANCE TO WORK

	Formal job=1					
Base cat.		*On foot*			*Less than 10 KM*	
Some vehicles	0.130	0.080	0.100			
	(0.002)	(0.002)	(0.002)			
10-29 KM				0.063	0.023	0.028
				(0.000)	(0.000)	(0.000)
$\geq$ *30 KM*				0.046	0.006	0.022
				(0.000)	(0.000)	(0.000)
District FE		✓	✓		✓	✓
Controls			✓			✓
Observations	6,729,176	6,729,176	6,729,176	6,510,228	6,510,228	6,510,228
R-squared	0.001	0.116	0.156	0.005	0.114	0.154

Notes: The first three columns report simple regressions of the probability of having a formal job on the dummy for means of transportation to work, while the last three columns report simple regressions of the probability of having a formal job on the dummy for distance to work. The outcome variable is coded as 1 if the job is formal and 0 if the job is informal, as defined in the text. The base category for distance to work is less than 10 km, while the base category for means of transportation is going to work on foot or walking. The vehicles used are either public, private, or shared. The unit of analysis is individuals surveyed in Sakernas 2014 who declare being employed. In columns (3) and (6), we also control for dummies for gender and age groups.

TABLE 14 – HETEROGENEITY BASED ON THE INITIAL GENDER NORMS IN THE DISTRICT

	quintile 1	quintile 2	quintile 3	quintile 4	quintile 5
			Veil		
Export shock	0.035	0.063	0.084	0.076	0.002
	(0.009)	(0.013)	(0.031)	(0.021)	(0.062)
Observations	290	333	354	367	343
R-squared	0.778	0.607	0.775	0.746	0.824

Notes: The table presents the OLS reduced form regression of veiling on export shocks, split by the quintiles of initial gender norms in the district. Gender norms are measured as the fraction of males who declare doing house chores in the past week in survey year 1993. The values of this measure range from 0 (the lowest), 0.005 (the median), to 0.024 (the highest). All regressions do not include additional controls, but control for district fixed effects and district-specific time trends. Standard errors are clustered at the district level.

TABLE 15 – PARENTAL VIEW OF WOMEN AND WORK (WORLD VALUES SURVEY)

	gender norm	*woman need children*	*mom wrk relation*	*wife fulfilling*	*prblm wife more inc*	*veil important*
Parent	-0.031	0.912	-0.010	0.009	-0.111	0.121
	(0.057)	(0.203)	(0.104)	(0.061)	(0.082)	(0.172)
Female	-0.430	-0.074	0.059	0.080	-0.018	0.219
	(0.071)	(0.243)	(0.138)	(0.078)	(0.110)	(0.228)
Parent × *Female*	0.194	0.519	-0.217	0.006	0.067	-0.246
	(0.082)	(0.314)	(0.153)	(0.089)	(0.121)	(0.249)
Constant	0.375	0.237	-1.095	-0.762	-0.412	0.815
	(0.086)	(0.369)	(0.110)	(0.092)	(0.087)	(0.471)
Observations	5,874	860	3,194	5,839	3,192	874

Notes: The table presents probit regression estimates of views surrounding women and work, using data from various waves of the World Values Survey in Indonesia. The number of observations varies depending on whether the question is included in the given wave. The unit of observation is individual. The outcome variable is equal to 1 in column 1 if the respondent says "Agree" to the statement *If jobs are scarce, men should have more right to jobs than women*; in column 2 if the respondent agrees that a woman must have children to be fulfilled; in column 3 if the respondent agrees or strongly agrees with the statement *Children suffer with a working mother*; in column 4 if the respondent agrees or strongly agrees with the statement *Being a housewife is just as fulfilling as paid work*; in column 5 if the respondent agrees with the statement *It is a problem if women have more income than their husband*; in column 6 if the respondent declares that wearing a veil is important or very important as a trait of a woman. Parent is a dummy variable indicating whether the respondent is a parent, and female is a dummy variable indicating whether the respondent is female. All regressions also control for an urban area dummy, wave fixed effects (where applicable), and income group dummies.

TABLE 16 – HETEROGENEITY ANALYSIS: OCCUPATION FIELD WORK

	Veil								
agriculture	0.110								
	(0.192)								
construction		3.945							
		(1.270)							
finance			0.518						
			(0.530)						
government				0.160					
				(0.082)					
manufacturing					0.100				
					(0.070)				
mining						2.523			
						(4.376)			
trading							0.095		
							(0.611)		
transportation								0.224	
								(0.094)	
services									0.406
									(0.281)
Observations	1,772	1,772	1,772	1,772	1,772	1,772	1,772	1,772	1,772
R-squared	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760

Notes: The table presents the OLS estimates of female formal job participation in different fields of work, defined as the share of females aged 20-24 working in each of the 9 KLUI classification sectors in Sakernas. Apart from the sector, the variable definitions for the other variables in this table follow exactly the main OLS specification. Each regression controls for district fixed effects and district-specific time trends, and standard errors are clustered at the district level.

TABLE 17 – VEILING AND THE EXISTENCE
OF A FIRM IN THE DISTRICT

Fraction of female workers	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
			Veil		
Firm exists	0.017	0.014	0.021	0.018	0.015
	(0.009)	(0.010)	(0.012)	(0.011)	(0.005)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No
Observations	408,957	100,450	103,066	100,672	104,769
R-squared	0.699	0.699	0.681	0.723	0.692
Fraction of female workers	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
			Veil		
Firm exists	0.016	0.014	0.020	0.014	0.014
	(0.008)	(0.011)	(0.012)	(0.009)	(0.005)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Observations	408,957	100,450	103,066	100,672	104,769
R-squared	0.705	0.703	0.686	0.743	0.697

Notes: The table presents an event study analysis of veiling on the existence of firms in the district. *Veil* is the fraction of female high school pupils wearing a headscarf in a given district; *firm exists* is a dummy variable (treatment) equal to one if the firm is in operation and recorded in the industrial census, and zero if the firm has either not entered the district or ceased to exist in the record. The first column presents the regression for all firms in the sample district, while the second and subsequent columns present the split-sample regressions by quartile of the fraction of female workers employed by the firm during its existence. The cut-offs for the fraction of female workers in each quartile are 0.15, 0.37, and 0.62, respectively. Each regression includes firm fixed effects as well as year fixed effects, and the standard errors are clustered at the district level.

