



INTERNATIONAL POLICY CENTER
Gerald R. Ford School of Public Policy
University of Michigan

IPC Working Paper Series Number 75

Minimum Wages, Globalization and Poverty

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December, 2006

MINIMUM WAGES, GLOBALIZATION AND POVERTY IN HONDURAS

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December 2007

JEL Classification: J23, J31, J38

Keywords: minimum wage, poverty, Central America, Honduras

We appreciate the suggestions and comments from Jan Svejnar, Machinko Nissanke, Erik Thorbecke and participants of the UNU-WIDER Project Conference on “The Impact of Globalization on the Poor in Latin America” 23-24 September 2006, Rio de Janeiro, Brazil. We would like to thank DFID for supporting this research and the individuals in Honduras who made this study possible: Miriam Montenegro, Domingo Ordonez and Julio Raudales at the Technical Secretariat of the Presidency, Dr. Ian Walter (Economic Advisor to the President) and Jorge Monge, of DFID. Numerous Honduran civil servants gave us comments, important institutional knowledge and the data including Manuel Rodriguez and Mario Ochoa (Central Bank) Bernardo Mejia and Rafael Su (Ministry of Labor); Elizabeth Ribera (Finance Secretariat), and Magdalena Garcia (National Institute of Statistics, INE).

Abstract

To be competitive in the global economy, some argue that Latin American countries need to reduce or eliminate labor market regulations such as minimum wage legislation because they constrain job creation and hence increase poverty. On the other hand, minimum wage increases can have a direct positive impact on family income and may therefore help to reduce poverty. We take advantage of a complex minimum wage system in a poor country that has been exposed to the forces of globalization to test whether minimum wages are an effective poverty reduction tool in this environment. We find that minimum wage increases in Honduras reduce extreme poverty, with an elasticity of -0.18, and all poverty, with an elasticity of -0.10 (using the national poverty lines). These results are driven entirely by the effect on workers in large private sector firms, where minimum wage legislation is enforced. Increases in the minimum do not affect the incidence of poverty in sectors where minimum wages are not enforced (small firms) or do not apply (self-employed and public sector).

**Does Gender Matter for Firm Performance?
Evidence from Eastern Europe and Central Asia**

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JEL codes: D24, M21, O12, O16,

Keywords: Entrepreneurship, Finance, Gender, Eastern Europe and Central Asia

Acknowledgements: This paper benefited from presentations at the World Bank Economists' Forum, PREM Learning Week and the Seminar on Poverty and Applied Microeconomics. We would like to thank the ECSPE and PRMGE groups at the World Bank for supporting this research and the following individuals for discussions that improved the paper: Elena Bardasi, Zuzana Brixiova, Paul Cichello, Stepan Jurajda, Leora Klapper, David McKenzie, Andrew Morrison, Fernanda Ruiz Núñez and Jan Svejnar.

*This paper was prepared as a part of the background research for an ECA regional report titled 'Sharing the Growth Dividend: Women in the ECA Region'.

1. Introduction

If women face different conditions and institutional constraints than men; these factors can spill over into their performance in entrepreneurship. A relatively new strand of entrepreneurship research raises the question “Does gender matter?” This paper complements the existing research (which is based largely on the experience of one country in the developed part of the world), with the analysis of entrepreneurial performance by gender in the 26 countries of the Eastern Europe and Central Asia (ECA), a region where there is little information on this topic. We measure relative performance in terms of sales revenues, profits and total factor productivity and we explore economic and institutional explanations for the patterns we observe. In contrast to some of the other studies on gender differences in entrepreneurial performance, this paper explores many dimensions of performance (such as scale, profitability, technical and financial efficiency) and therefore provides a more well rounded and comprehensive analysis of the role of gender in firm performance.

The definition of entrepreneurship in the literature is quite broad, including “self-employed” individuals (with or without employees), “owners of a firm” and “innovators” (defined in various ways). The operationalization of these definitions is in part circumscribed by data availability, but it is clear that they can reflect very different phenomena. In this paper, we define an entrepreneur as an owner/manager of an individually or family owned firm.

The paper is organized as follows: In Section 2 we review the literature on the relative performance of male and female-owned firms. The data are described in Section 3, and the measures of our performance gaps are presented in Section 4. We test for various explanations for the performance gaps in Section 5 and draw conclusions in Section 6.

2. Review of the Literature on the Relative Performance of Male and Female Entrepreneurs¹

In this section we briefly review the literature that evaluates the relative performance of male and female-owned firms by summarizing what we know about the types and sizes of gender gaps in entrepreneurial performance (Section 2.1) and what explanations have been offered for the gaps that have been found (Sections 2. 2). This literature spans a wide array of disciplines and journals. Since we focus on firm performance, we do not, for example, cover the vast labor economics literature on ‘self-employment’ as a proxy for entrepreneurship. Most studies of women business owners are in managerial journals; they tend to be descriptive and based on small sample sizes in one country (see e.g., Brush, 1992 for a review). Our analysis is more rigorous, based on economic theory of the firm, and uses a large firm-level data set for numerous countries.

2.1. Measures of Relative Performance

The evidence on the effect of gender on firm performance is mixed. Some studies provide evidence of female underperformance (e.g., Brush, 1992; Rosa et al., 1996), while others do not find gender-based differentials (e.g., Du Rietz and Henrekson, 2000; Bardasi, 2007). The findings depend in part on which measure of performance is used and what other factors are being controlled for.

A growing body of evidence consistently shows that female-owned enterprises are smaller -- in terms of sales, assets and employment -- than male-owned enterprises (Chagnati and Parsuraman, 1996; Coleman, 2007; Robb, 2002; Watson, 2002, Loscocco and Robinson, 1991). For example, Coleman (2007) finds that - as recently as 1998 in the US - among small firms (fewer than 500 employees), the average male-owned business was twice as large as the average female-owned business in terms of total sales and assets and had 50% more employees (without holding anything else constant). Similarly, Chagnati and Parsuraman (1996) find (using US data) that sales are twice as large in male-owned business as in female-owned business. However their sample (less than 400 firms) was much smaller than Coleman’s sample of 2,800 firms and covered smaller firms (4 - 99 employees). While these two studies only provide only ‘unconditional

¹ This section was enriched tremendously by the chapter on ‘Female Entrepreneurship’ in the forthcoming new edition of Simon Parker’s textbook *Economics of Entrepreneurship*. We are grateful to him for sharing it with us.

means,' Loscocco and Robinson (1991) find sales lower for women among small business owners in same industry comparisons (equivalent to the 4-digit ISIC) in the US. Their conclusions are drawn from comparing mean sales in industrial sub categories dominated by women compared to the sales in categories dominated by men. These findings are reminiscent of the occupational segregation or occupational crowding literature (e.g., Meng and Miller, 2001, Preston, 1999).

Some studies also indicate that firms owned by women are less profitable than those owned by men. Robb and Wolken (2002) study a sample of white-owned small businesses in the U.S. and show that women owned businesses generate only 78% of the profits generated by male-owned businesses. Bosma et al. (2004) find male Dutch business owners outperformed women in terms of profit. Neither of these studies conditions on the industrial location of the firm.

Other studies, however, do not find females perform less well when other measures of performance (such as return on equity, total factor productivity, growth of sales or employment) are used. In a study from Australia, Watson (2002) shows that women business owners earn similar rates of return on equity and assets as male business owners. Using World Bank Enterprise Surveys (2002-2006), Bardasi et al. (2007) find that in Africa, female-owned businesses are at least as productive as male entrepreneurs when measured by value added per worker and total factor productivity, holding constant the industry in which they work. Similarly, Kepler and Shane (2007) show that there are no significant gender differences in terms of performance outcomes of nascent entrepreneurs.

The research findings with respect to gender differences in the growth of the business are mixed. Some studies show that female-owned enterprises do not underperform in terms of employment growth (Fischer et al., 1993; Chagnati and Parsuraman, 1996) whereas others do (Bosma et al., 2004). Some find that women-owned firms have significantly higher annual sales growth than men (Coleman, 2007).

2.2 Explanations for Differences in Performance

In studies where gender differences in firm performance emerge, various explanations for these differences are proposed ranging from psychological and social differences between male and female entrepreneurs to institutional constraints. We focus

here on the two which we will address in our analysis – women’s selection into various sectors and institutional constraints.

Gender composition of industries

One explanation for the lower performance of female entrepreneurs is that they are disproportionately concentrated in certain industries, which have characteristics that explain their performance (e.g., the less well performing industries or in more competitive industries where there are lower profits). Systematic gender differences in overall industry composition have been documented in the US and elsewhere. Women entrepreneurs are seen to be heavily concentrated in retail sales and services (Bates, 1995; Kallegerg and Leicht, 1991; Du Rietz and Herekson, 2000; Loscocco and Robinson, 1991; Verheul et al., 2004) while industries like construction remain heavily dominated by men (Bates, 1995; Loscocco and Robinson, 1991). Moreover, it has been shown that women are less likely than men to operate business in high-technology sectors in the US (Loscocco and Robinson, 1991; Anna et al., 1999). Mayoux (1995) claims that: “Women are overwhelmingly clustered in a narrow range of low investment, low profit activities for the local market.” Loscocco and Robinson (1991) show that women are concentrated in sectors which tend to have lower sales revenue on average. Hundley (2001) shows that industrial choice explains about 9 to 14 percent of the gender based self-employment earnings differential. This was largely due to the concentration of women in personal services sector and their under-representation in the more lucrative professional services and construction industries.

Institutional Factors

Barriers to female entrepreneurship can arise from existing institutional structures, both formal and informal. Welter and Smallbone (2003) argue that while formal institutions can influence opportunities for entrepreneurship, informal institutions can strongly affect perceptions of entrepreneurial opportunities. This is particularly relevant in the context of female entrepreneurship. Aidis et al. (2007) catalogue the important institutional influences on female entrepreneurship. With regard to formal institutions they identify formal gender equality recognized by law, labor market legislation, tax legislation and child care infrastructure as being important. In the context of informal institutions discrimination against women in the workplace, traditional attitudes, religious

beliefs, perception of entrepreneurship as a male activity, social attitudes towards women and employment and family values are highlighted as important institutional influences on female entrepreneurship. We focus on institutional factors that may affect access to capital.

First we note that the literature tends to find that women have less access to capital. For example, in a study from Australia, Watson (2002) shows that women business owners have less start up capital, which explains their lower incomes and profits compared to men. Coleman (2007) found that among small business owners in the US, women were less likely to have a loan of any type (46.5% v. 58.9% of the men) and a significantly lower percentage had loans from banks (27.3% v. 39.3%). Similarly women were significantly less likely to have a line of credit (18.8% v. 32.2%). Finally Carter and Rosa (1998) estimated that in Britain, the average female entrepreneur uses a third less external finance than the average male entrepreneur.

Is differential access to finance due to discrimination? Several studies suggest that raising capital is more difficult for women than men in the US (Brush, 1992: Carter and Cannon, 1992: Carter 2000) and Eastern Europe (Muraveyev et al., 2007), but it is not clear whether it is due to discrimination on the part of the banking sector or the result of other factors.

Some studies infer that discrimination by banks can be a factor. An interesting study by Fay and Williams (1993) tested for discrimination by sending out identical loan applications, whose sole difference was the gender of the hypothetical applicant. They found that the applications were significantly more likely to be declined or restricted if the name was that of a woman than a man. In their study using data from Business Environment and Enterprise Performance Survey (BEEPS) from Europe, Muravyev et al. (2007) find that female managed firms have a 5.4 percent lower probability of securing a bank loan than male managed firms. They also evaluate existence of financial constraints by looking at interest rates and find that female managed firms on average pay 0.6 percent higher interest rates than their male counterparts. Both these factors suggest discrimination against female entrepreneurs and the authors suggest that this discrimination is found to be higher in the least financially developed countries in the region. This is corroborated by Aidis et al. (2007), who - using original survey data from

Lithuania and Ukraine - show that access to funds is a more important barrier for female business owners than their male counterparts. In survey data from Ukraine, women were more likely than men to cite financial constraints as an important obstacle to running their business. These financial constraints also included greater under-capitalization at start up and less ability to raise external funds.

There is some evidence against the discrimination story in the US and Canada. In studies with larger sample size than that of Fay and Williams (1993), only modest or negligible differences were found in the way that bank loan officers perceived gender in business loan applications (Buttner and Rosen, 1989; Wilson et al., 2007). Similarly, the terms of loans granted to male and female business owners did not vary significantly in a Canadian national study (Riding and Swift, 1990). Once one controls for the size and age of the venture and the particular industry, gender differences in access to and terms of finance (including rates of loan approvals and collateral requirements) tend to disappear (Coleman, 2000; Orser et al., 2006). Using data from the *Survey of Small Business Finances* in US, Cavalluzzo and Wolken (1998) find that after controlling for personal wealth (in the form of home ownership, home equity, personal net worth etc.), differences in denial rates between male and female-owned firms are not statistically significant. Similarly, in a study on micro and small enterprises in Trinidad and Tobago, Storey (2004) tests for the presence of racial and gender discrimination in bank loans. They take the reported refusal to grant loans to groups, when all other indicators of credit-worthiness are taken into account, as evidence of discrimination and find neither application nor denial rates differ significantly by gender once all other indicators of credit-worthiness are taken into account.

If discrimination does not explain loan decisions, why does the average female entrepreneur start business with less capital or have less access to bank finance than men? Significant differences in male and female access to finance may be accounted for by differences in other characteristics affecting their credit worthiness including human capital factors and personal wealth. For instance, women may have on average more difficulties in securing a loan than men because they concentrate in the sectors such as services, which need less capital (Verheul and Thurik, 2001). Since banks typically lend on the basis of “hard assets” such as plant and equipment, of which service businesses

have few, they are less likely to obtain a loan. Another argument is that they tend to run business in sectors with fewer market growth opportunities so it may be optimal for both lenders and entrepreneurs (Oser et al., 2006).

If women entrepreneurs are less growth oriented or run firms at lower capacity, this might also explain the lower supply of finance from the bank perspective. Several studies using US and UK data have found that women entrepreneurs are more likely than men to be working part-time. This is shown with data on both self-employed individuals (Devine, 1999a, 1999b) and firms (Loscocco and Robinson, 1991). For example, Census data collected in 1982 show that while 60% of women owners worked fewer than 29 hours per week, only 41 % of their male counterparts did so. Loscocco and Robinson (1991) report that only 27% of the women in their sample of small business devoted over 40 hours per week to business compared to 48% of the men.

However, is the lower access to loans explained by demand side behavior, such as lower applications to banks by women because they are more risk averse or for other reasons? Some papers show that women tend to have higher risk aversion (Jianakopulos and Bernasek 1998, Barber and Oden 2001, Dohmen et al 2005). These differences could have important implications for business performance if higher risk aversion leads women to restrict investment in their business ventures. The Global Entrepreneurship Report 2005 found that fear of failure is significantly higher for women than men in middle income countries (Minniti et al 2005). In addition, Kepler and Shane (2007) claim that male nascent entrepreneurs examine more ideas and gather more information while pursuing a new start-up than female nascent entrepreneurs. Do women use less external finance and depend more on own reinvesting own profits? There is some evidence to suggest that men re-invest a larger share of profits generated back into their business (Grasmuck and Espinal, 2000). See also Kim (2006) for US; Carter and Rosa (1998) for similar evidence in the UK.

3. Data

In this paper we use the 2005 *Business Environment and Enterprise Performance Survey* (BEEPS) data, produced by the World Bank and the European Bank for Reconstruction and Development (EBRD). This dataset provides detailed firm level data for 26 post-socialist economies: 15 from Central and Eastern Europe (CEE) and 11 from

the Commonwealth of Independent States (CIS).² The original 2005 database is comprised of about 9,500 firms, with 200-600 firms per country. The sample was constructed by stratified random sampling from a national registry of firms. In each country, the sectoral composition of the sample in terms of manufacturing versus services was determined by their relative contribution to GDP. Firms that operate in sectors subject to government price regulation and prudential supervision, such as banking, electric power, rail transport, and water and waste water, were excluded from the sample. The sample includes only registered firms (i.e., not informal firms), and their size varies from as few as 2 employees to as many as 9,999 employees. Moreover, firms in rural areas and small towns are represented since at least 10% of firms in the sample are in a small city or the countryside (i.e., population under 50,000 inhabitants).

The data enable us to identify the gender of the largest shareholder (owner) of individually or family owned firms. Hence in this paper we define male v. female entrepreneurs as “male v. female sole or principal owner of individual or family owned firms.”³ These individuals are also the main managers of the firm. Other strengths of these data from our perspective include the fact that the same survey instrument was administered in 26 countries in the same year; that there are a host of performance variables for each firm; and there are a set of questions dealing with institutional factors, especially in the area of finance, which may affect the relative performance of male and female-owned business. The weaknesses include a) the small number of firms sampled in each country; b) inability to identify the gender of the other owners of the firm when there is more than one; c) lack of demographic information on the entrepreneurs; and d) the numerous missing answers to some variables of interest (e.g., capital).

² The 15 CEE countries are: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Former Yugoslavia, FYROM, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia. The 10 CIS countries are: Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Ukraine and Uzbekistan. Note that Turkmenistan never entered the BEEPS sample.

