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Economies

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Suggested Citation: Teignier, Marc; Cuberes, David (2024) : How important are labor-market gender gaps in the South Caucasus?, *Economies*, ISSN 2227-7099, MDPI, Basel, Vol. 12, Iss. 12, pp. 1-18, <https://doi.org/10.3390/economies12120332>

This Version is available at:

<https://hdl.handle.net/10419/329259>

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Article

How Important Are Labor-Market Gender Gaps in the South Caucasus?

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Abstract: In this paper, we use survey data from the South Caucasus countries (Armenia, Azerbaijan, and Georgia) to document the presence of gender gaps in the labor market and examine its consequences. To do the analysis, we use a numerical general-equilibrium occupational choice model with heterogeneous agents in entrepreneurial ability. We then introduce the observed gender gaps in labor-force participants, employers, and self-employed. We find that entrepreneurship gender gaps cause an average GDP loss of 6.2%, while gender gaps in labor-force participation cause an average GDP loss of 9%. Armenia (2007) displays the largest total loss and Georgia (2007, 2014) the smallest ones. We also decompose the gender gaps and their associated costs by households with different education levels and with and without dependents at home. Our results indicate that most of the income losses are driven by households with high education and those with dependents, especially those with both children and elderly at home.

Keywords: gender inequality; entrepreneurship talent; factor allocation; aggregate productivity; span of control; South Caucasus; Armenia; Azerbaijan; Georgia

JEL Classification: E2; J21; J24; O40



Citation: Teignier, Marc, and David Cuberes. 2024. How Important Are Labor-Market Gender Gaps in the South Caucasus? *Economics* 12: 332. <https://doi.org/10.3390/economics12120332>

Received: 11 March 2024

Revised: 8 November 2024

Accepted: 12 November 2024

Published: 4 December 2024



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1. Introduction

The main goal of this paper is to document the labor-market gender gaps present in South Caucasus countries and calculate the losses in terms of income per capita associated with them. Our focus is on gaps in labor-force participation and entrepreneurship, where it has been shown that women are systematically underrepresented. Understanding the origins of these gaps is beyond the scope of the paper. In particular, we do not seek to disentangle between demand (e.g., discrimination) and supply factors (e.g., number of children and dependents) that determine the labor-force participation of women and their decision to become entrepreneurs. To do the analysis, we use survey data to summarize the gender gaps in entrepreneurship and labor-force participation in Armenia, Azerbaijan, and Georgia, together with a quantitative macroeconomic model.

The general-equilibrium occupational choice model used to compute the macroeconomic effects of these gender gaps is based on Cuberes and Teignier (2016). In the model, agents are heterogeneous in terms of their entrepreneurship skills. Depending on their skill level, they decide to work as either employers, self-employed, or workers. An employer in this model produces goods combining his or her entrepreneurship skill, capital, and employees under a span-of-control technology. On the other hand, a self-employed agent produces goods using a similar technology—adjusted by a productivity parameter—but without hiring any workers. The span-of-control element implies that, in equilibrium, agents with an entrepreneurial skill high enough choose to run firms that are larger for more talented agents, as in Lucas (1978). In the model, men and women are identical in terms of their managerial skill distributions, but women are subject to several exogenous

constraints in the labor market. As a consequence, a fraction of women who would like to be employers or self-employed are excluded from these occupations, implying that the occupational allocation becomes distorted, and aggregate productivity and income per capita are reduced. The intuition behind the output loss is as follows. When a talented woman does not become an employer, a less skilled agent will take her position and become the manager of a firm, resulting in a lower firm productivity and aggregate output per worker.

In the case of Armenia, we find a GDP loss due to all gender gaps equal to 18.5% in 2007 and 14.3% in 2013; in the case of Georgia, the loss we find is 13.7% in 2007 and 11.3% in 2014, while in the case of Azerbaijan in 2015, we find a loss of 16.5%. These losses are, of course, directly related to the existing gender gaps in the labor force and entrepreneurship in these countries. For example, the decline in the costs in Armenia between 2007 and 2013 is due to a reduction of the two gaps between these years. These total losses obtained for the South Caucasus countries are lower than the ones obtained in [Cuberes and Teignier \(2016\)](#) in South Asia and MENA, similar to the ones in LAC and EAP but higher than the losses in Central Asia, Europe, and SSA. Compared to the average losses for the OECD, we conclude that they are of a similar magnitude. Compared to the Balkan countries studied in [Cuberes et al. \(2019a\)](#), some countries like Kosovo display significantly higher losses than the South Caucasus countries, while the rest of the Balkan countries (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, and Serbia), display losses similar to countries in the South Caucasus region. However, it is important to acknowledge that, due to data constraints, the years used for different countries vary substantially, and therefore, country comparisons should be taken with a pinch of salt.

The rest of the paper is organized as follows. In Section 2, we provide a brief literature review of works related to ours. Section 3 documents the gender gaps in entrepreneurship and labor-force participation in Armenia, Azerbaijan, and Georgia. In Section 4, we summarize the theoretical framework, which is then extended in Section 5 to account for the important differences in gender gaps between countries in the South Caucasus region and OECD ones. This Section also discusses the parametrization of the model and the main numerical results of the paper. In Section 6, we present the predictions of the model for different levels of education and for women with and without dependents. Section 7 discusses the main results of the paper, and Section 8 concludes it.

