Long Term E ects of Temporary Labor Demand: Free Trade Zones, Female Education and Marriage Market Outcomes in the Dominican Republic

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Introduction

- Many developing countries have experienced a rapid period of industrialization which consisted in the expansion of jobs in the export manufacturing sector.
- Most of the jobs are in the textile industry and most of the workers are women.
- What are the e ects female factory jobs on human capital investments?
  - Positive e ects: if factories are in sectors that reward extra years of education ! " RS ! " schooling (Heath and Mobarak, 2012)
  - Negative e ects: if factories hire unskilled workers at attractive wages ! " OC ! students in legal working age # schooling (Atkin, 2012)
- Can temporary labor market opportunities shift developing countries to a \good equilibrium" in female education and associated outcomes?
- I study the long term e ects of female factory jobs on women status in the Dominican Republic.

Introduction

- Do women in places where female labor market existed in previous periods continue increasing their schooling and age of marriage in the absence of future labor market gains?
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Introduction

- I exploit the sudden and massive growth of female jobs in free trade zones (FTZs) in the Dominican Republic in the 1990s, and subsequent decline in the 2000s.
  - In the 1990s, textile manufacturing boomed as free trade zones (FTZs) were opened in the Dominican Republic ! female employment rose
- However, in the 2000s, labor market opportunities for women decreased since textile sector contracted due to Asian competition and the end of the main commercial agreement with the US.
  - Female employment was reduced by about 45 percent.
  - By 2008, about 70 percent of women who were displaced from the textile industry were still unemployed.
- These posterior contractions in the 2000s allow us to analyze if the e ects are sustained long term, even in the absence of labor market opportunities.

Outline

- Background on education and early marriage in the Dominican Republic and History of FTZs
- Data
- Identi cation strategy
- How can female factory jobs can change education for women?
  - Main ndings
  - Mechanisms
  - Robustness checks
- What are the e ects on marriage markets?
- Are these e ects long lasting?

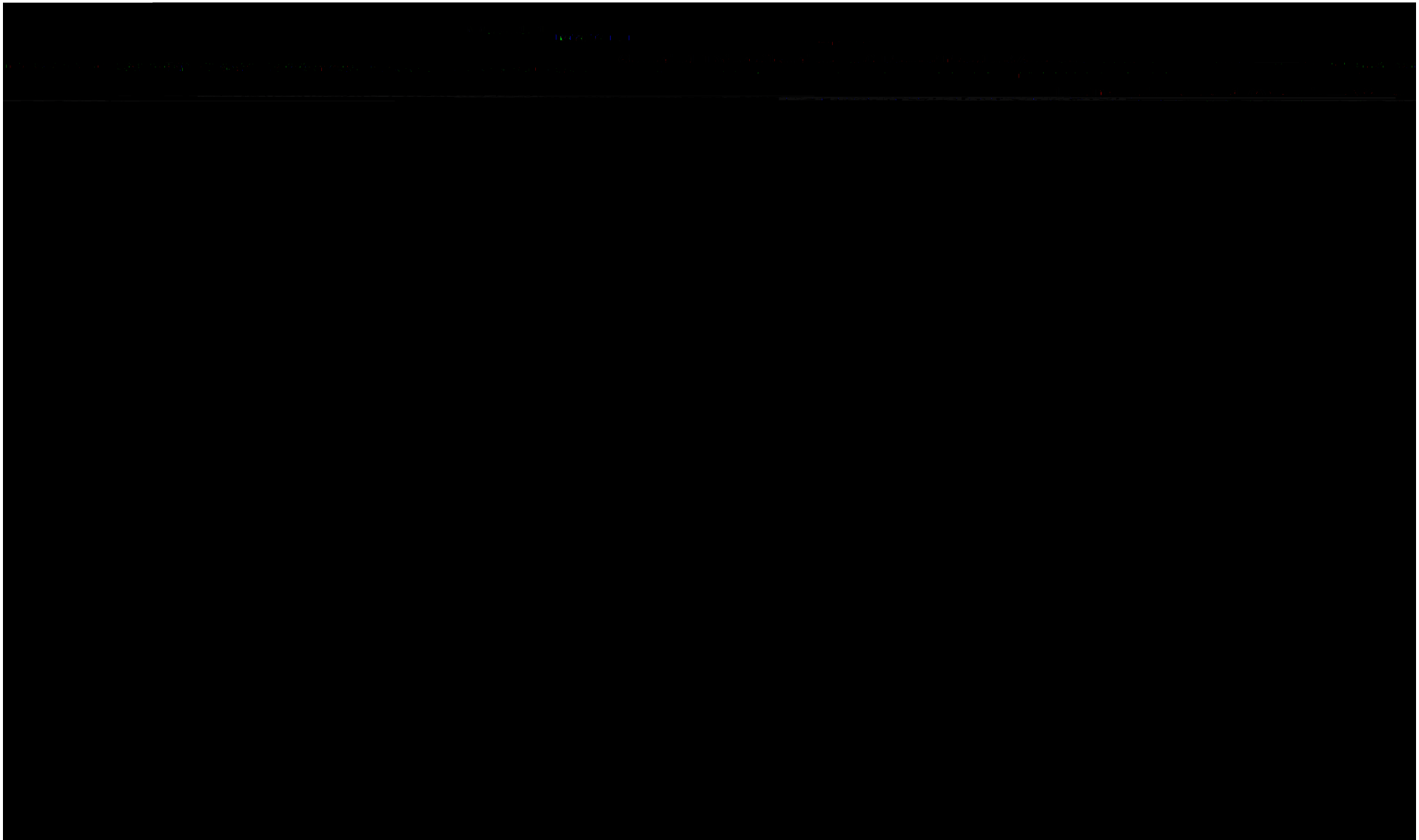
Background on Education and Early Marriage in the Dominican Republic

