The Effect of Trade Liberalization on Fertility in Indonesia*

Ridhika Agrawal†
May 2020

Abstract: This paper examines the impact of the ASEAN Free Trade Agreement on Indonesia's fertility rates. It also explores the channels through which trade and fertility are linked. The employment channel finds that a trade-induced increase in women's labor force participation increases opportunity cost of having children. The income channel is based on a positive association between availability of resources and producing children. This paper uses an OLS and a gradual Difference-in-Differences model to conclude that trade liberalization has a negative effect on fertility rates in Indonesia. The theoretical mechanism was ambiguous, although the employment channel is promising.

JEL E24 F16 J21 O19 O53

I. Introduction

The 20th century saw an increase in globalization with increased world trade liberalization based on the notion that a reduction in tariff-barriers, will lead to economic growth. The World Bank's Global Economic Prospect's, stated that a reduction in trade barriers around the world, could accelerate growth, lead to job creations and reduce poverty (The World Bank 2002, xi). However, there is ambiguity surrounding the positive impacts of trade liberalization, especially on developing countries like Indonesia. Developing countries might face a "liberalization licensing fees", costs associated with increased reserve holdings to maintain currency stability (Weisbrot and Baker 2003) and costs to laborers in less-protected industries in the form of reduced employment opportunities and wages. Thus, losses might exceed the gains from trade liberalization for developing countries. Tapping in on these ambiguities, my paper aims to understand whether trade liberalization has an impact on women's labor market decisions in the form of fertility rates.

Changes in fertility rates has effects on population rates and on labor market structures, thus making it important to understand what the determinants of fertility are, and the direction and intensity with which they affect fertility. Fertility rates effect the environment in terms of resources (Population Media Center 2020) and have been found to be positively correlated with female participation in labor force (Adserá 2003) which has an effect on the overall economy. Thus, policy-level determinants like changes in tariffs is one of the determinants of fertility and women's decisions.

Trade and fertility are often discussed as separate concepts. However, recent studies have shown that fertility rates are impacted by changes in trade in developed and developing countries, thus relating trade and population development (Gries and Grundmann 2012). In order to measure the impact of trade liberalization on women's fertility, I make use of a moderately exogenous shock offered by of AFTA (ASEAN Free Trade Agreement), a trade agreement between Association of South-East Asian Nations to reduce tariff rates. I measure the impact of AFTA on Indonesia's fertility rates. In compliance with AFTA, Indonesia reduced its tariff rates on goods produced locally, to below 5%. I exploit the industry-level heterogeneity to run an ordinary least

2

squares regression (Anukriti and Kumler 2012) as well as a yearly differences-in-differences empirical methodology to answer the question of interest (Pierce and Schott 2020).

There are two main theoretical mechanism through which trade liberalization has an impact on fertility rates: employment and standard of living. A change in tariff rates has an impact on the demand for women in the labor force through a structural readjustment. If there is an increase in the type of jobs that require women, it leads to an increase in employment opportunities for women. In turn, to increase income and minimize unemployment risk, women postpone having children, have fewer children, resulting in reduced fertility rates (Adserá 2003). This trend is confirmed by the fact that countries which have comparative advantage in female-labor intensive products have lower fertility (Do, Levchenko and Raddatz 2015). The other channel through which fertility is impacted is through income, i.e. standard of living. Theory suggests that population growth is usually limited by resources. The level of the standard of living determines the relationship between fertility and standard of living (Woods 1983, 21). After a certain point of standard of living, the relationship between quality of life and fertility switches from negative (for lower qualities of life), to positive (for higher quality of life) (Harttgen and Vollmer 2014). In Indonesia, if an increase in trade liberalization does have the effect of reducing poverty, it would be followed by an increase in fertility rates. This paper finds that an increase in trade liberalization leads to a reduction in fertility rates. I hypothesize that this is either through the employment or income mechanism. The paper does not find significant results regarding the channel through which fertility is being affected.

Thus, this paper adds to the literature on the ambiguity of relaxing tariff rates on developing countries like Indonesia. This paper focuses on fertility and attempts to understand the underlying mechanism of the effect of changes in trade, providing for a unique outcome and analysis. Further, although the economic impacts of AFTA has been explored, the impact of AFTA on fertility rates in particular have not been studied. Thus, through this paper I hope to add to the body of literature on the effects of AFTA.

The paper is organized in the following manner. Section II summarizes the history of ASEAN and AFTA. Section III describes the data and has some summary statistics. Section IV

lays out the identification strategy and section V outlines the results. Finally, the paper concludes with section VI, which summarizes the results, identifies the implications of the results and some limitations of the paper.