2. Literature Review

Gender inequality can be observed both in developed and developing countries in several dimensions, including education, earnings, occupation, access to productive inputs, political representation, or bargaining power inside the household.¹ The relationship between gender inequality and economic growth runs in both directions, with increases in gender inequality generally reducing economic growth and increases in GDP per capita, typically leading to more gender equality. Several cross-country empirical studies show a negative correlation between different gender gaps—mostly in schooling—and economic growth ([Hill and King 1995](#); [Lorgelly and Owen 1999](#); [Tzannatos 1999](#); [Dollar and Gatti 1999](#); [Forbes 2000](#); [Klasen 2002](#); [Knowles et al. 2002](#); [Yamarik and Ghosh 2003](#); and [Abu-Ghaida et al. 2004](#)). Other empirical papers illustrate how some of these gaps tend to decrease or even disappear as countries become sufficiently rich ([Dollar and Gatti 1999](#); [Tzannatos 1999](#); [Olivetti and Petrongolo \(2016\)](#)).²

In our view, most of the regression-based analyses carried out in the literature suffer from serious problems of endogeneity caused by both reverse causality and omitted variables. Moreover, this strand of the literature is not very well suited to quantify the aggregate or macroeconomic effects of gender gaps in the labor market. One attempt to alleviate some of these issues is the work of the International Labor Organization, which provides some estimates of the output costs associated with labor gender gaps in the Middle East and Northern Africa, although without proposing any specific theoretical model ([International Labor Organization 2014](#)). A shortcoming of this exercise is that it does not shed light on the mechanisms through which gender gaps in the labor market may affect

aggregate efficiency. This problem has been circumvented in a few theory-based papers that explore how gender inequality has adverse effects on economic growth by calibrating and simulating general-equilibrium theoretical models. For instance, Lagerlöf (2003) argues that gender equality in education affects fertility and the human capital of children and has a positive impact on economic growth. He proposes a model in which families play a coordination game against each other when deciding the human capital level of their offspring. When economies coordinate in a more “gender-equal” equilibrium, women’s human capital increases, which then leads families to substitute quality for quantity in children. Esteve-Volart (2009) presents a model in which the gender gap in employment leads to a reduction in the stock of talent available in the economy and to distortions in the allocation of talent across different occupations. Talent misallocation then results in less innovation and slower adoption of technology, both of which reduce aggregate output. Cavalcanti and Tavares (2016) construct a growth model based on Galor and Weil (1996) in which there is exogenous wage discrimination against women. Calibrating their model using U.S. data, they find very large effects associated with these wage gaps. Hsieh et al. (2019) use a Roy model to estimate the effect of the changing occupational allocation of white women, black men, and black women between 1960 and 2008 on U.S. economic growth and find that the improved allocation of talent within the United States accounts for 17 to 20 percent of growth over this period. Cuberes and Teignier (2016) develop a model, summarized in Section 4 of this paper, to calculate the macroeconomic effects of gender inequality in the labor market using data from the International Labor Organization for a large sample of countries.

3. Gender Gaps in the Data

In this section of the paper, we document several gender gaps in the labor market of Armenia, Georgia, and Azerbaijan for each of the available years. Throughout the analysis we expand the sample size using the weights associated with each observation. Table 1 shows the estimated population aged between 15 and 64 (both included) for each country and period.³

Table 1. Estimated number of individuals aged 15 to 64. Data sources: Integrated Living Conditions Survey (Armenia), Integrated Household Survey (Georgia), ILOSTAT (Azerbaijan).

| Country | Year | Men | Women |
|------------|------|-----------|-----------|
| Armenia | 2007 | 903,468 | 1,126,159 |
| Armenia | 2013 | 890,274 | 1,081,430 |
| Georgia | 2007 | 1,163,510 | 1,312,960 |
| Georgia | 2014 | 1,209,649 | 1,353,399 |
| Azerbaijan | 2015 | 2,746,366 | 3,180,117 |

Gender Gaps in the Labor Market

The gender gap for the labor-force participation in country i is calculated according to the following formula:

$$gender_gap_{i, LFP} = 1 - \frac{\frac{L_i^{female}}{N_i^{female}}}{\frac{L_i^{male}}{N_i^{male}}}$$

where L^{female} and L^{male} , respectively, represent the number of women and men in the labor force, and N^{female} and N^{male} are the number of working-age women and men, respectively, in the survey (see Table 1). The gender gaps in employers and self-employed are calculated similarly, although in this case, we normalize them by the corresponding labor-force participation of men and women in each country:

$$gender-gap_{i, employers} = 1 - \frac{\frac{E_i^{female}}{L_i^{female}}}{\frac{E_i^{male}}{L_i^{male}}}$$

$$gender-gap_{i, self-employed} = 1 - \frac{\frac{S_i^{female}}{L_i^{female}}}{\frac{S_i^{male}}{L_i^{male}}}$$

where E^{female} and E^{male} , respectively, represent the number of female and male employers and S^{female} and S^{male} are the number of self-employed women and men, respectively.

We begin by calculating the gender gap in the number of participants in the labor market, as well as the number of employers and self-employed.⁴ Participants in the labor market include wage workers, self-employed, employers, unpaid family workers, and unemployed. Employers are defined as individuals who hire at least one worker in their company, and self-employed are individuals who do not work for anyone else but do not hire any worker either.

In Armenia, Tables 2 and 3 display significant gender gaps in participation and the fraction of employers in the labor force in both 2007 and 2013. Comparing the two years, we observe a fall in both gaps. In 2007, we observe a negative gender gap in self-employed of about 13%, but this turns positive (2.6%) in 2013.

Table 2. Gender gaps in the labor market in Armenia in 2007. Sources: Integrated Living Conditions Survey and own calculations.

| | Men | Women | Gender Gap (%) |
|----------------------|---------|-----------|----------------|
| Participation | 667,855 | 532,495 | 36 |
| Employers | 5119 | 626 | 84.7 |
| Self-employed | 178,824 | 160,673 | −12.7 |
| Total | 903,468 | 1,126,159 | −24.6 |

Table 3. Gender gaps in the labor market in Armenia in 2013. Sources: Integrated Living Conditions Survey and own calculations.

| | Men | Women | Gender Gap (%) |
|----------------------|---------|-----------|----------------|
| Participation | 666,837 | 608,749 | 24.8 |
| Employers | 4370 | 872 | 78.1 |
| Self-employed | 160,369 | 142,624 | 2.6 |
| Total | 890,274 | 1,081,430 | −21.5 |

Georgia (Tables 4 and 5) displays gender gaps in all three labor-market categories and in both years, with the largest gap being in the category employers in both years. While the participation and self-employed gaps fall between the two years, the gap in employers rises.

