

The Inverted U-Shaped Relationship between Female Entrepreneurship and Economic Development

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Why does the share of entrepreneurs who are women first rise and then fall with national income? Goldin (1995) explored the U-shaped relationship between female labor force participation (LFP) and development, but as Figure 1 shows, the opposite pattern appears for female business ownership, as measured by the World Bank Enterprise Survey, which focuses on larger businesses with employees (WBES). There are more female entrepreneurs at higher income levels, but male entrepreneurship increases even faster with income – making the share of female entrepreneurs lower at high income levels.

In Section II, we present a model explaining the inverse-U relationship between income and female entrepreneurship. In the model, female entrepreneurs face challenges, such as expectations about household production and discrimination from male workers, which deter women from becoming employers at low-income levels. In richer societies, the same

challenges make it harder for women to start more complex firms. When development reaches the point where men start adopting complexity, the share of female entrepreneurs can decline with income.

Section III documents three facts that are compatible with the model: female-owned firms are typically smaller, concentrated in industries with fewer skilled workers and with lower revenue per workers. In Section IV, we look at cross-national patterns such as the 0.5 correlation between female entrepreneurship and female LFP in middle income countries. Female education and cultural variables, such as discrimination in the family, strong kinship ties, and Buddhism, are also powerful national correlates of female entrepreneurship.

1. Female Entrepreneurship and Income

The World Bank Enterprise Surveys (WBES) provide our primary measure of female entrepreneurship. We focus on the primary WBES which targets larger or “regular” enterprises, but we also provide results from the World Bank’s surveys of micro-enterprises and informal enterprises.

Our regular WBES data run from 2009 to 2020. We average over all survey years to form a country-level data set.¹ Most of our 116 countries are in Sub-Saharan Africa (35 percent), Europe and Central Asia (29 percent) and Latin America (29 percent). These surveys focus on poorer places, so they are less suited for studying rich-world entrepreneurship.

We define female-owned firms as those that have a majority (or all) of women owners, and define male-owned firms similarly. We exclude firms with equal ownership. In our regular WBES sample, 83.7 percent of firms are male-owned, 10.9 percent are female-owned and 4.7 percent are equally owned.²

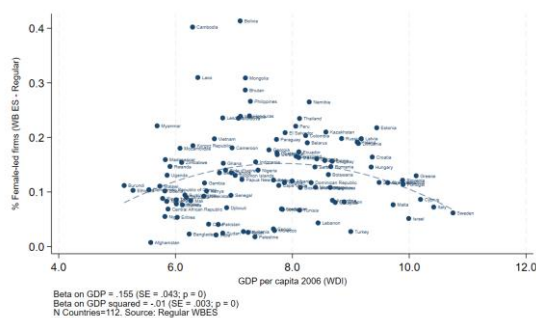


FIGURE 1. THE FEMALE ENTREPRENEURSHIP KUZNETS CURVE

Note: Log GDP per capita in 2006 is measured in 2006 US dollars. Winsorization at the top and bottom percent of countries.

Figure 1 shows the relationship between the logarithm of per capita GDP in 2006 and the share of entrepreneurs who are women in our main sample of countries.³ A simple regression estimates a significant positive slope and a significant quadratic term.⁴ This inverted-U does not appear for micro or informal enterprises.⁵ If anything, the micro-enterprise pattern mimics Goldin's (1995) standard U-shape, which is perhaps unsurprising, since starting a micro-enterprise, such as a small shop, can be a substitute for formal employment in the developing world.⁶

II. A Model of the Inverted U

Goldin (1995) explores the U-shaped relationship between female labor force participation and development across countries and over time.⁷ For Goldin (1995), the surprising fact was that LFP initially declines with income. For us, the surprising fact is that female entrepreneurship declines with income in richer places. Given the strong correlation

¹ 54 countries have more than one survey in the period 2009-2020.

² The shares of women leading micro and informal firms are higher, as documented by Kagy et al. (2023).

³ GDP is taken from the World Bank Global Economic Monitor. We use 2006 per capita GDP because 2006 is our earliest WBES survey year. From our initial set, we remove two countries for which we don't have information on female labor force participation and per capita GDP (Kosovo and South Sudan), leaving 114 countries for the analysis. For Figure 1, we winsorized the data at the top and bottom percent of the sample, but patterns are robust without winsorization.

⁴ We are not alleging that this relationship is causal, and controlling for female education largely explains the positive relationship between income and female entrepreneurship in poorer countries.