II. ASEAN Free Trade Agreement (AFTA)

The Association of South-East Asian Nations (ASEAN) was established in 1967 in order to prevent the spread of communism across Southeast Asia. It first consisted of 5 members: Indonesia, Malaysia, Philippines, Singapore and Thailand, who met for their first summit in Bali, Indonesia. Initially, there was not much economic cooperation, however in in the 1977 summit, the Preferential Trading Arrangements and the ASEAN Industrial Projects were adopted by the member nations. However, they were not very effective. When the oil crisis hit in 1979, as world economies were slowing down, ASEAN decided to strengthen its economic integration. An ASEAN Task Force was devised in 1987, who worked for 6 months to come up with the ASEAN Free Trade Agreement. This agreement was first proposed in 1987 in Manila. However, the People Power Revolution in the Philippines in 1986 cut the meeting short. There was much stand still between then and 1991. At the time, ASEAN was in the process of liberalizing trade under the Common Effective Preferential Tariff (CEPT). The summit of 1991 saw the discussion of AFTA, where everyone except Indonesia agreed. After much persuasion, in January 1992 AFTA was signed by its 6 members (including Brunei). Eventually, Laos, Vietnam, Myanmar and Cambodia joined ASEAN and singed the AFTA (Akrasanee 2017).

Under the AFTA, all member nations had to reduce their tariff rates to be between 0-5% in 10 years (it was initially proposed as 15). The countries joining later had a longer period within which to achieve this goal. Initially, only 15 products were on the list to be fast tracked to a reduced tariff, then it was broadened to include unprocessed agricultural goods, and finally, basically all goods were included in the scheme. Only some products that were exempt from the Scheme included on the Highly Sensitive List (for example, rice) and the General Exception List (ASEAN 2020). A temporary exemption list was created, which was phased out by 2003, the hope was to keep the exclusion list to a minimum. At the 1995 ASEAN summit, Indonesia reintroduced 15 agricultural products to its sensitive list that had earlier been in the temporary exclusion list. Some of these products included rice, sugar, wheat flour and soybeans. Indonesia also created a 'very

sensitive list' to which it added rice and sugar. Indonesia and Philippines demanded that the liberalization of these products be extended another 10 years from the initial 2010 deadline. However, by the end they agreed to started liberalization in 2003, ending in 2010 with flexibility for Indonesia and Philippines. For example, Indonesia was allowed to keep import tariffs on rice and sugar above 5% after 2010 (Feridhanusetyawan and Pangestu 2000, 8-11).

AFTA has had many socio-economic effects. Okabe and Urata (2013) found that AFTA created a positive demand for trade (Okabe and Urata 2013). Elliott and Ikemoto (2004) found that ASEAN countries' stance towards outward-oriented economic activity was stimulated by AFTA (Elliott and Ikemoto 2004). More specifically for Indonesia, as a result of AFTA, it is believed that Indonesia's environmental conditions will deteriorate greatly (Gumilang, Mukhopadhyay and Thomassin 2010). Calculating the welfare gains, it is not expected that the acceptance of AFTA will add much welfare to Indonesia (Feridhanusetyawan and Pangestu 2003). Further, since Indonesia has a minimum competitive advantage compared to other ASEAN countries, AFTA will not have a great impact on Indonesia's development (Kaihatu 2003). Thus, the impact of AFTA on Indonesia has been explored on various development indicators, however not on fertility. Hence, I aim to add to the literature on the impact of AFTA on Indonesia's fertility rates.

III. Data

The data is from surveys conducted by Demographic and Health Surveys (DHS) in Indonesia across 1991, 1994, 1997, 2002, 2007, 2012 and 2017. It measures the demographic characteristics and outcomes of an individual female in a household in a province in Indonesia, making the data a repeated cross-section. There are 33 provinces covered in the survey: Aceh, North Sumatera, West Sumatera, Riau, Jambi, South Sumatera, Bengkulu, Lampung, Bangka Belitung, Riau Islands, Jakarta, West Java, Central Java, Yogyakarta, East Java, Banten, Bali, West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan, North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, Maluku, North Maluku, West Papua and Papua. Table 1 below summarizes some of the relevant variables with respect to each individual female.

Table 1. Summary Statistics

|	Count	Mean	Standard Deviation	Minimum	Maximum
Is Residence Rural	220040	0.58	0.49	0	1
Age	220040	32.41	9.16	15	49
Number of Household Members	220040	5.13	2.19	1	31
Total Children Ever Born	220040	2.44	2.08	0	17
Highest Education Level	220040	1.52	0.78	0	3
Household Has Electricity	219933	0.80	0.39	0	1
Working/ Not	220040	0.59	0.49	0	1
Observations	220040				

Note: Is Residence Rural is 1 when rural, 0 when urban. Number of Household Members is total number of registered members. Highest Education ranges from 0-3 from lowest to highest education level. Household Has Electricity is 1 when it does, 0 otherwise.

