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Globalization and Social Change: Gender-Specific Effects of Trade Liberalization in Indonesia

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ABSTRACT

Globalization and Social Change: Gender-Specific Effects of Trade Liberalization in Indonesia*

We analyse the gender-specific effects of trade liberalization on work participation and hours of work and primary participation in domestic duties in Indonesia. We show that female work participation increased in relative terms in regions that were more exposed to input tariff reductions, whereas the effects of output tariff changes were much less pronounced. When looking at the potential channels for these effects, we find that in Indonesia the structure of initial protection was considerably more female-biased than skill-biased and hence reductions in input tariffs have especially benefited sectors with a larger initial concentration of female workers. This has led to a relative expansion of more female intensive sectors as well as to a decrease in gender segregation of occupation, especially among the low skilled. We also find that labour markets are a key channel through which trade liberalization affects marriage decisions. Delayed marriage among both sexes is related to input tariff liberalization, especially in the younger cohorts, as the improved labour opportunities for women reduce the returns to marriage.

JEL Classification: F13, F16, J12, J16, J21

Keywords: labour force participation, gender inequality, marriage, trade liberalization, Indonesia

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1. Introduction

Despite reductions in gender gaps in labour market outcomes over the past decades, large gaps remain, especially in middle-income countries. Globally, according to the World Bank World Development Indicators, 77 per cent of men aged 15 and older participated in the labour force in 2014, compared to 50 per cent of women. In emerging economies, the gender gap in participation rates ranged from 14 percentage points in China to more than 50 percentage points in India.

Women's ability to participate in the labour force depends on many social and economic constraints. Economic growth and structural change can help remove certain barriers, but little is known about the conditions under which they promote female employment opportunities. In this paper we assess whether trade liberalization in the 1990s induced gender specific labour market effects in Indonesia, where female labour force participation has been remarkably stagnant around 50 per cent over the last 25 years. The impact of globalization and trade policy on male and female employment has started to receive more attention in recent research (e.g. Juhn et al. 2014, Do et al. 2016, Gaddis and Pieters 2016), complementing a rich literature on the distributional effects of trade across the income or skill distribution. As global and regional trade integration intensify, understanding its impact on gender inequalities in the labour market can contribute to policy design for more equitable globalization.

Trade liberalization's labour market impacts can be gender specific for a number of reasons. First, increased competition can reduce taste-based discrimination, increasing the demand for female workers relative to male workers (Becker 1957, Black and Brainerd 2004, Hirata and Soares 2016). Second, increased competition and better access to foreign inputs may induce technological upgrading. If technology is gender-biased, for example by reducing the physical strength required for manual work, relative demand for female workers can increase (see Juhn et al. 2014). Finally, trade can induce structural change, by reallocation of output and production factors across sectors. Impacts will be gender specific if male and female workers are imperfect substitutes (Galor and Weil

1996, Sauré and Zoabi 2009) or if gender segregation across sectors is persistent for other reasons (see Do et al. 2016, Gaddis and Pieters 2016).

Nevertheless, it is difficult to predict gender specific labour market impacts, because the various channels do not necessarily point in the same direction, and because even the aggregate labour market effects of liberalization vary across countries. First of all, there is little evidence that trade reforms always lead to a substantial sectoral reallocation of labour (Goldberg and Pavcnik 2007, Wacziarg and Wallack 2004). Second, some recent liberalization episodes in developing countries had quite negative effects on employment and poverty. Topalova (2010) found that in India, districts more exposed to import tariff reductions experienced increased poverty (or slower poverty reductions), due to inflexible labour markets and immobile workers. In Brazil, liberalization in the late 1980s and 1990s led to a reduction in employment rates, as tradable sector workers were displaced and partly ended up unemployed and inactive (Meñezes-Filho and Muendler 2011). Gaddis and Pieters (2016) show that these negative effects on employment in Brazil were much stronger for men than for women, as the tradable sector was relatively male-intensive at the onset of liberalization reforms.

Existing evidence suggests that Indonesia provides a rather different case. Kis-Katos and Sparrow (2015) show that poverty reduced faster in districts that experienced greater exposure to tariff reductions. By reducing prices on intermediate products, import tariff reductions increased low-skilled work participation and wages of medium-skilled workers. These effects outweighed negative labour market effects due to reductions in import tariffs on final outputs, leading to a net reduction in poverty (Kis-Katos and Sparrow 2015). Consistent with these results, other studies have shown that input trade liberalization increased firms' sales and profits through the channel of intermediate goods (Amiti and Konings 2007), while the industrial skill premium decreased (Amiti and Cameron 2012). In this paper, we extend this work by analysing gender specific labour market impacts.

In addition, to further contribute to the existing literature on trade and gender inequality – and on trade and development more broadly – we study the marriage market impacts of the reforms. If trade liberalization affects labour market opportunities for women, it can potentially also affect marriage and family decisions. Economic theory predicts that greater specialization by men in market work and by women in non-market work raises the gains to marriage (Becker, 1981). Improvements in women’s labour market opportunities, relative to men’s, would thus reduce marriage rates (e.g. Blau et al. 2000). Heath and Mobarak (2015) analyse the emergence of the readymade garment industry in Bangladesh, and find that access to garment sector jobs led to delayed marriage among girls, as young girls were more likely to stay in school and older girls were more likely to be employed in a factory. Jensen (2012) studies the effect of labour market opportunities on girls’ marriage in India, based on an experiment in which recruiters randomly visited a selected set of villages to inform young women of job opportunities. He finds that the recruitment information reduced the probability of girls marrying and having children, while increasing schooling and employment. This paper contributes by analysing the marriage market impacts of macroeconomic policy, directly affecting many sectors of the economy. We assess to what extent this type of policy, which was not “gendered” in its design, can contribute to social changes beyond the labour market. Moreover, we analyse whether changes in the marriage market can be linked to changes in the labour market.

Our empirical analysis relates female and male employment and marriage outcomes at the level of Indonesian districts to regional exposure to changes in tariffs on final and intermediate goods during the period of trade liberalization from 1993 to 2002. We find that while regional exposure to output tariff reductions was not a particularly relevant driver of changes in the labour market, tariff reductions on locally relevant intermediate goods were affecting male and female employment differently. Input tariff reductions led to increases in various measures of female employment, which went partially at the cost of domestic duties. Females thus have responded much more strongly to the positive labour demand shock of input tariff liberalization than males. We investigate the potential mechanisms behind these gender differences and find that female work responded more

strongly not only because of the substantially larger scope for adjustment of workforce participation among females, but demand side factors—structural change and technology upgrading—have also played a role in explaining this gender difference. At the same time, input tariff liberalization has also led to reductions in marriage rates among the younger cohorts. For females, the reductions in marriage rates were especially closely related to reductions in the likelihood of performing primarily domestic duties, which links the marriage and the labour market.

The rest of the paper is structured as follows. Section 2 discusses the context of our analysis, followed by a description of our data and empirical strategy in Section 3. Results for labour market and marriage outcomes are presented in Section 4, including the analysis of potential channels, and main robustness checks. Section 5 concludes.

2. Context

2.1 Trade liberalization in Indonesia in the 1990s

Our analysis focuses on Indonesia's second wave of trade liberalization in the 1990s that followed a first round of tariff reductions from the mid-1980s (Basri and Hill, 1996). Trade liberalization in the 1990s took place in two major steps: By the end of the Uruguay round, Indonesia as a founding member of the WTO entered substantial obligations to reduce import tariffs on a wide variety of products, extending binding tariff ceilings from 9% of products to almost all products (95%, WTO 1998). A second round of tariff reductions followed in 1999 as part of an IMF conditionality package that came as a result of the 1997/98 monetary crisis. Overall, average applied tariff lines declined from 17.2% in 1993 to 6.6% in 2002 (Kis-Katos and Sparrow, 2015). In both rounds of trade liberalization, tariff cuts were greatest in the previously most protected sectors and took place across the board, without any substantial exemptions from tariff reduction at the sectoral level (Basri and Hill, 1996). As described in the introduction, previous studies have shown that the reforms led to increased sales and profits for manufacturing firms, a reduction in the skill premium, and to

employment growth and poverty reduction (Amiti and Konings 2007, Amiti and Cameron 2012, Kistos and Sparrow 2015).