³ These are existing firms, rather than “nascent” firms. To the extent that there are gender differences in the survival of firms, we may have a biased sample. However, given Kallebert and Leicht (1991) and Ruderl and Preisendorver (1998) have found no significant differences between the survival rates of male- and female-owned businesses, our sample should not be biased on this dimension. If survival bias is stronger among women, then our results comparing existing firms owned by men v. women might be upwardly biased for all women entrepreneurs.

There are about 7,000 firms where the largest shareholder is an individual or family;⁴ however, as Table 1 shows, a number of firms are missing observation for the performance measures. Hence, our analytical sample is restricted to approximately 3,334 firms once we delete observations: a) with missing information on capital (since only 3,531 firms have information on fixed assets or capital) or sales or labor, and b) from two-digit NACE industries with fewer than five firms. The result is that the analytical sample does have somewhat higher mean sales, cost of material inputs and profits than the original sample.

We begin with three basic descriptive statistics of female-owned firms in ECA. First the higher concentration of males in business ownership is evident in this region as in most of the world. In 2004, 26.8% of all entrepreneurs were women. This share is slightly lower to that found in the global averages, where according to Reynolds et al. (2002), men are about twice more likely to be involved in entrepreneurial activity than women. However, the average in our data is higher than that found in the 2005 GEM data base for “nascent entrepreneurs” in 35 countries. There the rates of female entrepreneurship range from about 1-2% in Netherlands and Japan to nearly 20-24% in Venezuela and Thailand (Minniti et al., 2005). The country level shares of female entrepreneurs in our data, shown in Figure 1, range from above 40% in Latvia to below 15% in Armenia. Explanations for the variance in the share of female entrepreneurs across countries are left for another paper, which can exploit panel data on countries over time. However, we provide a simple plot in Table A4, which indicates a positive association between the level of female education (share with secondary level schooling in a country) and the share of female entrepreneurship.

Second, again as found in other parts of the world, women in this region own significantly smaller firms than men, when measured by the number of permanent employees. About 57% of all female-owned enterprises employ fewer than 10 permanent employees in contrast with 41% of male-owned enterprises (see Figure 2). This finding is addressed in greater detail below.

⁴ We have therefore excluded from the analysis firms where the largest shareholder is the state, domestic and foreign companies, banks, or employees or management.

Third, we find that women business owners are more likely to be in certain industries than others: about 22% of all female entrepreneurs are found in retail and wholesale trade and 14% in textiles and apparel, while only 6% are in construction and less than 1% are in extraction activities (mining). Hence, not surprisingly a large share (45%) of the entrepreneurs in textiles and apparel are women, while in mining only 8% of the entrepreneurs are women.

4. Performance Gaps

In this section we first measure performance gaps in various ways: in terms of profits, firm size (total sales), and efficiency (profits controlling for output and TFP). We then perform a robustness test of our TFP measure using propensity score matching techniques (Section 4.2). In Section 4.3 we ask whether the scale of operation of male and female entrepreneurs is suboptimal. We first present results for all 26 ECA countries in our sample (Table 2a) and then present results for European Union (EU) member countries and non-member countries (Non-EU) separately (Table 2b).⁵

4.1 Differences in Firm Size and Efficiency

The unconditional (raw) average profit is 227 Euros in a male-owned firm and 166 Euro in a female-owned firm in ECA in 2004. Hence, the average female entrepreneur earns 61 Euros less (see appendix Table A1).⁶ When we correct for outliers by using robust regression methodology and take into account the country fixed effects, the gender gap in profits falls to only 11 Euros but this difference remains statistically significant.⁷ Finally, when we control for both industry and country fixed effects in a robust regression, the differences falls from 11 to 7 Euros; it remains statistically significant (see first panel in Table 2a). Hence, the inclusion of industry effects is important; it reduces the gap to only 3% of average male profits - from 27% for the unconditional mean gap.

⁵ EU countries in the sample include: Bulgaria, Czech Rep, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Non-EU countries in the sample include: Albania, Armenia, Belarus, Bosnia, Croatia, FYROM, Georgia, Kazakhstan, Kyrgyz Rep, Moldova, Russia, Tajikistan, Turkey, Ukraine, Uzbekistan and Yugoslavia.

⁶ These gaps in appendix Table A1 are calculated by giving each firm in the sample the same weight. We might consider weighting firms by size of GDP or Population of the country to make them “representative” of the region as a whole. In the original sample more firms were included in the larger countries so they are roughly representative.

⁷ These results do not change when we also control for the age and location (capital city v. other) of the firm.

Similarly, sales revenue⁸ of the average female entrepreneur in a given country in ECA is significantly (63.1%) smaller than that of the average firm owned by a man (using robust regression methods);, once we control for the (two digit) industry in which the firm operates, the difference falls dramatically to 37.2% (see second panel in Table 2a). Hence, on average sales revenue in a female-owned firm in a given industry and country in ECA is less than two-thirds that of a male-owned firm in that industry.

These findings suggest that women’s firms are smaller in terms of sales revenues and profits than men’s firms. Once we control for concentration of female entrepreneurs in different industries, the difference in their size and profits falls, but remains significant. We return below to the question “What is it about the industries in which women are located in that drives down these differentials?”

In the third panel of Table 2a we next explore gender gaps in efficiency, using both a measure of financial efficiency and total factor productivity (TFP) We ask whether the profit gap we found above could be brought about by a different scale of operation, hence we estimate the differences in men’s and women’s profits controlling for sales, which can be seen as a measure of financial efficiency.⁹ We find that by this measure, there are no statistically significant differences between male and female entrepreneurs in ECA. Hence the originally detected lower profit in female-owned firms is accounted for entirely by the lower scale of operation.

Are female entrepreneurs less productive in terms of the revenue that they generate from given inputs than males? The TFP findings are obtained from estimating a Cobb-Douglas production function with pooled firm-level data from all 26 countries:¹⁰

$$\ln Y_{ij} = \alpha^k \ln K_i + \alpha^L \ln L_i + \alpha^M \ln M_i + \delta F_{ij} + I\phi + C\eta + \varepsilon_{ij} \quad (1)$$

where $\ln Y$ is the log of sales revenues,¹¹ i and j index firm and industries (at the two-digit NACE level), respectively. The inputs include: K , capital stock (at replacement value); L ,

⁸ In the analysis, sales revenue is logged but profits are not logged in order to preserve negative observations for profits.

⁹ The financial literature often uses the profit rate (profit/sales) as a measure of efficiency. We also ran this regression with the profit rate on the left hand side and a female dummy on the right hand side and find that there is no significant gender difference in the profit rate. We prefer our specification it allows us to see that differences in profits by gender are brought about by the scale of operation.

¹⁰ Equation (1) can also be interpreted as a first order approximation for more complicated revenue (production) functions.

labor (number of permanent employees) and M , intermediate material input (including electricity). F is a dummy variable equal to one for a female entrepreneur; I is a set of industry fixed effects and C is a set of country fixed effects.

The estimated δ coefficient on F , presented in the next-to-last column of Table 2a, indicates that the average female-owned firm is only slightly (2.1%) less efficient than the average male-owned firm in a given industry.¹² It is argued that women's lower TFP is driven by lower capacity utilization. In the last column of Table 2a we estimate differences in TFP after adjusting capital for capacity utilization and find that this does not change the result. Figure 5 shows the kernel density distributions of the TFP of male and female entrepreneurs. Comparing the two we find that they are highly overlapping, indicating little difference in total factor productivity by gender of the entrepreneur.

If differences in the institutional environment of countries matter, it is possible that within the ECA region, there are differences between the EU and Non-EU countries in the relative performance of male- and female-owned firms. Hence in Table 2b we replicate the regressions of Table 2a for each set of countries. We find similar patterns between the two groups of countries for all performance indicators except TFP. That is, for both EU and Non-EU countries gender based gaps exist in log sales and profits and diminish once we control for industry fixed effects. There is no evidence of gender differences in financial efficiency in either EU or Non-EU countries. However, gender based differences in TFP are statistically significant only in Non-EU countries, not in their EU counterparts.

Hence we conclude that on average female-owned firms in the ECA region are slightly less efficient in terms of total factor productivity but equally efficient in terms of financial efficiency (profits controlling for firm size and industry). The gender difference in TFP in the region is being driven by differences in the Non-EU countries.

¹¹ Strictly speaking TFP is estimated with output. However, this is rarely implemented, except in studies of a single industry with a homogeneous product (such as cement). Most studies use revenue as we do and control for price differences with a price deflator. Since this not available, we use industry fixed effects to control for price (and other) differences across industries.

¹²We find that estimating this equation as an industry specific production function (i.e., interacting the inputs with two-digit industry dummies) does not affect the coefficient on the female dummy. With this specification, the coefficient is estimated as -0.028, with a standard error of 0.009.

4.2 Robustness Check of Differences in Efficiency (TFP)

The issue of concentration of women entrepreneurs in certain industrial categories and smaller firm size, which has received some attention in the literature, is confirmed in the ECA region. Moreover, since on average female entrepreneurs constitute merely 27 percent of all entrepreneurs in this region, one need question whether there might not be several industrial categories where males are present but female entrepreneurs are entirely absent. In this situation a comparison of male and female entrepreneurial performance using traditional regression analysis would compare productivity of male entrepreneurs by projecting productivity of female entrepreneurs in industry and size categories where they are in negligible numbers or nonexistent. Hence it becomes important to ensure that in making firm productivity comparisons we do not consider firms in those industry or size categories where the productivity of female entrepreneurs is not observed.

We use propensity score matching (PSM) methods as an alternative specification to test the robustness of our regression analysis. Matching methods allow us to weight our dataset in a way that the observations we analyze are more comparable. Male and female entrepreneurs are matched on industry (disaggregated at the two digit ISIC code level) and level of input use (labor, capital and materials). Average treatment effects are then calculated for $\ln\text{Sales}$. This method allows us to compare the sales of male and female entrepreneurs that are in similar industries and on similar scales of production, thereby allowing us to obtain the average effect of being a female entrepreneur on TFP. Propensity scores are calculated by using a *logit regression* in which dummy for female ownership is used as the dependent variable and log of inputs (labor, capital and material), industry and country dummies are used as independent variable.

A necessary condition for the implementation of PSM methods is a sufficiently large overlap in the distribution of observable characteristics between control (male entrepreneurs) and treatment groups (female entrepreneurs). This condition is known as ‘the common support condition’. On controlling for industry and inputs we obtain a large common support area. Only two observations from the treatment group are dropped due to lack of similar control group observations. For comparison we have 2332 observations for our control group of male entrepreneurs and 858 observations for the treatment group

of female entrepreneurs. To obtain average effects of being female we implement ‘Nearest Neighbor Matching,’ both with and without replacement.

The results from the PSM method, presented in Table 3, indicate that if we use the stricter method of “matching with replacement,” we find there is significant difference (at the 5% level) of 0.15 between the mean lnTFP of males and females. In percentage terms the gap is -2.7%, which is quite similar to the significant gap estimated in the regression of -2.5% (in Table 2). If we use the less stringent method of “matching without replacement,” the gender gap in TFP (of -4.1%) is significant at the 5% confidence level and larger than the gap estimated using the regression technique. Since the findings with the regression method are close to those using the more stringent PSM estimate, we conclude that they are robust. Although the difference in TFP is statistically significant, it does not appear to be large in terms of its economic significance.

The next question is whether the differences in TFP are related to the differences in scale. In particular, since women’s firms are smaller than men’s, are they inefficiently small?

4.3 Are Women’s Firms Operating at a Suboptimal Scale?

In order to determine the extent to which the scale of operation of male and female-owned firms are different and suboptimal, we test for returns to scale in the framework of the production function. We estimate equation (1) separately for men and women using a robust variance method and clustering the standard errors by two-digit industry. We perform two-tailed Wald tests to learn if men’s returns to scale are constant (i.e., $H_0: \alpha_k + \alpha_l + \alpha_m = 1$) and, similarly, if women’s returns to scale are constant ($H_0: \beta_k + \beta_l + \beta_m = 1$). We then test for increasing returns to scale, using a one-tailed Wald test. We reject the hypotheses of constant returns to scale and cannot reject the hypothesis that men’s and women’s returns to scale are increasing (1.024 for men and 1.049 for women). We then compare the set of coefficients for men and women and find that we cannot reject the hypothesis that women’s returns to scale are higher than those of men (see Table 4a and 4b).

We also explore differences in returns to scale by industry type, where industries are classified as being in manufacturing or services.¹³ On performing Wald tests similar to the ones described above, we find that returns to scale are greater than one for male and female entrepreneurs in both manufacturing and service industries and the returns to scale for female entrepreneurs are higher than those for male entrepreneurs within manufacturing and within service industries (see Table A1).

Hence, we conclude that both male and female entrepreneurs are operating at an inefficiently small scale (in the zone of increasing returns), and that women's firms do so to a greater extent than men's. We note, however, that the difference from constant returns is quite small as is the difference between men and women.

These differences in returns to scale persist when we decompose our sample by EU membership (Table 4b). Returns to scale are greater than one for both men and women in EU and Non-EU countries. It is interesting to note that returns to scale are slightly higher for both men and women in EU countries compared to their Non-EU counterparts. These results might reflect structural differences in the business environment among these countries and merit further investigation. In both the samples we find that returns to scale for female entrepreneurs are significantly higher than male entrepreneurs.

5. What Explains Why Women Are Operating Smaller Businesses?

We have found that women are operating smaller businesses than men and they are somewhat less efficient both in terms of total factor productivity and in terms of optimal size. We noted that holding industry constant reduces the gap in size and hence ask "What is it about the characteristics of the industry that women are located in that explains these gaps?" However, since a gap remains even within each industry, we also ask whether women are being constrained to be small by some institutional factors in the credit market.

¹³ Manufacturing industries include extraction, food & tobacco, textiles & apparel, wood & paper products, chemicals, basic metals, construction and other manufacturing. Service industries include wholesale & retail trade, maintenance & repair, hotels & restaurants, transport, post & communications, financial services, renting, health, education, recreation and other services.

5.1 Are Women in “Poorly Performing” Industries?

The literature hypothesizes and finds some evidence that the poorer performance of female-owned businesses can be attributed to the fact that they are “crowded” in “poor performing” industries. We noted above the study by Mayoux (1995) which claims that “Women are overwhelmingly clustered in a narrow range of low investment, low profit activities for the local market” and the paper by Loscocco and Robinson (1991) which shows that in US women are concentrated in sectors which tend to have lower sales revenue on average. If women are concentrated in industries that inherently use less capital, or only serve the local market or are more competitive, this might explain why they are smaller. This could also potentially explain why they are relatively less efficient (in terms of TFP) than men.

We explore these questions by plotting four average characteristics of an industry (at the two-digit level) against the share of women in that industry, and fitting a regression line to the scatter plot. Although the results in Figure 4 tend to show negative correlations between all these characteristics and the share of women in an industry, these correlations are not significant in three out of the four plots. I.e. there is no evidence that women tend to be in industries that are less capital intensive (proxied by capital-labor ratios) or more competitive (proxied by the cost-price markup) or have a lower output per worker. However it does appear from the fourth plot in Figure 4 that women entrepreneurs are more likely to be concentrated in industries where the average firm’s sales are smaller. Hence the fact that women entrepreneurs have smaller firms is in part explained by the product or service they produce (i.e., industry they are located in).

In addition to asking whether women are concentrated in capital or labor intensive activities, it is interesting to know whether women perform as well as men in industries that are capital or labor intensive. To answer this question, we augment the production function in equation (1) with variables for the average level of capital and labor in an industry and interact these two variables with the dummy for female ownership. The results, shown in Table 5, indicate that on average total factor productivity is lower for men who are located in industries with more capital (holding labor constant) but it is even lower for women in these industries. On the other hand, there is no difference in total factor productivity of men and women in more labor intensive industries.

Finally we ask, to what extent is the variation in sales of male and female-owned businesses attributable to between industry gaps v. within industry gaps. To address this question we use *one-way analysis of variance methods*. The results, shown in Table 9, indicate that while the variation in sales revenue of male entrepreneurs is highly concentrated within industries (91% of total variation comes from within industry); for female entrepreneurs this variation comes both from within industry gaps (74%) and also from between industry gaps (26%). This suggests that choice of industry has a relatively bigger role in explaining firm size/sales for female entrepreneurs than their male counterparts.

The findings that women i) fare worse in more capital intensive industries, ii) are concentrated in industries with lower average firm sales and iii) are operating at a suboptimal scale lead us to ask whether female-owned firms are being constrained to be small by lack of access to capital.

5.2 Are Women's Firms Constrained to Be Small?

Although economically the increasing returns found in Table 4a and 4b are not large, they suggest that over time we should observe the scale of firms increasing in the economies of Central Asia and Eastern Europe. Moreover, if women's firms are currently more constrained to be inefficiently small than firms owned by men, removing these constraints will result in greater growth of female-owned firms than male-owned firms. In this section we ask to what extent male and female business owners are constrained from reaching their optimal scale by lack of access to capital. We first ask whether or not women are more constrained than men in access to capital and we then test for the relative gender effects of capital constraints on their scale of operation and productive efficiency.