Figure 1 shows that fertility rates in Indonesia were falling, although not at consistent rates, i.e. the rate of decline increased around 2007. Figure 2 shows that Women's employment rate was decreasing steeply, however started increasing in 1997. Next, whether a household has electricity or not is used as a proxy for standard of living. Figure 3 shows an increase in the percentage of household with electricity across time. Thus, figures 2 and 3 highlight the trends across the two perspective theoretical mechanisms.

Figure 1. Fertility in Indonesia Rate

Figure 2. Women's Employment Rate in Indonesia

Figure 3. Rate of Households with Electricity in Indonesia
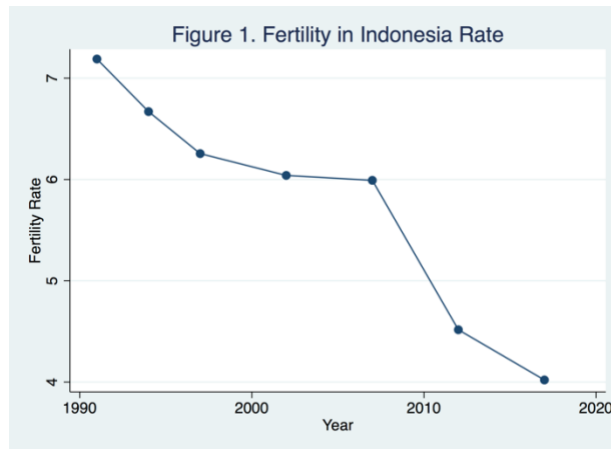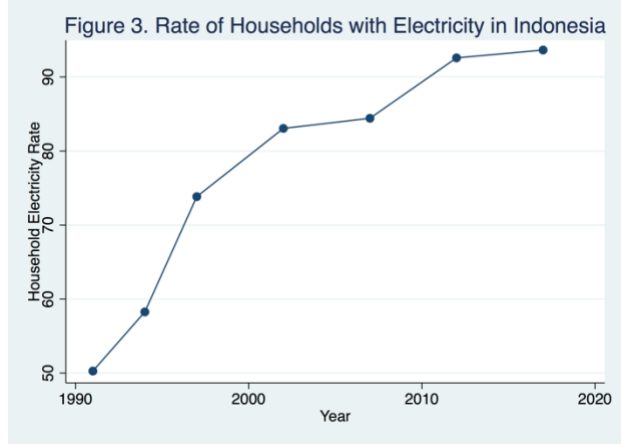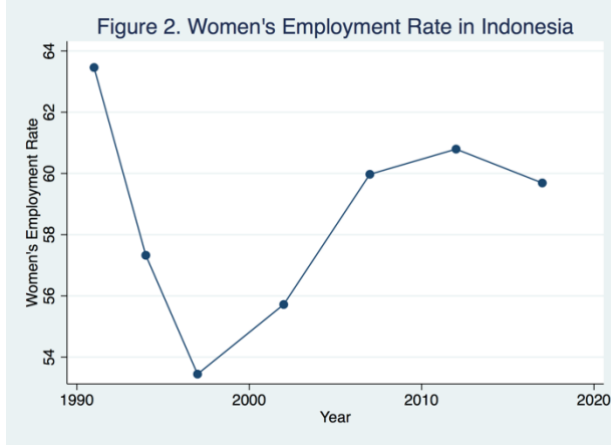
In order to measure the differential impact of the trade liberalization on different provinces, I created a province-by-time level exposure variable, $tariff_{pt}$. This made use of the difference in employment composition by industries across different provinces interacted with the cross-industry heterogeneity in tariff rates as can be seen by Figure 3. The employment composition data was obtained from Statistics Indonesia and the tariff data from World Integrated Trade Solutions.

Figure 4. Tariff Rates by Industry Across Time
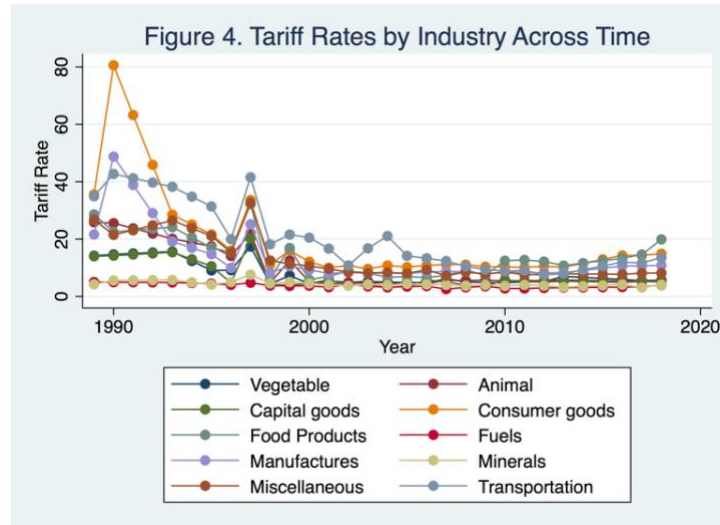
The exposure to tariffs was defined as the follows:

$$tariff_{pt} = \sum employment\_composition_{jp} \times tariff_{jt} \qquad (1)$$