2.2 *Female labour force participation in Indonesia*

Average female labour force participation in Indonesia has been remarkably stagnant over the last 25 years, hovering around the 50 per cent mark (Cameron, Contreras-Suarez and Pye 2015, Priebe 2010, Shaner and Das 2016). This despite decades of sustained economic growth, improved women's education and declining fertility rates, and the median age of first marriage of ever married women age 25 to 49 increasing from 17 to 20 years over the period 1980 to 2010 (BPS, 1989 and 2013). With male participation rates around 80 per cent, strong gender differences in labour force participation still persist and are prevalent both in the sector and occupation of work. Cameron, Contreras-Suarez and Pye (2015) argue that these differences are largely driven by cultural norms and family roles. They show that Indonesian women are three times more likely than men to be engaged in unpaid (family) work, and are more likely than men to work in trade and retail services and housekeeping, while they are much less likely to work in mining and construction. Finally, female workers earn about 10 per cent less than observably similar male workers in the formal sector, and more than 30 per cent less in the informal sector (Cameron, Contreras-Suarez and Pye 2015, Shaner and Das 2016).

Underlying the stagnation of female labour force participation is a large degree of heterogeneity by region and socioeconomic dimensions. Shaner and Das (2016) find an increase in labour force participation among women with secondary or tertiary education and in higher wealth groups, but a reduction among women with relatively low education and wealth. Cameron, Contreras-Suarez and Pye (2015) show that after controlling for confounding individual and local factors, female labour force participation is increasing in urban areas, which they argue is associated with changing attitudes towards gender roles and female employment. This trend is offset by declining female employment in rural areas due to a diminishing agricultural sector.

3. Data and empirical strategy

3.1 Data

Our empirical analysis draws on a panel of 259 districts with data for the years 1993, 1996, 1999, and 2002. The sample includes all Indonesian districts except those in the provinces of Aceh, Papua, and Maluku. The district panel is constructed from a number of data sources. First, Indonesia's national socio-economic household survey (Susenas), an annually repeated cross section representative at the district level, provides information on employment, gender, age, education, literacy, and marriage and allows us to distinguish between urban and rural inhabitants. Throughout the analysis, paid employment (whether formal or informal), unpaid market work, and self-employment are included when we refer to "work" or "employment". Work participation rates are measured as the share of the working age population (age 15-59) indicating employment as their primary activity during the past week, reporting having a permanent job, or having performed at least one hour of work during the past week. Alternative primary activities recorded in the survey are domestic duties, study, or none. We measure participation in domestic duties by the share of the working age population who report domestic duties as their primary activity during the previous week.¹ We also compute these labour market outcomes by highest completed education (none, primary, junior secondary and senior secondary or higher) and by age groups (15-19, 20-29, 30-39, 40-59). For the analysis of marriage market outcomes, we use age group-specific marriage rates as measured by the share of those within a particular age group who report being currently married or having been married in the past.

Second, we use import tariffs on final goods taken from the UNCTAD-TRAINS to measure regional exposure to trade liberalization. We combine tariff data into regional measures of protection by weighting sectoral tariff lines by the initial labour share of the sector within a district, using data from

¹ By these definitions, participation in work and domestic duties are not mutually exclusive. For example, a person can be primarily engaged in domestic duties while also having worked one or more hours during the past week.

the population census 1990 for 21 sectors, as further discussed below. Finally, we use national input-output tables for 1990 from the Indonesian Statistical office (BPS, *Badan Pusat Statistik*) to construct so-called input tariffs, to be explained below.

3.2 Labour market outcomes and marriage rates

The stagnating pattern in labour force participation is confirmed in our data for the period 1993 to 2002, presented in Table 1. Labour force participation among women aged 15 to 59 fluctuates around 50 per cent with a slight decrease in 2002, with male labour force participation above 80 per cent. We see similar patterns for weekly work hours (where non-workers work zero hours); women work on average around 16 hours per week and men about twice as much. Just over a quarter of women work more than 30 hours per week, with men between 58 and 63 per cent (these are unconditional shares, indicating that about half of all *working* women and three quarters of all *working* men work at least 30 hours weekly). The share of women indicating they engage primarily in domestic duties has increased slightly over the analysed timespan from 49 to 52 per cent, while for men this share is negligible throughout the period.

We see the increasing trend in the age of first marriage also reflected in our data set in terms of male and female marriage rates in different age groups (Table 1). The decline in marriage rates is especially prominent for men and women aged 20 to 39. In 1993, 46 per cent of men and 71 per cent of women in the ages 20-29 reported to have been married at least once. For the 30-39 age group male and female marriage rates are on par, around 95 per cent, suggesting that on average men tend to marry at a later age than women. By the age of 40 the marriage rates are close to 100 per cent. Over the following 10 years, marriage rates dropped for both men and women younger than 40, suggesting that younger cohorts delayed marriage.

3.3 Measuring trade liberalization

To assess the causal effects of trade liberalization we need to associate import tariff reductions, which are set at national level and vary over time and across products, with work and marriage outcomes that vary over time and across individuals. We do this by taking the analysis to the district level and relating the districts' exposure to changes in import tariffs with district level changes in labour market outcomes and marriage rates. This approach takes a regional perspective, following the assumption that the main effects of trade liberalization on individuals are propagated through local labour markets (compare also Topalova (2010), Kovak (2013), Gaddis and Pieters (2016), and for Indonesia Kis-Katos and Sparrow (2011, 2015)).

The trade liberalization exposure of districts is based on the pre-liberalization sectoral structure of district employment. For example, a district in which agriculture is the dominant sector in terms of employment will be more exposed to changing import tariffs on agricultural products, as compared to a district where manufacturing is the main sector of employment. Accordingly, district level exposure to import tariffs combines information on the exogenous tariff reduction schedule and initial district labour market structure:

$$OutputTariff_{kt} = \sum_{s=1}^S \left(\frac{Q_{sk,t=0}}{Q_{k,t=0}} \times Tariff_{st} \right) \quad (1)$$

where $OutputTariff_{st}$ is the average import tariff for sector s in year t (with $t = 1993, 1996, 1999, 2002$), $Q_{sk,t=0}$ is the workforce in sector s of district k in 1990, and $Q_{k,t=0}$ is the total workforce in district k in 1990. The resulting tariff exposure measure, $OutputTariff_{kt}$, then summarizes the average import tariffs for the sectors in which a district's labour force is active, weighted by the relative size of these sectors. That is, it reflects a district's exposure to trade protection of the output markets for which local workers produce. Trade liberalization (expressed as a reduction in $OutputTariff_{kt}$) reduces prices on these output markets through increased foreign competition.

But as trade liberalization increases competition on output markets, it also reduces the costs for local firms to import intermediate inputs from abroad (and indirectly reduces prices of locally used intermediates). To capture this effect separately from the reduction in prices on output markets, we differentiate between district-level input and output tariffs, by generating a tariff variable that looks explicitly at import tariffs for the inputs that sectors use in their production process:

$$InputTariff_{kt} = \sum_{s=1}^S \left(\frac{Q_{sk,t=0}}{Q_{k,t=0}} \times \sum_{j=1}^J \left(\frac{M_{js,1990}}{M_{s,1990}} \times Tariff_{jt} \right) \right) \quad (2)$$

We use the input-output tables for information on inputs, M_{js} , that each sector s acquires from each sector j , to produce sector input shares. These are combined with the average import tariffs for sectors that provide the inputs, $Tariff_{jt}$, yielding the average import tariff on inputs used by sector s . We again weigh this by the employment share of each sector s in the district labour market to get a measure of districts' exposure to trade protection of production inputs. Input trade liberalization (expressed as a reduction in $InputTariff_{kt}$) reflects a reduction in the cost of production and improvement in the international competitiveness of a district economy.

We follow Kovak (2013) by excluding the non-tradable sector from the weights (and by that from total initial employment $Q_{k,t=0}$) when calculating output tariffs (eq. 1): the assumption behind this is that price changes in the tradable sector will pass through to the non-tradable sector. When calculating input tariff exposure, we follow Kis-Katos and Sparrow (2015) by including non-tradables and tradables in the output producing sectors (indexed by s in eq. 2), but only tradables among the input supplying sectors (indexed by j in eq. 2). This allows for incorporating the effects of tariff changes on tradable inputs used in the non-tradable sector.