Table 4. Gender gaps in the labor market in Georgia in 2007. Sources: Integrated Household Survey and own calculations.

| | Men | Women | Gender Gap (%) |
|----------------------|-----------|-----------|----------------|
| Participation | 849,862 | 754,182 | 21.3 |
| Employers | 10,809 | 4139 | 56.8 |
| Self-employed | 235,437 | 117,032 | 44 |
| Total | 1,163,510 | 1,312,960 | −12.8 |

Table 5. Gender gaps in the labor market in Georgia in 2014. Sources: Integrated Household Survey and own calculations.

| | Men | Women | Gender Gap (%) |
|----------------------|-----------|-----------|----------------|
| Participation | 959,522 | 876,246 | 18.4 |
| Employers | 14,350 | 3866 | 70.5 |
| Self-employed | 340,094 | 190,241 | 38.8 |
| Total | 1,209,649 | 1,353,399 | −11.9 |

In the case of Azerbaijan, for the only available year with data, Table 6 shows that there are significant gender gaps in labor-force participation and the fraction of employers, but the gap is negative for the self-employed.

Table 6. Gender gaps in the labor market in Azerbaijan in 2015. Sources: ILOSTAT and own calculations.

| | Men | Women | Gender Gap (%) |
|----------------------|-----------|-----------|----------------|
| Participation | 2,097,857 | 1,718,914 | 29.2 |
| Employers | 19,501 | 2993 | 81.3 |
| Self-employed | 847,859 | 724,406 | −4.3 |
| Total | 2,746,366 | 3,180,117 | −15.8 |

To our knowledge, the micro data we use in the paper is only available for the years mentioned above. However, one can use aggregate data from the International Labor Organization (ILO) to have some notion of how the aggregated gaps have evolved since then. A big caveat when doing that is that any comparison between these figures and the ones we report in the paper using microeconomic data must be taken with extreme caution. This is the case because the data sources are different, and we do not know the exact mapping between them. Instead, one should simply interpret this as broad trends in these gaps in recent years. Reassuringly, for the case of Armenia and Georgia, the magnitude of the gaps is comparable to the ones we found using microeconomic data. However, they are significantly different for Azerbaijan. To provide these more recent figures, we use data on the variable Employment by Sex and Status in Employment.⁵ This variable contains the number of people in the following employment categories: employees, employers, self-employed, all-account workers, and contributing family workers. As in Cuberes and Teignier (2016, 2018), we use data on employers and on own-account workers to calculate the employer and self-employed gender gaps, respectively. To calculate the LFP gender gap, we also use data on the working age population of ages between 15 and 64 from ILO. Tables 7–9 show these gaps for each country in recent years. In Armenia, the gender gap in employers is very similar to the one in our sample period. The gender gap in labor-force participation has experienced a major improvement in recent years, while the gender gap in self-employment is still negative and has become more so in recent years. In Georgia, we observe a gender gap in employers relatively similar to the one in 2007. For the case of self-employed workers in the two most recent years, the gender gap is quite similar to the ones in our sample period, while the gender gap in labor-force participation has declined, especially in 2020. Finally, in Azerbaijan, we see a marked improvement in the employer gender gap and the labor-force participation gender gaps, while the gender gap in self-employment is positive instead of negative in recent years.

Table 7. Gender gaps in the labor market in Armenia in recent years. Sources: ILOSTAT and own calculations.

| Year | Employers (%) | Self-Employed (%) | LFP (%) |
|------|---------------|-------------------|---------|
| 2018 | 82.6 | −12.9 | 13.9 |
| 2021 | 78.4 | −19.6 | 3.6 |

Table 8. Gender gaps in the labor market in Georgia in recent years. Sources: ILOSTAT and own calculations.

| Year | Employers (%) | Self-Employed (%) | LFP (%) |
|------|---------------|-------------------|---------|
| 2017 | 48.1 | 45.9 | 15.3 |
| 2020 | 59.5 | 45.9 | 11.6 |

Table 9. Gender gaps in the labor market in Azerbaijan in recent years. Sources: ILOSTAT and own calculations.

| Year | Employers (%) | Self-Employed (%) | LFP (%) |
|------|---------------|-------------------|---------|
| 2019 | 28.5 | 6.5 | 0.9 |
| 2022 | 25.5 | 6.2 | 1.7 |

4. Theoretical Model

4.1. Baseline Model Summary

We next present the main elements of the general-equilibrium model developed in [Cuberes and Teignier \(2016\)](#), which is used to produce the numerical results of Section 5.⁶ In the model, agents are endowed with a random entrepreneurship skill based on which they decide to work as employers, self-employed, or workers. An employer in this model produces the consumption good by combining his or her entrepreneurship skills, capital, and workers. In particular, employers' output is equal to $y(x) = x(k(x)^\alpha n(x)^{1-\alpha})^\eta$, where $n(x)$ denotes the units of labor, $k(x)$ the units of capital, and the parameter η measures the span of control of entrepreneurs. Self-employed workers' output is equal to $\tilde{y}(x) = \tau x \tilde{k}(x)^{\alpha\eta}$, where $\tilde{k}(x)$ denotes the units of capital and τ is the productivity-adjusted parameter of self-employed. Aggregate production per capita in this economy comes from the output produced by employers and the one produced by self-employed:

$$y \equiv \frac{Y}{N} = \left[\int_{z_2}^{\infty} y(x) d\Gamma(x) + \int_{z_1}^{z_2} \tilde{y}(x) d\Gamma(x) \right].$$

As in [Lucas \(1978\)](#) and [Buera et al. \(2011\)](#), we use a Pareto function for the talent distribution to simulate the model, so the cumulative distribution of talent is given by

$$\Gamma(x) = 1 - B^\rho x^{-\rho}, \quad x \geq 0, \quad (1)$$

where $\rho, B > 0$.