TABLE 18 – VARIATION IN VEILING BY SCHOOLS IN THE SAME DISTRICT

	School1		School2		p-value of
	N	Mean veil	N	Mean veil	the difference
1105	10	.638248	10	.8862826	0.13
1109	22	.3408472	22	.4082044	0.63
1210	15	.0019006	15	0	0.29
1213	11	.0262892	11	.3045933	0.01
1273	12	.0137157	12	.0098806	0.72
1275	20	.2466439	20	.2280381	0.82
1309	21	.3538801	21	.4394098	0.56
1376	2	.0694444	2	0	0.24
1601	3	.0552136	3	.0058253	0.31
1671	22	.1906515	22	.0852909	0.11
3171	22	.100482	22	.0746448	0.19
3201	22	.3053733	22	.2516063	0.46
3206	22	.5916325	22	.5401275	0.71
3208	22	.3265894	22	.2407854	0.31
3210	22	.5346387	22	.4350029	0.37
3211	22	.3992697	22	.3866473	0.89
3212	22	.2273681	22	.2357642	0.95
3215	17	.1662289	17	.1401949	0.77
3216	8	.7186089	8	.8695143	0.07
3271	13	.3324005	13	.2363293	0.15
3273	14	.2038542	14	.1219743	0.05
3308	21	.042327	21	.0626796	0.52
3315	15	.0029548	15	.0101724	0.22
3316	22	.1525708	22	.0203829	0.00
3320	22	.0438333	22	.0188775	0.17
3325	21	.0796446	21	.0029431	0.00
3329	22	.1641669	22	.2682115	0.27
3372	22	.1612051	22	.1055965	0.22
3374	21	.0693132	21	.0385482	0.27
3403	21	.2777567	21	.3712072	0.44
3404	22	.1821845	22	.1493633	0.62
3471	19	.1248936	19	.1067144	0.72
3504	12	0	12	.0147695	0.00
3519	22	.0491093	22	.1510963	0.01
3521	20	.0952639	20	.2959783	0.01
3522	22	.0608446	22	.1632841	0.06
3525	17	.0802834	17	.2029941	0.08
3526	20	.1375225	20	.219708	0.28
3573	22	.1676228	22	.1023274	0.17
3576	21	.0627083	21	.1065037	0.18
3578	22	.1581157	22	.1738967	0.70
3601	19	.2247149	19	.2621355	0.76
3671	17	.3869787	17	.118869	0.00
3673	22	.2663295	22	.2474476	0.83

Notes: The table reports the mean value of the veiling rate across two schools within districts when data from both schools are available. Districts with only a single school observation are excluded, because there is no comparison to be made.

TABLE 19 – OTHER OUTCOMES PREDICTED BY THE INSTRUMENT

	Veil	*Male to female ratio*	*Num. of student*	*Fraction urban*	*Islamist votes*
Export shock	0.062	0.032	-2.796	0.003	0.900
	(0.012)	(0.018)	(3.401)	(0.005)	(0.830)
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.773	0.092	0.530	0.952	0.501

	Female HS enrollment	*Economic growth*	*Male job partcp.*	*Informal job partcp.*	*Family worker*
Export shock	0.004	1.302	0.035	-0.002	0.002
	(0.008)	(0.254)	(0.009)	(0.007)	(0.003)
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.661	0.053	0.594	0.659	0.619

Notes: The table reports OLS regressions of various variables used as controls in the main specification, as well as other relevant variables, on the instrument (export shock). The definitions of the variables are similar to those used in the main text. As in the main specification, each regression also includes district fixed effects and district-specific time trends. Standard errors for all regressions are clustered at the district level.

TABLE 20 – MAIN OLS ESTIMATES - DETAILS

	Veil							
Formal job partcipation	0.18	0.18	0.17	0.17	0.17	0.17	0.16	0.15
	(0.06)	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)
Male/female ratio		0.03			0.03	0.03		0.03
		(0.00)			(0.00)	(0.00)		(0.00)
Num. of student		0.00			0.00	0.00		0.00
		(0.00)			(0.00)	(0.00)		(0.00)
Latitude		0.12			0.12	0.12		0.12
		(0.18)			(0.18)	(0.18)		(0.18)
Longitude		-0.10			-0.10	-0.10		-0.10
		(0.14)			(0.14)	(0.14)		(0.14)
Fraction urban			-0.02		-0.02		-0.01	-0.00
			(0.08)		(0.08)		(0.08)	(0.08)
Islamist vote			0.00		0.00		0.00	0.00
			(0.00)		(0.00)		(0.00)	(0.00)
Female HS enrollment			0.02		0.02		0.01	0.02
			(0.05)		(0.05)		(0.06)	(0.05)
Male job participation			0.08		0.07		0.07	0.06
			(0.04)		(0.04)		(0.04)	(0.04)
Economic growth				0.00		0.00	0.00	0.00
				(0.00)		(0.00)	(0.00)	(0.00)
Observations	1,772	1,772	1,772	1,772	1,772	1,772	1,772	1,772
R-squared	0.762	0.770	0.763	0.763	0.772	0.772	0.765	0.773

Notes: The table reports detailed OLS estimates from Table 1. All specifications and definitions are exactly the same as those presented in Table 1 of the main text, which include district fixed effects and district-specific time trends. Standard errors for all regressions are clustered at the district level.