As is clear from equations 1 and 2, the changes in the two tariff measures, $\Delta OutputTariff_{kt}$ and $\Delta InputTariff_{kt}$, are likely to be correlated. Yet with a residual correlation coefficient of 0.5 (once island-year effects are controlled for) this should not be problematic in our estimations. Both measures show substantial and partly different patterns of regional variation (see Figures 1 and 2).

Descriptive statistics for the main district panel variables used in the analysis are given in Table 2 (note that tariffs are measured on a scale from 0 to 100, while labour market outcomes are measured as fractions between 0 and 1).

3.4 Empirical specification

We employ a first difference specification where the change in labour market outcomes and marriage rates for district k at time t (y_{kt}) is related to the change in output and input tariff measures, controlling for island specific time fixed effects λ_{rt} :

$$\Delta y_{kt} = \alpha + \beta_1 \Delta \text{OutputTariff}_{kt} + \beta_2 \Delta \text{InputTariff}_{kt} + I'_k \theta + \Delta X'_{kt} \gamma + \lambda_{rt} + \Delta \varepsilon_{kt} \quad (3)$$

Additional control variables are included, in separate estimations, to deal with a number of potential threats to identification of the causal effect of trade liberalization. First, the identifying assumption of parallel trends would be violated if structural change and overall economic development would be correlated with districts' initial sectoral structure of employment (which accounts for the cross-sectional variation in tariff measures). For example, structural change reducing the importance of agriculture might vary by the initial size of the agricultural sector, while at the same time affecting women's participation more than men's. For this reason, we control for the 1990 district employment shares of mining, manufacturing, and services (with agriculture as the omitted sector), and the 1993 value of the dependent variable in the vector I_k .

Second, we add time varying control variables to capture changes in districts' adult literacy rates, the share of the population living in rural areas, and minimum wages.² These may constitute some of the channels through which trade liberalization affects labour market outcomes (skill-specific migration, urbanization, endogenous response of local labour market policies). Comparison of the baseline

² Indonesia imposes a minimum wage policy where minimum wage levels are determined at provincial level (we have 259 districts across 23 provinces in our sample). Alatas and Cameron (2008) study the impact of a minimum wage hike on Java and find that this had a greater impact on female wages as these tend to be lower than male wages. However, they find little evidence that the minimum wage increase affected employment. Nevertheless, we include local minimum wages as control variable.

results to the results including these control variables allows us to assess whether these channels can account for the estimated impacts of tariff reductions.

A third potentially confounding event that needs consideration is the 1997/1998 South-East Asian financial crisis, of which the relative impacts varied greatly across districts and sectors. The island specific time fixed effects (λ_{rt}), which distinguish five main geographic regions (Java/Bali, Sumatra, Sulawesi, Kalimantan, and the smaller eastern Islands), will capture part of the crisis effect. In addition, we check the robustness of our results when controlling for local price increases at the height of the crisis. We interact the post-crisis years 1999 and 2002 with province level changes to the consumer price index (CPI) for 23 provinces in 1998, with strong price increases being a key symptom of the crisis (e.g. Hardjono et al. 2010).

A final threat to the parallel trend assumption is that trade liberalization might not be exogenous to the national political context and policy influence by local industries. In this case we may expect that the cross-sectoral variation in tariff reductions is correlated with pre-existing trends. However, Kis-Katos and Sparrow (2015) argue that in the 1990s district influence or sector-based lobbying was unlikely as political power in Indonesia was heavily centralized under the Suharto regime and trade policy was mainly influenced by crony capitalists' rent seeking (Basri, 2001; Basri and Hill, 1996). This is corroborated by the data, showing that initially highly protected and relative open sectors were equally subjected to tariff cuts. Moreover, pre-1990 regional trends in poverty or in the internationalization of firms were not correlated with exposure to tariff reductions post-1990 (see Kis-Katos and Sparrow 2015).

4. Results

4.1 Trade liberalization and labour market outcomes

The results presented in Table 3 show that input tariff reductions lead to increased work participation and work hours for women. This also translates to an increased share of women who

work more than 30 hours per week (column 3) and a decreased share of women for whom domestic duties are the primary activity (column 4). The latter suggests that the employment effects indicate a real shift of women from domestic duties into market work, rather than just working marginal hours while still considering domestic duties their primary activity. We see no effects of changes in output tariffs on female labour market outcomes, which suggests that trade liberalization impacts are driven by improved firm competitiveness as a result of cheaper intermediate inputs. This is in line with Kiskatos and Sparrow (2015), who show that aggregate work participation was more responsive to import tariffs changes for intermediate inputs than for final outputs.

Overall we thus find that districts more exposed to tariff reductions experienced faster growth (or a slower decline) in female work participation as compared to districts less exposed to tariff reductions. Estimates in panel B and panel C of Table 3 additionally control for initial conditions and time-varying district characteristics. The results are very similar but effects sizes do decline when we control for initial conditions. The effects are still economically large. Using descriptive statistics in Table 2 and the estimates in panel B of Table 3, the input tariff estimate of -0.0282 for female work participation implies that a district with a one standard deviation stronger reduction in input tariffs (-2.059) experienced a 5.8 percentage point greater increase in female work participation.

For males, tariff reductions are not related to work participation at the extensive margin. At the intensive margin, we find no evidence of an effect of input tariffs on weekly work hours but do see a statistically significant increase in males working more than 30 hours. However, these effects are less pronounced compared to the effects on women. Whereas a standard deviation stronger reduction in input tariffs implies the share of females working more than 30 hours to grow by 7.5 percentage points, or almost 1.5 standard deviations, the comparable effect for males is 5.5 percentage points, or 0.8 standard deviations.

One supply side interpretation of this gender difference may be that due to the gender gap in labour force participation in Indonesia, women had a substantially larger scope for adjusting their labour

supply in response to a positive labour demand shock. This interpretation would explain why we also see an increase in the share of males working more than 30 hours, since on average only about 60 per cent of males work nearly full-time, leaving a considerable margin of adjustment towards almost full-time work form males. Nonetheless, without significant increases in weekly hours of male work, this supply side explanation is unlikely to be the only driver behind the gender difference in labour participation effects of trade liberalization.

Before investigating demand side explanations further in the next section, Table 4 outlines the estimation results for women's work outcomes by education level and age group as well. The results by education level (Panel A) show that the labour market benefits of trade liberalization accrue to women with at most junior secondary education, and not to more highly educated women. In line with increased work participation and work hours, we see a reduction in domestic duties for the less educated, while we see no effects on any of the outcome variables for women who completed senior secondary or higher education.³

The results by age group (Panel B of Table 4) show that input tariff reductions increase female work participation and hours of work in the age groups above 20 years, while they have no significant effects on women aged 15-19. The largest point estimates are observed for the age group 30-39, where a percentage point input tariff reduction is associated with a 5 percentage point increase in work participation and additional 2.5 hours of work per week. For all age groups of 20 years and older, the effect of input tariff reductions on work participation is matched by an equally sized decrease in the per cent of women reporting domestic duties to be their primary activity.⁴

Finally, our findings are robust to controlling for the South-East Asian financial crisis. Including the crisis variables to the full specification provides very similar results as in panel C of Table 3, even

³ In addition, input tariff reductions lead to a small increase in weekly work hours of men with primary education (results are reported in the supplementary appendix), while we see no effects of tariff reductions for men or with education above primary.

⁴ For men, we find that input tariff reductions increase work hours only in the age group 15-19, while work participation is not affected for any age group (results are reported in the supplementary appendix).

though we do see that the variation in crisis intensity is correlated with hours of work and domestic work.⁵

4.2 Channels

As discussed in the introduction, the differential impacts of trade liberalization on labour market outcomes of women and men could be driven by several demand side factors. First, relative demand for female workers can increase if enhanced competition leads to reductions in taste-based discrimination (Becker 1957, Black and Brainerd 2004, Hirata and Soares 2016). Since output tariff reductions mainly capture increased competition, while we find that output tariffs are not significantly related to the labour market outcomes of women, changes in discrimination are unlikely to be driving our results.

