Occupational Choice and Gender Discrimination in Mexico

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Abstract

Stylized facts on discrimination in developing countries suggest that the large majority of micro and small enterprises are run by women, and that female are more likely to be self-employed entrepreneurs rather than wage workers. We propose a general equilibrium model able to capture the effect of discrimination on these occupational choices. Using data on Mexico, we quantify the effect of the peso devaluation on labour reallocation.

Keywords: Discrimination; Risk Aversion; Firms Heterogeneity, Devaluation.

JEL classification: F12, F13, F14, J16, O17

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1 Introduction

Elisa’s part: sections 1 and 2

There is a large literature that shows that increase in labor-intensive manufacturing exports is generally associated with an increase in female employment, particularly in wage jobs (see for example, Fontana et al. 1998, for a review of this literature).

While the literature on trade liberalization has focused mostly on salary jobs, self-employment represents often a key source of income, particularly for women. The literature that focuses on self-employment and entrepreneurship suggests the presence of gender difference also in this portion of the labor markets. Stylize facts for example suggests that women, compared to men, are more likely to run micro and small businesses. These entrepreneurs also appear more likely to engage in businesses out of “necessity” rather than out of “opportunity” (Batini et al., 2010). This necessity is also often associated with absence of a wage job.

This paper aims at filling this void and analyzes the impact of trade liberalization on occupational choice in the presence of gender gaps. There is a large literature that analyzes, often separately, gender gaps in entrepreneurship and wage work. This literature has mainly focus on gender gaps in outcomes. Potential explanations for these outcomes include gender difference in human, physical, and social capital, difference in time allocation, and the presence of a taste for discrimination against women. Building on this hypothesis, we propose a theoretical model that looks at the impact of trade liberalization on entry into self-employment and wage work. To better motivate this model, we also provide some stylized facts by looking at the Mexican manufacturing sector during the NAFTA trade liberalization.

The theoretical model will combine Krugman (1980) and Melitz (2003) with worker heterogeneity. The Krugman (1980) sector will hire female and male wage workers. The Melitz sector is characterized by firm heterogeneity and will attract individuals interested in opening their own business. Female and male entrepreneurs will differ in their productivity. Uncertainty and worker heterogeneity alter the individual occupational choice. In the model, the alternative to self-employment is wage work. The wage working sector is characterized by a principal-agent problem. Principal is risk neutral while agents are risk averse. More specifically, women are assumed to have a higher level of risk aversion that their male counterpart. Discrimination captured by a lower wage, will then constitute the trade-off between being employed as a wage worker or as a self-employed.

Previous research on the effects of trade on gender discrimination starts with Becker (1957), who predicts that increasing foreign competition will reduce discrimination in the labor market. More recently, Black et al. (2004), focusing on manufacturing sectors, find a negative relationship between import penetration and gender wage gap. Ederington et al. (2009) es-
tablish a positive effect of the Colombian trade liberalization on female labor share.

Microeconomic effects of trade episodes have been deeply studied. Theoretical works ...introduce briefly Melitz and firms heter...

Empirical works have concentrated on how trade openness shapes firms productivity ... (Pavcnik (2002), Lileeva and Trefler (2010)). The impact of NAFTA on the Mexican economy has been also studied by a numert of researchers. Nicita (2004) ... Iacovone and Javorcik (2010)... More recently, Verhoogen (2012) analyzes .... Juhn et al. (2012) consider ...

Previous studies, explored how Mexican microenterprises have been affected by credit crunch and trade openness (McKenzie and Woodruff, 2005; Trindade, 2008). Similarly, recent studies have looked at the impact of NAFTA liberalization on employment and wages (see Aguayo-Tellez et al, 2011). Differently, we analyse the role of devaluation on occupational choices. To achieve this objective, we exploit Encuesta Nacional de Empleo Urban (ENEU) during the period 1989-1999 and the peso shock in 1994.

There are at least two paper related to ours. The first is Yeaple (2005), who consider interaction between trade costs, different technologies, and worker skill heterogeneity. Our paper is different because it considers the change in occupational choices. The other paper is...

The paper is structured as follows. Section 2 provides some preliminary statistics which are used to justify the assumptions of the model. In section 3, we introduce the model and in section 4 we conduct comparative statics and section 4 concludes.