- Only 40% of students in primary level continue secondary education (Gajardo 2007).
- While men tend to drop out of school to participate in the labor market, women tend to drop out of school due to marriage and children.
- 42% of women between 20 and 49 years old were married before the age of 18 in 2010.

History of FTZs

- Industrial free zones were first implemented in the Dominican Republic in 1969 as part of a national policy that involved import substitution and export promotion.
- In 1984, industries in the FTZs benefited from the transition to a free exchange rate and preferential tariff treatment from the United States (Initiative for the Caribbean Basin).
- By 1996, 500 firms were active in these zones, making an average of 10 firms per FTZ.
- One of the main sources of economic growth, surpassing the agricultural sector (Liberato and Fennell 2007).

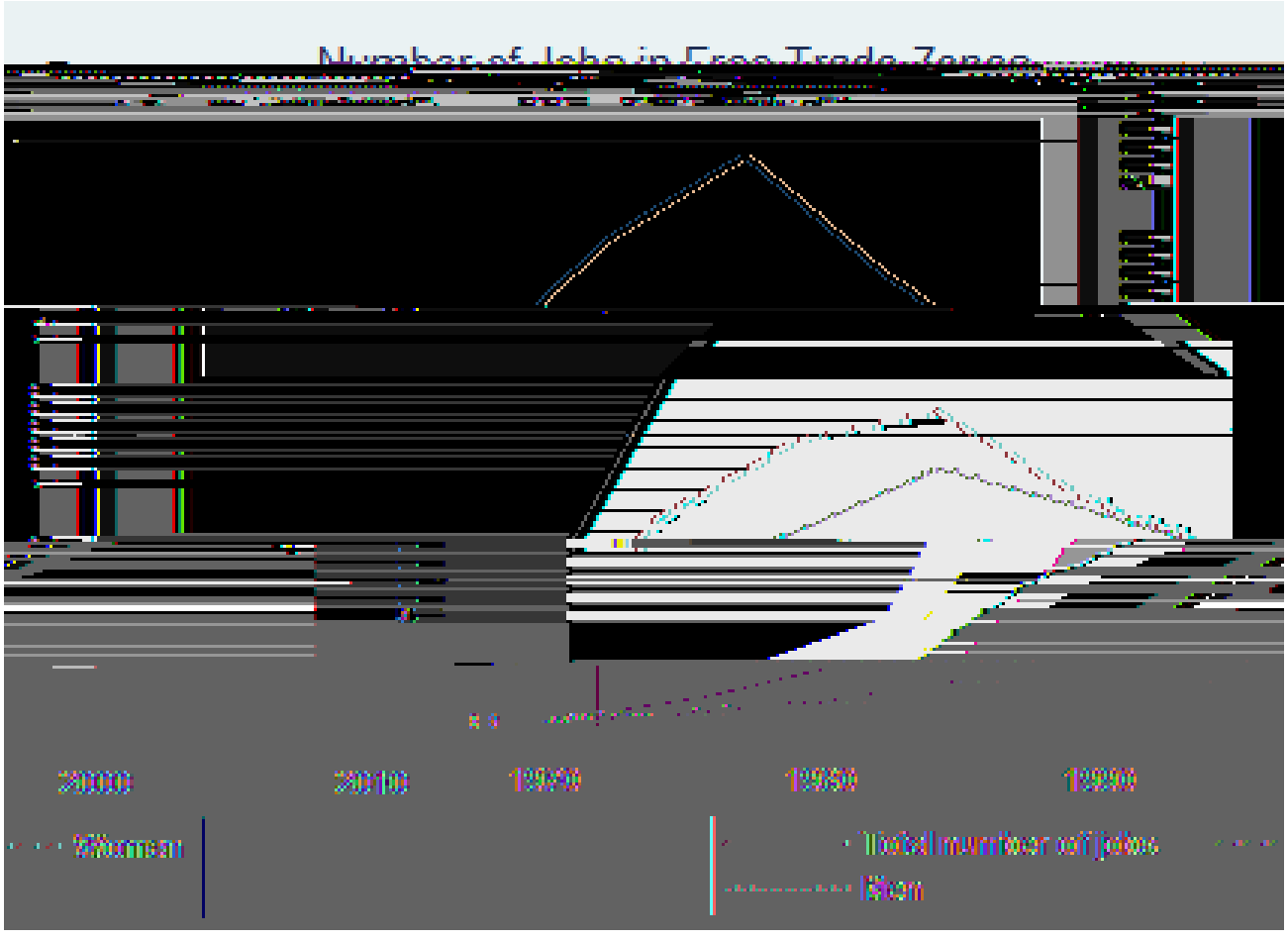
History of FTZs



History of FTZs

- During the analyzed period, industrial free zones were the main generator of employment in the country (CEPAL 1999).
  - In 1996, employment in these areas represented 6% of the economically active population.
- Most of these activities are labor intensive and require low skill workers (CNZF 2002).
- The average wage in free trade zones was higher than the average wage outside the zones (Madani 1999, Reyes Castro et al. 1993).
  - The composition of wages was based on productivity and other incentive bonuses as well as payments for overtime and piece work (Romero 1995).
- Most workers completed primary 39.6% and secondary education 47.2% (ENFL, 2005 and 2006).

History of Industrial Free Zones



Data

- Demographic Health Surveys (DHS) for the years 1986, 1991, 1996, 2002, and 2007.
  - These surveys provide information on health, nutrition, and demographic indicators for the Dominican Republic.
  - The target population for DHS is de ned as all women of reproductive age (15-49 years old) and their young children under ve years of age.
  - Limitation: province of residence at the time of the survey rather than when the FTZ opened and self reported measure for years of education.
- Industry data from National Free Zones Council:
  - Information on the dates of opening and location of every industrial park
    - There are 54 industrial parks with around 10 rms per industrial park.

Identi cation Strategy

- I keep only provinces that experienced an opening and exploit three sources of variation: i) provinces that opened industrial parks relative to others, ii) after opening of industrial park relative to before and iii) cohorts most a ected by the opening relative to other cohorts of young women.

- I exploit variation on the age of women at the time of the opening using thresholds in key ages: 15 and 16 years.
  - In the Dominican Republic, basic education is compulsory and covers the 6-14 years age group. Secondary education is not compulsory, but it is public.

  - Dropouts occur at the age of 16-17 for women.

Identi cation Strategy: Test of Pre-existing Di erences

- Following Bailey (2006), I generate province-level characteristics for each provinces from the 1986 DHS survey and estimate the following equation:

$$Time1986toOpening_p = \quad + \quad X_{p1986} + \quad _{p1986}$$

- $Time1986toOpening_p$ indicates the years elapsed from 1986, the year that the large expansion of the free industrial zones started, until the year they opened in a particular province.