Since another paper answers the first question with the same BEEPS data, we rely on the results of this study. Muravyev, Schafer and Talavera (2007) have shown that women are (5.4%) less likely than men to get a loan, when correcting for selection on whether the firm needs a loan, and controlling for the profit of the firm, capacity utilization, age, and competition faced by the firm, as well as industry and country fixed effects. They note the importance of controlling for capacity utilization and age; if women are operating firms that are younger and at lower capacity utilization than men

and this could influence the financial decisions of bankers. They also show evidence that women are charged 0.6% higher interest rates than men. They conclude that this evidence suggests gender discrimination against female entrepreneurs by financial institutions; which would indicate that women are more capital constrained than men.

To test for the effects of capital constraints on the scale and efficiency of operation, we use four variables. The first variable, *Bank Finance* is a dummy variable = 1, if the firm has financed part of their working or investment capital from a bank in the past year. The second constraint variable is a subjective measure that assesses whether “access to financing is an obstacle to the operation and growth of the business.” We code *Access to Finance* as a dummy variable = 1 if it is considered an obstacle and 0 otherwise. The third variable we use divides firms into those “which need a loan but did not get one or did not apply for one because they felt interest rates were too high, etc.” (*Need Loan* = 1; 0 otherwise); those which “did not need a loan and did not apply for one” (*Did not Need Loan* = 1; 0 otherwise) and firms that received a loan from the bank (*Received Loan* = 1; 0 otherwise). The fourth variable is simply the interest rate on the loans (proxying the cost of capital) which is only observed for the sub-sample that obtained a loan.

As seen in appendix Table A2, the means of these variables indicate that on average men and women are equally (and very) likely to view access to finance as a constraint. Women are significantly less likely to receive a loan (37 % v. 43% of men) and significantly more likely to not get one if they need it (25% v. 19% for men) although equally likely to say they do not need a loan (about 25%). Women and men are equally likely to receive financing from a bank for working or investment capital (about half do). On average, there is no difference in the interest rate that male and female entrepreneurs pay; on the other hand, average value of collateral for male entrepreneurs is significantly lower than that of female entrepreneurs. Muravyev, Schafer and Talavera (2007) show that once controls are introduced, there is a significant difference in the interest rate paid by men v. women.

Firms rely on sources other than banks for funding. Appendix Table A3 indicates that internal funds/retained earnings accounts for the largest share of financing of working capital (67.8% for men and 71.7% for women) and investment (64.3% v. 68.5%)

and that women tend to rely on this source more than men. Borrowing from banks is the second largest source of financing for both men and women however it accounts for a higher share for men: i.e., 12.6% of working capital and 17.1% of investment capital for men v. 8.9% and 12.7% respectively for women. Reliance on equity financing does not differ by gender and is relatively small, which is not surprising given the lack of development of stock markets in these countries as of 2004. Borrowing from informal sources (e.g., family, friends and money lenders) is not very substantive and it does not appear to be larger for women than men. Trade credit from suppliers or customers is of course more important for working capital (especially for women) while leasing arrangements are more important for new investment (especially for men). Hence internal financing and bank financing appear to be the two most important sources of financing; it also appears that women rely more on the internal financing and less on banks compared to men, which is consistent with the literature (e.g., Coleman, 2007; Carter and Rosa, 1998).

To test whether business owners with less access to capital have a smaller scale of operation, we regress sequentially the three measures of capital constraints, as well as the cost of capital (the interest rate), on log sales of the firm; we also ask whether these factors affect men and women in the same way by interacting the female-owned dummy with each of these variables. To avoid the problem of reverse causality, given that firms with larger sales might be more likely to obtain financing from banks, we control for lagged sales (sales in 2002) in these regressions. The results from the regressions presented in Table 6a generally show that, after controlling for sales three years earlier, firms with better access to capital in the previous year generate somewhat higher sales revenue. There is no significant difference between men and women in the effect of capital constraint on sales. Specifically, both female and male-owned firms that received at least part of their working or investment capital from a bank in the past year (*Bank Finance*) have 1.5 % higher sales than those who do not receive financing from a bank (column 2) and similarly firms that received a loan from the bank (*Received Loan*) have sales that are 1.7% higher than unconstrained firms, which did not need a loan and did not apply for one (column 3). On the other hand, while male-owned firms that complain more about access to finance being a constraint to business operation do not fare

significantly worse than firms that do not complain, the opposite is true for women: women-owned firms who complain about being capital constrained have larger sales revenue than firms that do not complain. This result is harder to interpret given that we do not have much information on how subjective perceptions regarding access to finance are formed. Finally, the results for the cost of capital indicate that firms which pay a higher interest rate generate similar sales revenue as firms which pay a lower interest rate, whether owned by a man or a woman (column 4). However, the rate of interest can be affected by the level of collateral a firm puts up. In column 5 we show that even when the value of collateral is held constant the results discussed above persist.

Table 6b presents results for the access-to-capital regressions estimated separately by EU and Non-EU membership. Most importantly, we find that bank finance has a significantly positive impact on firm sales in EU countries but not in Non-EU countries with both of our measures (columns 1, 2 and 5, 6). Further, according to one measure female entrepreneurs who have access to bank finance perform better than their male counterparts in Non-EU countries but not as well as their male counterparts in EU countries. However, this result is not robust with the second measure (have a loan), which shows no significant difference between male and female entrepreneurs. These results suggest that the environment surrounding access to bank finance may differ in these two groups of countries and this has a discernable impact on the way this finance affects firm performance. The reasons behind these differences need to be explored and could have important policy implications for the ECA region.

To what extent is productive efficiency (TFP) of male and female entrepreneurs affected by capital constraints? We find that entrepreneurs that have bank financing have significantly higher TFP; there is no difference between male and female entrepreneurs. However, the other capital constraint variables do not show any significant effect on TFP, although the signs seem to move in the expected direction. Nor does TFP vary with the cost of loans (see Table 7).

Next we ask whether together with the smaller scale, female entrepreneurs use the same or different capital intensity in production as male entrepreneurs. The small scale may be brought about by K constraints. We ask here: Do male and female entrepreneurs use different K:L ratios, and, if so, is the use of K and L affected by constraints and/or

input prices they face? We regress $\ln(K/L)$ at the firm level on the female-owned dummy, the \ln Sales of the firm, and then add the capital constraint and cost variables sequentially. The estimated coefficients on the female-owned dummy in Table 8 suggest that the average capital labor ratios of male and female entrepreneurs do not differ significantly, within an industry and country (column 1) or when the size of firm is held constant (column 2). The capital-labor ratios fall with an increase in sales revenues and this relationship does not differ for men and women (column 2). This suggests that the firms do not have homothetic production technology or that the relative price of capital to the price of labor rises with the scale of operation (sales). Next we find that firms with access to bank financing, and which have received a loan, tend to use more capital per unit of labor; this relationship does not differ by gender. The coefficient on the interest rate is negative but not significant for men and positive and not significant for women. Taking the results in the table together, it appears that the K:L ratio is more sensitive to access to capital than to its price.

6. Conclusions

Using firm level data from the 2005 BEEP Survey of 26 countries in the Eastern European and Central Asian (ECA) region, we explore various questions regarding differences in firm performance of male and female entrepreneurs and test various hypotheses offered to explain the observed patterns.

Our first finding is that there is a significant gender gap in the scale of operations, as measured by sales revenues. This finding is consistent with the literature from individual country studies which show that female business owners (entrepreneurs) run smaller businesses (measured in various ways, including sales and number of employees). Our finding holds even when controlling for the industry in which the firm operates, although the gap falls from being 63% (when controlling for country fixed effects) to 37% (when controlling for both country and industry fixed effects).

However, counter to studies which have found large gender gaps in profits (Robb and Wolken, 2002 for the US and Bosma et al., 2004 for Holland), we find that the unconditional average gender gap in profits in the ECA region is small to begin with and falls to 3% of men's profits after controlling for country and industry. Moreover, we find that the gap vanishes when we control for the scale of the firm (sales) in addition to

country and industry. Hence women entrepreneurs generate the same amount of profit per unit of revenue as men in ECA.

We provide robust evidence (using two specifications of the production function and applying propensity score matching techniques) that the performance of female-owned firms in terms of total factor productivity is significantly smaller than that of men in the same two-digit level industry. We note, however, that the average gap, at -2.1%, is small and may not be economically significant. We also note that since we are using sales revenue rather than output as the dependent variable, the lower TFP of women may be brought about by women facing lower prices than men in the same industries either because of quality or because of comparatively less expenditure on advertising.¹⁴

On examining returns to scale we find that both men and women are operating in the zone of increasing returns to scale and are therefore inefficiently small. However, we find that women's returns to scale are significantly larger than men's implying that they would gain more in profits for increasing their scale. It must be stressed, however, that neither women nor men are very far from constant returns to scale, even in the service industries where women's returns to scale is highest (1.084).

We then ask why it is that women are operating at an inefficiently small scale. On this question we explore two alternate hypotheses: a) women's firms are small because they are concentrated in industries which have small firms (low sales), or high competition or low capital intensity; b) women are inefficiently small because they are capital constrained. With respect to a), we find evidence that the share of women in an industry is negatively correlated with the industry's average sales per firm but no evidence of a higher concentration of women in industries with lower K:L ratios or higher levels of competition. Hence, women do seem to locate in industries with smaller firms.

We also test whether the lower total factor productivity of women is due in part to the industry characteristics. We find that women do indeed fare worse than men in capital intensive industries, whereas they are equally efficient in labor intensive industries. These two findings lead us to explore further the second explanation (that they are capital constrained) for why women's businesses are small.

¹⁴ Indeed we see that women are on average spending a lower share of their sales revenue on advertising.

We find fairly convincing evidence from the Muravyev, Schafer and Talavera (2007) that women in this region (and data set) are less likely than men to get financing from a bank, and they pay higher interests rates when they do. We also find that women who need a loan are less likely to get a loan than men who need a loan. Our analysis also shows that firms that do have access to capital are larger in scale. Hence, we conclude that women in ECA are capital constrained.

To what extent does the capital constraint affect their scale of operations? We show that female firms that are constrained in terms of capital are operating at higher returns to scale than female firms that are unconstrained in terms of capital. Hence, if the capital constraint were lifted they should grow to a more profitable scale. We also find that even though they are capital constrained, women tend to use capital and labor in the same proportions (similar K/L) as men. Hence, we surmise that in response to the constraint on capital, women adjust their scale rather than their factor proportions. Similarly, we found very little effect of access to finance on total factor productivity of either male or female-owned firms. We conclude that access to capital can partially explain the smaller scale but does not seem to affect the efficiency. Firms are adjusting their input to reflect the constraint, which perhaps could be attributed to their managerial skills, technological differences, regulatory environment (e.g., flexibility of labor market enables them to lay off workers easily), which would be useful areas to research in the future.

A separate exploratory analysis of firms in the EU and Non-EU member countries indicates that the patterns found for the entire ECA are similar in some respects and not others. Whereas the overall finding of gender differences in scale and profits is the same, we find that the gender gap in TFP is significant only in the Non-EU countries and not in the EU countries. We do find that women and men are operating at inefficiently small scale in both sets of countries but there is some evidence that women in Non-EU countries fare better than men with access to finance.

There is a stream in the literature that argues that women choose to run smaller businesses because they have limited time outside of home production (see e.g., Dolton and Makepeace, 1986). However, we find women do increase their scale if given more access to capital and they do so at the same rate as men in the ECA region as a whole.

We also find that significant gender gaps exist only in scale of firm operation and not as some others have argued in firm profitability or efficiency. This further supports the argument that on lifting existing capital constraints they are likely to expand at least as much as their male counterparts.

This paper strongly indicates that further research is needed to explain differences in firm performance between EU and Non-EU countries. Also, there is evidence to suggest that policy in ECA needs to be geared towards easing capital constraints for female entrepreneurs and shifting their concentration to industries with greater growth potential.

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Table 1: Means of Sample

Full Sample*					
Variable	Obs	Mean	Std. Dev.	Min	Max
Sales	5106	1342.0	4767.1	2.0	82480.0
Fixed Assets (Capital)	3531	643.9	2592.8	1.0	49834.0
Permanent Labor	7035	44.3	114.4	2.0	1700.0
Cost of Material Inputs	4816	647.1	2594.6	1.0	59231.0
Output per worker	5106	32.8	38.8	0.0	615.4
Capital per worker	3531	21.7	54.7	0.0	1522.0
Profits	4983	177.9	628.6	-669.0	11852.0
% with financing from bank	7,036	50.9			
Analytical Sample**					
Variable	Obs	Mean	Std. Dev.	Min	Max
Sales	3334	1602.2	5162.8	7.0	82308.0
Fixed Assets (Capital)	3508	619.8	2505.8	1.0	49834.0
Permanent Labor	3508	45.9	113.0	2.0	1600.0
Cost of Material Inputs	3213	805.8	2936.9	1.0	59231.0
Output per worker	3334	38.8	41.2	0.0	416.5
Capital per worker	3508	21.7	54.8	0.0	1522.0
Profits	3289	211.1	682.7	-669.0	10604.0
% with financing from bank	3508	52.1			

* Full sample does not include outliers in capital, labor, sales and profits

** Analytical Sample - observations which have information on capital or are not from industries with less than five observations

Table 2a: Performance Gaps - All countries

Depen. Var.:	Profits	Profits	In Sales	In Sales	Profits	In Sales	In Sales
female-owned	-11.424*** (2.036)	-7.193*** (2.090)	-0.631*** (0.061)	-0.372*** (0.060)	0.834 (1.281)	-0.021** (0.009)	-0.020** (0.009)
In Sales					33.531*** (0.376)	-	-
InL						0.204*** (0.006)	0.204*** (0.006)
InK						0.022*** (0.003)	
InM						0.795*** (0.005)	0.796*** (0.005)
In(K adj by capacity utilization)							0.019*** (0.003)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Indus. FE	No	Yes	No	Yes	Yes	Yes	Yes
Observations	3287	3287	3332	3332	3287	3203	3168
R-squared	0.06	0.51	0.13	0.24	0.76	0.98	0.98

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2b: Performance Gaps - EU and Non-EU countries

	Non-EU Profits	EU Profits	Non-EU Profits	EU Profits	Non-EU ln Sales	EU ln Sales	Non-EU ln Sales	EU ln Sales	Non-EU Profits	EU Profits	Non-EU ln Sales	EU ln Sales	Non-EU ln Sales	EU ln Sales
female-owned	-8.433*** (2.987)	-13.462*** (2.772)	-4.538 (3.006)	-9.949*** (2.958)	-0.633*** (0.098)	-0.631*** (0.079)	-0.374*** (0.093)	-0.392*** (0.079)	2.336 (1.938)	-0.575 (1.783)	-0.037** (0.016)	-0.015 (0.010)	-0.035** (0.016)	-0.015 (0.010)
lnY									32.193*** (0.552)	35.487*** (0.536)			0.207*** (0.010)	0.209*** (0.008)
lnL											0.204*** (0.010)	0.209*** (0.008)		
lnK											0.019*** (0.006)	0.022*** (0.004)	0.793*** (0.008)	0.794*** (0.006)
lnM											0.792*** (0.008)	0.794*** (0.006)		
ln(capital adj by capacity utilization)													0.014** (0.006)	0.021*** (0.004)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1479	1808	1479	1808	1488	1844	1488	1844	1479	1808	1431	1772	1419	1749
R-squared	0.04	0.07	0.13	0.63	0.15	0.11	0.28	0.23	0.75	0.83	0.98	0.99	0.98	0.99

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Comparing Mean TFP Estimates for Male and Female Entrepreneurs from Regression with those from Propensity Score Matching

Variable:	Sample	Female Mean	Male Mean	Diff.	S.E.	% Diff.	Regression
TFP	Unmatched	5.45	6.01	-0.56	0.06		
<i>With Replacement</i>							
TFP	ATT	5.45	5.60	-0.15**	0.45	-0.027	
<i>Without Replacement</i>							
TFP	ATT	5.45	5.69	-0.24**	0.07	-0.041	-0.025

Note: Bootstrapped standard errors presented.