In equilibrium, all agents optimize, and there is market clearing in both the labor and capital markets. Employers choose the units of labor and capital they hire in order to maximize their current profits π , while self-employed only choose the units of labor. The competitive equilibrium in this economy is a pair of cutoff levels (z_1, z_2) , a set of quantities $[n(x), k(x), \tilde{k}(x)]$, $\forall x$, a wage rate and a capital rental rate (w, r) such that all agents maximize their earnings. Labor supply is equal to labor demand, and capital supply is equal to capital demand.

Because the technology has a span-of-control element, in equilibrium, the more talented employers run larger firms and earn larger profits, as in [Lucas \(1978\)](#). Figure 1 displays the payoff of the three occupations at each level taken. Wages for workers (w) are independent of the entrepreneurial talent. On the other hand, both profits for employers (π_e) and profits for self-employed (π_s) increase in a convex way with talent.⁷ The figure shows that in this model, agents with entrepreneurship talent above z_2 optimally choose to become employers, whereas those with talent lower than z_1 become workers. Agents with intermediate levels of entrepreneurship talent choose the self-employed.

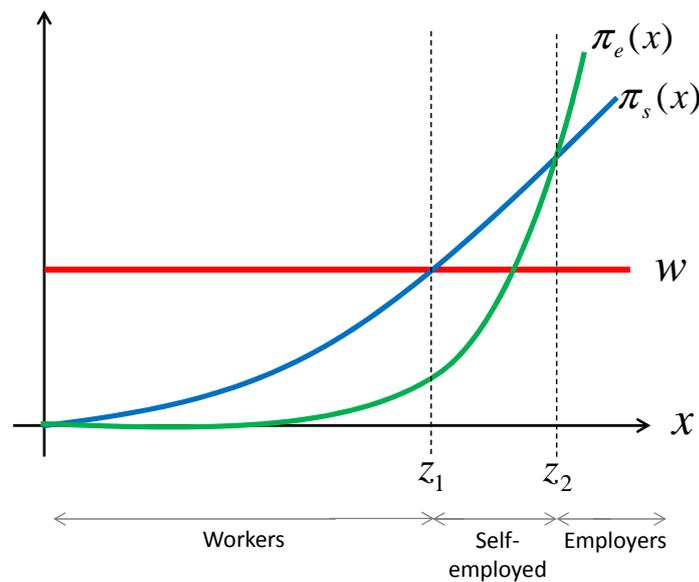


Figure 1. The occupational map.

4.2. Introducing Gender Gaps into the Framework

As discussed before, in the model, men and women are identical in terms of their managerial skills since they draw their skill level from the same distribution function.⁸ However, there are several exogenous constraints in the labor market for women. There is a fraction $1 - \mu$ of women who would like to be employers but are excluded from this occupation, while a fraction $(1 - \mu)(1 - \mu_o)$ are also excluded from self-employment. Moreover, in the model, a fraction $(1 - \lambda)$ of women are entirely excluded from participating in the labor market. The first two restrictions distort the occupational choice and, through the general-equilibrium effects, lead to a misallocation of talent. This reduces firm productivity and aggregate efficiency. The restriction on female labor force participation, on the other hand, mechanically results in a reduction in output per capita.

The intuition behind the loss in aggregate efficiency due to women with high management skills being “banned” from becoming an employer is as follows.⁹ Initially, it will result in a decrease in the demand for workers and possibly an increase in the supply of workers, which leads to a reduction of the equilibrium wage rate (as well as the capital rental rate for similar reasons). The model then implies that a less skilled agent will now find it profitable to become an employer and will take her position as manager of the firm. As a result, the firm will be less productive and, due to the nature of the span-of-control technology, also smaller. In equilibrium, aggregate productivity, wages, profits, and output will be lower as a result of this restriction.

5. Numerical Results for the South Caucasus

5.1. Numerical Model Extensions

Looking at the first three columns of Table 10, we can see that South Caucasus countries have female-to-male ratios in entrepreneurship and labor-force participation that are not too different from the OECD ones. When we look at the last two columns, however, we notice that South Caucasus countries differ greatly with respect to the OECD average in terms of employer share and self-employed share. Since the benchmark model cannot replicate these large differences, we modify the theoretical framework to account for these facts.

Table 10. Entrepreneurship and labor-force participation summary statistics. Sources: Integrated Living Conditions Survey (Armenia), Integrated Household Survey (Georgia), ILOSTAT (Azerbaijan) and own calculations.

| | Female-to-Male Ratios | | | Aggregate Shares (%) | |
|-------------------|-----------------------|---------------|-------------------|----------------------|---------------|
| | Employers | Self-Employed | Labor Force Part. | Employers | Self-Employed |
| Armenia (2007) | 0.15 | 1.13 | 0.61 | 0.52 | 28.06 |
| Armenia (2013) | 0.22 | 0.97 | 0.75 | 0.44 | 23.78 |
| Azerbaijan (2015) | 0.19 | 1.04 | 0.71 | 0.62 | 41.13 |
| Georgia (2007) | 0.43 | 0.56 | 0.79 | 0.95 | 22.34 |
| Georgia (2014) | 0.30 | 0.61 | 0.82 | 1.02 | 29.27 |
| OECD (2010) | 0.38 | 0.65 | 0.78 | 4.36 | 10.78 |

First, we incorporate a fourth employment category, namely the out-of-necessity entrepreneurs, who choose this occupation because they have no other occupational choices apart from running their own business.¹⁰ We introduce a new parameter into the model, θ , which is equal to the fraction of the workforce who cannot find a job as workers and are forced to become self-employed. This parameter is estimated for each country and year in the sample. Second, we introduce the parameter ϕ , which is equal to the fraction of the overall population that is allowed to become employers.¹¹

5.2. Model Parametrization

Table 11 shows the parameter values taken from in Cuberes and Teignier (2016) to match the OECD data. The parameter B of the talent distribution is normalized to 1. The parameter ρ of the talent distribution is set to 6.5 to minimize the distance between the actual and the predicted fraction of employers in the OECD countries, which is 4.5% on average. Similarly, the self-employed relative productivity parameter τ is chosen to match the fraction of self-employed workers in the OECD countries, which is 10.8% on average.