Identi cation Strategy: Test of Pre-existing Di erences

(A) Demographic Characteristics	
Proportion of Women in Age 15-21	2.660
	(12.08)
Proportion of Women in Age 22-30	-4.237
	(11.57)
Proportion of Women in Age 31-45	5.30
	(11.36)
Proportion of Households in Urban Areas	-1.054
	(1.765)
Proportion of Owners of Land Worked	0.219
	(2.539)
R-squared	0.023
(B) Social Characteristics	
Average Years of Education for Women	-0.681
	(0.805)
Proportion of Literated Women	0.671
	(6.890)
Average Years of Education for Men	1.888
	(5.890)
Average Age of First Marriage	2.369
	(2.493)
Average Age of First Birth	0.967
	(0.979)
Proportion of Married Women	7.296
	(5.897)
Average Age of First Intercourse	-3.681
	(2.924)
R-squared	0.100
(B) Labor Characteristics	
Proportion of Women Earning a Salary	0.344
	(2.783)
Proportion of Women Working for a Non-Family Member	-2.201
	(2.686)

Identi cation Strategy: Test of Pre-existing Di erences

(C) Labor Characteristics	
Proportion of Women Earning a Salary	0.344
	(2.783)
Proportion of Women Working for a Non-Family Member	-2.201
	(2.686)
Proportion of Women Working Before Marriage	2.319
	(5.628)
R-squared	0.03

- Low R2 and free trade zones do not seem to be correlated with female education.

Identi cation Strategy: Di erence-in-di erence (DD)

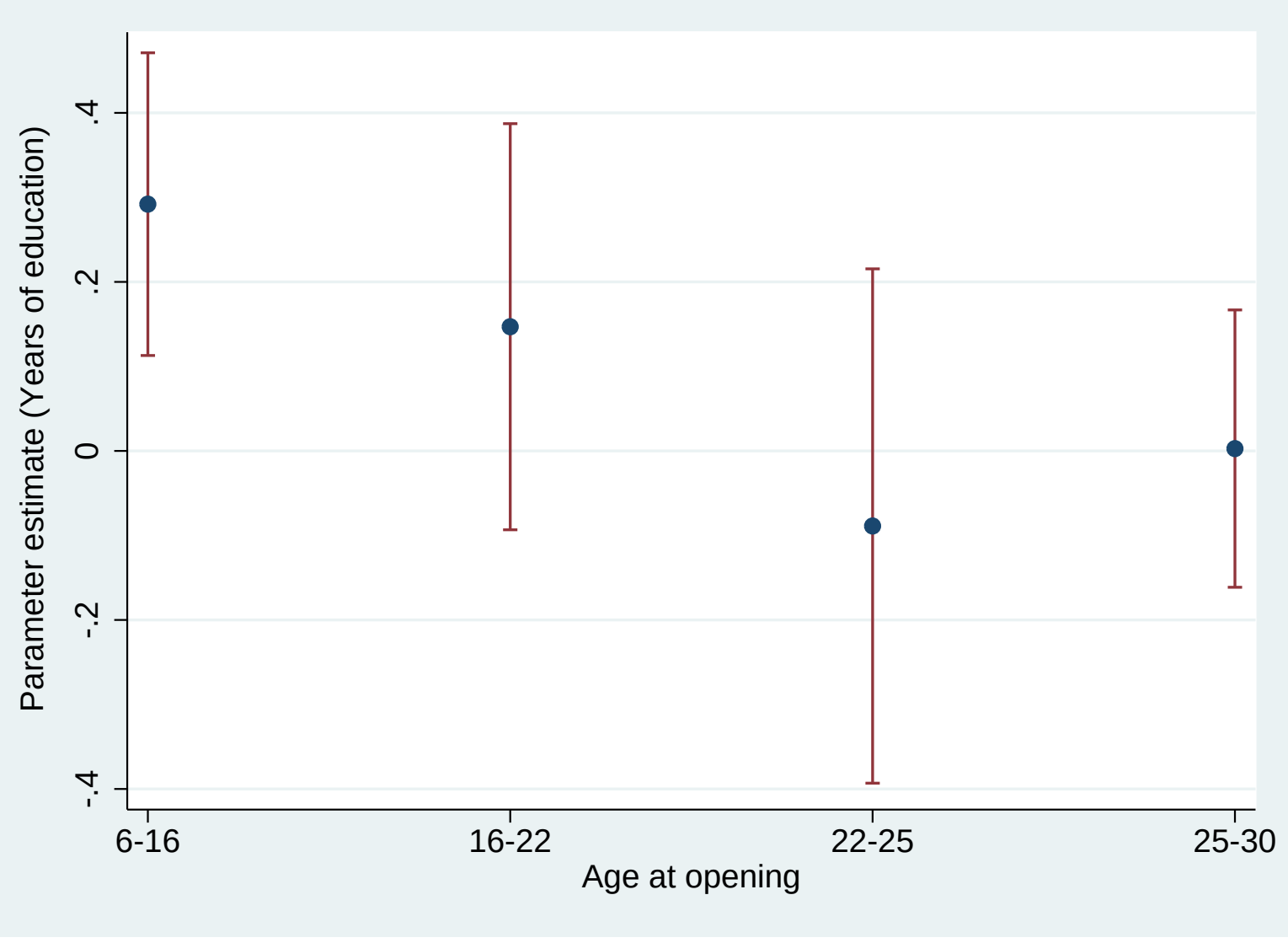
$$Outcome_{ihpt} = + FTZ_{pt} + Province_p + Year_t + Trend_p + X_{hpt} + X_{pt} + \varepsilon_{ihpt}$$