A second potential channel is related to the sectoral segregation of male and female workers. In our data, we see that the 1990 female share of workers varies widely across sectors, ranging from 8.2 per cent in the basic metal industry to 61.9 per cent in the textile and garment industry. If gender segregation across sectors is persistent, as argued by for example Borrowman and Klasen (2015) and Do et al. (2016), tariff reductions can have gender-specific impacts if they are systematically stronger (or weaker) in more female-intensive industries. As Figure 3 shows, there is indeed a strong correlation across sectors between the 1993-2002 tariff reduction on intermediate products and the initial female share of workers in a sector: tariff rates declined more in more female-intensive sectors. This pattern suggests that the effects of trade liberalization on female labour market outcomes may (partly) be explained by female-intensive sectors benefiting relatively more from input tariffs cuts and subsequent lower costs of intermediate inputs.⁶ Gaddis and Pieters (2016) put

⁵ The results are reported in the supplementary appendix.

⁶ One could worry that, given this correlation, our tariff measure picks up initial female work participation. For example, districts with a large share of total 1990 employment in the textiles sector, and hence a relatively high initial female participation rate, are more exposed to tariff reductions. Yet in all estimations reported in panel B we control for the initial value of the dependent variable. Further note that tariff reductions are not correlated with the initial share of educated workers across sectors (see Figure 3), which suggests that the variation in female intensity across sectors is not merely capturing differences in skill-intensity.

forward a similar argument to explain why trade liberalization in Brazil had a stronger negative effect on male employment than on female employment.

To assess the role of structural change and sectoral segregation, we analyse whether input tariff reductions led to a relative expansion of more female-intensive sectors, and whether it affected the sectoral segregation of male and female workers. For the former, we use the following measure of the female intensity of the local sectoral structure ($FISS$):

$$FISS_{kt} = \sum_{s=1}^S \left(\frac{Q_{skt}}{Q_{kt}} \times FI_{s,1993} \right), \quad (4)$$

where $FI_{s,1993}$ is the female share of workers in sector s in the year 1993, measured at the aggregate Indonesian level, and $\frac{Q_{skt}}{Q_{kt}}$ is the share of sector s in total employment at time t in district k . An increase in $FISS_{kt}$ indicates that the sectoral structure of employment in district k shifted towards more female-intensive sectors, keeping the female-intensity of each sector at its initial level.

For the analysis of sectoral segregation we use an index of dissimilarity (Duncan and Duncan 1955) that has been frequently used to assess occupational segregation (see Borrowman and Klasen 2016):

$$ID_{kt} = 0.5 \sum_{s=1}^S \left| \frac{M_{skt}}{M_{kt}} - \frac{F_{skt}}{F_{kt}} \right|, \quad (5)$$

where $\frac{M_{skt}}{M_{kt}}$ ($\frac{F_{skt}}{F_{kt}}$) measures the share of sector s in total male (female) employment at time t in district k . The dissimilarity index is scaled to take values from 0 to 1 and is monotonically increasing in sectoral segregation by gender. It reaches the value of 1 if sectors are perfectly segregated by gender, for instance if all females work in one sector and all males in one or more other sectors.

The precision of our $FISS_{kt}$ and ID_{kt} measures is somewhat limited by the relatively high level of aggregation of sectoral information in the yearly household surveys: we can only distinguish between 9 main sectors of economic activity (3 tradable, 6 nontradable). This means we cannot pick up employment shifts from basic metals to textiles, for example, which is an important caveat given the

pattern observed in Figure 3 (which uses employment shares based on the 1990 census that included more detailed sectoral data than the yearly household surveys).

As we have seen labour supply responses being concentrated among relatively lower skilled females while completely absent for the highest skill category, we also generate the two measures, $FISS_{kt}$ and ID_{kt} , separately for low and high skilled workers. For this distinction, we group the lower three education categories (up to junior secondary school completed) into a low skill category and contrast it with workers who have at least finished senior secondary school. We adjust the $FISS_{kt}$ measure by computing both the initial national female share in a sector, as well as the time-varying share of the same sector in the local occupation structure separately by skill level (see equation 4). In a similar vein, the segregation measure ID_{kt} is adjusted to be skill-specific by calculating male and female district employment in a sector and in total by skill level.

Our estimation results (Table 5) suggest that input tariff reductions, which increased female work participation, did not affect the female intensity of the local sectoral structure of employment overall (column 1), but did induce a weakly significant increase in local female intensity among low-skilled occupations (column 2) although not among the high skilled (column 3). At the same time, we also see a statistically significant decrease in sectoral gender segregation of local employment (column 4), which is again driven by the effects among the low skilled (column 5), and not among the high skilled (column 6).

These findings suggest that structural change towards initially female-intensive sectors has contributed to the observed female participation effects. As sectors that were originally more female intensive benefited the most from input tariff liberalization (compare figure 3), we see them expanding and hence the female sectoral intensity increasing, at least in terms of low-skilled occupation. But women also appear to be joining, at least partly, those sectors that were relatively more male-intensive, resulting in reduced segregation. This evidence thus shows that sectoral segregation of male and female workers was not immune to the labour market impacts of

Indonesia's trade liberalization. This is in contrast with the cross-country panel analysis by Borrowman and Klasen (2015), which shows that trade openness and economic development during the 1990s and 2000s did not erode sectoral segregation by gender (across 10 sectors) in developing countries.⁷ Evidently, the lack of a macro-level association does not rule out significant causal links between trade liberalization and labour market segregation of men and women in particular countries.

Besides discrimination and structural change, a third theoretical link between trade liberalization and gender-specific labour market effects is liberalization-induced technological change. If liberalization induces firms to upgrade their technologies, for example through investments in imported capital goods, and new technologies erode men's comparative advantage in physically demanding work, one may see an increase in the relative demand for female workers in blue-collar occupations (Juhn et al. 2014). Previous research on Indonesia's liberalization found that reduced tariffs on inputs increased firms' sales and profits (Amiti and Konings 2007), but no direct evidence on firms' investments in new technology is available. Yet our finding that input tariff reductions reduce sectoral segregation is in line with the technological change channel, as technology upgrading would allow women to enter production work in traditionally male-dominated sectors. Furthermore, results in columns 5 and 6 of Table 5 show that the reduction in sectoral segregation is concentrated among less educated workers, and as discussed above, the overall work participation effects are driven by less educated women (Panel A of Table 4). Since technology-induced increases in the relative demand for female workers would in theory be concentrated in blue-collar occupations, these education-specific results are also in line with technology upgrading.⁸

In all, we have presented indirect evidence in support of the role of technology upgrading, but we cannot provide more conclusive evidence on the exact channels at play, as data with sufficient detail

⁷ Borrowman and Klasen (2015) conduct cross-country fixed effects estimations, with trade openness measured as the ratio of exports to GDP, and controlling for GDP per capita and female labor force participation rates, among others.

⁸ We do not have detailed enough data on occupations to estimate the effects on blue-collar and white-collar employment.

on firm-level employment and investment is not available. We also cannot rule out that differential female labour supply response played a relevant role. Given the relatively low female labour participation rates, women are more likely to respond at the extensive margin. For men, on the other hand, room to increase labour supply lies largely at the intensive margin, which we observe in the results with statistically significant effects of input tariffs only for increasing full working weeks. In addition, the gendered effects could also be driven by an increase in wages if women have higher reservation wages than men, as previous evidence shows that input tariff reductions led to wage growth for medium-skilled workers (Kis-Katos and Sparrow 2015). Yet our results are robust to controlling for education-specific wages, suggesting that wage growth does not account for the tariff effect on female work participation.

4.3 *Effects on the marriage market*

Improved labour market opportunities for women are expected to reduce marriage rates or to induce women to postpone marriage, by reducing the returns to (early) marriage. Given our labour market results, we expect to find lower marriage rates especially for women older than 20 and younger than 40: labour market outcomes for women younger than 20 were not affected by liberalization (see section 4.1 and Table 4), while marriage rates for women older than 40 were close to 100 per cent in 1993 and unlikely to be affected in the 10-year period analysed.