Where, $tariff_{jt}$ is the tariff experienced at that year, t in industry, j. $employment\_composition_{jp}$ is the percentage of population of province, p working in industry,

7

j. Thus, $tariff_{pt}$ is the average tariff experience by province, *p* working at year, *t*. I matched the tariff rate of a product with an industry, by comparing the Harmonized Commodity Description and Coding System (HS codes) from the World Integrated Trade Solutions and European Custom Portal as can be seen in Table 2 below. The industries which are not traded were matched with a 100% tariff rate.

Next, I subtracted the created variable from 1, to create $liberalization_{pt}$, in order to switch the meaning of the direction of the tariff rates. Thus, $liberalization_{pt}$ measures how liberalized a province, *p* is at year, *t*.

Table 2. Industry Matched with Tariff Rate of Traded Product

Employment Composition Industry	Tariff Rate of Product
Growing of horticulture plants	Vegetable
Growing of rice, roots and tubers	Vegetable
Agriculture, estate or plantation	Vegetable
Fishing and aquaculture	Animal
Animal production	Animal
Other agricultural activities	Food products
Mining and quarrying	Minerals
Manufacturing	Manufactures
Electricity and gas	Fuels
Wholesale and retail trade	Capital goods
Transportation and storage	Transportation
Construction	(untraded)
Hotel and Restaurant	(untraded)
Information and Communication	(untraded)
Financial and Insurance	(untraded)
Education services	(untraded)
Human health	(untraded)
Public Services and Personal Services	(untraded)
Others (real estate, water supply)	Miscellaneous

Source: World Integrated Solutions and European Custom Portal

IV. Empirical Strategy

A. Ordinary Least Squares

In order to understand the relationship between removal of tariff barriers and fertility rates, I run an ordinary lest squares (OLS) regression, with province and time fixed effects, and standard errors clustered at the province level. In order to measure fertility rate at an individual level, I use the dummy which measures whether a female is pregnant or not. The fixed effects make sure to exclude time and province invariant differences. The clustered standard error adjusts for correlation across provinces. The OLS had the following specification:

$$pregnant_{ipt} = \beta_0 + \beta_1 liberalization_{pt} + \beta_2 X_{ipt} + \gamma_p + \delta_t + \varepsilon_{ipt} \qquad (2)$$

The trade liberalization experienced by a province, p at year, t is measured by $liberalization_{pt}$ and is the independent variable of interest. Thus, I will be interpreting its coefficient, β_1. $pregnant_{ipt}$ is a binary variable, which equals to 1 if the individual, i from province, p is pregnant at year, t. I also control for a vector, X_{ipt} of individual level controls at year, t which might impact the outcome of pregnancy. The control variables are education level of the individual, age, whether the individual's residence is in an urban or rural setting, sex of the household head, whether the individual's house has electricity, number of registered household members, total children ever born and whether the individual is working or not. γ_p is the province fixed effect, δ_t is the time fixed effects and ε_{ipt} is the error term.

The effect of tariff rate could be through the women's employment channel. In order to explore this, I also run an OLS with the same specification as the one for pregnancy:

$$working_{ipt} = \beta_0 + \beta_1 liberalization_{pt} + \beta_2 X_{ipt} + \gamma_p + \delta_t + \varepsilon_{ipt} \qquad (3)$$

The outcome variable of interest now is $working_{ipt}$ which equals to 1 if the individual, i is working at year, t. The standard errors are once again clustered at the province level and there is province and time fixed effects. The control variables are the same as the ones used in the previous model, except the control for whether the individual is working or not is excluded, since it now the dependent variable.

In order to explore the other channel, i.e. the standard of living, I use the dummy which measures whether the household has electricity or not as a proxy for measuring standard of

living. Once again, it is the same specification as (2), except the control for household electricity has been dropped:

$$electricity_{ipt} = \beta_0 + \beta_1 liberalization_{pt} + \beta_2 X_{ipt} + \gamma_p + \delta_t + \varepsilon_{ipt} \qquad (4)$$

$electricity_{ipt}$ measures whether an individual's, $i's$ household in province, p has electricity at time, t.