⁵ This pattern also does not appear in the ILO data on female employers, which resembles the data on informal firms in the WBES.

⁶ We find a U-shape pattern between the share of female self-employment and GDP also using the Jobs of the World dataset (Bandiera and Elsayed, 2023).

⁷ She followed earlier work by Pscacharopoulos and Tzannatos (1989) and Durand (2015), who also discuss the U-shaped pattern. Boserup (1970) discusses how the shift to industry can lead to a decrease in female LFP.

between income and female education (0.78 in our sample), we are never surprised when female outcomes improve with development.

Goldin (1995) explains the initial decline in LFP with a switch from household to factory labor, which deters female work because of a stigma associated with industrial work.⁸ Our model relies on a similar change in the nature of work. In our model, the female entrepreneurship rate declines with income in wealthier countries because managing complex organizations can be easier for men who do not face the family-related time costs or worker discrimination experienced by women.⁹

We consider an entrepreneur, who has τ_i units of time to allocate to work and receives $\delta_i L$ effective labor units per unit of labor hired. These parameters are gender/society specific, where τ_i reflects the time remaining after family-related tasks and δ_i reflects the reduction in productivity due to worker discrimination against female managers. We abstract away from marriage and motherhood, and assume that τ_i is fixed, and from

discrimination differences between female or male employees.

We assume a production function for the numeraire good of the form

$$\prod_{n=1}^N (A(ManagerTime_n)^\theta (Effective Labor_n)^\sigma)^\alpha$$

where N reflects the number of processes involved in production. An entrepreneur that hires L workers and allocates her time and workers equally across processes will receive output of $(A\delta_i^\sigma \tau_i^\theta N^{-(\theta+\sigma)})^{\alpha N} L^{\sigma \alpha N}$. Profit-

maximizing hiring generates profits $\pi_i^N A^{\frac{\alpha N}{1-\sigma \alpha N}}$,

where $\pi_i^N = \left(N^{\frac{-\theta \alpha N}{1-\sigma \alpha N}} - \right.$

$$\left. \sigma \alpha N^{\frac{1-(\theta+\sigma)\alpha N}{1-\sigma \alpha N}} \right) (\delta_i^\sigma \tau_i^\theta)^{\frac{\alpha N}{1-\sigma \alpha N}} \left(\frac{\sigma \alpha}{W} \right)^{\frac{\sigma \alpha N}{1-\sigma \alpha N}}.^{10}$$

Entrepreneurs choose between a simple production function with N_S processes and a complex production function has N_C processes, where $N_C > N_S$ and $1 > \sigma \alpha N_C$.

Complexity increases profits if and only if

$$A^{\frac{\alpha(N_C-N_S)}{(1-\sigma \alpha N_S)(1-\sigma \alpha N_C)}} > \frac{\pi_i^{N_S}}{\pi_i^{N_C}}, \text{ which implies:}$$

Claim 1: If $\delta_M > \delta_F$ and $\tau_M \geq \tau_F$ or $\delta_M \geq \delta_F$ and

$$\tau_M > \tau_F, \text{ then } \frac{\pi_F^{N_S}}{\pi_F^{N_C}} > \frac{\pi_M^{N_S}}{\pi_M^{N_C}}, \quad \text{and} \quad \text{if } \frac{\pi_F^{N_S}}{\pi_F^{N_C}} >$$

$$A^{\frac{\alpha(N_C-N_S)}{(1-\sigma \alpha N_S)(1-\sigma \alpha N_C)}} > \frac{\pi_M^{N_S}}{\pi_M^{N_C}}, \text{ male entrepreneurs adopt}$$

⁸ The paper also notes that “a general increase in income could serve to decrease women’s paid work and unpaid labor in family enterprises through a simple income effect,” but that “the quantitative and narrative evidence appears more consistent with the stigma case.”

⁹ Becker (1957) focused on discrimination by managers, co-workers and customers against African-American workers, not business-owners. Yet it is quite possible that female and minority business owners face discrimination from their employees. For example, one World Bank survey of female entrepreneurs in Cambodia states that “interviewees indicate that men often see women as less capable

managers and, as a rule, most men do not want to work for a woman boss.” One Cambodian woman, Chum Sokha, who manages a construction firm says that “when it comes to ability or talent in management, I believe that men and women are equal” but “my businesses require many male workers and men respond better to a male boss than to a woman (International Finance Corporation, 2008, p. 11).