2 Context and Data

We provide some preliminary evidence on the gender difference in occupational choice and informality rates looking at the Mexican economy in the period 1989-1999. This period is characterized by a dramatic increase in trade. This was due to the ongoing liberalization efforts that had started in the late ’80s. A particular role was played by the NAFTA agreement, which entered in force of in January 1994. The period is however also characterized by the pesos crisis, characterized by a large drop in output during 1994-1995 followed by a quick recovery. The recovery was characterized by a strong GDP growth in the period 1996-2000. As a result, GDP returned to its pre-crisis level by the first quarter of 1997 (Kose et al, 2004).

Data

We use a repeated cross-sectional data from Mexico’s National Survey of Micro Enterprises...
(ENAMIN), gathered in 1992, 1994, 1996, 1998, 2002 and 2008. In each round, the surveys include a sample of around 10,000 firms with 5 or fewer workers, except in manufacturing, where the upper limit is 15. Despite minor variations in the survey instrument, the data are comparable across rounds, enabling analysis of changes in the share, sectoral distribution and performance of female and male-owned enterprise during the surveyed years. The sample is representative of all urban areas with populations of 100,000 or more. An important characteristic of the survey design is that it captures unregistered (informal) enterprises in addition to registered enterprises. Besides information on the firms’ characteristics and financial accounts, the survey includes questions on characteristics of the owners, including their education and tenure in business.

Consider Woodruff and Zenteno for additional info (JDE 2006) pages 520-521.

Preliminary Evidence

...plots and other stuffs
3 Theoretical Framework

We develop a model that combines firm heterogeneity and entrepreneurial sector. Firms heterogeneity is generated by worker skill heterogeneity. When workers cannot find a match with a firm, they enter the entrepreneurship sector. The main value of our theory and the key to our empircs lies in the consideration of how the 1994 peso devaluation affected occupational choices.

3.1 Preferences and consumers

The model relies on different level of risk aversion across gender. Following the literature, female workers are modelled as more risk averse than their male counterparts, i.e. $\gamma_g$ with $g \in \{F, M\}$, where $\gamma_F > \gamma_M$. Some justifications for female workers being more risk averse than their male counterpart are based on rational beliefs that female education will not be rewarded by the market (pre-market discrimination), etc. Tastes are identical among individuals.

Consumers maximize utility functions of the CRRA class with two degrees of constant relative risk aversion $\gamma_g$ with $g \in \{F, M\}$. The higher $\gamma$, the more concave the utility function and the stronger the precautionary savings motive. Thus individuals utility function is defined as

$$u(c; \gamma_g) = \frac{c^{1-\gamma_g}}{1-\gamma_g}$$

The utility $u(.)$ is strictly increasing, and strictly concave and it depends on the risk aversion parameter $\gamma$. Women and men are born with an innate attitude towards risk, as captured by their CRRA parameter, which is a permanent feature. Since the analysis focuses on steady states, time subscripts are supressed.

Utility maximization is subject to the following constraint,

$$I = pc \quad \text{where} \quad I = \int_0^S \pi(s)ds + \int_S^\infty w(\gamma_g, s)M_gds$$

where $s$ stands for the skill/ability level of the individual.

3.2 Workers and Entrepreneurs

There is a continuum of individual with mass $M(=M_M+M_F)$. Individuals are differentiated by their skill/ability level, which is indexed with $s$. Men and women have the same distribution of skill, $G(s)$, over the support $[0, \infty)$. The larger is $s$ the more skilled is the individual.
3.3 Production

There are three types of production, tradable and non-tradable inputs and a final good: $Y_T$, $Y_N$ and $Y$ respectively. Tradable and non-tradable inputs are differentiated, while the final good is homogeneous and here the market is competitive.

The amount of good a worker with ability $s$ can produce is denoted with $\varphi(s)$. If the final good $Y$ is characterized by a unique technology, two different technologies are instead assumed for producing tradable versus non-tradable inputs. More precisely, tradable inputs require a more advanced technology than non-tradable, $\varphi_T > \varphi_N$. Thus the amount of tradable inputs a worker with skill $s$ can produce depends on the match between ability and technology, $\varphi_T(s)$. Since a skilled worker is more productive than an unskilled worker, the high skilled worker has a comparative advantage in the high technology production.