Table 11. Parameter values in Cuberes and Teignier (2016). Own calculations.

| Parameter | Value | Explanation |
|-----------|-------|---|
| B | 1 | Normalization |
| ρ | 6.5 | To match employers' share OECD countries |
| τ | 0.7 | To match self-employed share OECD countries |

To match the data for the South Caucasus countries, we introduce the parameters ϕ and θ described above. Moreover, we also allow the span-of-control parameter to differ by country and year to make sure the simulated model matches the income share of the top 10% earners.¹² This country-specific parameters are presented in Table 12, while the rest of the parameters are the ones in Table 11. The capital-output elasticity parameter α is set so to $\alpha\eta + (1 - \eta) = 0.3$, in order to match the 30% capital income share observed in the U.S.

Table 12. Country-specific parameters and gender gap values. Own calculations.

| | η | ϕ | θ | μ | μ_o | λ |
|-------------------|--------|--------|----------|-------|---------|-----------|
| Armenia (2007) | 0.83 | 0.42 | 0.75 | 0.15 | 1 | 0.64 |
| Armenia (2013) | 0.84 | 0.43 | 0.77 | 0.22 | 0.94 | 0.76 |
| Azerbaijan (2015) | 0.84 | 0.82 | 0.60 | 0.19 | 1 | 0.71 |
| Georgia (2007) | 0.81 | 0.30 | 0.79 | 0.43 | 0.22 | 0.87 |
| Georgia (2014) | 0.79 | 0.23 | 0.78 | 0.3 | 0.43 | 0.90 |

5.3. Quantitative Results

Table 13 and Figure 2 display the aggregate effects of the labor-market gender gaps analyzed in this article. The last column of Table 13 shows the fall in aggregate GDP due to the presence of all the gender gaps, namely the (λ, μ, μ_o) -gaps. The middle column, on the other hand, shows the fall in aggregate GDP caused by the presence of the entrepreneurship gender gaps, namely the (μ, μ_o) -gaps. Armenia (2007) displays the largest fall of GDP due to all gender gaps, while Georgia (2007, 2014) the smallest ones. Interestingly, Georgia (2007, 2014) has the largest GDP losses due to gender gaps in entrepreneurship. Figure 2 plots the GDP losses due to entrepreneurship gender gaps and labor-force participation for three countries in the last available year.

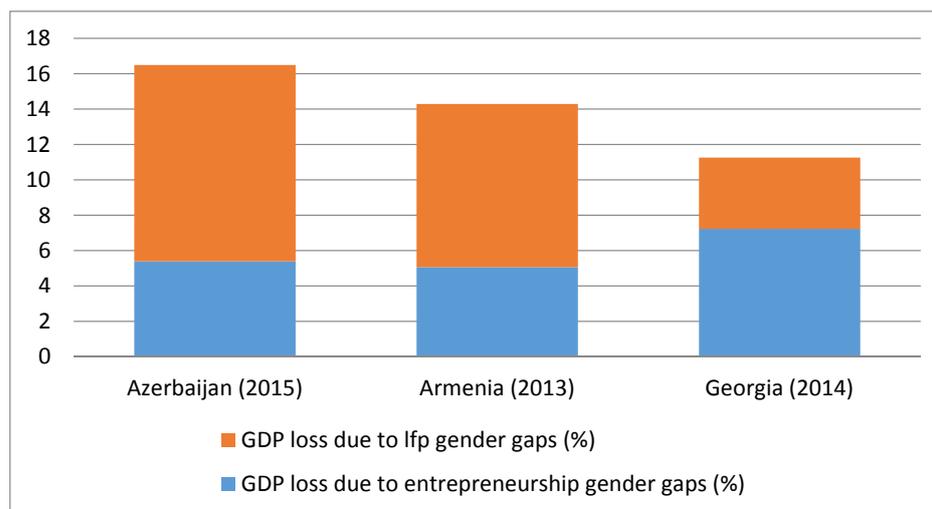


Figure 2. Income losses due to gender gaps (last available year). Own calculations.

Table 13. Income losses due to gender gaps. Own calculations.

| (%) | GDP Fall Due to Entrepreneurship Gender Gaps | GDP Fall Due to All Gender Gaps |
|-------------------|--|---------------------------------|
| Armenia (2007) | 4.34 | 18.53 |
| Armenia (2013) | 5.07 | 14.29 |
| Azerbaijan (2015) | 5.39 | 16.49 |
| Georgia (2007) | 9.08 | 13.72 |
| Georgia (2014) | 7.23 | 11.26 |

The explanation behind the results can be observed in Tables 10 and 12. In the case of Georgia, both in 2007 and 2014, we can see that the estimated value for the parameters ϕ and μ_o are very low, leading to a high GDP loss due to entrepreneurship gender gaps, while the parameter λ is high, implying a low GDP loss due to gender gaps in labor-market participation. In the case of Armenia 2007, the high GDP fall is due to a low value of μ and, especially, to a low value of λ , which implies a large GDP loss due to gender gaps in labor-market participation. This is also the case for Azerbaijan in 2015.