The effects of tariff reductions on female and male marriage rates by age group are shown in Panel A of Table 6. For women, we see that input tariff reductions significantly decrease the marriage rate in the age group 20-29, for whom the experience of a first marriage is also most likely. For female cohorts older than 30 there is no effect on marriage rates despite the fact that we do find increased work participation and work hours for this group. This suggests that the marriage effects reflect delays in timing of marriage rather than a decline in marriage rates altogether. As with the labour market results, tariff changes do not affect marriage decisions for women younger than 20. We find

similar effects for men's marriage rates, but concentrated in the age group 30-39, reflecting typical age differences between spouses.

Our results suggest that the increased labour market opportunities caused by tariff reforms induce women and men to delay marriage. In order to assess whether increased female work participation is indeed what drives the impacts on marriage rates, panels B and C of Table 6 repeat the marriage rate estimations for females by age group, with two alternative additional control variables included in the regressions. Panel B additionally controls for the (time-varying) female work participation rate in the respective age group, while Panel C controls for the age specific share of females performing primarily domestic duties. The results show that once we control for female work participation, the effect of input tariffs on women's marriage rate in the age group 20-29 declines and is no longer significant. This is an indication that the tariff effect in Panel A runs through increased work participation, although note that work participation itself is not significantly related to marriage rates. Results in Panel C show that the effect of input tariffs is further reduced, and again insignificant in all age groups, once we control for the share of women primarily engaged in domestic duties, while domestic duties are significantly positively related to the marriage rate. Taken together, our findings suggest that labour markets are indeed a key channel through which tariff reductions contributed to an increase in marriage ages.

5. Conclusions

We exploit regional variation in exposure to import tariff reductions in Indonesia to study the causal effect of trade liberalization on gender specific labour market participation and marriage rates. Our results suggest that reductions in tariffs on inputs led to increased work participation by women, as well as increased work hours and a reduction in domestic duties. The effects are mainly concentrated among less educated women and women aged 20 and older. However, we do not find similar effects for men, other than a relatively modest increase in work hours.

Overall, our findings indicate that reduced discrimination and the larger scope for a response in labour supply among females than males are not the only channels at play. Rather, we find both signs of a structural change towards more female-intensive sectors as well as a reduction in sectoral segregation of male and female workers, which suggests that women (especially the less educated) entered traditionally more male-intensive sectors. This would be in line with a process of technological change reducing the physical strength required for production work, thereby reducing men's comparative advantage (as described by Juhn et al. 2014).

In line with earlier studies by Amiti and Konings (2007), Amiti and Cameron (2012), and Kis-Katos and Sparrow (2015), the effects of trade liberalization on female labour market participation in Indonesia are dominated by the reduction of tariffs for production inputs, which improved competitiveness of domestic firms and job opportunities in local labour markets. Increased competition from output market liberalization had little impacts in Indonesia, in contrast to experiences in India (Topalova, 2010) and Brazil (Meñezes-Filho Muendler 2011, Kovak 2013, Gaddis and Pieters 2016).

The impacts of trade liberalization reach beyond the labour market, as we find reduced marriage rates among females aged 20-29 and males aged 30-39. The increased work participation and associated reduction in women's specialization in domestic duties thus had broader social effects, in line with previous findings in Bangladesh (Heath and Mobarak 2015) and India (Jensen, 2012).

Finally, the finding that trade liberalization in Indonesia reduced sectoral segregation deviates from the macro-level associations found by Borrowman and Klasen (2015). This suggests that labour market segregation by gender may be less persistent than aggregate international trends suggest, making a case for further research on country case studies and subnational analyses.

References

- Alatas, V., & Cameron, L. (2008). The Impact of Minimum Wages on Employment in a Low-Income Country: A Quasi-Natural Experiment in Indonesia, *Industrial and Labor Relations Review*, 61(2), 201-223.
- Amiti, M. and Cameron, L. (2012). Trade liberalization and the wage skill premium: Evidence from Indonesia, *Journal of International Economics*, 87(2), 277-287.
- Amiti, M. and Konings, J. (2007). Trade liberalization, intermediate inputs and productivity: Evidence from Indonesia, *American Economic Review*, 97(5), 1611-1638.
- Basri, M.C. (2001). *The political economy of manufacturing protection in Indonesia, 1975-1995*. Canberra: Australian National University.
- Basri, M.C. and Hill, H. (1996). The political economy of manufacturing protection in LDCs: An Indonesian case study, *Oxford Development Studies*, 24(3), 241-259.
- Becker, G.S. (1957). *The Economics of Discrimination*. Chicago: University of Chicago Press.
- Becker, G.S. (1981). *A Treatise on the Family*. Cambridge, Mass.: Harvard University Press.
- Black, S.E., and Brainerd, E. (2004). Importing Equality? The Impact of Globalization on Gender Discrimination, *Industrial and Labor Relations Review*, 57(4), 540-559.
- Blau, F.D., Kahn, L.M., and Waldfogel, J. (2000). Understanding young women's marriage decisions: the role of labor and marriage market conditions, *Industrial and Labor Relations Review*, 53(4), 624-647.
- Borrowman, M., and Klasen, S. (2015). Drivers of Gendered Occupational and Sectoral Segregation in Developing Countries. Unpublished paper.
- BPS (1989). *National Indonesia Contraceptive Prevalence Survey 1987*. Jakarta: Statistics Indonesia (BPS).
- BPS (2013). *Indonesia Demographic and Health Survey 2012*. Calverton, Maryland: Statistics Indonesia (BPS) and Macro International.

- Cameron, L. A., Contreras-Suarez, D, & Pye, E. (2015). Gender Inequality in Indonesia. A Report prepared in collaboration with the Australian-Indonesian Partnership for Economic Governance and the Australian Department of Foreign Affairs and Trade. <http://users.monash.edu.au/~clisa/papers/Gender%20Inequality%20in%20Indonesia>.
- Cameron, L. A., Dowling, J. M., & Worswick, C. (2001). Education and Labor Market Participation of Women in Asia: Evidence from Five Countries, *Economic Development and Cultural Change*, 49(3), 459-477.
- Do, Q.T., Levchenko, A.A., & Raddatz, C. (2016). Comparative advantage, international trade, and fertility, *Journal of Development Economics*, 119, 48-66.
- Duncan, O.D., & Duncan, B. (1955). A methodological analysis of segregation indexes, *American Sociological Review*, 20(2), 210-217.
- Gaddis, I., and Pieters, J. (2016). The gendered labor market impacts of trade liberalization: evidence from Brazil, forthcoming in *Journal of Human Resources*.
- Galor, O., and Weil, D.N. (1996). The Gender Gap, Fertility and Growth, *American Economic Review*, 86(3), 374-387.
- Goldberg, P.K. and Pavcnik, N. (2007). Distributional effects of globalization in developing countries, *Journal of Economic Literature*, 45(1), 39-82.
- Hardjono, J., Akhmadi, N., and Sumarto, S. (2010). *Poverty and Social Protection in Indonesia*. Singapore: Institute of Southeast Asian Studies.
- Heath, R., & Mobarak, A.M. (2015). Manufacturing growth and the lives of Bangladeshi women, *Journal of Development Economics*, 115, 1-15.
- Hirata, G., and Soares, R.R. (2016). Competition and the Racial Wage Gap: Testing Becker's Model of Employer Discrimination. IZA Discussion Paper 9764.
- Jensen, R. (2012). Do Labor Market Opportunities Affect Young Women's Work and Family Decisions: Experimental Evidence from India, *Quarterly Journal of Economics*, 127(2), 753–92.