Firms producing the tradable intermediates are identical when born. They freely hire workers who vary in their skill on a perfectly competitive labor market. Thus firms are heterogeneous ex-post, after they match with workers. Overall two types of intermediate producers exist: firms producing tradable intermediates with advanced technology and firms producing non tradable intermediates with low technology. Firms are free to enter in both sectors, homogeneous and differentiated. However, to produce the differentiated intermediate inputs, $Y_T$ and $Y_N$, a firm must bear a fixed cost. The size of this fixed cost depends on the technology employed. The fixed cost in the more advanced technology sector is assumed to be larger than the fixed cost in the non tradable sector, i.e. $F_T > F_N$.

In our set up, individuals with low skill do no find a match with high technology firms producing the tradable intermediate. Thus, these individuals enter the non-tradable inputs sector where they become entrepreneurs (self-employed). In the tradable intermediate sector (wage sector) individuals receive a wage which is lower than what workers receive in the self-employment sector, s.a. $w(\gamma_g, s) < \pi_g(s)$. Monopolistic competition characterizes tradable and non-tradable input sectors. The main difference is that in the non-tradable inputs sector (self-employment) each individual is a firm which then produces a variety.

Firms producing the tradable intermediates are risk neutral and have perfect information about skill and risk aversion. These firms are aware of the different level of risk aversion between female and men. Therefore, they will offer a contract that completely insures the workers. Since there is perfect information, the efficient condition requires that at the optimal contract the worker receives a payoff that is independent of the result. The optimal distribution of risk in this case is for the firm to accept all the risk completely insuring the workers. Since

2 Notice that if the fixed cost in the tradable sector is unique, the fixed cost in the self employment sector will be gender specific.

3 The wage schedule in a competitive labor market is composed by three types of wage (see Yeaple page 6).
women are more risk than men, they will accept to pay a higher cost for this insurance, thus:

\[ w_F(\gamma_F, s) < w_M(\gamma_M, s) \]

**Lemma 1** If a worker with skill \( s \) works in the non-tradable sector, \( Y_N \), then all workers with \( s < \bar{s} \) will enter the self-employment sector. If a worker with skill \( \hat{s} \) works for firms producing intermediates in the tradable sector (using high technology), then all workers with \( s > \hat{s} \) will be hired by those firms.

**Final Good Producers**

Final good are produced by combining home and foreign intermediate goods. The home final good producer combines domestically produced inputs with those foreign intermediate imported from abroad.

Production is Cobb Douglas in tradable and non-tradable inputs, with a tradable share \( \beta \),

\[ Y = \left( \frac{Y_T}{\beta} \right)^\beta \left( \frac{Y_N}{1-\beta} \right)^{1-\beta} \]  

(3)

where \( Y \) is the final good output and \( Y_T \) and \( Y_N \) are the aggregates of tradable and non-tradable intermediates respectively.

The aggregate tradable and non-tradable intermediates will be:

\[ Y_N = \left( \int_0^{\bar{s}} y_{N,g}(s) \frac{\theta-1}{\theta} ds \right)^{\frac{\theta}{\theta-1}} \]  

(4)

\[ Y_T = \left( \int_{\bar{s}}^{\infty} y_T^{\frac{\theta-1}{\theta}} ds + \int_{\bar{s}}^{\infty} y_T^{\frac{\theta-1}{\theta}} ds \right)^{\frac{\theta}{\theta-1}} \]  

(5)

where \( y_{N,g} \) is the non-tradable variety produced by the gender specific entrepreneur; \( y_T \) is the tradable variety realized combining female and male workers using the high technology and \( y_T^* \) is the imported tradable variety. The elasticity of substitution between intermediate goods within a sector is \( \theta \). In the following section, we will be more precise on intermediate good producers.

The final goods market is competitive. Given the final good price at home, \( P \), and the price of inputs, the final good producer solves the following problem,

\[ \max \quad \Pi = PY - P_N Y_N - P_T Y_T \]  

(6)

subject to production technology for the final good, equation (3). The equilibrium price for
one unit of final good is:

$$P = P_N^{1-\beta} P_T^\beta$$

(7)

The exchange rate shocks will play a role by affecting directly $P_T$ and then indirectly occupational choices in the non tradable sector (self employment).

### 3.4 Intermediate Good Producers

As described above, two types of intermediates are combined to obtain the final good: tradable and non-tradable intermediates. Tradable intermediates, $Y_T$, are produced by monopolistic competitive firms that hire both female and male workers. Non-tradable intermediates, $Y_N$, are produced by self-employed individuals which interact in a monopolistically competitive environment. Individuals with skill in the interval $[\overline{s}, \infty)$ will be hired to produce the tradable intermediate using the high technology, $\varphi_T$. Differently, individuals with skill in the interval $(0, \overline{s})$, become self-employed in the non-tradable sector and use the low technology, $\varphi_N$.