For comparison purposes, Table 14 summarizes the results obtained in Cuberes and Teignier (2016) using the theoretical framework explained in Section 3 with the parametrization from Table 11. The total losses obtained for the South Caucasus countries are lower than the ones in South Asia and MENA, similar to the ones in LAC and EAP but higher than the losses in Central Asia, Europe, and SSA. Compared to the average losses for the OECD, we conclude that they are in a similar order of magnitude.

Table 14. Cross-country income losses due to gender gaps, by region (from Cuberes and Teignier 2016). Own calculations.

| (%) | GDP Fall Due to Entrepreneurship Gender Gaps | GDP Fall Due to All Gender Gaps |
|-------------------------|--|---------------------------------|
| Central Asia | 6.22 | 9.04 |
| East Asia and Pacific | 7.09 | 14.60 |
| Europe | 4.86 | 9.83 |
| Latin America & C. | 4.67 | 15.76 |
| Middle East & N. Africa | 6.90 | 35.11 |
| South Asia | 8.79 | 22.94 |
| Sub-Saharan Africa | 5.29 | 10.82 |
| OECD | 5.08 | 14.08 |

6. Results by Groups

In this section, we decompose the total income loss due to gender gaps by different demographic groups; first, we compare individuals with high and low education, and second, we compare households with and without dependents. To do the decomposition, we compute the fraction of the gender gaps that can be attributed to each group by calculating a counterfactual of the gender gap for each group where the gender gaps of all other groups are set equal to zero. If we have two groups, the aggregate employer’s gap, for example, is defined as follows:

$$\mu \equiv \frac{E_f^{all} / L_f^{all}}{E_m^{all} / L_m^{all}} = \frac{\frac{E_f^1 + E_f^2}{L_f^1 + L_f^2}}{\frac{E_m^1 + E_m^2}{L_m^1 + L_m^2}},$$

where E stands for number of employers and L represents the labor force. The sub-indexes f, m denote females and males, respectively, while the super-indexes 1, 2 represent the first and second groups. Finally, the super-index all is the sum of the two groups. We can then rewrite μ as the weighted sum of the employers’ gap of each group:

$$\mu = \frac{\mu_1 \frac{E_m^1}{L_m^1} \frac{L_f^1}{L_f^{all}} + \mu_2 \frac{E_m^2}{L_m^2} \frac{L_f^2}{L_f^{all}}}{E_m^{all} / L_m^{all}} \tag{2}$$

where $\mu_i = \frac{E_f^i / L_f^i}{E_m^i / L_m^i}$, $i = 1, 2$. To compute the income loss due to the group 1, we set $\mu_2 = 1$ in Equation (2), while to compute the income loss due to age group 2, we would set $\mu_1 = 1$.

Similarly, the aggregate labor-force participation gender gap, λ is equal to

$$\lambda \equiv \frac{L_f^{all} / N_f^{all}}{L_m^{all} / N_m^{all}} = \frac{\frac{L_f^1 + L_f^2}{N_f^1 + N_f^2}}{\frac{L_m^1 + L_m^2}{N_m^1 + N_m^2}},$$

where L represents the labor-force and N population. As before, we can rewrite λ as the weighted sum of the labor-force participation gap of each group:

$$\lambda = \frac{\lambda_1 \frac{L_m^1}{N_m^1} \frac{N_f^1}{N_f^{all}} + \lambda_2 \frac{L_m^2}{N_m^2} \frac{N_f^2}{N_f^{all}}}{L_m^{all} / N_m^{all}}, \tag{3}$$

where $\lambda_i = \frac{L_f^i / N_f^i}{L_m^i / N_m^i}$, $i = 1, 2$. And we set $\lambda_2 = 1$ in Equation (3) and compare it to λ to determine the fraction of the loss attributable to group 1, and $\lambda_1 = 1$ to determine the fraction attributable to group 2. As Equations (2) and (3) show, the fraction of the loss due

to each group depends not only on the group gender gap but also on the weight of the group in the total population.

6.1. Decomposition by Education Level

When we examine the gender differences at different education levels, we observe that women with low education tend to be more underrepresented in labor force participation, while women with high education tend to be more underrepresented in entrepreneurship.¹³ When decomposing the total income loss due to these gender gaps, we find that the high-education group tends to be responsible for most of the losses. In the case of Armenia in 2007, for example, we find that 44% of the total losses are due to the low-education group while 66% are due to the high-education group. This result is a combination of the gender gaps in this group and the higher weight of this group, especially among the entrepreneurs (see Table 15). Over time, we observe that the fraction of the losses due to the high-education groups tends to increase.

Table 15. Income losses decomposition by education level. Own calculations.

| (%) | Educ. Level | Gender Ratios (Female-to-Male) | | | Income Loss Decomposition | | |
|-------------------|-------------|--------------------------------|-----------|---------------|---------------------------|---------------|-------|
| | | Labor Part. | Employers | Self-Employed | Labor Part. | Entrepreneurs | Total |
| Armenia (2007) | Low | 0.59 | 0.28 | 1.36 | 53% | 13% | 44% |
| | High | 0.67 | 0.10 | 0.87 | 47% | 87% | 66% |
| Armenia (2013) | Low | 0.74 | 0.00 | 1.06 | 39% | 41% | 40% |
| | High | 0.73 | 0.32 | 0.94 | 61% | 59% | 60% |
| Azerbaijan (2015) | Low | 0.67 | 0.24 | 1.14 | 80% | 38% | 52% |
| | High | 0.79 | 0.14 | 0.63 | 20% | 62% | 48% |
| Georgia (2007) | Low | 0.74 | 0.54 | 0.62 | 50% | 11% | 31% |
| | High | 0.80 | 0.37 | 0.47 | 50% | 89% | 69% |
| Georgia (2014) | Low | 0.76 | 1.19 | 0.73 | 47% | 0 | 21% |
| | High | 0.83 | 0.20 | 0.49 | 53% | 100% | 79% |