Appendix II Measuring gender segregation in the labor market

To further substantiate the mechanism described in the main text, we conduct an analysis of heterogeneity in the effect based on the level of gender segregation in the manufacturing labor market at the district level. This involves constructing and aggregating an industry-specific segregation index to capture the extent of occupational gender separation. Specifically, the process involves two steps:

First, we calculate a segregation index for each industrial sector present in a district, which quantifies the degree of gender-based occupational separation within that sector. This index is a function of the share of female workers in the industry, referred to as the "female score" (the same variable used as a component in the main instrument). The segregation index for an individual sector k is defined as:

$$Segregation\ index_k = |2 * female\ score_k - 1| \tag{1}$$

This function is designed as a V-shaped measure that reaches its maximum value of 1 when the female score is either 0 (only male workers) or 1 (only female workers), and its minimum value of 0 when the female score is 0.5 (an equal proportion of male and female workers). The intuition behind this index is straightforward: an industry is most segregated when it is entirely composed of workers from a single gender, and least segregated when there is a perfect gender balance.

Second, we aggregate these industry-specific segregation indices to create a district-level measure of labor market gender segregation. This aggregation is performed by calculating a weighted average of the segregation indices for all industries represented in the district. The weights correspond to the baseline share of each industry within the district's overall labor market composition, as of the base year (1993). The formula for the district-level segregation index is as follows:

$$District\ gender\ segregation = \sum_{k=1}^{K} \underbrace{\frac{L_{k,d,t=1993}}{L_{d,t=1993}}}_{sector\ \ share_{kd}} Segregation\ Index_k \tag{2}$$

Where:

- $L_{k,d,t=1993}$ is the number of workers employed in industry k in district d at baseline (1993)
- $L_{d,t=1993}$ is the total number of workers in district d at baseline

- $Segregation\ Index_k$ is the segregation index for industry k as defined in equation 1

This aggregated measure systematically captures the degree of gender segregation in the labor market at the district level, reflecting the structural characteristics of the industrial labor market within the district. It is likely to capture exogenous features of the labor market, as the weights are based on the baseline industrial composition, and the segregation indices reflect intrinsic historical patterns of gender separation within each industry.

In sum, this method ensures that the district-level segregation index provides an interpretable and robust measure of labor market gender segregation, distinguishing districts with higher degrees of occupational gender separation from those with more integrated labor markets.

Appendix III Heterogeneity of veiling at T-1

We run the following regressions to understand the effect of economic shocks on veiling at different levels of previous veil adoption using the following model:

$$\begin{aligned} Veil_{sdt} =& \alpha_1\ export\_shock_{dt} + \alpha_2\ Veil_{sd,t-1} + \alpha_3\ export\_shock_{dt} * Veil_{sd,t-1} \\ &+ \mathbf{X'}_{s;d;t}\ \mathbf{\Omega} + \eta_d + \ \theta_d T + \varepsilon_{dt} \end{aligned} \tag{3}$$

In Figure 3, we present the marginal effects of export shocks on veiling, while the details of the regression estimates are presented in Table 21 below. Under this model, the effect of economic shocks diminishes as the proportion of women already adopting the veil increases. Interestingly, export shocks do not appear to significantly affect veiling when the fraction of veiled students in the previous period reaches about 60%. In other words, when veiling becomes the majority practice, adopting it may no longer be an effective signaling device in the community.

One concern about this approach is that the frequency of veiling is naturally capped at one. In theory, however, this should not have a definite effect on the regression pattern (the effect could be progressive, regressive, or constant over different values of T-1), except in schools where the frequency of veiling is already high, causing the effect to "hit the ceiling".

To account for this, we reran the analysis by restricting the observations below a certain threshold, thus avoiding cases where the effect hits the ceiling. Since the average effect on veiling is around 2 percentage points, while the maximum value of the export shock is around eleven, the maximum average effect that may occur in

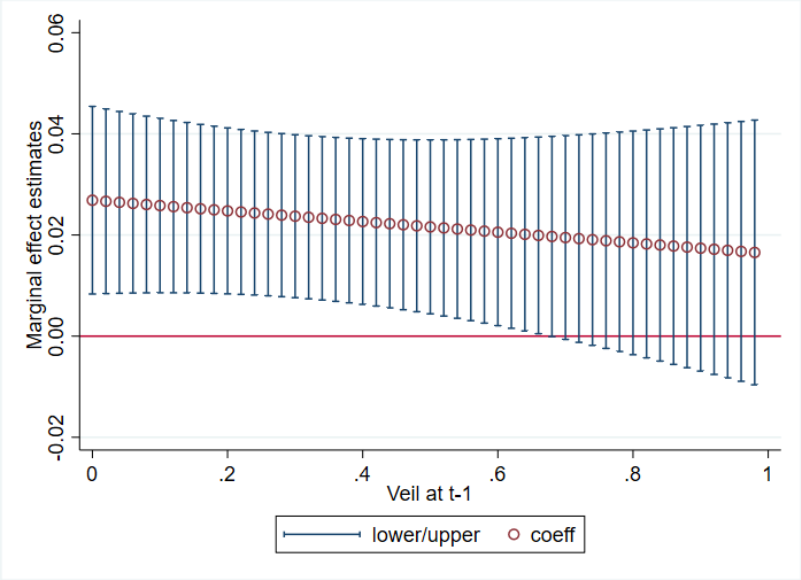

FIGURE 3 – HETEROGENEITY EFFECTS BY VEILING AT *T-1*

Note: The figure displays the estimates of the marginal effects of export shocks on veiling in the reduced form following equation 3. The outcome variable is veiling at time t, while the marginal effect of export shocks is estimated at different levels of veiling at t-1. The hollow dots represent the estimated marginal effect, while the vertical lines represent the 95% confidence interval.