Treatment assignment	Off support	On support	Total
Untreated (Male)	0	2,332	2,332
Treated (Female)	2	858	860
Total	2	3,190	3,192

Note: Common support identical for matching with and without replacement

Table 4a: Returns to Scale - All countries

Depen. Var.: Ln Sales	Ln Sales	
	Male	Female
lnL	0.287*** (0.038)	0.327*** (0.064)
lnK	0.035*** (0.007)	0.014 (0.009)
lnM	0.702*** (0.037)	0.708*** (0.049)
Sum	1.024	1.049
Observations	2343	860
R-squared	0.98	0.99

Standard errors clustered by industry and shown in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: Regression with country and industry fixed effects

Wald Test - Male and Female Entrepreneurs

Ho:	Men $\alpha_l + \alpha_k + \alpha_m = 1$	Women $\beta_l + \beta_k + \beta_m = 1$	Men = or > Women $\alpha_l + \alpha_k + \alpha_m = \beta_l + \beta_k + \beta_m$
p value for 2 tailed test	0.000100	0.001100	0.001900
Ho:	$\alpha_l + \alpha_k + \alpha_m < 1$	$\beta_l + \beta_k + \beta_m < 1$	$\alpha_l + \alpha_k + \alpha_m > \beta_l + \beta_k + \beta_m$
p value for left tailed test	0.000057	0.000527	0.000968
F(num,den)	F(1,32)	F(1,30)	F(1,32)
Conclusion	Null Hypothesis is Rejected Cannot reject the hypothesis that returns to scale are greater than one		Null Hypothesis Rejected Male and Female returns to scale not the same Cannot reject the hypothesis that returns to scale for females greater than that for males

Table 4b: Returns to Scale - EU vs. Non-EU

EU=0	Non-EU Male	Non-EU Female	EU Male	EU Female
lnLL	0.255*** (0.031)	0.351*** (0.087)	0.326*** (0.055)	0.300*** (0.060)
lnKK	0.037*** (0.010)	-0.004 (0.027)	0.036*** (0.010)	0.021 (0.017)
lnMM	0.726*** (0.031)	0.683*** (0.061)	0.671*** (0.053)	0.737*** (0.047)
Sum	1.018	1.03	1.033	1.058
Observations	1122	309	1221	551
R-squared	0.97	0.97	0.97	0.98

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Wald Test - Male and Female Entrepreneurs - Non EU

Ho:	Men $\alpha_l + \alpha_k + \alpha_m = 1$	Women $\beta_l + \beta_k + \beta_m = 1$	Men = or > Women $\alpha_l + \alpha_k + \alpha_m = \beta_l + \beta_k + \beta_m$
p value for 2 tailed test	0.0849	0.0292	0.095100
Ho:	$\alpha_l + \alpha_k + \alpha_m < 1$	$\beta_l + \beta_k + \beta_m < 1$	$\alpha_l + \alpha_k + \alpha_m > \beta_l + \beta_k + \beta_m$
p value for left tailed test	0.04243564	0.014608	0.047550
F(num,den)	F(1,32)	F(1,26)	F(1,32)
Conclusion	Null Hypothesis is Rejected Cannot reject the hypothesis that returns to scale are greater than one		Null Hypothesis Rejected Male and Female returns to scale not the same Cannot reject the hypothesis that returns to scale for females greater than that for males

Wald Test - Male and Female Entrepreneurs - EU

Ho:	Men $\alpha_l + \alpha_k + \alpha_m = 1$	Women $\beta_l + \beta_k + \beta_m = 1$	Men = or > Women $\alpha_l + \alpha_k + \alpha_m = \beta_l + \beta_k + \beta_m$
p value for 2 tailed test	0.0001	0.0004	0.024300
Ho:	$\alpha_l + \alpha_k + \alpha_m < 1$	$\beta_l + \beta_k + \beta_m < 1$	$\alpha_l + \alpha_k + \alpha_m > \beta_l + \beta_k + \beta_m$
p value for left tailed test	0.00006113	0.000218	0.012133
F(num,den)	F(1,31)	F(1,27)	F(1,31)
Conclusion	Null Hypothesis is Rejected Cannot reject the hypothesis that returns to scale are greater than one		Null Hypothesis Rejected Male and Female returns to scale not the same Cannot reject the hypothesis that returns to scale for females greater than that for males

Table 5: Effect of Industry Characteristics on TFP

Dependent Var.: ln(Sales)	
female owned (F)	0.083 (0.066)
Avg. K in Industry	-0.021** (0.008)
F*Avg. K in Ind.	-0.032** (0.016)
Avg. L in Industry	-0.043*** (0.012)
F*Avg. L in Ind.	0.025 (0.024)
Observations	3203
R-squared	0.98

Standard errors in parentheses: *significant at 10%;

significant at 5%; *significant at 1%

Note: Coefficients from estimating a Cobb-Douglas production

Table 6a: Financing Constraints on Size (lnSales = dependent variable) - All countries

	(1) lnYY	(2) lnYY	(3) lnYY	(4) lnYY	(5) lnYY
Femaleowned	0.014 (0.009)	-0.011 (0.011)	0.016 (0.018)	-0.008 (0.021)	-0.013 (0.033)
Sales in 2002	0.982*** (0.002)	0.982*** (0.002)	0.980*** (0.002)	0.983*** (0.003)	0.981*** (0.003)
Financing from Bank	0.015** (0.006)				
F*(financing from Bank)	-0.015 (0.012)				
Access to finance is a constraint to business		-0.01 (0.007)			
F*(access to finance is a constraint to business)		0.026** (0.013)			
Got a loan recently			0.017** (0.007)		
F*(got a loan recently)			-0.021 (0.020)		
Need a loan but don't have it			-0.013 (0.009)		
F*(need a loan but don't have it)			0.006 (0.022)		
F*(Don't need a loan)			-0.013 (0.020)		
Rate of interest				-0.001 (0.001)	-0.001 (0.001)
F*(rate of interest)				0.000 (0.001)	0.000 (0.002)
Value of collateral					0.000 (0.001)
F*(value of collateral)					0.000 (0.001)
Observations	2510	2432	2510	1259	1051
R-squared	0.99	0.99	0.99	0.99	0.99

Note: Robust regressions include country and industry fixed effects

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Effect of Financing Constraints on Total Factor Productivity^a

	(1)	(2)	(3)	(4)	(5)
Femaleowned	-0.019 (0.012)	-0.032** (0.015)	-0.038* (0.023)	0.002 (0.028)	0.002 (0.043)
Financing from Bank	0.016* (0.009)				
F*(financing from Bank)	-0.003 (0.017)				
Access to finance is a constraint to business		-0.002 (0.010)			
F*(access to finance is a constraint to business)		0.019 (0.018)			
Need a loan but don't have it			-0.020 (0.012)		
F*(need a loan but don't have it)			0.031 (0.028)		
Got a loan recently			-0.006 (0.010)		
F*(got a loan recently)			0.024 (0.026)		
F*(Don't need a loan)			0.000 (0.025)		
Rate of interest on loan				0.000 (0.001)	0.000 (0.001)
F*(rate of interest on loan)				-0.002 (0.002)	-0.001 (0.002)
Value of collateral					0.000 (0.001)
F*(value of collateral)					0.000 (0.001)
Observations	3203	3096	3203	1493	1238
R-squared	0.98	0.98	0.98	0.99	0.99

^aNote: Robust regressions where ln(Sales) is the dependent variable; coefficients on ln(labor), ln(capital) and ln(materials), country and industry fixed effects have been suppressed.

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Constraints on the use of inputs (dependent variable is ln(K/L))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Femaleowned	-0.021 (0.046)	-0.048 (0.047)	-0.104 (0.166)	-0.068 (0.065)	-0.012 (0.079)	-0.105 (0.122)	-0.09 (0.148)	0.068 (0.225)
ln(sales)		-0.078*** (0.014)	-0.081*** (0.015)	-0.086*** (0.014)	-0.082*** (0.014)	-0.104*** (0.014)	-0.093*** (0.020)	-0.106*** (0.022)
F*ln(sales)			0.01 (0.028)					
Financing from Bank				0.125*** (0.047)				
F*(financing from Bank)				0.049 (0.089)				
Access to finance is a constraint to business					-0.015 (0.051)			
F*(access to finance is a constraint to business)					-0.042 (0.096)			
Need a loan but don't have it						-0.04 (0.065)		
F*(need a loan but don't have it)						0.074 (0.151)		
Got a loan recently						0.206*** (0.053)		
F*(got a loan recently)						0.105 (0.140)		
F*(Don't need a loan)						-0.013 (0.136)		
Rate of interest on loan							-0.006 (0.007)	-0.006 (0.007)
F*(rate of interest on loan)							0.004 (0.010)	0.006 (0.011)
Value of collateral								0.001 (0.001)
F*(value of collateral)								-0.001 (0.001)
Observations	3506	3332	3332	3332	3219	3332	1550	1289
R-squared	0.35	0.37	0.37	0.37	0.37	0.37	0.41	0.44

Note: Robust regressions include country and industry fixed effects

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: Within and Between Industry Variance for Entrepreneurs

Analysis of Variance for Ln(sales) - Male Entrepreneurs					
Source	SS	df	MS	F	Prob > F
Between groups	533.00	32.00	16.66	7.13	0.000
Within groups	5634.99	2411.00	2.34		
Total	6167.99	2443.00	2.52		
Bartlett's test for equal variance		chi2 (89)	53.643		
		Prob>chi2	0.010		
Analysis of Variance for Ln(sales) - Female Entrepreneurs					
Source	SS	df	MS	F	Prob > F
Between groups	596.28	30.00	19.88	10.03	0.000
Within groups	1698.56	857.00	1.98		
Total	2294.84	887.00	2.59		
Bartlett's test for equal variance		chi2(81)	39.104		
		Prob>chi2	0.036		

Figure 1: Share of Female Entrepreneurs by Country

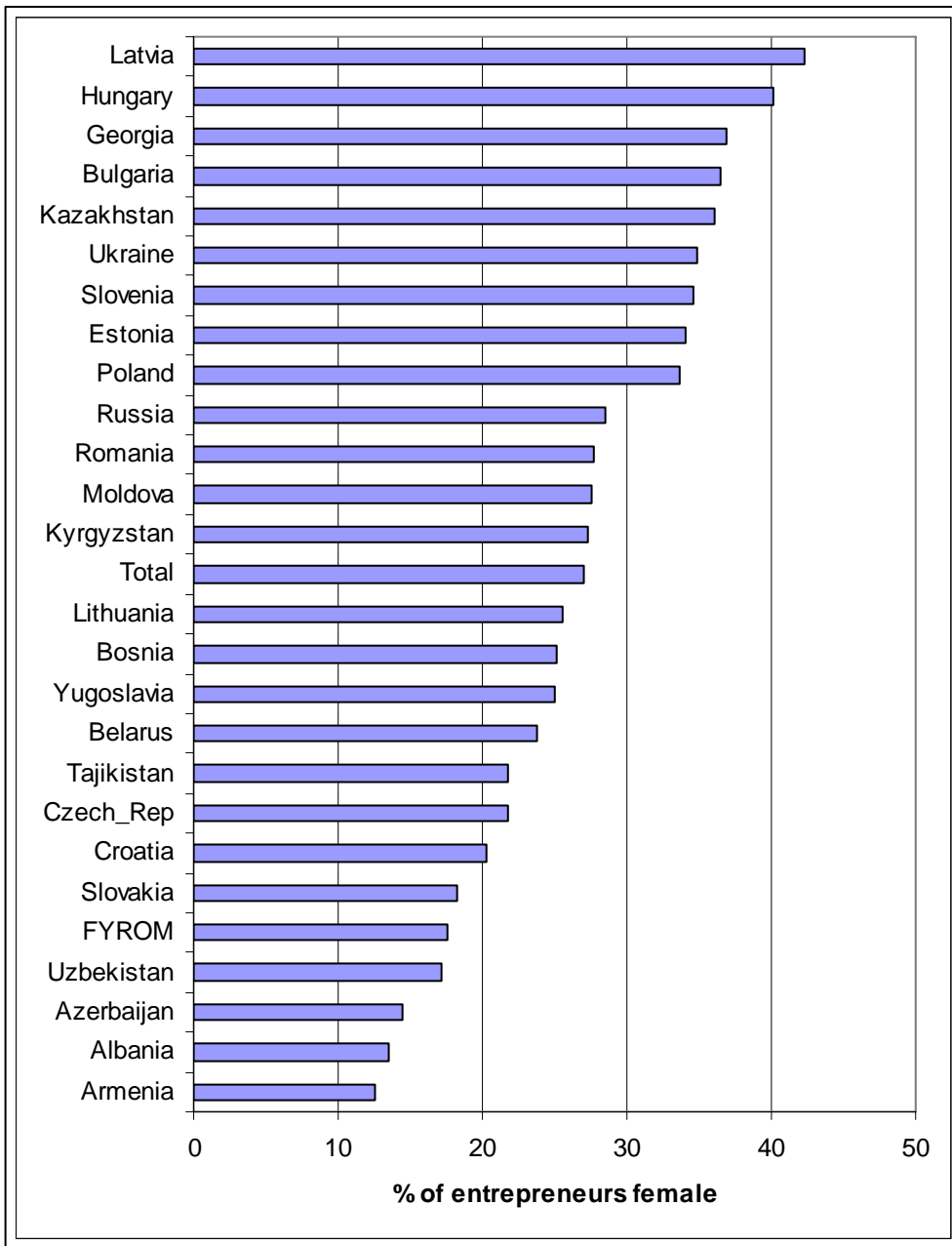


Figure 2: Share of Female v. Male Entrepreneurs by Size of Firm (no. of Employees)



Figure 3: Concentration of female entrepreneurs by industry

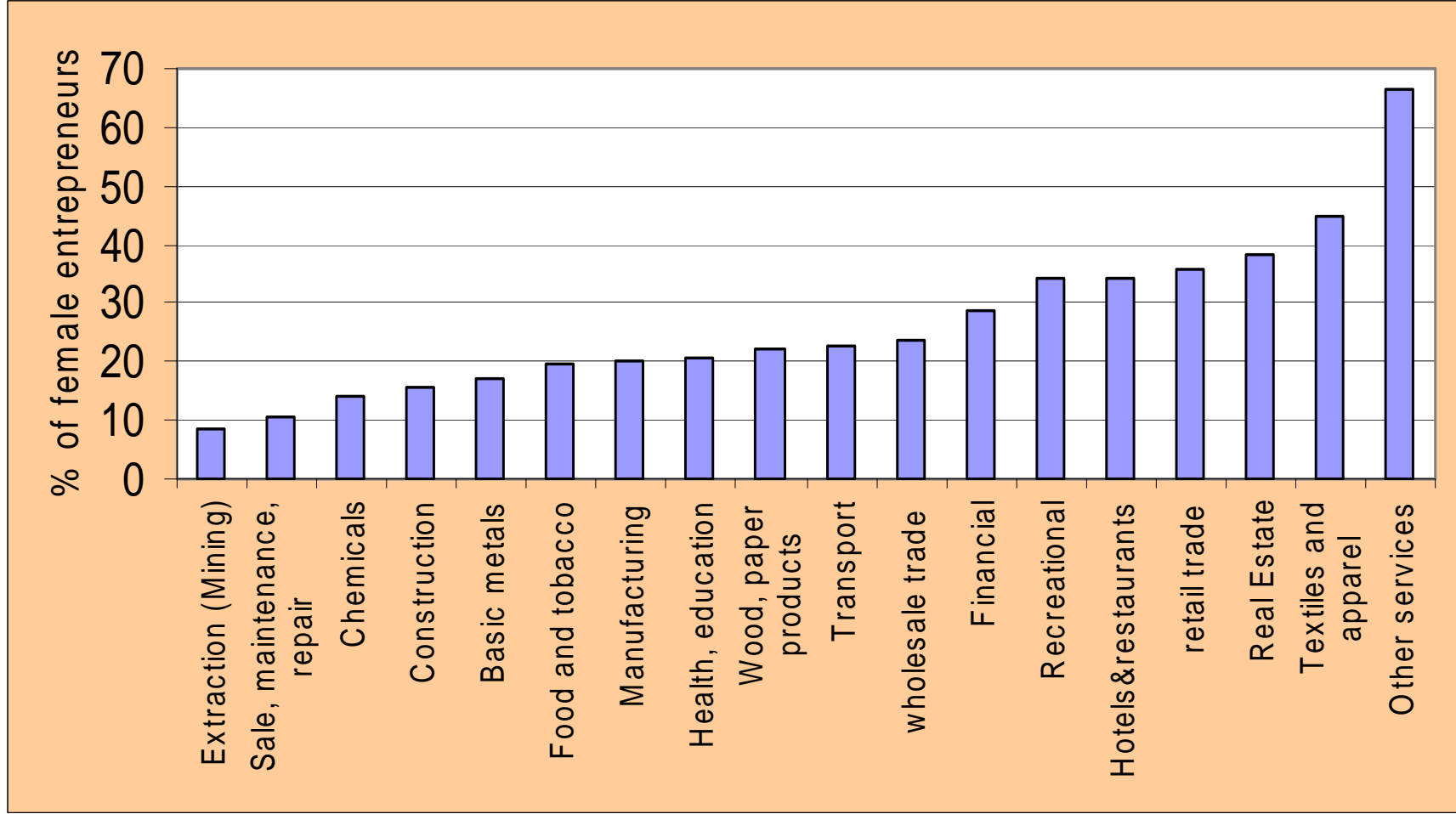
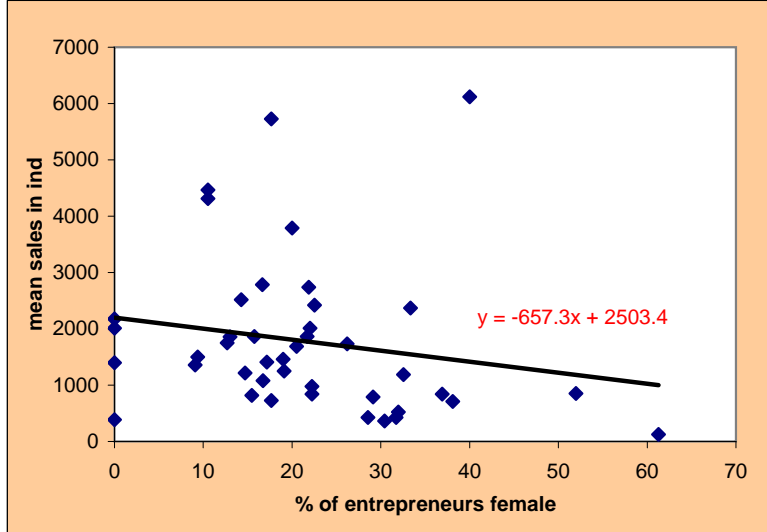
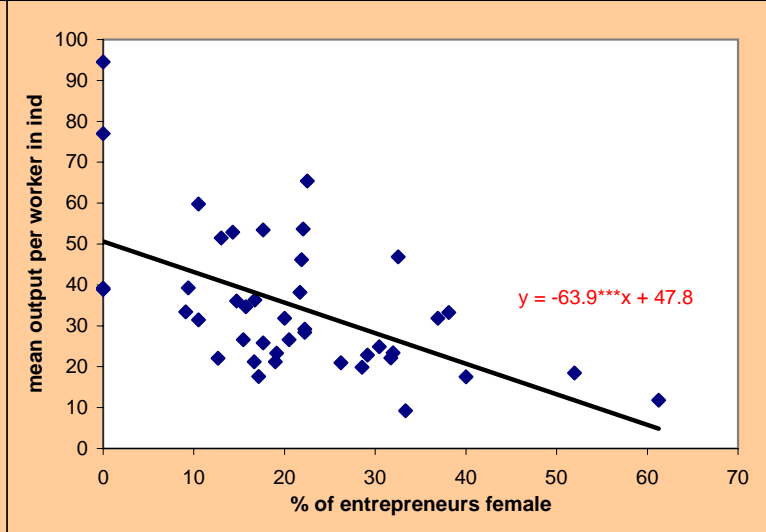