B. Difference-in-Differences

Building on the base results provided by the OLS, I run a gradual difference in differences model with the following specification:

$$pregnant_{ipt} = \beta_0 + \sum_t \theta_t 1\{year = t\} \times liberalization_{pt} + \beta_2 X_{ipt} + \gamma_p + \delta_t + \varepsilon_{ipt} \qquad (5)$$

Similar to the OLS specification, $pregnant_{ipt}$ is a dummy which equals to 1 if the individual, i is pregnant and 0 otherwise at year, t in province, p. The terms with the coefficients, θ_t are the interaction terms and hence the DID coefficients of interest. They are an interaction of year dummies with province-level liberalization at year, t signified by $liberalization_{pt}$. The 1991 interaction term is not included in the model to serve as a control group to compare the other coefficients with. Next, the model controls for province and time invariant factors denoted by γ_p and δ_t respectively. The standard errors are clustered at the province level to adjust for correlation. The model also controls for individual level, time varying factors that could be correlated with pregnancy such as education level of the individual, age, whether the individual's residence is in an urban or rural setting, sex of the household head, whether the individual's house has electricity, number of registered household members, total children ever born and whether the individual is working or not denoted by X_{ipt}. ε_{ipt} is the error term and β_0 is the constant.

In a similar vein as the OLS, I also run a model with the working and electricity dummy as the outcome variable for the yearly difference in differences model:

$$working_{ipt} = \beta_0 + \sum_t \theta_t 1\{year = t\} \times liberalization_{pt} + \beta_2 X_{ipt} + \gamma_p + \delta_t + \varepsilon_{ipt} \qquad (6)$$

$$electricity_{ipt} = \beta_0 + \sum_t \theta_t 1\{year = t\} \times liberalization_{pt} + \beta_2 X_{ipt} + \gamma_p + \delta_t + \varepsilon_{ipt} \qquad (7)$$

Once again, (6) and (7) are the same as the (5) DID specification, except the outcome variable is a dummy for working or not in (6) and the household has electricity or not in (7). In equation (6), the working dummy is not in the vector of individual controls and in (7), the electricity is not in the vector of individual controls since they are both the outcome variables of interest.

V. Results

First, the results from the Ordinary Least Squares are summarized in Table 3 below.

Table 3. Ordinary Least Square of Trade Liberalization on Fertility, Employment and Electricity

	Pregnant/ Not	Working/ Not	Household Has Electricity/ Not
Trade Liberalization	-0.292	-1.160	1.061
	(0.2733)	(1.6816)	(2.7322)
Highest Education Level	0.004***	0.014**	0.083***
	(0.0010)	(0.0060)	(0.0095)
Is Residence Rural	0.003*	0.062***	-0.156***
	(0.0014)	(0.0106)	(0.0182)
Age	-0.002***	0.014***	0.005***
	(0.0001)	(0.0005)	(0.0005)
Sex of Household Head	-0.019***	0.079***	-0.027***
	(0.0019)	(0.0092)	(0.0037)
Household Has Electricity	-0.008***	-0.004***	0.002*
	(0.0023)	(0.0012)	(0.0012)
Number of Household Members	-0.002***	-0.015***	-0.009***
	(0.0004)	(0.0021)	(0.0016)
Total Children Ever Born	-0.006***	-0.079***	
	(0.0005)	(0.0092)	
Working/ Not	-0.005***		-0.041***
	(0.0013)		(0.0055)
Year Fixed Effects	yes	yes	yes
Province Fixed Effects	yes	yes	yes
N	219933	219933	219933

Note: Regressing whether an individual is pregnant/not on province level exposure to trade liberalization, with individual controls - education level, residence type, age, sex of household head, electricity dummy, number of household members, total children. It includes province and years fixed effects. The regressions also produces a constant term, which was excluded. The standard errors are clustered at province level.
* $p < .10$, ** $p < .05$, *** $p < .01$

Focusing on the coefficient of interest, trade liberalization, notice that the OLS on Pregnant/ Not indicates a negative, not statistically significant relation between province-level trade liberalization and the probability that a woman gives birth. Although the coefficient is not significant, the OLS

suggests that as a province becomes more liberal by 1%, the probability that a female has a child reduces by 0.00292%. In order to understand the mechanism through which trade and fertility is related, the coefficients of columns 2 and 3 of Table 3 should be interpreted. The coefficient of OLS on Working/Not is positive, implying that as a province becomes more liberal by 1%, the probability of a woman participating in the labor force goes down by 0.01160%. Thus, the theoretical employment mechanism outlined does not hold true in this case, since both, fertility and women's employment decrease. Next, the coefficient of OLS on Household Has Electricity/ Not is positive, indicating that as a province becomes more liberal by 1%, the probability that a household has electricity also goes up by 0.01061%. This also defies the theoretical channel, which says that if standard of living increases, fertility should increase. Thus, it seems like none of the results from the OLS were significant, and it went against theory. This disparity might be because of a simplistic specification, a flaw in the data, or might reflect the reality of Indonesia through another mechanism.