TABLE 21 – HETEROGENEITY EFFECT BY VEILING FRACTION AT T-1

	$Veil_t$				
Export shock	0.032	0.031	0.028	0.031	0.027
	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)
$Veil_{t-1}$	0.584	0.574	0.568	0.573	0.565
	(0.089)	(0.089)	(0.088)	(0.089)	(0.088)
*Export shock**$Veil_{t-1}$	-0.015	-0.014	-0.011	-0.013	-0.011
	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,588	1,588	1,588	1,588	1,588
R-squared	0.843	0.851	0.851	0.851	0.852

Notes: The table reports reduced-form estimates with interaction following equation 3. $Veil_t$ is the fraction of female pupils wearing a headscarf at time t, $Veil_{t-1}$ is the fraction of female pupils wearing a headscarf at time $t-1$, and *Export shock* is the instrument. School-level controls include the male-to-female student ratio, the size of the student body, and the latitude and the longitude of the school location. District-level controls include the fraction of the population who live in urban areas, the fraction of the male population aged 20-24 who are working, the vote share of Islamist parties, and female high school enrollment rate, National-level controls include the economic growth rate. Standard errors for all regressions are clustered at the district level.

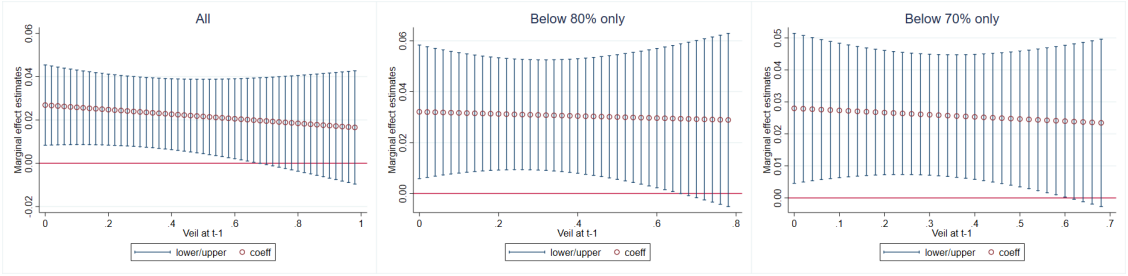

FIGURE 4 – ROBUSTNESS: HETEROGENEITY OF EFFECT AT T-1

any given year is around 22 percentage points. Please note that this exercise, while avoiding the problem of the ceiling effect, leads to another problem: a drop in the number of observations, which renders the estimates to be less precise. Nevertheless, we reran and compared the same analysis for the sample of observations with veiling frequencies below 80 percent and 70 percent, excluding all the observations beyond the thresholds. Despite the changes in the standard errors, most likely due to the drop in the number of observations as predicted, we found a very similar pattern, where the effect fades at higher levels of veiling at T-1. In particular, the effects become very imprecise around the frequency of veiling at T-1 when it is around 60 percent. This corroborates the interpretation of veiling as a signaling device, as the effect fades as more women adopt the veil in the community.

Appendix IV Robustness checks

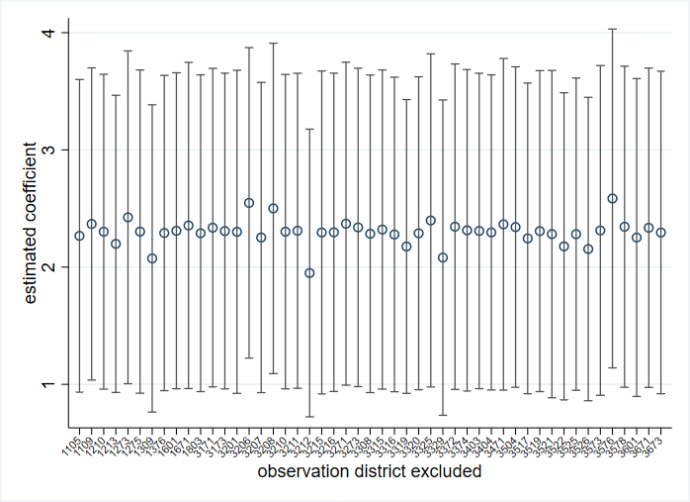

FIGURE 5 – JACKKNIFE RESAMPLING ESTIMATES BY DISTRICT

Note: This figure displays the re-estimation of the coefficient (within 95% confidence intervals) in the main regression presented in Table 2–Model 4, using a jackknife resampling method over the district dimension.

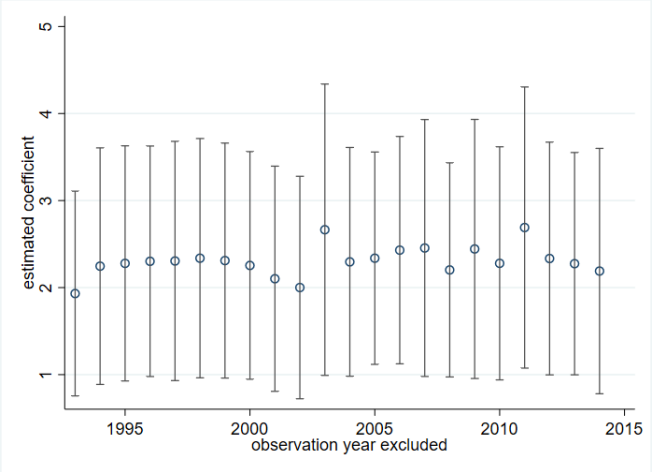

FIGURE 6 – JACKKNIFE RESAMPLING ESTIMATES BY YEAR

Note: This figure displays the re-estimation of the coefficient (within the 95% confidence interval) from the main regression presented in Table 2–Model 4, using a jackknife resampling method over the year dimension.