Fig 4: Plots of the Share of Female Entrepreneurs in an Industry v. Industry Characteristics

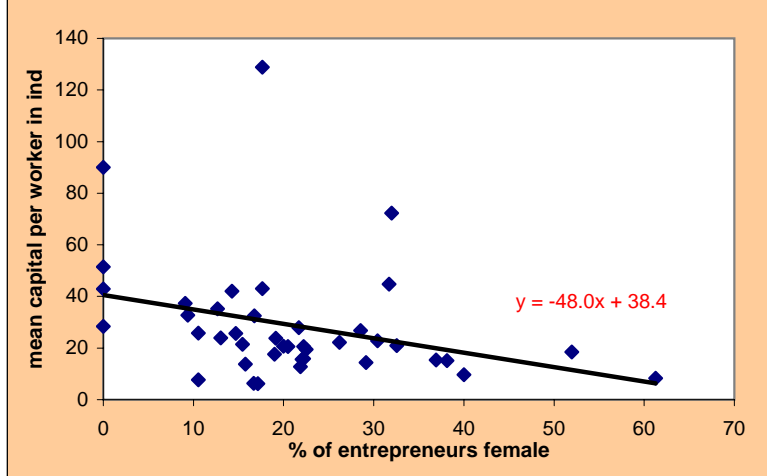
Sales Revenue



Output per worker



Capital per Worker



TFP

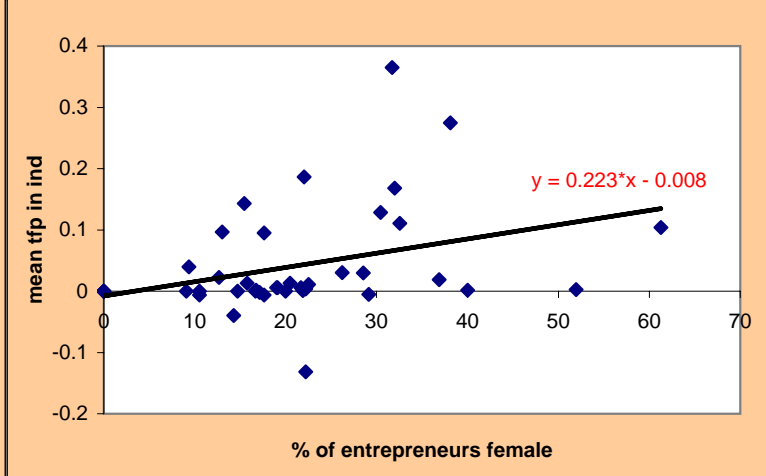
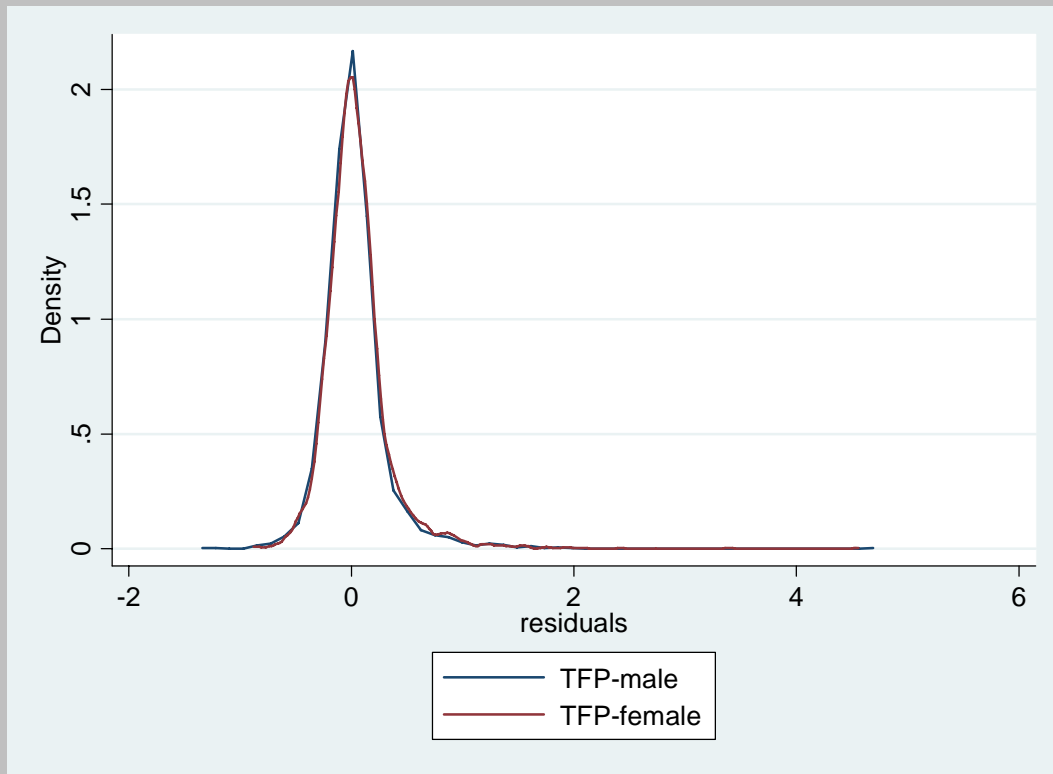


Fig 5: Kernel Density Estimates of TFP for Male and Female Entrepreneurs



Note: Kernel density calculated using Epanechnikov kernel function.
Note: Country and industry fixed effects used in TFP calculation.

Table A1: Returns to Scale

Depen. Var.:	Services		Manufacturing	
	In Sales Male	Ln Sales Female	In Sales Male	Ln Sales Female
InL	0.388*** (0.072)	0.420*** (0.110)	0.200*** (0.011)	0.209*** (0.013)
InK	0.039*** (0.011)	0.015 (0.014)	0.027*** (0.007)	0.016* (0.008)
InM	0.617*** (0.067)	0.649*** (0.075)	0.785*** (0.012)	0.802*** (0.010)
Sum	1.044	1.084	1.012	1.027
Observations	997	479	1346	381
R-squared	0.95	0.96	0.98	0.99

Standard errors clustered by industry and shown in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: Reg with country and industry fixed effects

Wald Test - Mfg and Services Male Entrepreneurs

	Services	Mfg	Mfg = or > Services
Ho:	$\alpha_l + \alpha_k + \alpha_m = 1$	$\beta_l + \beta_k + \beta_m = 1$	$\alpha_l + \alpha_k + \alpha_m = \beta_l + \beta_k + \beta_m$
p value for 2 tailed test	0.001700	0.002500	0.008200
Ho:	$\alpha_l + \alpha_k + \alpha_m < 1$	$\beta_l + \beta_k + \beta_m < 1$	$\alpha_l + \alpha_k + \alpha_m > \beta_l + \beta_k + \beta_m$
p value for left tailed test	0.000827	0.001231	0.995894
F(num,den)	F(1,12)	F(1,19)	F(1,32)
Conclusion	Null Hypothesis is Rejected		Null Hypothesis Rejected
	Cannot reject the hypothesis that returns to scale are greater than one		Mfg and Services returns to scale not the same Cannot reject the hypothesis that returns to scale for services greater than that for manufacturing

Wald Test - Mfg and Services Female Entrepreneurs

Ho:	Services $\alpha_l + \alpha_k + \alpha_m = 1$	Mfg $\beta_l + \beta_k + \beta_m = 1$	Mfg = or > Services $\alpha_l + \alpha_k + \alpha_m = \beta_l + \beta_k + \beta_m$
p value for 2 tailed test	0.035400	0.006900	0.073000
Ho:	$\alpha_l + \alpha_k + \alpha_m < 1$	$\beta_l + \beta_k + \beta_m < 1$	$\alpha_l + \alpha_k + \alpha_m > \beta_l + \beta_k + \beta_m$
p value for left tailed test	0.017720	0.003471	0.963525
F(num,den)	F(1,11)	F(1,18)	F(1,30)
Conclusion	Null Hypothesis is Rejected		Null Hypothesis Rejected
	Cannot reject the hypothesis that returns to scale are greater than one		Mfg and Services returns to scale not the same Cannot reject the hypothesis that returns to scale for services greater than that for manufacturing

Wald Test - Male and Female Entrepreneurs (Mfg and Services)

	Mfg	Services
Ho:	Male = or > Female $\alpha_l + \alpha_k + \alpha_m = \beta_l + \beta_k + \beta_m$	Male = or > Female $\alpha_l + \alpha_k + \alpha_m = \beta_l + \beta_k + \beta_m$
p value for 2 tailed test	0.198600	0.173700
Ho:	$\alpha_l + \alpha_k + \alpha_m > \beta_l + \beta_k + \beta_m$	$\alpha_l + \alpha_k + \alpha_m > \beta_l + \beta_k + \beta_m$
p value for left tailed test	0.099321	0.086873
F(num,den)	F(1,32)	F(1,12)
Conclusion	Null Hypothesis Rejected Male and female returns to scale not the same Cannot reject the hypothesis (at 10% level) that returns to scale for females greater than that for males	Null Hypothesis Rejected Male and female returns to scale not the same Cannot reject the hypothesis that returns to scale for females is greater than that for males

Table A2: Means and St. Dev. of Variables by Gender (for analytical sample)

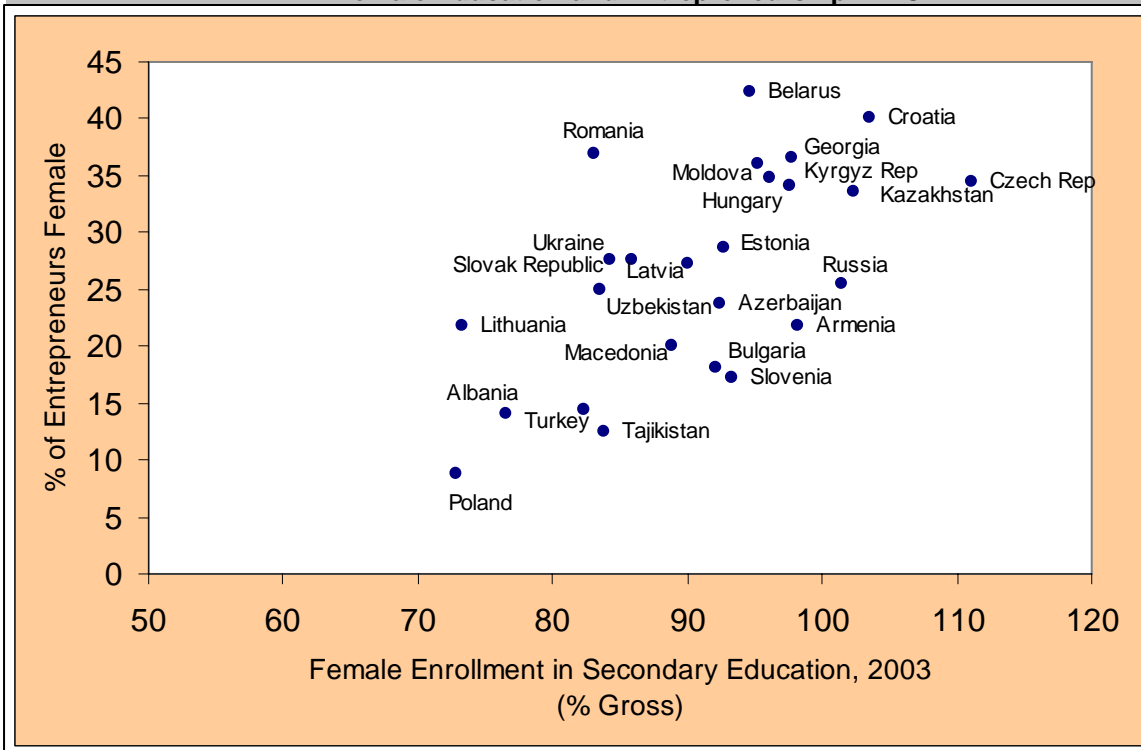
Variable		Obs	Mean	Std. Dev.	Min	Max	M-F (Significance of Difference)
ln(sales)	Male	2444	6.01	1.59	2.08	11.32	Y at 0.01 level
	Female	888	5.46	1.61	2.20	11.32	
ln(labor)	Male	2568	2.89	1.32	1.10	7.38	Y at 0.01 level
	Female	938	2.44	1.25	1.10	7.20	
ln(capital)	Male	2568	4.92	1.68	0.69	10.82	Y at 0.01 level
	Female	938	4.44	1.70	0.69	10.35	
ln(materials)	Male	2350	5.09	1.74	0.69	10.60	Y at 0.01 level
	Female	861	4.51	1.80	0.69	10.99	
profits	Male	2411	227.30	686.56	-669.00	10540	Y at 0.05 level
	Female	876	166.14	670.78	-75.00	10604	
profits/sales	Male	2411	0.14	0.09	-0.56	0.60	Y at 0.05 level
	Female	876	0.15	0.10	-0.29	0.94	
ln(capital per worker)	Male	2568	2.12	1.43	-3.18	7.33	N
	Female	938	2.12	1.40	-2.81	6.86	
financing from bank (local or foreign or state owned)	Male	2568	0.53	0.50	0	1	N
	Female	938	0.51	0.50	0	1	
financing from internal sources (internal+family/friends+money lenders & other informal)	Male	2019	73.89	36.60	0	100	Y at 0.01 level
	Female	674	78.16	35.01	0	100	
financing from external sources (Banks+Credit cards+Leasing)	Male	2019	23.13	34.87	0	100	N
	Female	674	17.23	31.82	0	100	
got a loan recently (within last 12 months)	Male	2568	0.43	0.50	0	1	Y at 0.01 level
	Female	938	0.37	0.48	0	1	
do not need a loan	Male	2568	0.26	0.44	0	1	N
	Female	938	0.27	0.44	0	1	
need a loan but do not have it	Male	2568	0.19	0.40	0	1	Y at 0.01 level
	Female	938	0.25	0.43	0	1	
access to finance is a constraint to business	Male	2489	0.67	0.47	0	1	N
	Female	893	0.66	0.47	0	1	
rate of interest on loan	Male	1228	13.47	6.85	0.70	70	N
	Female	394	13.39	6.67	0.50	36	
value of collateral for loan	Male	1062	163.20	75.74	12.00	600	Y at 0.05 level
	Female	336	173.15	76.21	30.00	500	
capacity utilization (%)	Male	2546	81.13	19.54	5	100	Y at 0.1 level
	Female	923	82.36	19.35	10	100	
age of firm	Male	2566	2.36	0.61	1.39	5.19	Y at 0.05 level
	Female	936	2.31	0.60	1.39	4.96	

Table A3: Sources of Finance by Gender

Male Variable	Working Capital			New Investment		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Internal funds/ Retained earnings	2553	67.8	37.6	2039	64.3	40.5
Equity (i.e. issue of new share)	2553	5.2	18.7	2039	4.9	19.4
Borrowing from local private commercial	2553	9.6	21.5	2039	13.2	27.9
Borrowing from foreign banks	2553	1.0	6.8	2039	1.7	10.7
Borrowing from state owned banks	2553	2.0	10.2	2039	2.2	12.1
Loans from family/friends	2553	4.1	14.5	2039	3.6	14.2
Money lenders and other informal sourc	2553	1.2	7.4	2039	1.2	8.1
Trade credit from suppliers	2553	4.2	14.1	2039	1.0	6.9
Trade credit from customers	2553	1.0	6.6	2039	0.4	4.2
Credit Cards	2553	0.6	5.4	2039	0.4	4.5
Leasing arrangement	2553	1.9	8.9	2039	5.5	18.8
The government	2553	0.4	4.9	2039	0.2	2.7
Other	2553	1.0	9.0	2039	1.4	11.0

Female Variable	Working Capital			New Investment		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Internal funds/ Retained earnings	925	71.7	38.2	679	68.5	40.2
Equity (i.e. issue of new share)	925	5.3	19.9	679	4.9	19.4
Borrowing from local private commercial	925	6.4	18.4	679	9.3	24.5
Borrowing from foreign banks	925	1.0	8.0	679	1.4	10.2
Borrowing from state owned banks	925	1.5	9.0	679	2.0	11.5
Loans from family/friends	925	3.4	13.3	679	4.1	16.0
Money lenders and other informal sourc	925	0.4	3.8	679	0.6	4.5
Trade credit from suppliers	925	5.2	16.2	679	1.6	8.4
Trade credit from customers	925	1.2	8.1	679	0.7	6.1
Credit Cards	925	0.5	4.5	679	0.2	4.0
Leasing arrangement	925	1.5	6.8	679	4.3	16.9
The government	925	0.4	4.9	679	0.4	4.1
Other	925	1.4	11.2	679	1.9	13.2

A4. Female Education and Entrepreneurship in ECA



Data for Secondary Education from World Development Indicators 2006

Data for Female Entrepreneurship from BEEPS 2005

1. Introduction

This paper examines the role of minimum wage legislation in reducing poverty in Honduras. The justification for minimum wage legislation is to redistribute income to low wage workers.¹ This policy tool can be especially important in developing countries during periods of rapid adjustment to the global economy. However, in an era when global competition is very strong, several policy makers are arguing for reductions in (and even the abolition of) minimum wages (and other labor market regulation) in Latin America to allow for more labor market flexibility and increased competitiveness (see e.g., Heckman and Pages, 2003). The main argument is that rigidities in the labor market, such as wage rigidity caused by the minimum wage, can slow down job creation and in turn contribute to unemployment and poverty (see e.g., Kowan, Micco and Pages 2004). On the other hand, fierce competition in the globalized world is also creating an environment that some have termed “the race to the bottom.” This group is concerned that wages and working conditions are being driven down by global competition and there is a need to uphold the bottom with regulations such as the minimum wage and labor standards. Acemoglu’s (2001) theoretical model, which shows that minimum wages can shift the composition of employment toward high-wage jobs, could be used in support of this latter view. Hence, increases in minimum wages could contribute to the reduction of poverty by increasing the incomes of those affected by the legislation and perhaps even increasing the share of higher wage jobs in the economy.