- *YearsEducation* the years of education reported by women i in household h in province p in year t.
- FTZ_{pt} is a dummy variable that indicates the existence of an FTZ in province p in year t.
- $Year_t$ and $Province_p$ xed e ects, as well as province time trends.
- X_{ihpt} includes type of place of residence, age, literacy, if the main source of drinking water comes from piped water, type of toilet facilities, if the household has electricity, radio, television, refrigerator and car, main oor and wall material, and number of household members. X_{pt} number of construction permits in province p in year t.

Schooling and Female Factory Jobs, 1986-2007 (DD)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Years of educa-tion	Years of educa-tion	Years of educa-tion	Years of education	Enroll-ment in primary	Enroll-ment in sec-ondary	Com-plete primary	Com-plete sec-ondary
FTZ	0.408***	0.386***	0.359***	0.436*	0.007	0.046**	0.010	0.038**
	(0.141)	(0.131)	(0.127)	(0.211)	(0.022)	(0.017)	(0.021)	(0.013)
Mean of dependent	7,82	7,82	7,82	7,82	0.9	0.46	0.4	0.24
N	55,894	55,894	55,894	51,949	27,975	51,991	39,244	51,949
R^2	0.075	0.076	0.124	0.188	0.043	0.154	0.145	0.118
Province FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Province trends		YES	YES	YES	YES	YES	YES	YES
Cohort FE			YES	YES	YES	YES	YES	YES
Province year of birth trends				YES	YES	YES	YES	YES
Covariates				YES	YES	YES	YES	YES