A Alternative IV with global import

This alternative instrument still follows the fundamental logic of the original instrument, but instead of using the value of Indonesia's exports, we use the global

demand for commodities, specifically the total value of global imports from all countries except Indonesia. It is computed based on the formula below:

$$global\_demand\_shock_{dt} = \sum_{k=1}^{K} global\_import_{kt} \underbrace{\frac{L_{kd,t=1993}}{L_{d,t=1993}}}_{sector\_share_{kd}} \underbrace{\frac{L_{fk,t=1993}}{L_{k,t=1993}}}_{\text{female score\_k}} \tag{4}$$

$$global\_import_{kt} = \sum_{n=1}^{N} import_{knt} - import_{kt\_Indo} \tag{5}$$

Where $\sum_{n=1}^{N} import_{knt}$ is the sum of global imports of commodity k at time t by all countries; $import_{kt\_Indo}$ is the value of imports of commodity k by Indonesia at time t; and N is the total number of countries importing commodity k at time t.

TABLE 22 – ALTERNATIVE IV WITH GLOBAL IMPORT

A. REDUCED FORMS ESTIMATES

	Veil				
Global import shock	0.107	0.107	0.105	0.100	0.091
	(0.028)	(0.028)	(0.038)	(0.027)	(0.041)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.764	0.773	0.774	0.774	0.775

B. 2SLS ESTIMATES

	Veil				
Formal job partcp.	2.884	2.898	2.814	2.968	2.892
	(1.040)	(1.046)	(1.135)	(1.168)	(1.482)

C. FIRST STAGE ESTIMATES

	Veil				
Global import shock	0.037	0.037	0.037	0.034	0.031
	(0.012)	(0.012)	(0.014)	(0.012)	(0.015)
K-P Wald F-Statistics	9.53	9.42	7.20	7.41	4.12

Notes: The table reports the reduced form and 2SLS estimates using an alternative instrument, *Global import shock*. Unlike the original instrument, it takes the value of world imports (minus Indonesia's imports) rather than the value of commodities exported by Indonesia's producers. *Veil* is the fraction of female pupils wearing a veil, *Formal job participation* is the fraction of female population aged 20-24 working in the formal sector. School-level controls include the male-to-female student ratio, the size of the student body, and the latitude and the longitude of the school location. District-level controls include the fraction of the population who live in urban areas, the fraction of the male population aged 20-24 who are working, the vote share of Islamist parties, and the female high school enrollment rate, National-level controls include the economic growth rate. Panel B and C also include the same set of additional controls (school, district, and national-level) 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.

TABLE 23 – ROBUSTNESS: TRIMMING OUTLIERS

	Veil				
Formal job participation	2.466	2.490	2.852	2.498	2.875
	(0.665)	(0.692)	(0.861)	(0.719)	(0.937)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,728	1,728	1,728	1,728	1,728
R-squared	0.282	0.275	0.186	0.272	0.176

Notes: The table presents 2SLS estimates corresponding to the results in Panel B of Table 2, but excluding observations with 100% female pupils with headscarves. Variable definitions, as well as the set of controls, are similar to those presented in Table 2.

TABLE 24 – ROBUSTNESS: TRIMMING OBSERVATIONS WITH HIGH VARIANCE

	Veil				
Formal job participation	2.080	2.071	2.360	2.062	2.352
	(0.634)	(0.630)	(0.777)	(0.662)	(0.848)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,680	1,680	1,680	1,680	1,680
R-squared	0.516	0.527	0.482	0.530	0.484

Notes: The table presents 2SLS estimates corresponding to the results in Panel B of Table 2, but excluding observations from districts with only one school in the sample. All variable definitions, as well as the set of controls, are similar to those presented in Table 2.

TABLE 25 – MAIN RESULTS USING LAGS OF ECONOMIC SHOCKS

A. Reduced Forms Estimates

	$Veil_{sdt}$					
$Export\ shock_{d,t-1}$	0.058	0.055				
	(0.013)	(0.014)				
$Export\ shock_{d,t-2}$			0.049	0.048		
			(0.013)	(0.013)		
$Export\ shock_{d,t-3}$					0.038	0.035
					(0.014)	(0.013)
School-level controls		✓		✓		✓
District-level controls		✓		✓		✓
National-level controls		✓		✓		✓
Observations	1,695	1,695	1,614	1,614	1,532	1,532
R-squared	0.775	0.785	0.782	0.791	0.782	0.791

B. 2SLS Estimates

	$Veil_{sdt}$					
$Formal\ job\ partcp_{d,t-1}$	2.005	1.938				
	(0.637)	(0.658)				
$Formal\ job\ partcp_{d,t-2}$			1.691	1.660		
			(0.560)	(0.553)		
$Formal\ job\ partcp_{d,t-3}$					1.373	1.366
					(0.563)	(0.562)
School-level controls		✓		✓		✓
District-level controls		✓		✓		✓
National-level controls		✓		✓		✓
Observations	1,695	1,695	1,614	1,614	1,532	1,532
R-squared	0.546	0.575	0.644	0.662	0.688	0.698

Notes: The table presents reduced forms and 2SLS estimates of veiling on different lags of economic shocks. The unit of analysis is school-district-year. *Veil* denotes the fraction of female students who wear a veil, *Export shock* denotes the instrument, *Formal job participation* denotes the fraction of the female population aged 20-24 who works in the formal sector. School-level controls include the male-to-female student ratio, the size of the student body, and the latitude and the longitude of the school location. District-level controls include the fraction of the population who live in urban areas, the fraction of the male population aged 20-24 who are working, the vote share of Islamist parties, and the female high-school enrollment rate. National-level controls include the 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.