#### Tradable intermediate good producers

Concerning the tradable intermediates goods, each firm $f$ produces a different variety, $y_{Tf}$, by combining female and male workers,

$$y_{Tf} = T(s\varphi_T) \left( \frac{l_F}{1-\eta} \right)^{1-\eta} \left( \frac{l_M}{\eta} \right)^\eta$$

(8)

where $T(s\varphi_T)$ is a function that matches the skill level of the hired workers and the technology used. Since the tradable intermediate sector uses the high technology, the skill level will lie in the interval $[\overline{s}, \infty)$: workers hired in the tradable sector have an ability $s > \overline{s}$. All tradable intermediate good producers use technology $\varphi_T$, but pay a wage related to the workers skill and corrected for risk aversion.

Profits are:

$$\pi_T = p_T y_T - \left( \frac{y_T \tau_{ij}}{\varphi_T} + F_T \right) w_F^{1-\eta} w_M^{\eta}$$

(9)

where $\tau_{ij}$ and $e_{ij}$ equal one when the varieties is sold at home.

#### Non-tradable intermediate good producers

Individuals that cannot find a match in the tradable intermediate sector enter as self-employed the non-tradable sector. These individuals have low ability/skill, $s < \overline{s}$, and produce using the low technology, $\varphi_N$. Individuals enter the non-tradable sector because they have a comparative advantage in the low technology sector. In the non-tradable sector the production function is

$$y_N = T(s\varphi_N)l$$

(10)
Profits are
\[ \pi_N = p_N y_N - (c_N y_N \varphi_N + F_N)w_N \] (11)

Notice that there is no difference between female and male entrepreneurs, so \( w_N \) is the cost of the unique worker in the firm. In this formulation each worker is also the entrepreneur who runs the firm and earns operating profits. Individuals, female and male, enter the self-employment sector because of their ability level. The profits will reflect the level of skill of the entrepreneur which lies in the interval \([0, \bar{s}]\).

**Price Indices for Intermediates**

Price indices for tradable varieties is:
\[ P_{1}^{1-\sigma} = (\frac{\sigma}{1-1})^{1-\sigma} \int_{s}^{\infty} \left( \frac{w_{T}^{1-\eta} w_{M} \tau_{ij} e_{ij}}{\varphi_{T}(s)} \right)^{1-\sigma} ds \] (12)

notice that when \( i = j \) then \( \tau_{ij} = e_{ij} = 1 \). This price index, \( P_T \), includes both tradable intermediate produced and consumed domestically and those tradable intermediate imported from abroad. Similarly, the price index for non-tradable varieties is defined as:
\[ P_{N}^{1-\sigma} = (\frac{\sigma}{1-1})^{1-\sigma} \int_{0}^{\bar{s}} \left( \frac{1}{\varphi_{N}(s)} \right)^{1-\sigma} ds \] (13)

Notice that \( m \) is a subset of \( n \).

**4 Equilibrium Conditions**

The firm operating in the non-tradable sector, run by a type-\( s \) entrepreneur does not export. Free entry implies that the earnings of entrepreneurs coincides with firms’ operating profits,
\[ w_N(s, \varphi_N) = (p_N - c_N)y_N(s, \varphi_N) \] (14)

In the non-tradable sector, the earnings of a worker/entrepreneur with skill \( s \) is positively related to the scale of the firm on the domestic market and to the firm’s market power. Notice that entrepreneurial profit rises with \( T(s, \varphi_N) \).

In the tradable sector, a firm employs a combination of type-\( s \) workers. Recalling that the intermediate tradable producer must incur a fixed cost \( F_T \), the wage paid to type-\( s \) worker depend on the degree of risk aversion,
\[ w_T(\gamma) = \] (15)
which derives from the solution of the problem in which each firm (principal) maximizes the surplus she obtains from the relationship

\[(p_T - w_F^{1-\eta}w_M^\eta)y_N\]

under the restriction that the agent is willing to accept to participate

\[u(w(s,\varphi_T)) \geq u\]

this is known as the participation condition.

TBC...

5 General Equilibrium Analysis

In this section we analyse the effect of a devaluation (reduction in e).

TBC...
References