- Juhn, C., Ujhelyi, G., and Villegas-Sanchez, C. (2014). Men, women, and machines: How trade impacts gender inequality, *Journal of Development Economics*, 106, 179-193.
- Kis-Katos, K. and Sparrow, R. (2011). Child labor and trade liberalization in Indonesia, *Journal of Human Resources*, 46(4), 722-749.
- Kis-Katos, K. and Sparrow, R. (2015). Poverty, labor markets and trade liberalization in Indonesia, *Journal of Development Economics*, 117, 94–106.
- Kovak, B.K. (2013). Regional effects of trade reform: What is the correct measure of liberalization? *American Economic Review*, 103(5), 1960-1976.
- Meñezes-Filho, N.A., and Muendler, M.A. (2011). Labor Reallocation in Response to Trade Reform. NBER Working Paper 17372, National Bureau of Economic Research.
- Priebe, J. (2010). Child Costs and the Causal Effect of Fertility on Female Labor Supply: An Investigation for Indonesia 1993–2008. Courant Research Centre – Poverty, Equity and Growth Discussion Papers 45. <http://www.uni-goettingen.de/en/67061.html>
- Sauré, P., and Zoabi, H. (2014). International Trade, the Gender Wage Gap and Female Labor Force Participation, *Journal of Development Economics*, 111, 17-33.
- Shaner, S., & Das, S. (2016). Female Labor Force Participation in Asia: Indonesia Country Study. Economics Working Paper 474, Asian Development Bank.
- Topalova, P. (2010), Factor immobility and regional impacts of trade liberalization: Evidence on Poverty from India, *American Economic Journal: Applied Economics*, 2(4), 1-41.
- Wacziarg, R., and Wallack, J. (2004). Trade liberalization and intersectoral labor movements, *Journal of International Economics*, 64(2), 411-439.
- WTO (1998). *Trade Policy Review Indonesia*. World Trade Organization, Geneva.

Tables

Table 1: Labour market and marital outcomes for men and women age 15-59

Panel A	Labour market outcomes by gender			
	1993	1996	1999	2002
Work participation				
Male	0.836	0.814	0.799	0.805
Female	0.504	0.457	0.469	0.439
Weekly work hours				
Male	34.03	33.05	32.29	33.61
Female	16.51	15.30	15.91	15.81
Share working > 30 hours				
Male	0.630	0.613	0.593	0.635
Female	0.257	0.240	0.249	0.262
Share primarily in domestic duties				
Male	0.007	0.008	0.014	0.013
Female	0.497	0.512	0.531	0.528
Panel B	Marriage rates by gender and age group			
	1993	1996	1999	2002
Age 15-19				
Male	0.016	0.015	0.009	0.015
Female	0.130	0.124	0.108	0.104
Age 20-29				
Male	0.458	0.450	0.402	0.411
Female	0.730	0.710	0.678	0.683
Age 30-39				
Male	0.945	0.936	0.914	0.920
Female	0.967	0.960	0.950	0.953
Age 40-59				
Male	0.990	0.988	0.988	0.988
Female	0.987	0.985	0.984	0.985

Note: Yearly averages are calculated for the whole country (based on Susenas), using sampling weights.

Table 2: Descriptive statistics for sample districts

	Mean	Median	St. dev.	P75-P25
Δ Output tariffs	-4.408	-5.235	2.069	3.879
Δ Input tariffs	-3.319	-3.712	2.059	4.668
Δ Female work participation	-0.021	-0.019	0.066	0.080
Δ Male work participation	-0.008	-0.009	0.032	0.039
Δ Weekly work hours females	-0.250	-0.132	2.412	2.975
Δ Weekly work hours males	-0.151	-0.283	2.625	3.340
Δ Share females working >30 hours	0.001	0.002	0.051	0.058
Δ Share males working >30 hours	0.000	-0.002	0.067	0.081
Δ Share females primarily doing domestic duties	0.012	0.013	0.058	0.070
Δ Share males primarily doing domestic duties	0.002	0.001	0.011	0.009
Δ Share of ever married females	0.001	0.000	0.030	0.038
Δ Share of ever married males	0.002	0.002	0.032	0.043
Δ Female work participation by education				
None	-0.011	-0.010	0.092	0.109
Primary	-0.014	-0.014	0.082	0.111
Junior secondary	-0.005	-0.003	0.082	0.101
Senior sec. or higher	-0.025	-0.025	0.087	0.114
Δ Female work participation by age group				
15-19 year old	-0.040	-0.037	0.082	0.101
20-29 year old	-0.024	-0.024	0.076	0.094
30-39 year old	-0.024	-0.026	0.085	0.109
40-59 year old	-0.013	-0.013	0.083	0.109
Δ Female intensity of sectoral structure by skill				
All workers	-0.001	-0.001	0.010	0.012
Low skill workers	-0.002	-0.002	0.012	0.012
High skill workers	-0.004	-0.004	0.008	0.009
Δ Sectoral gender segregation				
All workers	0.005	0.006	0.058	0.065
Low skill workers	0.008	0.008	0.062	0.074
High skill workers	0.007	0.007	0.094	0.111

Note: All variables are based on district averages included in the analysis, with N=777.

Table 3: Labour market outcomes for females and males ages 15-59

Panel A				
First difference specifications including island-year effects				
	Work participation	Weekly work hours	Work > 30 hours	Primarily domestic duties
Females				
Output tariffs	-0.0027 (0.0043)	0.0326 (0.1548)	0.0014 (0.0031)	0.0018 (0.0027)
Input tariffs	-0.0425** (0.0126)	-1.6074** (0.4970)	-0.0364** (0.0109)	0.0273** (0.0094)
Males				
Output tariffs	-0.0013 (0.0031)	-0.0108 (0.1882)	-0.0005 (0.0027)	0.0013* (0.0004)
Input tariffs	-0.0068 (0.0084)	-0.8936 (0.5455)	-0.0267** (0.0102)	-0.0024 (0.0016)
Panel B				
Specifications as in panel A, additionally controlling for initial conditions				
	Work participation	Weekly work hours	Work > 30 hours	Primarily domestic duties
Females				
Output tariffs	-0.0020 (0.0043)	0.0266 (0.1570)	0.0010 (0.0031)	0.0024 (0.0031)
Input tariffs	-0.0282* (0.0141)	-1.2755* (0.5777)	-0.0325* (0.0127)	0.0234* (0.0105)
Males				
Output tariffs	-0.0009 (0.0028)	-0.0381 (0.1928)	-0.0009 (0.0031)	0.0010+ (0.0005)
Input tariffs	0.0037 (0.0080)	-0.6363 (0.5547)	-0.0241* (0.0111)	-0.0015 (0.0018)
Panel C				
Specifications as in panel B, adding time variant controls				
	Work participation	Weekly work hours	Work > 30 hours	Primarily domestic duties
Females				
Output tariffs	-0.0033 (0.0044)	0.0278 (0.1597)	0.0016 (0.0032)	0.0009 (0.0030)
Input tariffs	-0.0235+ (0.0142)	-1.2961* (0.5873)	-0.0349** (0.0130)	0.0294** (0.0107)
Males				
Output tariffs	-0.0024 (0.0023)	-0.1066 (0.1728)	-0.0023 (0.0029)	0.0012* (0.0005)
Input tariffs	0.0097 (0.0063)	-0.4033 (0.4907)	-0.0192+ (0.0104)	-0.0019 (0.0017)

Note: Specifications in panel A control for island-year fixed effects. Specifications in panel B additionally control for the 1993 level of the dependent variable and the 1990 employment shares of mining, manufacturing and the services sector. Panel C additionally controls for changes in the rural share of districts' population, literacy rates at age 15-59, and minimum wages. Standard errors, clustered at the district level, are reported in parentheses. **, *, and † denote statistical significance at the 1, 5, and 10% levels. N=777.