6.2. Decomposition by Dependents

Table 16 shows that gender inequality in labor-force participation is larger when we look at males and females in households with dependents relative to those in households without dependents.¹⁴ However, the opposite tends to occur for gender gaps in employers, where the female-to-male ratios are almost always lower in households with no dependents. For self-employed, the picture is more mixed. In terms of income losses, we find that households with dependents are responsible for most of the loss. We find that, in all cases, the share of the total income loss due to households with dependents is larger than the share due to households without dependents. This is also true when looking at income losses coming from gender gaps in labor force participation and, in most cases, when looking at the income losses coming from gender gaps in entrepreneurship since the weight of the households with dependents group is larger. When looking at the time evolution, we find that the share of the total losses due to groups with dependents falls over time, both in Armenia and Georgia.

When we divide the group with dependents into the group with children, the group with elderly, and the group with both, we observe that the group with children tends to have the lowest female-to-male labor-force participation, and the group with elderly is the largest one (Table 17). In the case of employers, the group with the lowest female-to-male ratios differ across countries, but the ones with the highest are those with children, with the exception of Azerbaijan. However, in all instances except in Georgia (2014), the group with both children and elderly are responsible for most of the income loss due to their higher weight in the population. Over time, the share of the losses due to the group with both children and elderly falls in the cases of Armenia and Azerbaijan, and the fall is mainly due to the income loss coming from gender gaps in entrepreneurship.

Table 16. Income losses decomposition between households with and without dependents. Own calculations.

| (%) | Household Type | Gender Ratios (Female-to-Male) | | | Income Loss Decomposition | | Total |
|-------------------|----------------|--------------------------------|-----------|---------------|---------------------------|---------------|-------|
| | | Labor Part. | Employers | Self-Employed | Labor Part. | Entrepreneurs | |
| Armenia (2007) | Dependents | 0.60 | 0.15 | 1.16 | 76% | 78% | 77% |
| | No dep. | 0.72 | 0.18 | 0.99 | 24% | 22% | 23% |
| Armenia (2013) | Dependents | 0.68 | 0.25 | 0.95 | 86% | 47% | 72% |
| | No dep. | 0.89 | 0.18 | 0.96 | 14% | 53% | 28% |
| Azerbaijan (2015) | Dependents | 0.79 | 0.20 | 1.04 | 58% | 67% | 64% |
| | No dep. | 0.77 | 0.12 | 0.98 | 42% | 33% | 36% |
| Georgia (2007) | Dependents | 0.75 | 0.50 | 0.46 | 78% | 59% | 69% |
| | No dep. | 0.86 | 0.28 | 0.65 | 22% | 41% | 31% |
| Georgia (2014) | Dependents | 0.75 | 0.44 | 0.55 | 75% | 32% | 61% |
| | No dep. | 0.89 | 0.18 | 0.60 | 25% | 68% | 39% |

Table 17. Income losses decomposition by type of dependents. Own calculations.

| (%) | Household Type | Gender Ratios (Female-to-Male) | | | Income Loss Decomposition | | Total |
|-------------------|----------------|--------------------------------|-----------|---------------|---------------------------|---------------|-------|
| | | Labor Part. | Employers | Self-Employed | Labor Part. | Entrepreneurs | |
| Armenia (2007) | Children | 0.54 | 0.18 | 1.22 | 29% | 32% | 30% |
| | Elderly | 0.84 | 0.13 | 1.01 | 17% | 10% | 16% |
| | Both | 0.55 | 0.16 | 1.20 | 40% | 42% | 40% |
| | No dep. | 0.72 | 0.18 | 0.99 | 13% | 16% | 14% |
| Armenia (2013) | Children | 0.61 | 0.47 | 1.02 | 32% | 10% | 24% |
| | Elderly | 0.99 | 0.00 | 1.01 | 20% | 29% | 24% |
| | Both | 0.62 | 0.46 | 0.95 | 41% | 10% | 30% |
| | No dep. | 0.89 | 0.18 | 0.96 | 6% | 51% | 22% |
| Azerbaijan (2015) | Children | 0.77 | 0.12 | 1.02 | 22% | 34% | 30% |
| | Elderly | 0.79 | 0.24 | 1.03 | 28% | 4% | 12% |
| | Both | 0.79 | 0.19 | 1.04 | 27% | 40% | 35% |
| | No dep. | 0.77 | 0.12 | 0.98 | 23% | 22% | 22% |
| Georgia (2007) | Children | 0.69 | 0.79 | 0.54 | 21% | 12% | 17% |
| | Elderly | 0.88 | 0.17 | 0.44 | 36% | 21% | 29% |
| | Both | 0.70 | 0.61 | 0.47 | 33% | 31% | 32% |
| | No dep. | 0.86 | 0.28 | 0.65 | 10% | 36% | 23% |
| Georgia (2014) | Children | 0.67 | 0.66 | 0.58 | 21% | 6% | 16% |
| | Elderly | 0.91 | 0.54 | 0.65 | 40% | 7% | 29% |
| | Both | 0.69 | 0.40 | 0.51 | 29% | 21% | 26% |
| | No dep. | 0.89 | 0.18 | 0.60 | 10% | 66% | 26% |

7. Discussion of the Main Results

To sum up, our simple framework allows us to calculate the GDP losses experienced by countries due to gender gaps in the labor market and entrepreneurship participation. The model can demonstrate the potentially large effects of these gender gaps, both in terms of aggregate productivity and aggregate output. It is important to highlight that our framework abstracts from many aspects, like the presence of a household sector (see [Cuberes and Teignier 2018](#)) or the selection for entrepreneurship and labor participation (see [Cuberes and Teignier 2022](#)), which could affect our numerical results.