¹⁰ The corresponding labor demand is $\left(\frac{\sigma \alpha N}{W} \right)^{\frac{1}{1-\sigma \alpha N}} (A\delta_i^\sigma \tau_i^\theta N^{-(\theta+\sigma)})^{\frac{\alpha N}{1-\sigma \alpha N}}$

the more complex production technology, while female entrepreneurs adopt the simpler production technology.

This claim suggests that at low levels of development male and female entrepreneurs will operate similarly simple organizations, but there exists a threshold at which men transition to the more complicated production technology while women do not.¹¹ If there are only two technologies, then for high enough levels of A , women will also move into more complex production processes.¹²

We assume that the number of entrepreneurs depends on the returns to entrepreneurship, so that if entrepreneurs of gender i choose technology N at productivity level A , the number of entrepreneurs of that gender will equal $e_i = \left(\pi_i^N A^{\frac{\alpha N}{1-\sigma\alpha N}} - k \right)^p$, where k represents entry and opportunity costs.

Claim 2: If $A^{\frac{\alpha(N_C - N_S)}{(1-\sigma\alpha N_S)(1-\sigma\alpha N_C)}} < \frac{\pi_M^{N_S}}{\pi_C^{N_C}}$, the share of female entrepreneurs increases with A .

The share of women who are entrepreneurs is increasing with A if and only if $\frac{1}{e_F} \frac{de_F}{dA} > \frac{1}{e_M} \frac{de_M}{dA}$ and $\frac{1}{e_i} \frac{de_i}{dA} = \frac{\alpha N}{A(1-\sigma\alpha N)} \frac{1}{1 - k A^{\frac{\alpha N}{1-\sigma\alpha N}} / \pi_i^N}$. If men and women use the same technologies, then a

higher value of k/π_i^N means a higher elasticity, because that means the ratio of growth to the base level of entrepreneurship is higher.

This result can reverse in a region where men, but not women, use the more complicated technology:

Claim # 3: If $\frac{\pi_F^{N_S}}{\pi_C^{N_C}} > A^{\frac{\sigma\alpha(N_C - N_S)}{(1-\sigma\alpha N_S)(1-\sigma\alpha N_C)}} > \frac{\pi_M^{N_S}}{\pi_C^{N_C}}$ and

if k is sufficiently small, then the share of male entrepreneurs is increasing with A .

If men but not women are using the complex technology, then the higher elasticity of complex production profits with respect to A can become more important than the fact that fewer female entrepreneurs earn more than the fixed cost of entry. If entry costs are sufficiently small, then this is guaranteed. Figure 2 shows the model at work.

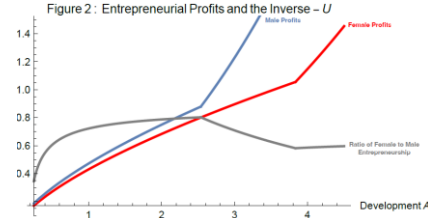


FIGURE 2. AN ILLUSTRATION OF THE MODEL

Note: The two monotonically increasing lines show the returns to male and female entrepreneurship. Both lines kink where entrepreneurs transition from simple to complex organization, with male entrepreneurs' profits kinking at a lower productivity. The third, non-monotonic line shows the ratio of female to male entrepreneurs, which dips precisely in the region in which men transition to complex organizations but women do not, as noted in Claim # 3.

¹¹ In reality there may be heterogeneity within genders, but still, if women have less time to devote to entrepreneurship or if employees discriminate more against them, then we expect men to lead larger/more complex organizations.

¹² If there were a hierarchy of such processes, then men might continue to lead more complex businesses even at higher income levels.

III. Gender, Complexity and Productivity

We now document three facts which are compatible with the model. Figure 3 shows the size distribution of female- and male-run firms in the regular WBES at different income levels. More than 40 percent of female-led firms have fewer than 10 employees in all income categories, and 38 percent of male-led businesses in low-income countries are that small. But in high-income countries, 20 percent of male businesses have more than 100 employees, while fewer than one-tenth of female-owned businesses are as large.

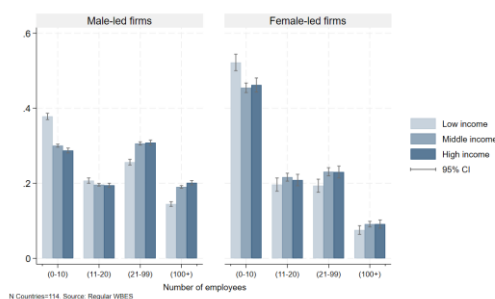


FIGURE 3. SHARE OF MALE AND FEMALE-LED FIRMS BY FIRM SIZE AND INCOME CATEGORY

Note: Countries are classified as low, high or middle income if they belong to the first, fourth or middle two quartiles of log 2006 income (in 2006 US dollars).