Table 4: Labour market outcomes for females by education level and age group

Panel A	Female labour market outcomes by education level			
	None	Primary	Junior sec.	Senior sec. or higher
Work participation				
Output tariffs	-0.0017 (0.0057)	0.0011 (0.0048)	0.0038 (0.0049)	-0.0015 (0.0059)
Input tariffs	-0.0389+ (0.0205)	-0.0500** (0.0153)	-0.0401** (0.0150)	0.0190 (0.0190)
Weekly work hours				
Output tariffs	0.1091 (0.1967)	0.3652+ (0.1922)	0.2492 (0.1870)	-0.0621 (0.2310)
Input tariffs	-2.0315** (0.7421)	-2.4415** (0.7291)	-1.4825* (0.7137)	0.7173 (0.7737)
Work > 30 hours				
Output tariffs	0.0036 (0.0042)	0.0050 (0.0035)	0.0051 (0.0034)	0.0009 (0.0051)
Input tariffs	-0.0555** (0.0157)	-0.0490** (0.0137)	-0.0346** (0.0131)	0.0068 (0.0174)
Primarily domestic duties				
Output tariffs	-0.0016 (0.0051)	0.0015 (0.0044)	-0.0017 (0.0049)	-0.0026 (0.0049)
Input tariffs	0.0363* (0.0163)	0.0251+ (0.0147)	0.0469** (0.0153)	0.0170 (0.0165)
Panel B	Female labour market outcomes by age group			
	15-19	20-29	30-39	40-59
Work participation				
Output tariffs	-0.0035 (0.0047)	-0.0026 (0.0049)	-0.0009 (0.0052)	-0.0058 (0.0057)
Input tariffs	0.0028 (0.0197)	-0.0367* (0.0153)	-0.0496** (0.0163)	-0.0250 (0.0158)
Weekly work hours				
Output tariffs	0.0210 (0.2007)	0.0522 (0.2029)	0.0667 (0.1888)	0.0320 (0.2279)
Input tariffs	0.3829 (0.8503)	-1.7788** (0.6615)	-2.4519** (0.6835)	-1.7126** (0.6268)
Work > 30 hours				
Output tariffs	0.0001 (0.0041)	0.0011 (0.0039)	0.0032 (0.0039)	0.0037 (0.0047)
Input tariffs	-0.0009 (0.0171)	-0.0408** (0.0134)	-0.0581** (0.0151)	-0.0478** (0.0153)
Primarily domestic duties				
Output tariffs	0.0028 (0.0049)	-0.0008 (0.0039)	-0.0003 (0.0044)	-0.0021 (0.0043)
Input tariffs	0.0011 (0.0121)	0.0356** (0.0130)	0.0461** (0.0152)	0.0332* (0.0154)

Note: Education levels refer to the highest level completed. Specifications include the full set of controls as in panel C of table 3. Standard errors, clustered at the district level, are reported in parentheses. **, *, and † denote statistical significance at the 1, 5, and 10% levels. N=777.

Table 5: Female intensity of sectoral structure and sectoral gender segregation of work

Dependent By skill level	Female intensity of sectoral structure			Sectoral segregation index		
	All	Low skill	High skill	All	Low skill	High skill
Output tariffs	-0.0005 (0.0007)	-0.0011 (0.0013)	-0.0000 (0.0004)	-0.0003 (0.0034)	-0.0002 (0.0037)	0.0017 (0.0054)
Input tariffs	-0.0022 (0.0025)	-0.0063+ (0.0036)	-0.0001 (0.0014)	0.0272* (0.0117)	0.0319** (0.0121)	0.0056 (0.0210)

Note: Specifications include the full set of controls as in panel C of table 3. The female intensity of sectoral structure is defined in equation 4, the sectoral segregation index in equation 5. Low skill labor includes workers with at most junior secondary education completed, high skill labor includes workers with at least a completed senior secondary education. Standard errors, clustered at the district level, are reported in parentheses. **, *, and † denote statistical significance at the 1, 5, and 10% levels. N=777.

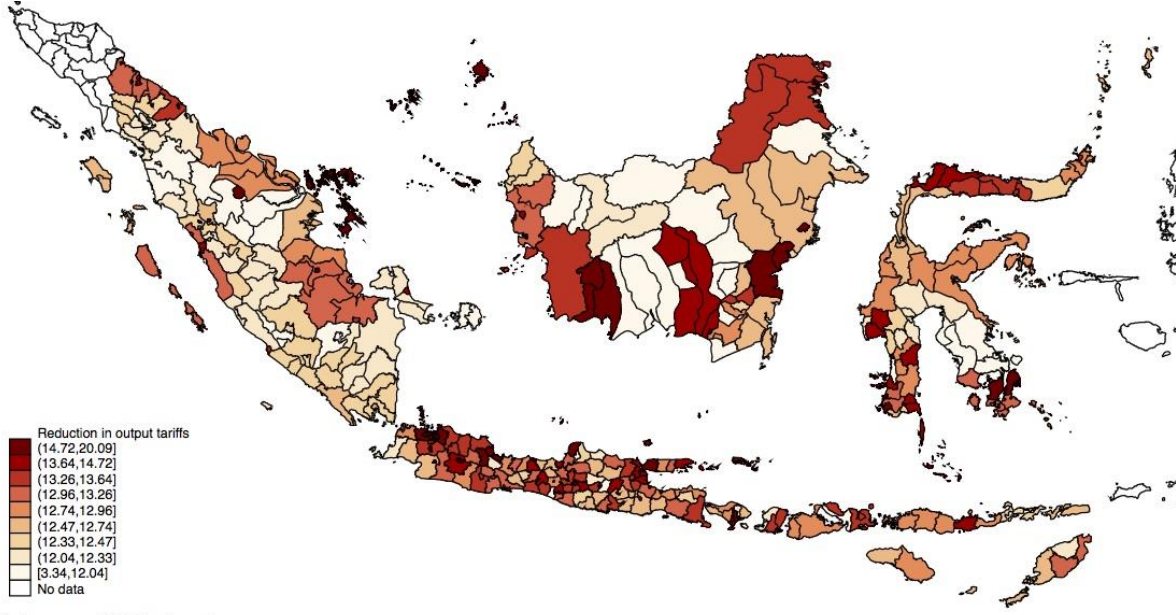
Table 6: Marriage rates for females and males by age group

Panel A	By age group			
	15-19	20-29	30-39	40-59
Females				
Output tariffs	0.0000 (0.0026)	-0.0054+ (0.0029)	-0.0008 (0.0017)	-0.0007 (0.0011)
Input tariffs	0.0037 (0.0082)	0.0219* (0.0105)	-0.0008 (0.0058)	0.0036 (0.0034)
Males				
Output tariffs	0.0001 (0.0009)	-0.0047 (0.0042)	-0.0071 (0.0023)	-0.0008 (0.0008)
Input tariffs	0.0010 (0.0032)	0.0140 (0.0130)	0.0221** (0.0080)	0.0028 (0.0027)
Panel B	By age group			
	15-19	20-29	30-39	40-59
Females				
Output tariffs	-0.0015 (0.0034)	-0.0104+ (0.0046)	-0.0005 (0.0020)	-0.0019 (0.0012)
Input tariffs	-0.0005 (0.0114)	0.0150 (0.0161)	-0.0006 (0.0079)	0.0053 (0.0044)
Work participation	-0.0217 (0.0228)	-0.0039 (0.0308)	-0.0016 (0.0121)	0.0009 (0.0075)
Panel C	By age group			
	15-19	20-29	30-39	40-59
Females				
Output tariffs	-0.0012 (0.0032)	-0.0072+ (0.0040)	-0.0001 (0.0020)	-0.0018 (0.0012)
Input tariffs	-0.0061 (0.0097)	0.0035 (0.0138)	-0.0024 (0.0078)	0.0049 (0.0044)
Primarily domestic duties	0.2638** (0.0261)	0.2775** (0.0293)	0.0327** (0.0111)	0.0064 (0.0065)

Note: Specifications include the full set of controls as in panel C of table 3. Standard errors, clustered at the district level, are reported in parentheses. **, *, and † denote statistical significance at the 1, 5, and 10% levels. N=777.

Figures

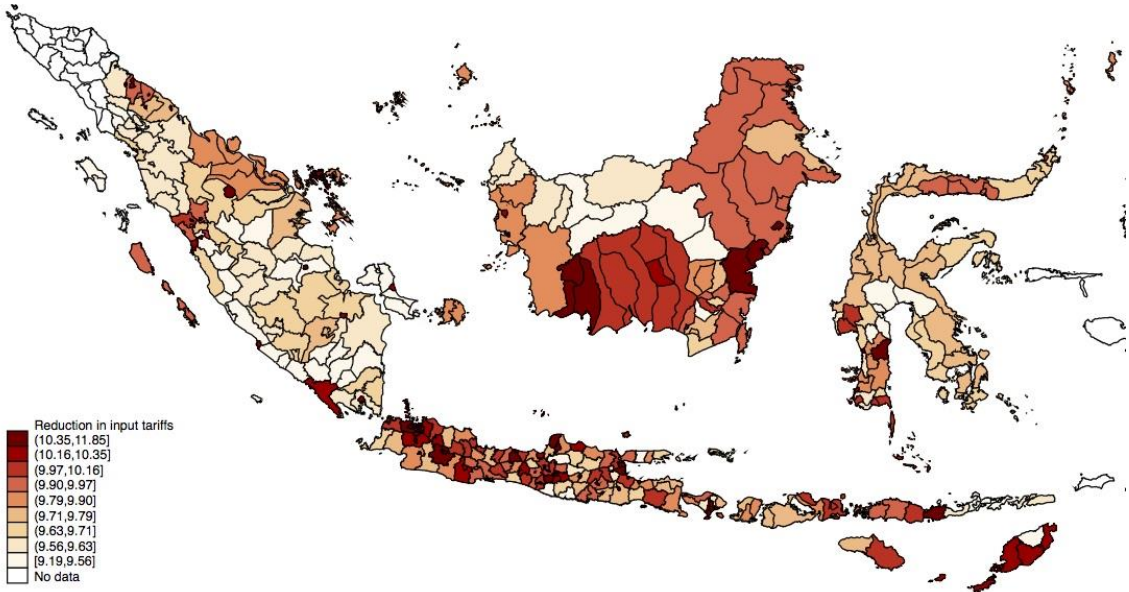
Figure 1: Average 3-year reduction in output tariffs