We take advantage of the enormous variation in the minimum wage structure of a relatively poor country to examine minimum wage effects on poverty during the 2001-

¹ See Freeman (1996) for an enlightened discussion of the minimum wage as a redistributive tool.

2004 period.² Honduras has set over 22 minimum wages, by industry and firm size, for decades. These legal minimum wages apply to all employees in the private sector, although we present evidence that they are complied with only in large private firms and not in small private firms. There is also a large group of workers (the self-employed and public sector) for whom minimum wages do not apply directly, but whose wages and employment can be affected indirectly either through the mobility of workers across sectors in response to changes in the minimum wage or through institutions, such as unions, that try to emulate the minimum wage increase in their sector's wages. We combine micro data from the household surveys with data on minimum wages to determine whether increases in the minimum wage affect the probability that a typical individual in the labor force, as well as different types of workers in both the covered and uncovered sectors are poor.

We find that minimum wage increases do reduce extreme poverty: A 10% increase in the minimum wage will reduce the probability that an average individual in the labor force is in extreme poverty by 1.8% (i.e., from 44.0% to 43.2%) and in poverty by 1.0% (although this latter finding is close to but not statistically significant by conventional levels). These results are driven entirely by the effect on workers in large private sector firms, where a 10% increase in the minimum wage reduces extreme poverty and poverty by 2.0% and 1.9%, respectively. Increases in the minimum wage do not seem to affect the net probability of being poor for individuals employed or previously employed in a small firm, or as self-employed or in the public sector.

² The period of analysis is circumscribed by the fact that micro data on poverty is not available until 2001.

2. Theoretical Considerations and Empirical Literature

The minimum wage as a poverty reducing tool is problematical for a number of reasons. To begin with, it is difficult to predict the effect of the minimum wage on the wages and employment of workers to whom the law applies. As Freeman (1996, p. 639) notes “The goal of the minimum wage is not, of course, to reduce employment, but to redistribute earnings to low-paid workers.” Yet, most of the literature has found negative employment effects (see Brown, 1999 and Neumark and Wascher, 2006 for reviews of the evidence). There are a few studies using data from the US (Card and Krueger, 1994 and 1995) and the UK (Machin and Manning, 1994) that have found no or positive employment effects. If minimum wages have no disemployment effects, as the monopsonistic model predicts, then minimum wage increases will certainly raise the incomes of low wage workers. However, if the labor market is competitive, some workers lose their jobs while others retain them at a higher wage. Moreover, if the elasticity of demand for labor in the covered sector is high (greater than 1), minimum wages will reduce the share of total earnings to low-paid workers by displacing a larger number from employment than the number whose wages are raised by the minimum wage.³ Whether the displaced worker’s earnings fall below the per capita poverty level is of course a function of a number of variables including, the existence and generosity of the social safety net, the flexibility of the labor market, the demand for the workers’ skills, etc. There are, of course, other ways that workers covered by minimum wage legislation can gain or lose from increases in the minimum wage, including adjustments

³ See Neumark and Wascher (2002, pp. 316-318) for an extensive discussion of the assumed elasticities in the literature and the actual measured elasticities for affected workers.

in hours worked, reduction in non-wage benefits, and spillover effects.⁴ If workers above the minimum also gain from minimum wage increases, then there can be larger positive income effects on low-wage workers.⁵

A second set of issues to consider is the indirect effect of minimum wage increases on workers not covered by minimum wages (or sectors where there is no compliance with minimum wage legislation). Minimum wages can indirectly contribute to poverty creation in the uncovered sector if workers who lose their job in the covered sector greatly increase their labor supply to the uncovered sector, lowering wages below the per capita poverty line. In this two-sector competitive model of the labor market, the final effect on the uncovered sector will depend on the elasticities of labor demand and supply in both sectors. However, if there are institutions, such as unions, which try to garner the level and increases in minimum wage in the uncovered sector, then reductions in poverty of families of workers in the uncovered sectors might be an outcome.

In considering the potential for minimum wage policy to reduce poverty, we must recognize that poverty is a function of a worker's family income, which raises a third set of issues: It requires addressing whether low-wage workers are in low-income families. Hikes in the minimum wage that raise the incomes of low-wage workers will only reduce poverty to the extent that those workers are in low-income families. Gramlich (1976) was one of the first to note that minimum wage workers can live in relatively affluent families. More recently Burkhauser et al. (1996) showed that only one-third of the workers in the US affected by the 1990 minimum wage increase were in poor or near

⁴ See Brown (1999) for a full discussion of the many adjustments in the labor market that can result from an increase in the minimum wage.

⁵ Fajnzylber (2001) and Maloney and Núñez (2003) have found large spillover effects in Latin American countries.

poor families. (Another third of the workers were in families with incomes more three times the poverty line.)

A related issue is that the impact of minimum wages can have different effects on family income depending on who in the household is affected and how they respond. For example, one could envision scenarios where increases in the minimum wage could bring a family out of poverty if a secondary earner decides to join the labor force because the wage increase is above her reservation wage (Addison and Blackburn, 1999; Freeman, 1996). However, an increase in the minimum wage might also cause a family to fall into poverty if it is the head of the household who loses his or her job as a result of the increase (and other members are not able to increase their hours of work or find a job if not working). Which workers gain and which lose can also influence whether the family's income is above or below the poverty line.

Finally, a fourth factor to consider is the relative level of the minimum wage to the per-capita poverty line.⁶ One might expect that raising the minimum wage could have a bigger effect reducing poverty if the minimum wage is set at or below the per-capita poverty line than if it is set at four times the per capita poverty line. However, the relative level of the minimum wage to the per-capita poverty line also reflects the government/society's view as to whether the minimum wage is meant to cover the basic needs of a worker or a family. It is also a function of the extent to which families are expected to rely on one vs. two bread-winners. For example, if the society believes that the minimum wage should cover only the basic needs of a worker, a family of four with

⁶ See Fields and Kanbur (2006) for a theoretical treatment of the impact of minimum wages on poverty reduction which focuses on four parameters: the elasticity of labor demand, the ratio of the minimum wage to the poverty line, the extent of income sharing in the household and the degree of poverty aversion.

only one household member earning the minimum wage will be poor; raising the minimum wage in this scenario would have no impact on poverty reduction. On the other hand, if the minimum wage is meant to meet the basic needs of a family, then raising the minimum wage in this scenario is more likely to reduce poverty.

Because of all these factors, it is difficult to predict what the consequences of a minimum wage increase are for poverty and the distribution of family incomes. We turn to the empirical literature on this question, which unfortunately is sparse in comparison to the literature on the wage and employment effects.

Card and Krueger (1995) provide one of the first estimates of the effect of minimum wages on poverty in the US. They regress the change in a state's poverty rate from 1989 to 1991 on the fraction of the state's workers that are "affected by" the minimum wage increase in 1990-1991 and provide some weak evidence (mostly insignificant) for a modest poverty reducing effect of the minimum wage.⁷ Addison and Blackburn (1999) also use state panel data and a methodology similar to Card and Krueger's (1995), however they use a longer time frame (1983-1996) and focus on low wage families. They find that increases in minimum wages reduce the poverty level among teenagers and junior high school dropouts. However when they analyzed the relationship separately for the 1980s and 1990s, they found it is only statistically significant in the 1990s.⁸ Neumark and Wascher (2002) have recently contributed to the literature with a study that goes beyond estimating the net effects by measuring flows into and out of poverty. They present evidence using US CPS data that increases in the

⁷ The 'fraction affected' was the share of workers whose wage was between the minimum wage in 1990 and the new minimum wage in 1991.

⁸ Their search for explanations of the different outcomes in the 1980s and 1990s did not come up with anything conclusive.

minimum wage raises both the probability that some poor families escape poverty and the probability that some previously non-poor families fall into poverty. They conclude that the combined evidence indicates a redistribution of income among the poor rather than from the non-poor to the poor.

Several studies have examined the effect of minimum wages on poverty in developing countries, mostly in Latin America. Studies using aggregate country data tend to find minimum wage increases reduces poverty. For example, Morely (1995), using data for Latin American countries, finds that poverty falls with an increase in the minimum wage during upswings in the business cycle by not during recessions. Lustig and McLeod (1996) regress changes in poverty indicators (using alternative measures) in Latin American and Asian countries on their minimum wage changes (controlling for other variables associated with changes in poverty) and find higher minimum wages are associated with lower levels of poverty in both regions, whether the economy was growing or declining, and the population was urban or not. However, they also find that minimum wage increases raise unemployment and hence they do not endorse minimum wages as an effective policy measurer to reduce poverty. Saget (2001) uses data on a cross section of countries and finds a negative and significant relationship between the level of poverty (using a national poverty line) and the level of the minimum wage (in dollars), after controlling for the GDP/capita, average wage in manufacturing and location. However, the results from a subset of countries where the regression could be run using the US\$1 or US\$2 a day international poverty line show no significant correlation. Sagat (2001, p. 22) concludes that “This result confirms our intuition that

minimum wages in developing countries do not affect the poorest share of the population, but rather the upper levels of the low-income population.”

Whereas the country-level studies in developing economies have a fairly consistent message, studies using micro data do not always find that poverty falls with a rise in the minimum wage. For example, IPEA’s (2000) simulations using Brazilian micro-data find that an increase in minimum wage has no effect on poverty, once the unemployment effects of the minimum wage increase are taken into account. Arango and Pachón’s (2004) study, using Colombian panel data on urban areas, finds minimum wages improve the living conditions of families in the middle and upper part of the income distribution with net losses for those at the bottom. They also find significant negative minimum wage effects on both the likelihood of being employed and hours worked, especially for women, the young and less educated workers. On the other hand, Cunningham and Siga (2006) find that that minimum wages increases household earnings among the poor and that the poorest households experience the highest wage gains in Mexico. The World Bank (2006) attributes the difference in Arango and Pachón’s (2004) and Cunningham and Siga’s (2006) findings for Colombia and Mexico, respectively, to the fact that minimum wages are relatively low in Mexico and relatively high in Colombia.

The Arango and Pachón (2004) and Neumark, Cunningham and Siga (2006) studies also begin to explore the impact of the minimum wage on the labor supply responses of different members of the household by examining separately the probabilities of employment and the change in the hours worked of the heads v. non-heads of households. Arango and Pachón (2004) find that an increase in the minimum wage relative to the median wage reduces the likelihood that a household head is

employed; this negative effect is larger for women and less educated people. Although the findings for non-heads are not directly comparable to those for heads, since they are estimates of unemployment and participation in the labor force which are conditioned on the number of family members in the labor force, the authors claim that increases in the ratio of the minimum wage the median raises the probability of unemployment of non-heads and also increases their probability of participation in the labor market, which the authors interpret as a “third-bread-giver response to negative family income shocks” (p. 24).

Hence the sparse literature on minimum wages and poverty has provided inconclusive evidence on the question of the impact of increases in the minimum wage on the level of poverty. Most of the evidence is of reduced form with estimates of the correlation between (changes in) poverty and (changes in) the minimum wage. The older studies, using country level data, were more likely to find a negative relationship between minimum wage hikes and poverty than the more recent studies based on micro data. Some recent students are beginning to look more at the structural relationships and providing us with a richer understanding of the household responses to minimum wage increases.

3. Minimum Wages and Poverty in Honduras

During the period under study, Honduras set 22 minimum wages -- for small (1-15 employees) and large (16+ employees) firms in eleven industries -- and adjusted them about two times a year.⁹ These minima applied to all salaried employees in the private

⁹ The information on the structure of minimum wages was gathered from interviews with staff at the Ministry of Labor and Social Security in Honduras and from a report by the Secretaria de Trabajo y Seguridad Social (2003).

sector; hence the public sector and the self-employed are the “uncovered sector.”¹⁰ Appendix Table A1 summarizes the data on minimum wages from the decrees that we use in our analysis. These are daily minimum wages deflated to December 1999 prices using the monthly Consumer Price Index provided by the Bank of Honduras. In our empirical work we use all 22 minimum wage categories. We note that the minimum wage for large firms was on average 27% higher than the minimum for small firms during this period and that the rate of growth of real minimum wages was more rapid for small firms (4% per year) than for large firms (1% per year). Hence over the period, minimum wages for small firms rose by 11.9% while for large firms they only rose by 3.3%.

The second data set we use is the Permanent Household Surveys for Multiple Purposes (PHSMP), which is a nationally representative survey that was carried out two times a year (in May and September) during 2001-2004. These surveys provide information on the economic activity, firm size and location of each person’s job, which allowed us to append to each worker and each unemployed person who has worked before the minimum wage that corresponds to his/her job in a given month and year.¹¹

¹⁰ A separate wage grid applies to public sector employees who are not covered by union agreements. Among the unionized civil servants, there are two groups (medical staff and teachers) whose base wage has at times been adjusted with a formula tied to minimum wage adjustments.

¹¹ Unfortunately, we are not able to assign a minimum wage to those outside of the labor force or to unemployed workers who have never worked before because we do not know the firm size and industry of their job; the applicable minimum wage depends on these two characteristics of the job. However, since the unemployed who worked before are on average over three-quarters (76%) of all unemployed during the period under study, our results represent the vast majority of the unemployed.

The daily minimum wages were converted into monthly and hourly minimums in order to have them in the same units as the salary data in the PHSMP.¹²

In order to get a sense of the variation in the real minimum wage over time in relation to the real wage, we plot in the first graph (upper left quadrant) of Figure 1 the average real minimum wages and wages (in Lempiras, December 1999 prices) of all private sector employees for each survey date during 2001-2004.¹³ The average real hourly minimum wage increased by 3.8% per annum on average or 10.9% from May 2001 to May 2004.¹⁴ We also see that the minimum wage is relatively high -- between about 0.45 and 0.56 of the average wage -- during 2001-2004.

The graphs in the lower half of Figure 1 are presented to show that Honduras was enjoying a period of relatively stability and growth after the destruction created by Hurricane Mitch in 1999. Inflation ranged between 6.0% and 9.6% and GDP was growing at an average annual rate of about 4.3%, without any significant shocks.

Honduras is a relatively poor country. With a GNI per capita of US\$1,040 in 2004 (World Bank Indicators), it is the fourth poorest country in Central America (but

¹² According to the Directorate of Salaries in the Ministry of Labor, employers are required to pay 30 daily MWs in a month. We calculated an hourly minimum wage = Monthly MW/(4.3 x 44), which assumes an average of 4.3 weeks a month and that full time work is 44 hours a week. (In Honduras, full-time work for private sector employees is defined in the labor code as 8 hours a day for five days plus one half-day on Saturday.) The hourly wage was calculated by dividing the monthly salary (provided in the PHSMP) by the number of hours the worker indicated he/she had worked per week times 4.3 (weeks/month). (Observations with missing data on any of the key variables -- labor earnings, hours worked, sector, etc. -- were deleted.)

¹³ These minimum wages are averaged over all private sector employees, hence over large and small firms and over the 10 industries in the PHSMP.