TABLE 26 – MAIN RESULTS USING
DISTRICT-SPECIFIC-SHARE FEMALE SCORE INDEX

	Veil				
Formal job partcp.	2.133	2.126	2.491	2.112	2.488
	(0.644)	(0.642)	(0.884)	(0.667)	(0.962)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.493	0.504	0.433	0.507	0.434

Notes: The table presents 2SLS estimates corresponding to the results in Panel B of Table 2, but using a slightly different construction of the instrument. The instrument in this table is constructed using a district-specific female score index, while the instrument in the main text uses a national female score index that is applied homogeneously to all districts in the sample. Variable definitions, as well as the set of controls, are similar to those presented in Table 2. All specifications include district fixed effects and district-specific time trends. Standard errors for all regressions are clustered at the district level.

TABLE 27 – ROBUSTNESS CHECK WITH TIME FIXED EFFECTS

	Veil				
Formal job participation	2.298	2.933	2.926	3.354	4.413
	(0.684)	(1.018)	(1.010)	(1.259)	(2.093)
District specific time trends	✓	✓	✓	✓	✓
Decade FE		✓	✓	✓	✓
School-level controls			✓	✓	✓
District-level controls				✓	✓
National-level controls					✓
Observations	1,772	1,772	1,772	1,772	1,772

Notes: The table presents a comparison of estimates and standard errors across specifications that progressively incorporate more comprehensive sets of control variables, ranging from the least to the most demanding. All regressions include district fixed effects. Variable definitions are consistent with those used in the main regression results. The decade fixed effects are indicator variables for each decade within the 22-year observation period.

TABLE 28 – ROBUSTNESS CHECK FOLLOWING BORUSYAK ET AL. (2022)

A. Robust standard error

	Veil				
Formal job participation	2.298	2.285	2.615	2.279	2.622
	(1.059)	(1.057)	(1.297)	(1.121)	(1.409)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	616	616	616	616	616

B. Clustered SE at 3 digit SIC code

	Veil				
Formal job participation	2.298	2.285	2.615	2.279	2.622
	(0.452)	(0.454)	(0.445)	(0.481)	(0.483)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	616	616	616	616	616
Number of clusters	28	28	28	28	28

C. Clustered SE at 2 digit SIC code

	Veil				
Formal job participation	2.298	2.285	2.615	2.279	2.622
	(0.487)	(0.497)	(0.535)	(0.529)	(0.579)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	616	616	616	616	616
Number of clusters	9	9	9	9	9

Notes: The table presents robustness analysis of the Bartik IV following the procedures in Borusyak et al. (2022). The estimates are produced after implementing Stata command *ssaggregate*. They are re-estimations of the main estimates, but using industry-level shocks instead of location-level shocks. Following the procedure, the outcomes and endogenous variables are aggregated at the industry-year level, with the share of industry and female index as weights. Meanwhile, the instrument is the shock, which varies by industry and year. The top panel presents the robust BHJ standard errors, while the second and the last panels present the standard errors clustered at the 3-digit and 2-digit ISIC codes, respectively.

TABLE 29 – IV ESTIMATES EXCLUDING ONE INDUSTRY AT A TIME

Industry Code Excluded	Coefficient	SE	N
311	2.584	(1.049)	1772
312	2.461	(0.848)	1772
313	2.618	(0.925)	1772
314	2.373	(0.859)	1772
321	2.521	(0.905)	1772
322	2.548	(0.899)	1772
323	2.612	(0.919)	1772
324	2.588	(0.957)	1772
331	2.812	(0.987)	1736
332	2.508	(0.889)	1772
341	2.638	(0.929)	1772
342	2.583	(0.911)	1772
351	2.624	(0.919)	1772
352	2.597	(0.936)	1772
354	2.622	(0.927)	1772
355	2.742	(0.928)	1772
356	2.594	(0.918)	1772
361	2.613	(0.922)	1772
362	2.618	(0.925)	1772
369	2.048	(0.892)	1772
371	2.629	(0.918)	1772
372	2.621	(0.925)	1772
381	2.602	(0.924)	1772
382	2.834	(0.991)	1772
383	2.595	(0.891)	1772
384	2.653	(0.941)	1772
385	2.623	(0.927)	1772
390	2.603	(0.966)	1772

Notes: This table presents 2SLS estimates from the main specification, where each row represents the estimate obtained after excluding a single industry from the sample. This robustness check helps assess whether the results are driven by any particular industry.

TABLE 30 – ROBUSTNESS: EXCLUDING TEXTILE-RELATED INDUSTRY

A. REDUCED FORMS ESTIMATES

	Veil				
Export shock	0.052	0.051	0.050	0.049	0.047
	(0.012)	(0.012)	(0.013)	(0.013)	(0.014)
School-level controls		✓	✓	✓	✓
District-level controls			✓		✓
National-level controls				✓	✓
Observations	1,772	1,772	1,772	1,772	1,772
R-squared	0.772	0.781	0.781	0.781	0.782

B. SECOND-STAGE 2SLS ESTIMATES

	Veil				
Formal job participation	2.122	2.110	2.429	2.094	2.421
	(0.644)	(0.640)	(0.801)	(0.670)	(0.871)

C. FIRST-STAGE ESTIMATES

	Formal job participation				
Export shock	0.024	0.024	0.020	0.024	0.020
	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)
K-P Wald F-statistics	25.89	25.52	22.13	24.87	19.32

Notes: The table reports reduced form and 2SLS estimates of the main results using an alternative instrument, excluding textile industries (ISICRev2 codes: 321 and 322). *Veil* is the fraction of female students who wear a veil, *Formal job participation* is the fraction of the female population aged 20-24 working in the formal sector, and *Export shock* is the instrument. School-level controls include the male-to-female student ratio, the size of the student body, and the latitude and the longitude of the school location. District-level controls include the fraction of the population who live in urban areas, the fraction of the male population aged 20-24 who are working, the vote share of Islamist parties, and the female high-school enrollment rate. National-level controls include the 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.