Our second fact is that women appear to be in less complex industries, where complexity (non-complexity) is defined as being in the top (bottom) quarter of industries based on the employment share of skilled workers. By this measure, “Manufacturing of medical instruments” is complex, while “Retail trade”

is not. Figure 4 shows female entrepreneurs are more concentrated in non-complex industries across all income levels.

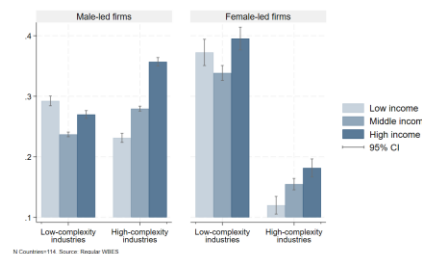


FIGURE 4. DISTRIBUTION OF FIRMS BY INDUSTRY COMPLEXITY, NATIONAL INCOME, AND FEMALE OWNERSHIP

Note: Complexity is defined at Isic 2-digit level. Low- (high-) complexity industries belong to the first (fourth) quartile of the proportion of highly skilled production workers, in the WBES dataset across countries and years. Highly skilled workers are “professionals or technicians whose tasks require extensive theoretical and technical knowledge”. Income categories are defined as in Figure 3.

In richer countries, 30 percent of male-owned businesses, but only 15 percent of female-owned firms, are in complex industries, which is compatible with the male switch to complexity in our model.

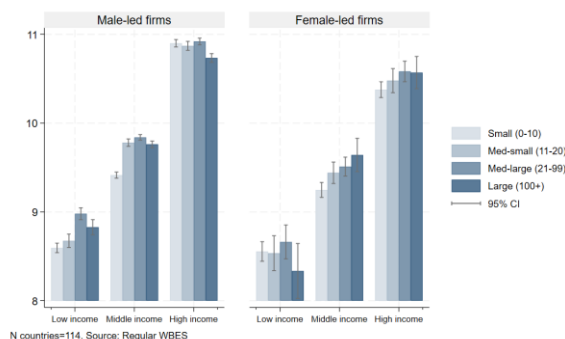


FIGURE 5. AVERAGE LOG SALES PER WORKER BY FIRM SIZE, NATIONAL INCOME, AND FEMALE OWNERSHIP

Note: Logged sales per worker refer to the last fiscal year before the WBES survey. Income categories are defined as in Figure 4.

Figure 5 shows the relationship between productivity, measured as logged revenues per employee, firm size, national income and owner gender. At all income levels and firm

sizes, female entrepreneurs have lower revenues per worker, which is compatible with $\pi_M^N > \pi_F^N$. The relationship between firm size and productivity suggests that the smaller size of female-owned firms in richer countries may mean lower returns to entrepreneurship.

IV. Cross-National Correlations

Table 1 turns to the broader patterns of female entrepreneurship around the globe.