¹⁴ However, the annual increases in the average real minimum wage are more erratic and very different when using May to May annual changes (15.1% increase between 2001 and 2002; a 5.9% decline in 2002-2003; and a 2.3% rise in 2003-2004) than when using the September to September annual changes (0 changes between 2001 and 2002 and 6.5% increase between 2002 and 2003). This is of a function primarily of when the minimum wage was last raised and how much inflation there was in the interim, and to a lesser extent to changes in the distribution of workers across industry and firms size.

very close to Nicaragua, the poorest country). It has the highest poverty headcount ratio in the region, which has remained fairly constant since 1990 (Trejos and Gindling, 2004). Since 2001, micro data have been available on two levels of poverty -- poverty and extreme poverty -- from the household surveys (PHSMPs). The extremely poor poverty line is constructed from the cost of a basic basket of foodstuff yielding 1,200 calories a day. A household is considered extremely poor if its per capita earnings are less than the cost of this basic basket of food. The poverty line is constructed from a basic basket of goods that includes housing and education services in addition to the basic basket of food.

To get a sense of the levels poverty and its trend in Honduras, we present in the upper right quadrant of Figure 1 a bar graph with the shares of the labor force which fall in each of three categories – extremely poor, poor and non poor – at each of the survey dates from 2001 to 2004. The average shares, over the entire period, are in the bottom row of Table 1. As can be seen, a very large percentage of the labor force in Honduras -- on average 44% -- is considered extremely poor, with 63% (an additional 19%) considered poor, leaving only about 37% of the work force as non-poor. The bar charts in Figure 1 indicate that over these four years, these shares are fairly constant, with only small fluctuations around the mean.

We also show in Table 1 the unconditional probability that different groups of individuals in the labor force are poor. The rates of extreme poverty are highest among those working in small firms, 46%, or self-employed, 51% (which together account for almost three-quarters of the labor force); workers and unemployed who are unskilled, 49% (two-thirds of the labor force); young people between 15 and 21 years of age, 50%

(which account for one-quarter of the labor force); and individuals living in rural areas, 62% (almost half of the labor force). Although these patterns are typical, the gap between the urban and rural extreme poverty rates is remarkably large in Honduras. We note that the measure we present here is comparable but not equivalent to the poverty head count measure, which measures the share of the population below the poverty line.

How high is the minimum wage relative to the household per capita poverty line? At 3.5 times the poverty line, the World Bank (2006) ranks Honduras' ratio of the minimum wage to the per capita poverty line as third out of 20 Latin American and Caribbean countries, with Guyana being the highest (6.5 times the poverty line) and Chile the second highest (at about 3.8 times the poverty line). We noted earlier that if the minimum wage is set high relative to the poverty line, then raising it may have no impact because it is raising the income of the middle (a bit like the findings of Arango and Pachón, 2006, for Colombia). In Honduras a minimum wage earner could provide a household with three dependents with the basic needs above the poverty. However, in a country where the female labor force participation rate is low and the average family size is large, this minimum would not necessarily cover the basic needs of the typical family of five if there were only one income earner. Hence, there is scope for a reduction in poverty from raising the minimum.¹⁵

Finally, we noted that in the US literature there is a concern that individuals who earn the minimum wage are not in poor households. Hence we calculate the share of workers who earn within 10 percent of the minimum wage (i.e., $0.9MW < W < 1.1MW$) that are poor. We note from Table 2 that 71% of all workers who earn the minimum

¹⁵ The World Bank (2006) study notes that at \$7/day the Honduran poverty line is also far above the \$2/day poverty line and that three countries (Venezuela, Mexico and Uruguay) out of twenty Latin American and Caribbean countries have minimum wages that are below this poverty line.

wage are in poor households, which indicates that raising the minimum wage could have a substantial effect on poverty.¹⁶ We list the probabilities for various groups in the population and see that raising the minimum wage for household heads, unskilled, men and older individuals could potentially lift more families out of poverty than raising it for the non-heads, skilled, women and younger people.

4. The Impact of the Minimum Wage on the Distribution of Wages

A straightforward method of looking for an impact of minimum wages is to look for spikes in the wage distribution at or around the minimum wage (e.g., Dinardo, Fortin and Lemieux, 1996). However, given the number of minimum wages in Honduras, we simplify the graphical analysis by plotting the kernel density estimate of the log wage minus log minimum wage for each worker, where a zero indicates that the worker is earning the legal minimum wage. In Figure 2 we plot these kernel density estimates separately for four sectors: two covered (the large firm and the small firm sectors) and two sectors not formally covered by minimum wage legislation (self-employed and the public sector). If legal minimum wages are enforced in a particular sector, we would expect to see the distribution of wages censored from below at the level of the minimum wage, with no (or very few) workers earning below the minimum wage. We might also expect to see a density at zero (at the minimum wage) to be higher in the covered sector than in the uncovered sector. This is what we find in the kernel density estimates in the top left panel of Figure 2 for covered workers in large firms: there is a large spike at the minimum wage and there is a clear censoring of the distribution below the minimum wage. On the other hand, the distribution of wages in the small firm covered sector is not

¹⁶ We note from Table 1 that the average individual in the labor force has a .63 probability of being poor in Honduras, and the probability is higher for those earning the minimum wage.

censored and there is no spike at the minimum. The shape of the distribution of wages in the small firm covered sector is more similar to the shape of the distribution in the uncovered self employed and public sectors. In these three sectors, there is no indication that minimum wages affects the distribution of wages, and therefore we conclude that minimum wages are not effectively enforced in the small firm covered sector, self-employed sector or public sector.

Another way to summarize the information presented in Figure 2 is to calculate the average share of workers earning less than, at, or more than the MW within each of these four sectors, as we do in Table 3.¹⁷ We find the share at the MW is substantially higher among private sector employees in large firms (12.4%) than among private sector employees in small firms (9.7%), among the self employed (7.1%) or in the public sector (5.3%), again pointing to higher enforcement in the large firm private sector. Similarly, we find relatively fewer workers earn less than 90% of the minimum wage in the large firm covered sector (16.9%) than in the small firm private sectors (39.8%). Additionally, we find no evidence that minimum wages directly affect the distribution of wages in the self-employed or public sector. Hence the combined evidence of the wage distribution and the average share earning below and at the minimum wage point to better enforcement of minimum wages in the large firm covered sector than in small firms, where we might conjecture there is little to no enforcement.

In a companion paper (Gindling and Terrell, 2006) we use an industry-level panel data set to estimate the wage and employment effects of changing minimum wages in Honduras. In that paper we find that increases in the minimum wage are correlated with

¹⁷ We use a bound of 10% to allow for measurement error so that we are actually measuring the share earning less than 0.9 of the MW, within 0.9 and 1.1 of the MW and more than 1.1 of the MW.

higher average wages in the large firm covered sector (our estimates suggest that a 10% increase in legal minimum wages will increase average wages in the large covered sector by 2.1%). At the same time, higher minimum wages reduce employment in the large firm covered sector (we estimate that an increase in real minimum wages of 10% reduces employment by 5.3%). Where do the workers who lose their jobs in the large firm covered sector go? Our evidence suggests that they enter the small firm covered sector and unemployment. As workers pushed out of the large firm covered sector by higher minimum wages enter the small firm covered sector, they drive down average wages in that sector. Our estimates suggest that a 10% increase in legal minimum wages will increase employment by 4.3% and reduce wages by 1.9% in the small firm covered sector. We find no significant wage and employment effects on self-employed workers or on workers in the public sector suggesting that minimum wages are not affecting these workers indirectly either through public sector wage setting or shifts in the supply of labor.

5. Econometric Methodology and Findings

Our goal is to estimate the extent to which an increase in minimum wages increases/decreases the probability that a person in the labor force (with particular characteristics) will be poor or extremely poor. We begin by estimating the following equation with a probit model using individual-level data on members of the labor force (employed plus unemployed who worked before) using a pooled data set of all seven surveys from 2001 to 2004:¹⁸

¹⁸ The data in the regression are weighted by sample weights. Estimated standard errors are robust to heteroskedasticity and serial correlation as well as corrected for the clustering of errors around minimum wage categories at each survey date.

$$Poor_{it} = a_0 + a_1 \ln MW_{it} + \overline{X_{it}} \beta + \sum_{j=1}^J \lambda_j IND_{itj} + \sum_{t=1}^T \gamma_t YR_t + \mu_{it} \quad (1)$$

where $Poor_{it}$, equals 1 if the worker is living in a poor (or extremely poor) family. The explanatory variable of interest is $\ln MW_{it}$, the log of the real hourly minimum wage (in 1999 Lempiras) that applies to that firm size and industry at time t . The coefficient α_1 is an estimate of the effect of one percent increase in legal minimum wage on the probability an individual in the labor force is poor. The vector X_{it} , controls for other factors that explain low wages and poverty (education, age, age squared, family size, dummy variables for rural/urban location and gender). We include fixed effects for the month and date of the survey, YR_t , to control for changes in the survey design and any time-specific factors such as aggregate supply and aggregate demand changes or changes in the timing of the surveys. We also include 22 industry/firm-size dummies (IND_{it}) to control for industry/firm-size specific fixed effects and for the endogenous correlation of employment and minimum wages across industry categories.

Because we find that minimum wages are only complied with in large firms, we also estimate separate coefficients for the effects on individuals in large v. small firms (covered sector) as well as for individuals the two uncovered sectors – self-employed and public sector workers.

The coefficients on the minimum wage (α_1) presented in Table 4 indicate that a 10% increase in the minimum wage will lower the probability that a person in the labor force is extremely poor by 2% and may lower the probability that a person in the labor force is poor by 1%, although this second coefficient is not statistically significant at conventional levels. The findings in the next rows demonstrate clearly that the negative relationship between changes in minimum wages and poverty is being driven entirely by

the higher wages in the large firm sector as the coefficients on all other sectors are insignificant. Hence workers who are in the large firm sector gain from a minimum wage increase in terms of some leaving poverty. Workers in the small scale sector are not made worse off – in terms of poverty – by minimum wage hikes but, as we found in Gindling and Terrell (2006), their wages are lowered in this sector as it absorbs some as of workers that lose their jobs in the large firm sector.

We next ask to whether the findings in the first row of Table 4 hold more strongly for low paid workers than for high paid workers. Hence, in separate probit regressions we interact the minimum wage variable in equation (1) with a dummy variable for different characteristics of workers that signal low v. higher pay: i.e., unskilled (people with up to an elementary school education) v. skilled (with more than an elementary school education); heads v. non-heads of households; urban v. rural; male v. female; and younger (15 to 21 years of age) v. older (21+ years) individuals. The estimated coefficients from these interacted variables are shown in Table 5; they indicate that in almost all cases, the relationship between increases in the minimum wage and poverty reduction is stronger among the lower paid workers (unskilled, rural, female and young) than among their higher paid counterparts. For example a 10 % increase in the minimum wage reduces the probability that a woman is extremely poor by 3.3% and poor by 2.3% whereas the point estimates for men are much smaller and not statistically significant. This would lower the incidence of extreme poverty among women from 33.9% to 33.1% and their incidence of poverty from 21.4% to 20.7%. The one case where this does not hold is with heads and non-heads of households. The evidence presented in Table 5 suggests that hikes in the minimum wages lowers the probability that the head of a

household is poor by more than it lowers the probability that the non-head of a household is poor. This is important because the proportion of working household heads that are poor is a stronger indicator of the proportion of families who are poor. These results suggest that minimum wages in Honduras are correlated with a bigger reduction in families in poverty than the results for individual workers (from Table 4) would suggest.

In Table 6 we address the question of whether this minimum wage/poverty relationship, which we learned in Table 4, is being driven by changes in the large scale sector more than the small scale sector, continues to hold for workers with low pay more than for workers with higher pay in large v. small firms. The findings in Table 6 show that indeed, the coefficients for small firms are nearly all insignificant whereas for large firms they are nearly all significant. Within large firms, the estimates indicate that minimum wages have a larger impact on poverty among the unskilled relative to the skilled, the old relative to the young, and especially in the rural areas relative to the urban areas. Their impact on poverty reduction is not significantly different among heads v. non-heads of households and between men and women in the large firm sector.

7. Conclusions

We conclude from these findings that increases in the minimum had a modest poverty reducing effect in Honduras during 2001-2004: A 10% increase in the minimum wage is associated with a 1.8% fall in extreme poverty and a 1.0% decline in poverty among all individuals in the labor force. Checking this with the historical record, we note that minimum wages in Honduras rose by 10.9% over this period; and extreme poverty fell from 46.8% to 42.1%, which is more than 2% decline predicted by our model, indicating additional factors are at play in reducing poverty. The impact of minimum

wages on poverty reduction is driven by one sector where minimum wages are enforced - - i.e., the large firm sector -- where only 20% of the labor force is located. We find no indirect (significantly negative or positive) effects on the small firm sector (where minimum wages should apply but are not enforced) or the two uncovered sectors (self-employed and public sector). Closer inspection of the relative effects on lower paid v. higher paid workers indicates that the poverty reduction effects tend to be larger among the unskilled and especially the rural areas, which experience the largest poverty reduction impact. (A 10% increase in the minimum wage lowers extreme poverty by 4.4% and poverty by another 4.1% in rural areas). We find, contrary to findings by Sagat (2001) and Arango and Pachón (2006), that Honduras' minimum wage impacts extreme poverty as well as poverty in spite of a relatively high minimum wage (in terms of the poverty line or average wage).

We stress that these findings are reduced form estimates of the net impact of minimum wages on poverty. A more thorough analysis using panel data on individuals (which is not available in Honduras) would estimate a structural/dynamic model of the channels driving these net effects on poverty reduction.

We noted at the outset that questions are being raised with respect to the role of minimum wages in a fiercely competitive global economy. Some argue that they impede employment creation, especially of “good” jobs (Heckman and Pages, 2001; Pages and Micco, 2006) while others argue that minimum wages can shift the composition of employment toward “good jobs” (Acemoglu, 2001). We have shown in companion studies that minimum wage legislation can reduce the number of good jobs in the formal/regulated sectors and increase the number of jobs in the informal/unregulated

sector in Honduras (Gindling and Terrell, 2006) and Costa Rica (Gindling and Terrell, 2007). Moreover, increases in the minimum wages lower the wages of employees in the small firm sector in Honduras. However, we have shown in this paper that the impact of increased minimum wages on poverty in the small sector is not significant (although the coefficient is estimated with a positive sign). These combined findings imply that someone in the household of the individual working in the small firm sector had to increase his/her labor supply in response to the minimum wage increase in order to keep the family out of poverty. This can be interpreted as a reduction in the household's welfare if not an increase in its poverty. If the increased supply of labor is from a child that should be in school, then there are implications for long-term poverty among the next generation.

In an era of globalization, the extent to which countries are competitive is an important consideration. However, one would hope that governments could help protect their workers from fierce competition (the "race to the bottom") by creating an environment that enables good job creation and poverty reduction while at the same time not hampering and hopefully enhancing firms' competitiveness. This is a difficult challenge. In that context, however, there is the argument that raising minimum wages will force employers to consider investing in capital and other complementary factors that increase a worker's productivity when they might not have otherwise. Hence increased minimum wages may stimulate employers to seek ways to increase their efficiency and remain competitive in the global economy. This is an area that needs further study with data from developing countries.

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Table 1: Poverty Rates for Different types of Workers in Honduras (avg. for 2001-2004)

Area	Extremely Poor	Poor	Non-Poor	Share of Total
Covered Large	19.0	24.7	56.2	20.3%
Covered Small	46.4	19.9	33.7	36.3%
Self-employed	51.1	17.8	31.1	36.2%
Public	9.8	18.9	71.4	7.2%
Unskilled*	49.3	20.5	30.2	67.6%
Skilled**	14.5	21.1	64.4	32.4%
Non-Head	41.2	20.1	38.7	56.6%
Head	41.1	19.9	39.0	43.4%
Rural	62.0	9.9	28.1	48.3%
Urban	27.1	27.4	45.5	51.7%
Female	33.9	21.4	44.8	35.8%
Male	45.2	19.3	35.5	64.2%
Young (15-21)	50.4	19.5	30.0	24.4%
Older (21+)	38.2	20.2	41.6	75.6%
All Workers + Unemp.	44.0	18.9	37.1	100.0%

*Unskilled are individuals primary or less education.

**Skilled are individuals with some secondary or higher education.

Source: Authors calculations from the Honduran Household Surveys.

Table 2: Percent of Workers who Earn Within 10% of the Minimum Wage that are Poor (average over 2001-2004)

All Workers	71
Skilled	60
Unskilled	72
Household head	80
Non-head	64
urban	71
rural	70
male	75
female	63
old	73
young	64

Source: Authors calculations from the Honduran Household Surveys.

Table 3: Share of Workers Earning Less than, At, and More than the Minimum Wage by Sector (Average for 1990-2004)

	Less Than¹	At²	More Than³
Total	32.4%	9.3%	58.2%
Private Salaried Employees			
Large	16.9%	12.4%	70.7%
Small	39.8%	9.7%	50.4%
Self-Employed	43.2%	7.1%	49.7%
Public	6.0%	5.3%	88.7%

¹Less than 90% of the Minimum Wage

²Within 10% of the Minimum Wage

³110% or more than the Minimum Wage

Source: Authors calculations from the Honduran Household Surveys.