Next, focusing in the yearly difference in differences specifications, the results of which are highlighted in Table 4 below. The coefficient of each of the years, 1994, 1997, 2002, 2007, 2012 and 2017 is an interaction term between liberalization and the year dummy. The DID on the dummy for pregnant/ not across the years shows an initial positive coefficient in years 1997 and 2002, followed by a negative coefficient in years 2007, 2012 and 2017. The policy was set to fully take effect by 2003, thus indicating that after the AFTA was full accepted, probability of a female getting pregnant first increased slightly and then decreased relative to 1991, although not significantly. Thus, trade liberalization and fertility are negatively correlated, as was seen in the OLS specification as well. Next, exploring the channels of the effect, the coefficients of the DID for working/not seems to be consistently decreasing relative to 1991 across the years. Thus, indicating that the probability of a woman being employed decreased relative to 1991. Clearly, this was not the mechanism through which fertility rates are affected. Thus, exploring the DID on electricity. The coefficients in this case are all positive, indicating that the probability that a household has electricity has increased across the years, with no significant effect of the liberalization.

Table 4. Difference in Differences of Trade Liberalization on Fertility, Employment and Electricity
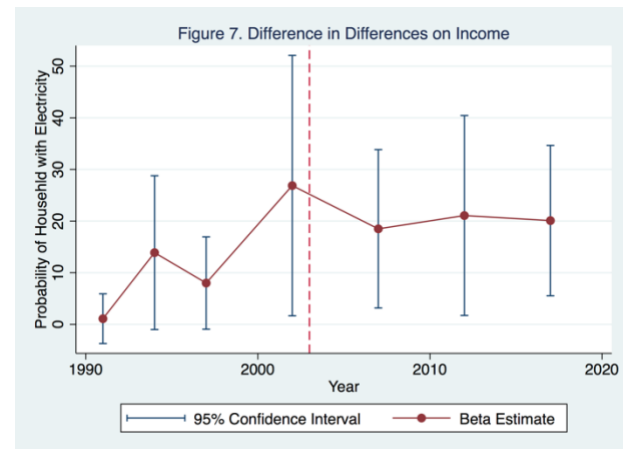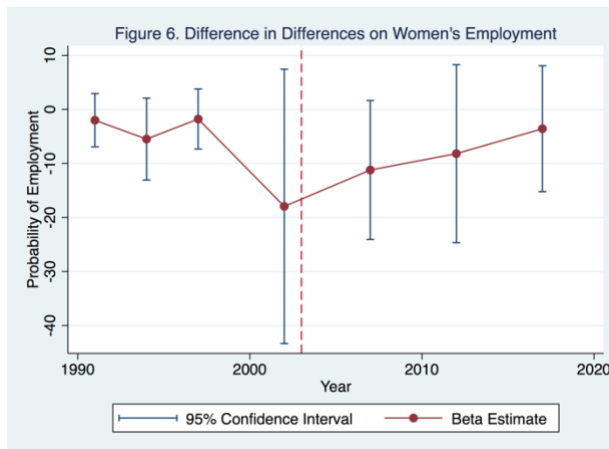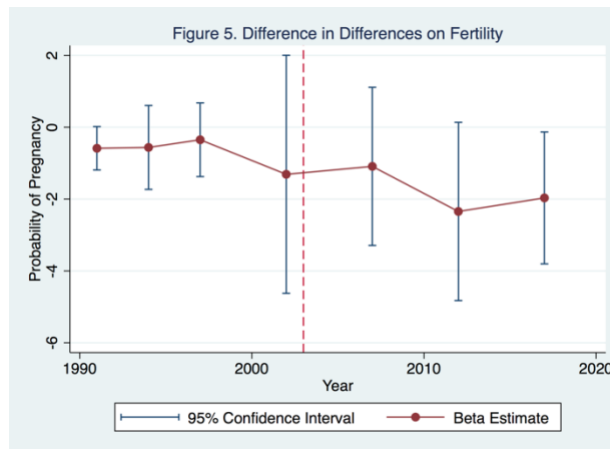
	Pregnant/ Not	Working/ Not	Household has Electricity/ Not
1994	-0.051	-3.745	12.935*
	(0.5704)	(3.7686)	(6.9965)
1997	0.034	-0.476	7.285*
	(0.4796)	(3.0213)	(4.2781)
2002	0.010	-13.444	24.416*
	(1.9170)	(14.3230)	(12.7246)
2007	-0.083	-7.784	16.628**
	(1.1782)	(6.1151)	(6.6143)
2012	-1.000	-3.595	18.573**
	(1.2466)	(6.5827)	(7.7371)
2017	-0.999	-0.274	18.292***
	(0.8875)	(4.7171)	(5.2604)
Highest Education Level	0.004***	0.014**	0.082***
	(0.0010)	(0.0061)	(0.0096)
Is Residence Rural	0.003**	0.061***	-0.154***
	(0.0014)	(0.0102)	(0.0163)
Age	-0.002***	0.014***	0.005***
	(0.0001)	(0.0005)	(0.0004)
Sex of Household Head	-0.019***	0.079***	-0.027***
	(0.0019)	(0.0092)	(0.0035)
Number of Household Members	-0.002***	-0.004***	0.002
	(0.0004)	(0.0012)	(0.0012)
Total Children Ever Born	-0.006***	-0.015***	-0.009***
	(0.0005)	(0.0021)	(0.0016)
Household Has Electricity	-0.008***	-0.078***	
	(0.0023)	(0.0086)	
Working/ Not	-0.005***		-0.040***
	(0.0013)		(0.0051)
Year Fixed Effects	yes	yes	yes
Province Fixed Effects	yes	yes	yes
N	219933	219933	219933