Appendix V Variable definition, calculation and data source

A International trade data

The first component of the instrument, the value of Indonesia's exports (alternatively, the value of global imports), is sourced from the UN-COMTRADE database, **The World Integrated Trade Solution (WITS)** at https://wits.worldbank.org/ in July 2018. The interface allows users to customize their query, such as choosing the reporting country, trade partner, year of report, and the nomenclature of product classification. The nomenclature used in this paper is ISIC Revision 2 at the 3-digit level, which can be matched to the industrial classification used by Statistics Indonesia for the Large and Medium Industry Census in 1993.

The trading values acquired are transformed into their constant value in 1990 USD using the GDP deflator for the United States, downloaded from **Penn World Table - International Comparisons of Production, Income, and Prices 9.1** at https://febpwt.webhosting.rug.nl/, accessed in August 2018.

After deflating the values so that they are comparable across years, these numbers are normalized to 1 in 1990 to ensure comparability across different industrial sectors. This way, we are essentially capturing the normalized real value of the demand for a specific product across different time periods.

B District sectoral composition and industrial female scores

The second and third components of *Export shock* are the female score index of the industry and the district industrial composition. These are calculated using the Medium and Large Manufacturing Census produced annually by Statistics Indonesia (Badan Pusat Statistik - BPS). The census provides information on the location, output/product classification, and, since 1993, the breakdown of male and female labor employed in the production process of the firm.

The historical sectoral composition is calculated as the base-year ratio of the labor force working in a given sector in a particular district to the total workforce of the manufacturing sector in that district. The base year used is 1993. In Figure 7, one can observe the variation in historical industrial composition across districts included in the sample.

While **industrial female score** is an index calculated as the ratio of female workers to the total workforce in a given industry at the national level. This index is also calculated for the base year 1993. These scores are presented in Table 32.

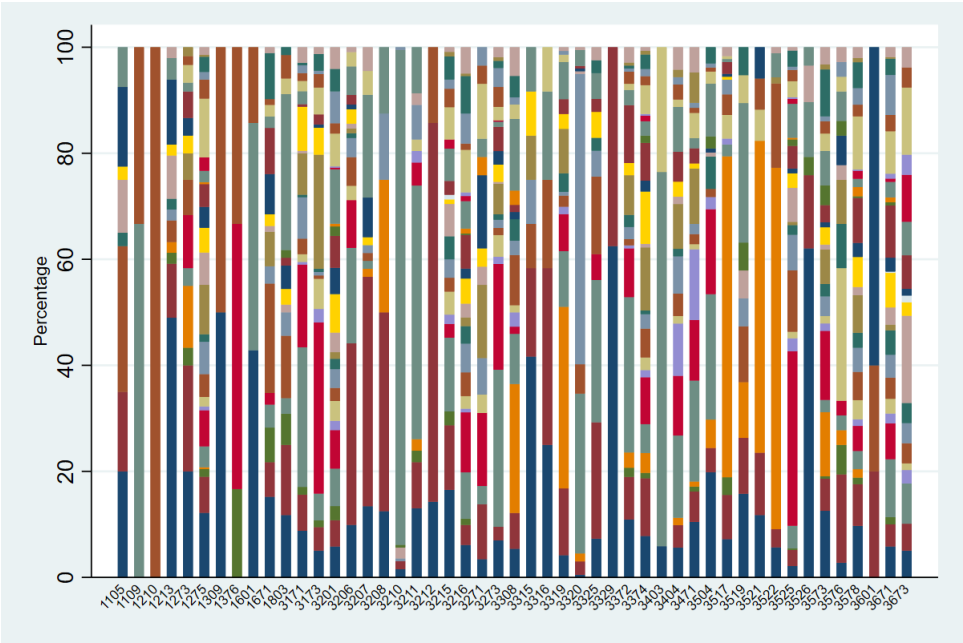

FIGURE 7 – HISTORICAL INDUSTRIAL COMPOSITION BY DISTRICT

Note: The figure shows the industrial composition in each district (district codes on the x-axis) for the base year (1993), disaggregated by the 3-digit ISIC Rev.2 industrial classification. Each color represents one industrial sector.

TABLE 31 – OPERATIONALIZATION OF VARIABLES

VARIABLES	Details	Source
Veil	Fraction of female pupils who wear a headscarf in school book pictures in a given school-district-year*	School book, see details in part VI below
Formal job partcp.	Fraction of female population aged 20-24 who hold 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, various years (1993-2014)*
Export Shock	Demand shocks for the product produced by Indonesian based firms in the international market	See text section B and appendix V below for detailed calculation.
Informal job partcp.	Share of female aged 20-24 who hold 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, various years (1993-2014)*
Family worker	Share of female aged 20-24 who work as a family worker (paid or unpaid). A family worker is defined as satisfying two criteria: 1. Working is the activities taking most time in the previous week. 2. Occupation status as family/unpaid workers= code 5 in SAKERNAS 2001 and earlier; code 7 in SAKERNAS 2002 and later	SAKERNAS, various years (1993-2014)**
Male job partcp.	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, various years (1993-2014)*
Fraction urban	Fraction of population aged 10 and above who live in urban areas	SAKERNAS, various years (1993-2014)**
Male/female ratio	The ratio of male students to female 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
Female HS enrollment	Fraction of female population aged 15-19 years old whose main activities is going to school in the previous week	SAKERNAS, various years (1993-2014)**
Female score	The share of female labor in sector k in the base year,1993	Medium and Large Manufacturing Census (Statistik Industri)
Sector share	The share of sector k in district d in the base year,1993	Medium and Large Manufacturing Census (Statistik Industri)
Value of export	The value of Indonesia's export in sector k in year t	UN Comtrade

Note: *We interpolate the missing values in this variable. This procedure does not change the mean or the standard deviation up to 2 decimal point.
**SAKERNAS 1995 is not available, therefore for all variables sourced from SAKERNAS, we interpolate the value for this year.
***only PPP before 1999 election.