Data source: BPS Indonesia

Note: This map shows the five main island groups included in the analysis. Changes are the district averages across the periods 1993-1996, 1996-1999, and 1999-2002.

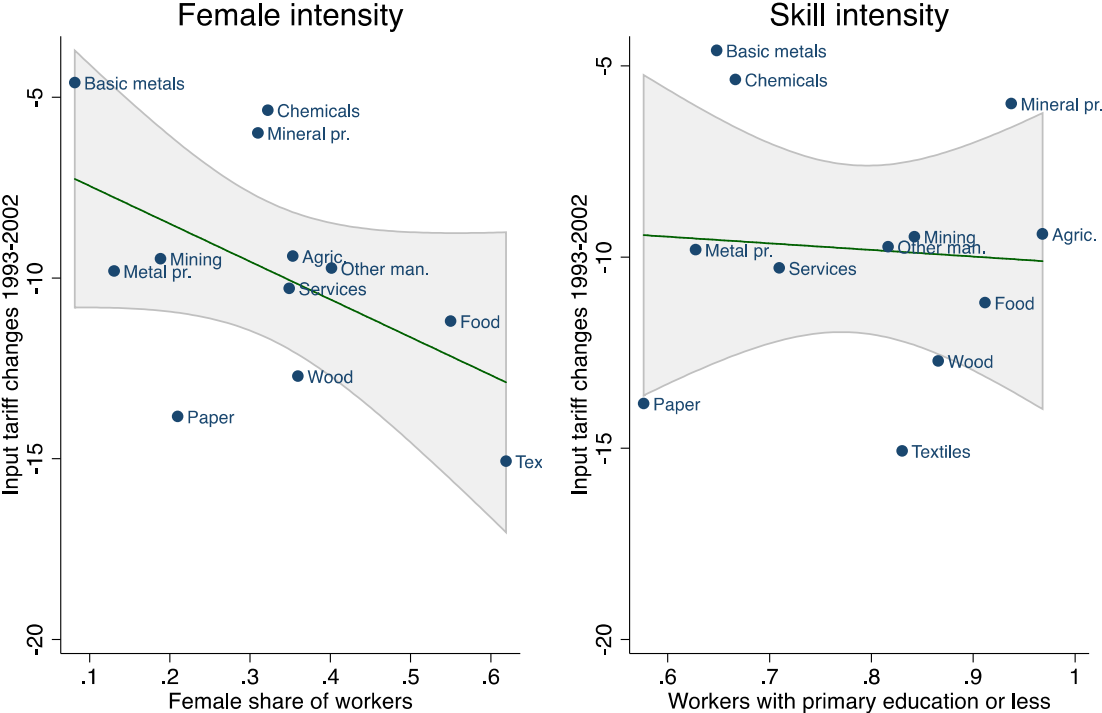
Figure 2: Average 3-year reduction in input tariffs



Data source: BPS Indonesia

Note: This map shows the five main island groups included in the analysis. Changes are the district averages across the periods 1993-1996, 1996-1999, and 1999-2002.

Figure 3: Correlation of 1993-2002 changes in input tariffs with initial female intensity and skill intensity per sector



Supplementary appendix

Table S1: Labour market outcomes for males by education level and age group

Panel A	Male labour market outcomes by education level			
	None	Primary	Junior sec.	Senior sec. or higher
<hr/>				
Work participation				
Output tariffs	-0.0065* (0.0030)	0.0049 (0.0033)	-0.0047 (0.0039)	-0.0027 (0.0034)
Input tariffs	0.0056 (0.0103)	-0.0059 (0.0102)	0.0168 (0.0129)	0.0131 (0.0092)
Weekly work hours				
Output tariffs	-0.6960* (0.3061)	0.3337+ (0.1851)	-0.1215 (0.2471)	-0.2026 (0.2332)
Input tariffs	0.1034 (0.9648)	-1.2512+ (0.6910)	-0.1666 (0.7380)	0.1006 (0.6241)
Work > 30 hours				
Output tariffs	-0.0106+ (0.0057)	0.0052 (0.0042)	-0.0026 (0.0044)	-0.0036 (0.0039)
Input tariffs	-0.0181 (0.0190)	-0.0348* (0.0143)	-0.0097 (0.0152)	-0.0031 (0.0118)
<hr/>				
Panel B	Male labour market outcomes by age group			
	15-19	20-29	30-39	40-59
<hr/>				
Work participation				
Output tariffs	-0.0016 (0.0049)	-0.0046 (0.0042)	0.0004 (0.0018)	0.0000 (0.0021)
Input tariffs	-0.0117 (0.0162)	0.0143 (0.0130)	0.0050 (0.0056)	-0.0008 (0.0061)
Weekly work hours				
Output tariffs	0.1001 (0.1968)	0.0249 (0.2811)	-0.1311 (0.2242)	-0.2478 (0.1928)
Input tariffs	-1.5554** (0.5252)	-0.3686 (0.8993)	-0.4637 (0.5802)	-0.7682 (0.5601)
Work > 30 hours				
Output tariffs	0.0017 (0.0036)	-0.0000 (0.0054)	-0.0029 (0.0036)	-0.0037 (0.0034)
Input tariffs	-0.0384** (0.0111)	-0.0218 (0.0176)	-0.0134 (0.0130)	-0.0317* (0.0129)

Note: Each block of the table reports separate input and output tariff coefficients, generated by first difference estimates of indicated dependent variables and age groups on tariffs and further controls. Specifications include the full set of controls as in panel C of table 3. Standard errors, clustered at the district level, are reported in parentheses. **, *, and † denote statistical significance at the 1, 5, and 10% levels. N=777.

Table S2: Robustness check - controlling for crisis effects

	Labour market outcomes for females and males			
	Work participation	Weekly work hours	Work > 30 hours	Primarily domestic duties
Females				
Output tariffs	-0.0036 (0.0043)	0.0539 (0.1633)	0.0023 (0.0033)	0.0007 (0.0031)
Input tariffs	-0.0250+ (0.0147)	-1.4232* (0.6139)	-0.0384** (0.0136)	0.0302** (0.0111)
Province CPI * '99	-0.0479 (0.0687)	6.8247* (2.7126)	0.1289* (0.0594)	-0.2025* (0.0791)
Province CPI * '00	-0.0266 (0.0821)	2.8977 (3.1484)	-0.0906 (0.0718)	0.0412 (0.0621)
Males				
Output tariffs	-0.0021 (0.0023)	-0.0939 (0.1718)	-0.0022 (0.0029)	0.0011* (0.0005)
Input tariffs	0.0085 (0.0064)	-0.5423 (0.4904)	-0.0221* (0.0104)	-0.0020 (0.0017)
Province CPI * '99	0.0193 (0.0344)	8.3415** (2.7577)	0.2293 (0.0732)	0.0104 (0.0150)
Province CPI * '00	0.0328 (0.0359)	3.6376 (2.6746)	0.0617 (0.0717)	0.0003 (0.0167)

Note: Specifications include the full set of controls as in panel C of Table 3. Standard errors, clustered at the district level, are reported in parentheses. **, *, and † denote statistical significance at the 1, 5, and 10% levels. N=777.