Note: Yearly difference in differences on whether an individual is working/not and if household has electricity or not on province level exposure to trade liberalization, with individual controls - education level, residence type, age, sex of household head, electricity dummy, number of household members, total children. It includes province and years fixed effects. The regressions also produces a constant term, which was excluded. The standard errors are clustered at province level. Interaction term for 1991 was excluded.
$* p < .10$, $** p < .05$, $*** p < .01$

Figures 5, 6 and 7 show the effect of trade liberalization on pregnancy, employment and electricity respectively. The red dotting line indicates 2003, the year by which tariff rates reduced below 5%. The results from Table 4 are confirmed in these figures, where there is not much change across the years in these rates with regard to trade liberalization. However, in Figure 5, if the probability of pregnancy is extended beyond the year 2020, it would decrease. Similarly if the post-tariff trends are extrapolated to further years for Figure 6, it shows probability of employment

13

increasing. For Figure 7, if the post-tariff trends are extrapolated beyond 2020, it does not seem like there would be much change. Thus, I hypothesize that a lack of significant results, and the results not aligning with theoretical channels would not be the case if the same analysis was done in the long run, with the fertility rates changing through the employment channel. The Asian Financial Crisis of 1997 coincides with AFTA, which might also be hampering our results.

Figure 5. Difference in Differences on Fertility

Figure 6. Difference in Differences on Women's Employment

Figure 7. Difference in Differences on Income

VI. Conclusion

This paper analyzes the impact of trade liberalization, through AFTA, on Indonesia's fertility rates. It explores two perspective channels through which fertility rates might be changing: women's employment, measured by the dummy indicating whether the woman is working or not and standard of living, measured by the dummy indicating whether the household has electricity or not. In order to conduct this analysis, OLS and yearly Difference-in-Differences is used as an empirical strategy. The results from OLS and the yearly DID show that trade liberalization is

negatively related to fertility rates, although not at a statistically significant level. Further, both the employment channel and the standard of living channel do not show any significant results, and the signs of the coefficients are the opposite of what theory dictates.

There are several limitations in the paper, that could also significantly impact the results. First, the implementation of AFTA was not an exogenous shock, it was gradual, which weakens the results from the DID. Next, the employment composition data was from 2010, after AFTA was already imposed, thus having the results be highly endogenous. Further, the data was available at gaps across time, and was not available annually, which changes the power of the results. Further, the implementation of AFTA in Indonesia is fairly recent and coincides heavily with the Asian Financial Crisis. The lack of distance between the liberalization and last available data point, and it being close to 1997 might be clouding the results. Further, having data on the disposable income of an individual would be a better measure of standard of living than electricity.

Finally, if the paper was conducted in the longer run, and the results were significant, it could have major policy implications. If trade liberalization has distributional consequences to women's labor force participation, it is a consideration international policymaker must not overlook as a women's developmental issue. As a further research, it would be interesting to re-do this analysis in 10 years of time, and perhaps divide the data based on income level subgroups, to understand of the different channels work differently across an income range.

References

Adserà, Alícia. "Changing Fertility Rates in Developed Countries. The Impact of Labor Market Institutions." *Journal of Population Economics* 17, no. 1 (January 2004): 17–43. https://doi.org/10.1007/s00148-003-0166-x.

Akrasanee, Narongchai. "Essays: Ministers and Senior Officials." Accessed May 7, 2020. https://www.eria.org/asean50-vol.1-26.narongchai-akrasanee.pdf.