Table 4: Impact of an Increase in the Minimum Wage on the Poor and the Extremely Poor: All Workers Plus Unemployed and by Large and Small Firms¹

Sample	Poor	Extremely Poor
All Workers plus Unemployed	-0.103 <i>0.074</i>	-0.184** <i>0.084</i>
Covered Large	-0.191** <i>0.081</i>	-0.195*** <i>0.055</i>
Covered Small	0.454 <i>0.459</i>	0.158 <i>0.397</i>
Self-employed	0.292 <i>0.341</i>	0.495 <i>0.440</i>
Public	0.144 <i>0.238</i>	-0.024 <i>0.121</i>

¹Coefficients on the log of the Minimum Wage estimated with the a probit as specified in Equation (1) in the text.

Notes: Standard errors, in italics, are robust to heteroskedasticity and serial correlation as well as corrected for the clustering of errors around minimum wage categories in each year.

*significant at the 0.10 confidence level

**significant at the 0.05 confidence level

***significant at the 0.01 confidence level

Table 5: Impact of an Increase in the Minimum Wage on the Poor and the Extremely Poor for Sub-Groups in the Labor Force¹

Sample	Poor	Extremely Poor
Unskilled	-0.136 <i>0.086</i>	-0.222** <i>0.094</i>
Skilled	-0.078 <i>0.083</i>	-0.131 <i>0.100</i>
Non-head	-0.087 <i>0.073</i>	-0.173** <i>0.083</i>
Head	-0.134* <i>0.073</i>	-0.212*** <i>0.082</i>
rural	-0.406*** <i>0.086</i>	-0.440*** <i>0.087</i>
urban	0.058 <i>0.073</i>	-0.027 <i>0.084</i>
female	-0.225** <i>0.097</i>	-0.334*** <i>0.109</i>
male	-0.031 <i>0.077</i>	-0.109 <i>0.085</i>
young (15-21)	-0.161* <i>0.093</i>	-0.231** <i>0.099</i>
older (21+)	-0.082 <i>0.073</i>	-0.170** <i>0.082</i>

¹Coefficients on the log of the Minimum Wage estimated with the a probit as specified in Equation (1) in the text.

Notes: Standard errors, in italics, are robust to heteroskedasticity and serial correlation as well as corrected for the clustering of errors around minimum wage categories in each year.

*significant at the 0.10 confidence level

**significant at the 0.05 confidence level

***significant at the 0.01 confidence level

Table 6: Impact of an Increase in the Minimum Wage on the Poor and the Extremely Poor for Sub-Groups in the Labor Force in Small and Large Firms¹

Sample	Large Firms		Small Firms	
	Poor	Extremely Poor	Poor	Extremely Poor
Unskilled	-0.373*** <i>0.104</i>	-0.279*** <i>0.073</i>	0.612 <i>0.532</i>	0.263 <i>0.414</i>
Skilled	-0.009 <i>0.120</i>	-0.001 <i>0.096</i>	0.76 <i>0.553</i>	0.456 <i>0.486</i>
Non-head	-0.134* <i>0.078</i>	-0.170*** <i>0.054</i>	0.511 <i>0.441</i>	0.108 <i>0.394</i>
Head	-0.219*** <i>0.076</i>	-0.205*** <i>0.059</i>	0.468 <i>0.441</i>	0.058 <i>0.393</i>
rural	-0.512*** <i>0.134</i>	-0.381*** <i>0.094</i>	-0.068 <i>0.427</i>	-0.156 <i>0.351</i>
urban	-0.015 <i>0.072</i>	-0.063 <i>0.049</i>	0.592 <i>0.401</i>	0.189 <i>0.383</i>
female	-0.166 <i>0.114</i>	-.277** <i>0.112</i>	1.054** <i>0.512</i>	0.687 <i>0.547</i>
male	-0.197** <i>0.084</i>	-0.187*** <i>0.051</i>	0.319 <i>0.419</i>	-0.058 <i>0.345</i>
young	-0.125 <i>0.149</i>	0.080 <i>0.102</i>	0.662 <i>0.486</i>	0.103 <i>0.550</i>
old	-0.159** <i>0.080</i>	-0.208*** <i>0.056</i>	0.47 <i>0.435</i>	0.098 <i>0.414</i>

¹Coefficients on the log of the Minimum Wage estimated with the a probit as specified in Equation (1) in the text.

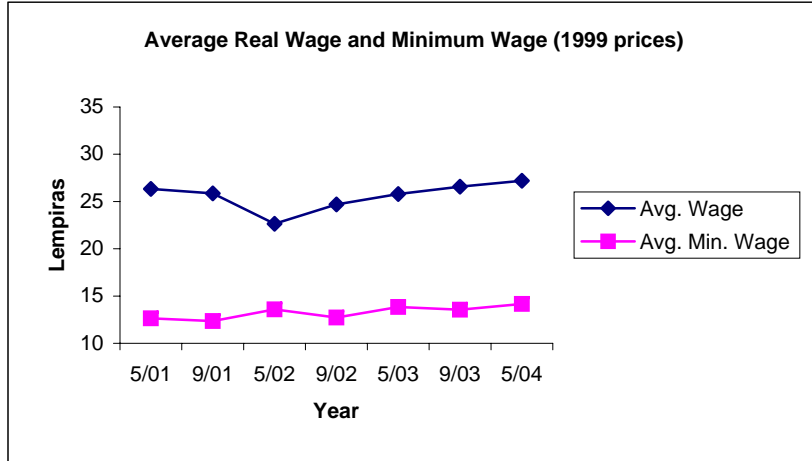
Notes: Standard errors, in italics, are robust to heteroskedasticity and serial correlation as well as corrected for the clustering of errors around minimum wage categories in each year.

*significant at the 0.10 confidence level

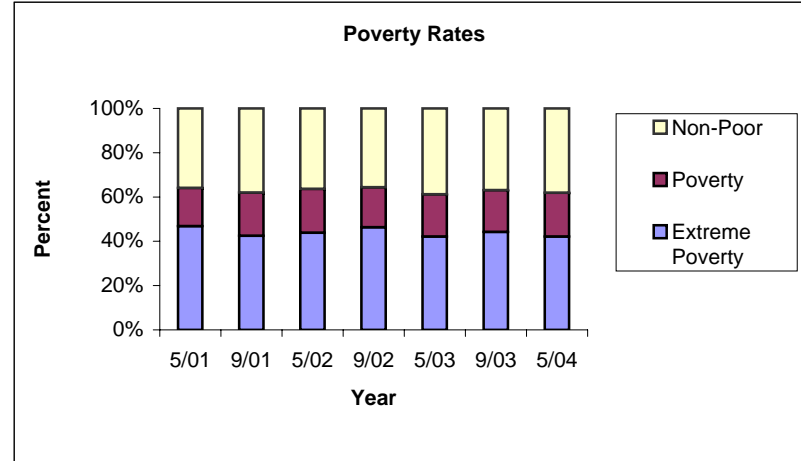
**significant at the 0.05 confidence level

***significant at the 0.01 confidence level

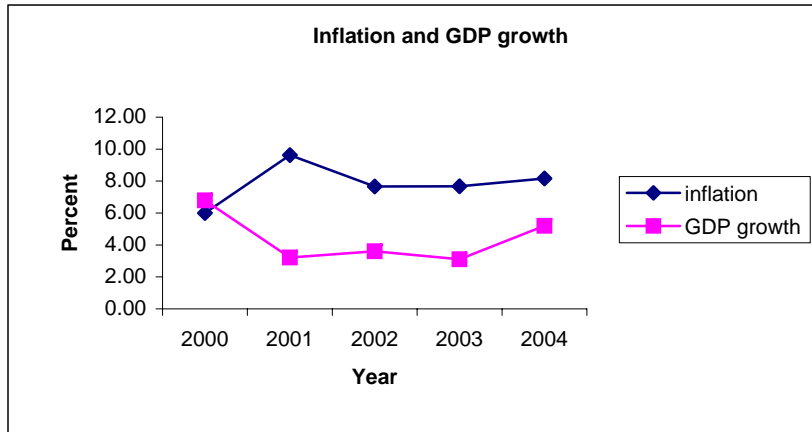
Figure 1: Macroeconomic Indicators for Honduras



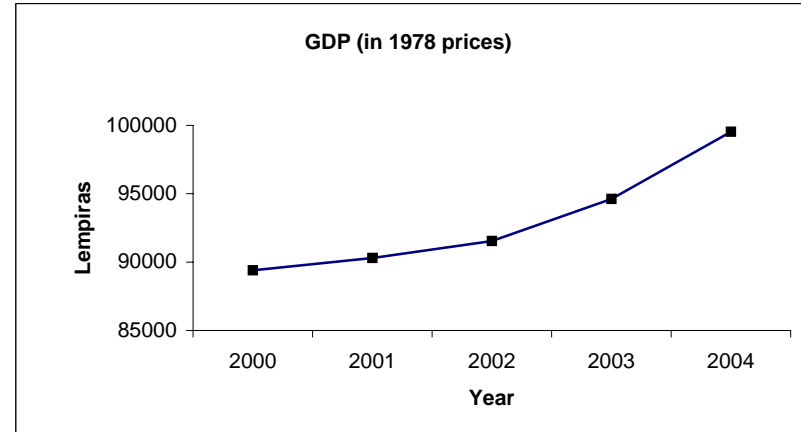
Source: Author's calculations from the Honduran Household Surveys



Source: Author's calculations from the Honduran Household Surveys



Source: Central Bank of Honduras



Source: Central Bank of Honduras

Figure 2: Kernel Density Distribution of the Log Wage Minus the Log Minimum Wage in Each Sector

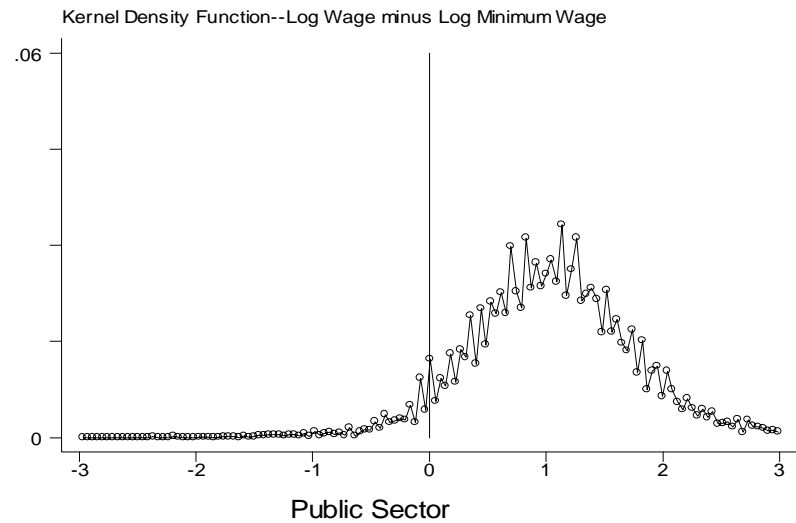
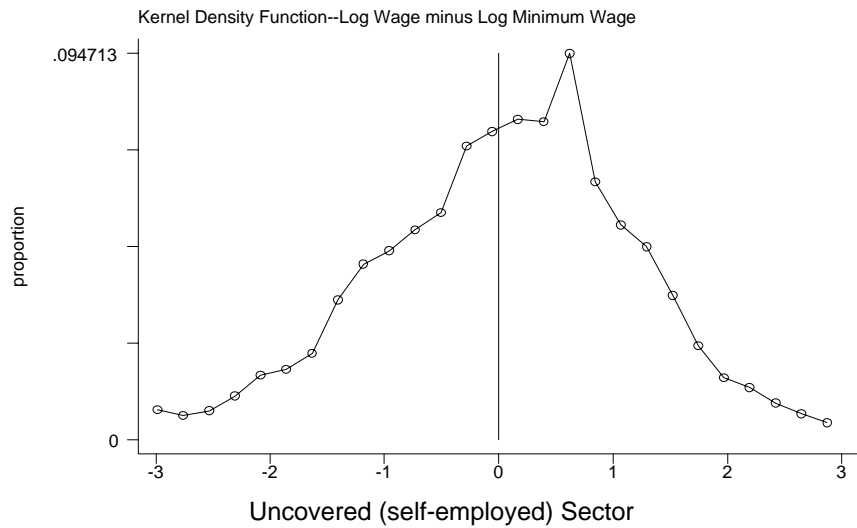
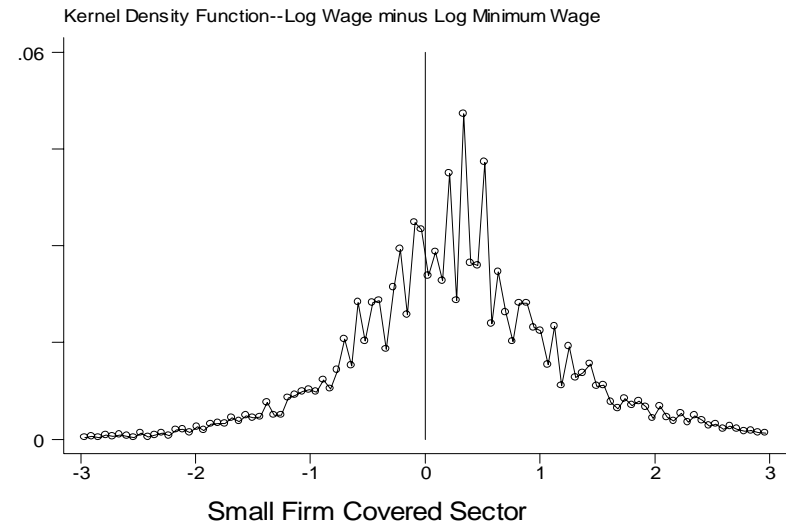
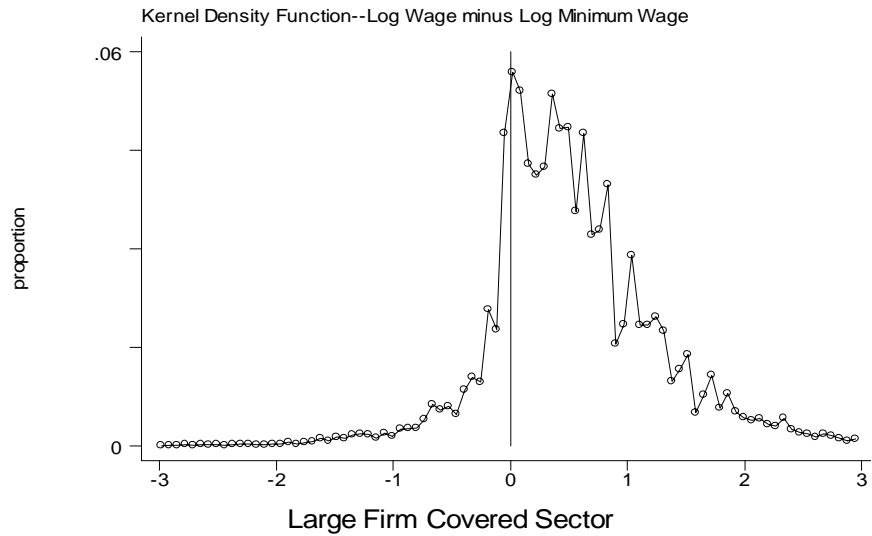


Table A1: Real Daily Minimum Wage (Dec. 1999 Monthly Prices)

Sector	May_01	Sept_01	May_02	Sept_02	March_03	Sept_2003	May_2004
Agriculture, Hunting and Fishing							
1 -15 workers	34.60	33.73	35.25	32.83	36.82	35.85	37.91
16+ workers	48.62	47.39	49.47	46.08	50.30	48.97	50.45
Non-Metallic Mining	60.55	59.02	61.03	56.85	61.97	60.34	62.16
Metallic Mining							
1 -15 workers	36.33	35.41	38.72	36.07	40.44	44.06	41.65
16+ workers	50.35	49.07	52.71	49.10	53.46	56.74	53.64
Manufacturing							
1 -15 workers	36.33	35.41	38.72	36.07	40.44	39.37	41.65
16+ workers	50.35	49.07	52.71	49.10	53.46	52.05	53.64
Utilities	54.76	53.37	61.03	56.85	61.97	60.34	62.16
Construction							
1 -15 workers	36.33	35.41	38.72	36.07	40.44	39.37	41.65
16+ workers	50.35	49.07	52.71	49.10	53.46	52.05	53.64
Trade, Hotels and Restaurants							
1 -15 workers	36.33	35.41	38.72	36.07	40.44	39.37	41.65
16+ workers	50.35	49.07	52.71	49.10	53.46	52.05	53.64
Transpntn., Storage and Comm.							
1 -15 workers	41.09	40.05	44.06	41.04	46.54	45.31	47.40
16+ workers	52.08	50.76	51.09	47.59	51.88	50.51	52.04
Financial Services							
1 -15 workers	54.76	53.37	61.03	56.85	61.97	60.34	62.16
16+ workers	60.55	59.02	61.03	56.85	61.97	60.34	62.16
Real Estate							
1 -15 workers	41.09	40.05	44.06	41.04	46.01	45.31	47.40
16+ workers	52.08	50.76	51.09	47.59	51.88	50.51	52.04
Business Services							
1 -15 workers	41.09	40.05	44.06	41.04	41.04	39.96	37.77
16+ workers	52.08	50.76	51.09	47.59	47.59	46.33	43.80
Communal Services							
1 -15 workers	36.33	35.41	38.72	36.07	40.44	39.37	41.65
16+ workers	50.35	49.07	52.71	49.10	53.46	52.05	53.64