Schooling by Age at Opening



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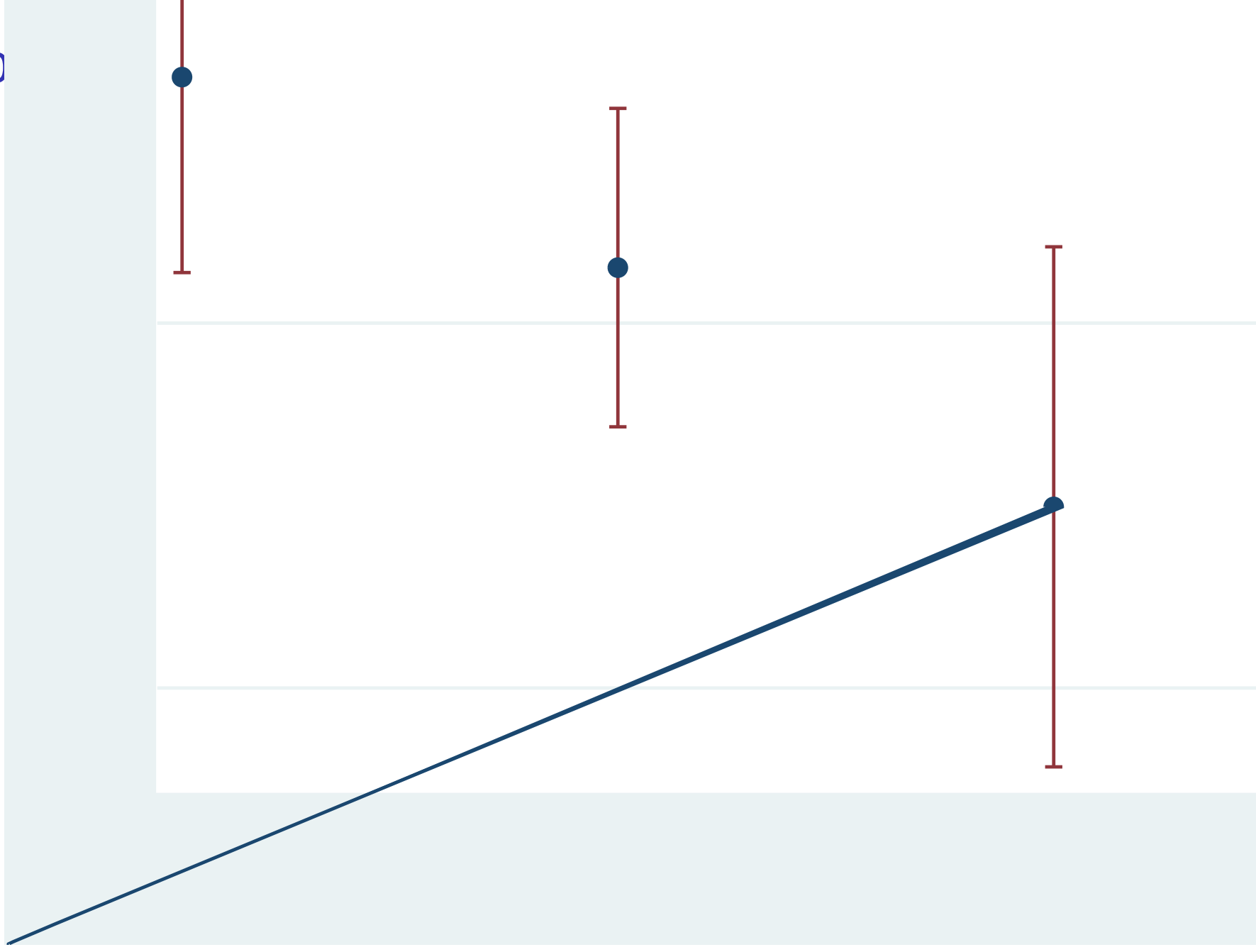
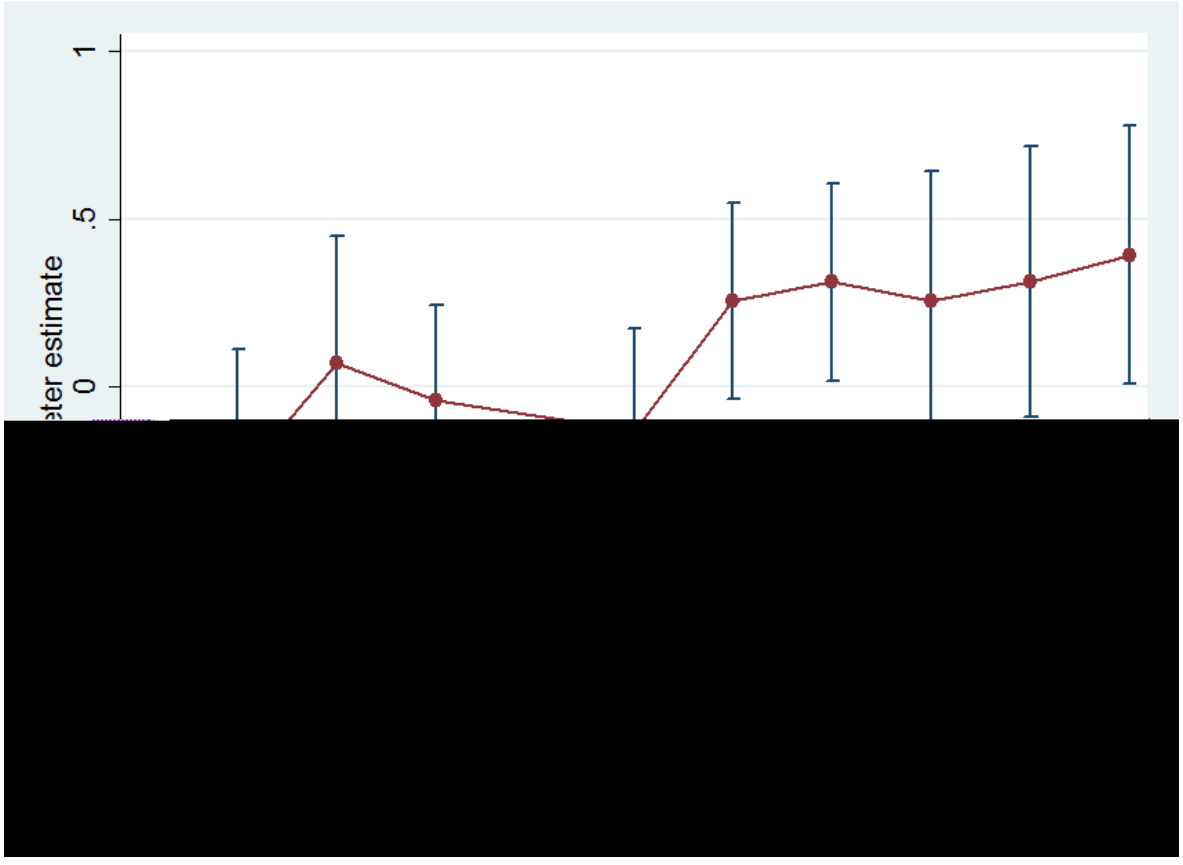