TABLE 32 – FEMALE SCORE INDEX (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 VI Veil: Data collection procedure

The data on veiling rates is obtained by calculating the number of female pupils wearing a headscarf in the high school yearbook pictures as a proportion of all female pupils. This book is a register, a document normally kept by the administrative office of public schools in Indonesia. Examples of pages from this document are presented in Figure 8.

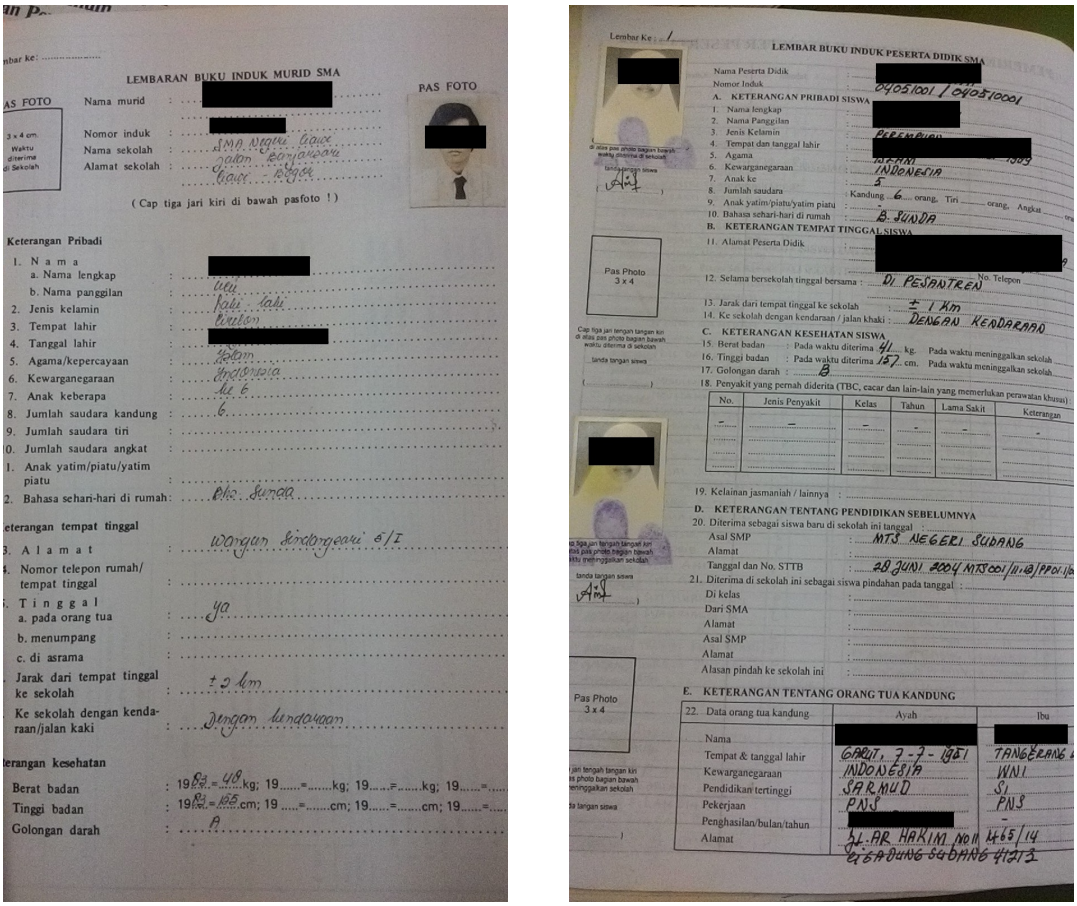

FIGURE 8 – SAMPLES OF HIGH SCHOOL BOOK PAGES

A Sampling

The sample frame consists of all districts (a total of 267) located in Java and Sumatra (the two main islands of Indonesia). The data collection was performed between March and August 2017. The number of districts included in the original sample was 50. They were randomly chosen with the number proportional to the size of the population inhabiting the province in 2014, a choice made to maximize the efficiency of the data collection. In Table 33, one can observe the characteristics of non-sampled and sampled districts. Apart from the population size, there are no

significant differences between the two groups. From each of the districts chosen in the sample, two schools were randomly selected. Out of the 50 districts originally planned, one district was dropped due to logistical problems, as no reliable enumerator was found to perform the data collection in this district. Out of 49 districts successfully sampled, five districts ended up with a single school. The geographic distribution of the district sample is shown in Figure 1.

TABLE 33 – DISTRICTS CHARACTERISTICS: SAMPLING VS. NON-SAMPLING

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)

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

TABLE 34 – 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 this order. The sample frame of this study does not include Islamic schools (public madrasahs). This is done intentionally because all female pupils in madrasahs wear a headscarf, so there is no information to obtain from these religious schools.

The instructions for the data collection procedure at the school level are as follows:

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

2. Check if the quality of the register book passes the standards (readable, fairly organized, and available for multiple cohort years). If the quality of the material is below standard, proceed to the next school on the list. Otherwise, proceed to the next step.

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

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

5. Scan or take pictures of randomly selected pages of the register book. Enumerators scan every other page of the available books. To ease the process, the PI set the rule that odd pages are to be scanned for odd-year cohorts and even pages for even-year cohorts.

6. Upload all information collected, including the pictures or scans, to the dedicated online server.

7. Data quality control is performed by the PI and team, with approval granted if the quality is acceptable and the scans match the information in the data collection sheets.

8. Amend or collect any missing information if necessary.

9. Repeat the procedure for the next school on the list.