Anukriti, S., and Todd Kumler. "The Effects of Trade Liberalization on Fertility and Child Health Outcomes in India." *SSRN Electronic Journal*, 2012. https://doi.org/10.2139/ssrn.2158523.

"Badan Pusat Statistik." Badan Pusat Statistik. Accessed May 7, 2020. https://www.bps.go.id/.

Do, Quy-Toan, Andrei Levchenko, and Claudio Raddatz. "Comparative Advantage, International Trade, and Fertility." *Journal of Development Economics* 119, no. C (2016): 48–66. https://doi.org/10.3386/w21677.

Elliott, Robert J. R., and Kengo Ikemoto. "AFTA and the Asian Crisis: Help or Hindrance to ASEAN Intra-Regional Trade?" *Asian Economic Journal* 18, no. 1 (2004): 1–23. https://doi.org/10.1111/j.1467-8381.2004.00179.x.

Feridhanusetyawan, Tubagus, and Mari Pangestu. "Indonesian Trade Liberalisation: Estimating The Gains." *Bulletin of Indonesian Economic Studies* 39, no. 1 (2003): 51–74. https://doi.org/10.1080/00074910302008.

"Global Economic Prospects and the Developing Countries." *The World Bank*, 2002, xi. http://documents.worldbank.org/curated/en/285571468337817024/pdf/multi0page.pdf.

Gries, Thomas, and Rainer Grundmann. "Trade and Fertility in the Developing World: the Impact of Trade and Trade Structure." *Journal of Population Economics* 27, no. 4 (2012): 1165–86. https://doi.org/10.1007/s00148-014-0508-x.

Gumilang, Howard, Kakali Mukhopadhyay, and Paul J. Thomassin. "Economic and Environmental Impacts of Trade Liberalization: The Case of Indonesia." *Economic Modelling* 28, no. 3 (2011): 1030–41. https://doi.org/10.1016/j.econmod.2010.11.015.

Kaihatu, Thomas Stefanus. "AFTA : Indonesian Industrialist And Customs Perspective." *Jurnal Manajemen & Kewirausahaan* 5, no. 2 (September 2003): 112 – 122.

"HS Code, Customs Tariff Number, Tariff Guide - European Database." English. Accessed May 7, 2020. https://www.tariffnumber.com/.

Okabe, Misa, and Shujiro Urata. "The Impact of AFTA on Intra-AFTA Trade." *Journal of Asian Economics* 35 (2014): 12–31. https://doi.org/10.1016/j.asieco.2014.09.004.

"One Vision One Identity One Community." ASEAN. Accessed May 7, 2020. https://asean.org/.

Pierce, Justin R., and Peter K. Schott. "Trade Liberalization and Mortality: Evidence from US Counties." *American Economic Review: Insights* 2, no. 1 (January 2020): 47–63. https://doi.org/10.1257/aeri.20180396.

"Population: The Most Under-Addressed Issue." Population Media Center. Accessed May 7, 2020. https://www.populationmedia.org/issue/population-growth/.

"The DHS Program." The DHS Program - Quality information to plan, monitor and improve population, health, and nutrition programs. Accessed May 7, 2020. https://dhsprogram.com/.

Weisbrot, Mark, and Dean Baker. "THE RELATIVE IMPACT OF TRADE LIBERALIZATION ON DEVELOPING COUNTRIES." *Investigación Económica* 62, no. 244 (2003): 15-55. Accessed May 7, 2020. www.jstor.org/stable/42842418.

"World Integrated Trade Solution (WITS)." World Integrated Trade Solution (WITS) | Data on Export, Import, Tariff, NTM. Accessed May 7, 2020. https://wits.worldbank.org/Default.aspx?lang=en

Addressing Paper Comments

Limitations of the paper:

1. **Recoding non-traded industries:** I incorporated this suggestion by recoding the tariff variable by having the non-traded industries coded to 100.

2. **Interpretation of the coefficients:** I addressed this by flipping the direction of my main independent variable. I also spoke to Professor Hale about the interpretation of the DID and made sure that it was correct.

Minor fixed for the paper:

1. **Make it clearer that liberalization happens in 2003:** I added a section which talks about the details of AFTA, which specifies this.

2. **The mechanism can be introduced earlier:** I have an entire paragraph in the introduction discussing the mechanism. I spend the rest of the paper also exploring the mechanisms by running OLS regression and yearly DID on working/not and electricity/not.

3. **State that the variables are created relative to 1991:** I state this in my method, in my table notes and I also interpret the results of the DID relative to 1991.

4. **The introduction says that Indonesia's tariffs were set to be <=5% by 2000. There is disparity in this:** I address this by having summary statistics which show that by 2000, the rates went below 5%. However, in the AFTA section I talk about the exact details of the policy.