Identi cation Strategy: Di erence-in-di erence-in-di erence (DDD)

- This strategy compares the outcomes of women who are a ected by the opening to the outcomes of women who are not a ected by the opening (rst di erence) in provinces with an \earlier" FTZ versus provinces with \later" FTZ (a second di erence) over time (the third di erence)

$$Outcome_{ihpt} = + {}_1FTZ_{pt} + {}_2age6to16_i + {}_3FTZ_{pt} \quad age6to16_i + Province_p + Year_t + Trend_p + X_{hpt} + X_{pt} + "_{ihpt}$$

Results on Education (Event Study)



Notes: This graph plots the coe cients obtained from a regression of the outcome on dummies

Mechanisms Behind Schooling E ects

- Income?
- Infrastructure?
- Migration?
- Returns to schooling?

Mechanisms Behind Schooling E ects

	(1) Years of education	(2) Years of education	(3) Years of education	(4) Enrollment in secondary	(5) Enrollment in secondary	(6) Enrollment in secondary
FTZ age6to16	0.224*	0.262**	0.236**	0.030**	0.028**	0.021*
	(0.119)	(0.122)	(0.103)	(0.012)	(0.013)	(0.010)
Parks	0.085**			0.005		
	(0.040)			(0.004)		
Construction permits		-0.001			-0.000*	
		(0.001)			(0.000)	
N	49,660	46,026	29,808	49,716	46,067	29,831
R^2	0.177	0.174	0.207	0.144	0.142	0.162
Province FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Province trends	YES	YES	YES	YES	YES	YES
Cohort FE	YES	YES	YES	YES	YES	YES
Province year of birth trends	YES	YES	YES	YES	YES	YES
Sub-sample of non-working women			YES			YES

Migration and Female Factory Jobs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Years of education	Years of education	Years of education	Years of education	Age of marriage	Age of marriage	Age of marriage	Age of marriage
FTZ	0.423**	0.385***	0.488***	0.350**	1.323***	1.276***	1.332***	1.337***
	(0.164)	(0.127)	(0.160)	(0.127)	(0.209)	(0.247)	(0.224)	(0.245)
Movers				-0.761***				-0.330***
				(0.108)				(0.0855)
Mean of depen-dent	7,82	7,82	7,82	7,82	17.94	17.94	17.94	17.94
N	41,985	54,778	40,869	55,894	17,732	25,714	17,506	25,940
R^2	0.157	0.125	0.159	0.131	0.039	0.026	0.038	0.0276
Province FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Province trends		YES	YES	YES	YES	YES	YES	YES
Non-migrants	YES		YES		YES		YES	
Without just movers		YES	YES			YES	YES	

Mechanisms Behind Schooling E ects

- Expectations
  - Even though most of the jobs were unskilled, they were better paid than other labor market opportunities and provided the main source of female employment over the period of analysis.
  - In equilibrium, I observe that most women working in FTZs had complete secondary education (40%).
  - Before the FTZs opened, about 33% of high educated women were working in contrast to 43% after the opening.
  - After the FTZs opened *!* proportion of educated women working in professional, managerial, technical and skilled manual positions than before the opening.

Robustness Checks-Schooling, Female Factory Jobs (Already Married)

	(1) Years of education	(2) Enrollment in secondary	(3) Complete secondary	(4) Age of marriage	(5) Early marriage
FTZ	-0.145	-0.020	0.004	0.203	-0.002
	(0.228)	(0.020)	(0.016)	(0.165)	(0.025)
N	22,709	22,735	22,737	20,867	20,867
R^2	0.073	0.053	0.043	0.112	0.082
Province FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Province trends	YES	YES	YES	YES	YES
Cohort FE	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Consequences of Improving Schooling and Delaying Marriage