TABLE 1—CROSS-COUNTRY CORRELATIONS

	(1)	(2)	(3)	(4)	(5)	(6)
	Female Entrepreneurship (WISD 2009-2019)	Female Entrepreneurship, middle income (WISD 2009-2019)	Female LFP (ELA, 2006-2019)	Female LFP, middle income (ELA, 2006-2019)	Female Entrepreneurship (WI Informal ES, 2006-2019)	Female Entrepreneurship (WI Micro ES, 2006-2019)
Observations	89	41	69	41	27	21
Female Entrepreneurship (WISD 2009-2019)	1.00		0.36*** (0.000)	0.36*** (0.000)	0.42* (0.011)	0.42* (0.009)
Female LFP (ELA, 2006-2019)	0.30*** (0.000)	0.50*** (0.000)	1.00	1.00	0.74 (0.240)	-0.09 (0.643)
Log GDP (WIS, 2006)	-0.02 (0.409)	0.15 (0.254)	-0.08 (0.494)	0.05 (0.715)	0.18 (0.364)	0.44* (0.033)
<i>Av. years schooling (women) (Barro-Lee, 2005)</i>	0.28* (0.030)	0.40** (0.001)	0.17 (0.113)	0.42** (0.000)	0.16 (0.443)	0.25 (0.270)
Share of women in primary school (Barro-Lee, 2005)	0.35*** (0.001)	0.53*** (0.000)	0.13 (0.217)	0.45** (0.001)	0.28 (0.176)	0.06 (0.806)
Global Education Score (WEP, 2006-2019)	0.54*** (0.000)	0.46*** (0.001)	0.08 (0.430)	0.11 (0.439)	0.30* (0.044)	0.16 (0.266)
Global Gender Gap Score (WEP, 2006-2019)	0.41*** (0.000)	0.66*** (0.000)	0.55*** (0.000)	0.48*** (0.000)	0.42* (0.034)	0.35 (0.000)
Discrimination in the family (SDG, 2014, 2019)	-0.44*** (0.000)	-0.59*** (0.000)	-0.42*** (0.000)	-0.54*** (0.000)	-0.24 (0.204)	-0.29 (0.117)
Rate of Doing Business Score (WB, 2016-2019)	0.25** (0.008)	0.23* (0.040)	0.10 (0.277)	0.19 (0.144)	0.12 (0.442)	0.23 (0.226)
Kinship tightness (Tidke, 2019)	-0.33*** (0.001)	-0.53*** (0.000)	-0.08 (0.396)	-0.13 (0.353)	-0.20* (0.031)	-0.03 (0.890)
Share of Muslim (FTW, 2010)	-0.14*** (0.000)	-0.70*** (0.000)	-0.56*** (0.000)	-0.63*** (0.000)	-0.17 (0.306)	0.47* (0.031)
Share of Black/African (FTW, 2010)	0.42*** (0.000)	0.36** (0.007)	0.18 (0.066)	0.19 (0.061)	0.10 (0.400)	0.36 (0.000)

Note: Observations indicate the minimum number of observations in a given column. Data are collapsed at the country level.

The table reports results for our three different female entrepreneurship measures (the larger entrepreneurs who are the main topic of this paper, informal entrepreneurs and micro entrepreneurs) and female LFP. We measure female LFP between 15 and 64 years old using indicators from the International Labor Organization (ILO) between years 2006 and 2019. Columns (2) and (4) show results for

the female entrepreneurship rate and LFP within our middle-income countries, which have the most variation in both female LFP and the female entrepreneurship rate.

The first two rows show the correlation between female entrepreneurship measures and LFP. Even though the pattern linking female entrepreneurship (of larger firms) and GDP is the reverse of the pattern for female LFP, these two variables are quite correlated. Table 1 reports a 0.35 correlation between these two variables across the entire sample, and a 0.5 correlation among the middle-income income countries. This fact might mean that female entrepreneurs are more likely to hire female workers, or that there are omitted country-level variables related to gender norms.¹³ There is also a positive correlation between our main female entrepreneurship rate and the micro and informal female entrepreneurship rates.

The next three rows look at measures of development: per capita income, total years of female schooling and the share of women in primary school (Barro-Lee, 2005). The essentially zero aggregate relationship between GDP and both LFP or our core entrepreneurship measure masks the underlying U-shaped and inverted U-shaped relationships. Female education is positively

¹³ Female employees make up 53 percent of workers in female-led firms in our sample, but only 28 percent of workers in male-led firms.

In high income countries, female employees represent 62 percent of workers in female-led firms, and 34 percent in male-led firms.

correlated with all outcomes, with the strongest correlations in middle-income countries.

Three measures of gender gaps all correlate with female entrepreneurship. We use the WEF Global Gender Gap score and its subindex in education (WEF, 2006-2020). We also use the OECD SIGI measure of “Discrimination in the Family” (SIGI, 2014, 2019), which captures gender discrimination in laws, social norms and practices. The Discrimination with the Family variable is particularly strongly correlated with entrepreneurship and LFP in middle income places, pointing to the importance of cultural norms. We also find a mild correlation between the Ease of Doing Business score (World Bank, 2016-2019) and the share of female-led firms.

Our final three rows refer to cultural variables. Strong kinship ties (Enke, 2019) are negatively correlated with female entrepreneurship, perhaps because women in these societies are taxed more by their kin or can access smaller social networks. We also find negative correlations between Muslim presence in the country and all the outcomes, while Buddhist influence is positively correlated with female entrepreneurship, as noted by Zhang (2024), which is a particularly fascinating topic for future research.

V. Conclusion

This paper documented an inverted U-shaped relationship between the female entrepreneurship rate and economic development, and proposed a simple explanation for it. While the World Bank’s states that these are “nationally representative firm-level surveys,” we hope that future work will investigate whether the inverse U-shape persists in other samples. We are excited about a research agenda investigating policies to reduce the costs of female entrepreneurship.

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