	(1) Age at first birth	(2) Early birth	(3) Age at first intercourse	(4) Early intercourse	(5) Out-of-wedlock birth	(6) Desired fertility	(7) Child survival
FTZ age6to16	0.924***	-0.093***	0.725***	-0.046***	-0.111***	0.008	0.013**
	(0.143)	(0.015)	(0.113)	(0.014)	(0.030)	(0.005)	(0.006)
Mean of depen-dent	19.31	0.24	17.31	0.39	0.036	3.2	0.9
N	31,151	46,069	26,779	46,069	46,069	31,151	29,184
R^2							

Summary

- FTZs open $!$ $''$ expectations of getting a job after school for women $!$ $''$ years of education for those in schooling ages $!$ $''$ age of marriage
- $!$ better health outcomes
- FTZs open $!$ $''$ female labor force for those older of 25 at the time of opening (short run) and $''$ female labor force for those younger than 16 (long run)

Are these E ects Long Lasting?

- I study whether the e ects found in education and marriage revert due to the presence of negative female labor demand shocks.
  - Increased competition coming from Asian countries in 2000
  - End of the preferential tari treatment from the United States (Multi ber Arrangement) in 2005

- Large decrease in manufacturing textile activities in free trade zones between 2000 and 2007

- Larger negative e ect on industrial parks with a large apparel sector than those with a large service sector
  - The textile sector employment was reduced by about 45%.
  - The service sector was not able to absorb displaced workers (most of it expansion after 2006).

Are these E ects Long Lasting? Approach 1

$$Outcome_{ihpt} = + {}_1 FTZ_{p;t} + {}_2 Shock_t + {}_3 Textile_p + {}_4 Shock_p \quad Textile_t + Province_p + Year_t + Trend_p + X_{hpt} + X_{pt} + "_{ihpt}$$

- where $Shock_t$ is a dummy variable for after 2000 and $PrTextile_p$ is the proportion of rms in the textile industry before 2000 in province p.
- The interaction between both variables control for the e ect of the negative shock.
  - For example, if a province has a 60% of the rms in the manufacturing industry just before the shock, the variable shock is equal to 0 for the years before 2000 and 60% after 2000.

Are these E ects Long Lasting? Approach 2

- Interact the variable FTZ_{pt} with a variable that takes the value of zero in province p in the year 2000 and onwards if that province has more than 50before the shock.

$$Outcome_{ihpt} = + {}_1FTZ \ (1 \quad 1_{f\,Year \quad 2000 \ \& \ Textile \quad 0:5g})_{pt} + Province_p + Year_t + Trend_p + X_{h;p;t} + X_{p;t} + "_{i;h;p;t}$$

- where $(1 \quad 1_{f\,Year \quad 2000 \ \& \ Textile \quad 0:5g})$ takes the value of 0 after the year 2000 if the province has more than 50 percent of rms in the textile industry before the shock.

Are these E ects Long Lasting?

	(1) Years of education	(2) Years of education	(3) Enrollment in secondary	(4) Enrollment in secondary	(5) Complete Secondary	(6) Complete secondary
FTZ	0.329**		0.036**		0.030**	
	(0.156)		(0.015)		(0.012)	
Shock textile	-0.075		-0.016		-0.006	
	(0.243)		(0.022)		(0.019)	
FTZ (*1*		0.341**		0.028***		0.0214***
1 f Year 2000 & *Textile* 0:5*g*		(0.128)		(0.009)		(0.007)

Summary

- Some FTZs close ! # expectations of getting a job after school for women but not to the pre-opening levels ! those women who were in schooling ages at the time of opening, they keep increasing their years of education.

- Gains in the marriage market?

Spillovers in the Marriage Market

Conclusions

- Results from dif-in-dif, event study analysis and triple di erences show that the opening of FTZs is associated with:
  - Increase in women's years of education (additional 0.3 years of education)
    - Main channel: expectations
  - Increase in age of marriage and decrease in probability of early marriage (marrying under age 18)
    - Main channel: education
  - Increase in labor force participation and work outside home

Conclusions

- The e ect persists even after the end of a trade agreement with the U.S. and Asian competition that led to a decline in FTZ jobs in the 2000s.
  - the increase in (some) girls' education changed marriage markets, with the girls whose education increased due to the FTZs marrying later, matching with a higher-quality husband, giving birth later, and having children that are more likely to survive infancy.

- Female labor market opportunities can profoundly change female outcomes in developing countries through general equilibrium e ects in the education and marriage markets.