The analysis by demographic groups shows that gender gaps are larger for women in some groups than in others, indicating that the labor-market participation costs may be especially high for some women. In particular, less educated women may find it harder to participate in the labor market because the economic gains are lower for them than for the

more educated ones. We also find that women with dependents (especially with children) may find it harder to participate, probably because the time cost is higher for them.

Conditional on participating in the labor market, however, women with less education and women with dependents (again, especially with children) are more likely to become employers. This could suggest that there exist different types of entrepreneurship, and some groups with high time costs choose to become entrepreneurs instead of workers to have more flexibility in terms of their schedule and the number of working hours.

8. Conclusions

In this paper, we document the presence of significant gender gaps in the labor market of three countries in the South Caucasus: Armenia, Georgia, and Azerbaijan. We then use the occupational choice model of [Cuberes and Teignier \(2016\)](#) to calculate the efficiency losses, in terms of income per capita, associated with these gender gaps. We find a GDP loss due to all gender gaps equal to 18.5% in 2007 and 14.3% in 2013 in Armenia, 13.7% in 2007 and 11.3% in Georgia 2014, and 16.5% in Azerbaijan in 2015. The total losses obtained for the South Caucasus countries are lower than the ones obtained in [Cuberes and Teignier \(2016\)](#) in South Asia and MENA, similar to the ones in LAC and EAP but higher than the losses in Central Asia, Europe, and SSA. Compared to the average losses for the OECD, we conclude that they are in a similar order of magnitude. Compared to the Balkan countries studied in [Cuberes et al. \(2019b\)](#), some countries like Kosovo display significantly higher losses than the South Caucasus countries, while the rest of the Balkan countries (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, and Serbia), display losses similar to the South Caucasus countries.

Our current framework has some limitations. An important one is that we do not model the decision to participate in the labor market or engage in entrepreneurship. We think an interesting extension would be to analyze the income and time costs affecting women in households with dependents. Having elderly relatives at home may mainly have a negative income effect on the labor supply of women while having children at home is likely to have both an income cost as well as a time cost.

Related to this, our current model assumes that all women are equally likely to become excluded, while in reality the selection into the labor market or into entrepreneurship might not be talent-neutral. When looking at the gender gaps by education level, we find that women with low education tend to be more underrepresented in labor-force participation, while women with high education tend to be more underrepresented in entrepreneurship. If we assumed that entrepreneurial talent and education are positively correlated, there could be positive selection in labor-market participation but negative selection in entrepreneurship. Another interesting extension would be to take this selection into account when computing the income costs of gender inequality.

In the future, we would also like to explore the existence of gender gaps in education. A preliminary look at the data reveals that there tend to be more women than men in the highest education level (tertiary education), while in the rest of the categories, men tend to outnumber women. Again, if one is willing to assume that entrepreneurial talent and education are positively correlated, then incorporating these gender gaps in education in the framework could also affect the costs predicted by the model.

Author Contributions: Conceptualization, D.C. and M.T.; methodology, D.C. and M.T.; software, D.C. and M.T.; validation, D.C. and M.T.; formal analysis, D.C. and M.T.; investigation, D.C. and M.T.; resources, D.C. and M.T.; data curation, D.C. and M.T.; writing—original draft preparation, D.C. and M.T.; writing—review and editing, D.C. and M.T.; visualization, D.C. and M.T.; supervision, D.C. and M.T.; project administration, D.C. and M.T.; funding acquisition, D.C. and M.T. All authors have read and agreed to the published version of the manuscript.

Funding: Teignier acknowledges financial support from the Grant PID2022-139468NB-I00, funded by MICIU/AEI/10.13039/501100011033 and ERDF/EU, as well as the Grant 2021SGR-00862, funded by AGAUR-Generalitat de Catalunya.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: ILO: https://rshiny.ilo.org/dataexplorer15/?lang=en&id=EMP_2EMP_SEX_STE_NB_A (accessed on 28 September 2024). Data from the World Bank is unavailable due to privacy restrictions: <https://www.mdpi.com/ethics> (accessed on 28 September 2024).

Acknowledgments: We wish to thank Lourdes Rodriguez Chamussy and Nistha Sinha for their invaluable comments on the paper.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Appendix A. Model Details

The economy we consider has a continuum of agents indexed by their entrepreneurial talent x , drawn from a cumulative distribution Γ that takes values between B and ∞ . We assume the economy is closed and that it has a workforce of size N and K units of capital. Labor and capital are inelastically supplied in the market by consumers in exchange for a wage rate w and a capital rental rate r , respectively. These inputs are then combined by firms to produce a homogeneous good. Agents decide to become either firm workers, who earn the equilibrium wage rate w —which we assume to be independent of their entrepreneurial talent—, or entrepreneurs, who earn the profits generated by the firm they manage.¹⁵ In the model, we also include a fourth category, namely the out-of-necessity entrepreneurs, who choose this occupation because they had no other occupational choices apart from running their own businesses. We denote by $1 - \theta$ the fraction of both males and females that are out-of-necessity entrepreneurs.

The agents' optimization problem and occupation map in this version of the model are the same as the one discussed in Section 3. However, the market-clearing conditions are now different to reflect the new restrictions in the labor market.

An agent with entrepreneurial talent or productivity level x who chooses to become an employer and hires $n(x)$ units of labor and $k(x)$ units of capital produces $y(x)$ units of output and earns profits $\pi(x) = y(x) - rk(x) - wn(x)$, where the price of the homogeneous good is normalized to one. As in Lucas (1978) and Buera et al. (2011), the production function is given by

$$y(x) = x \left(k(x)^\alpha n(x)^{1-\alpha} \right)^\eta, \quad (\text{A1})$$

where $\alpha \in (0, 1)$ and $\eta \in (0, 1)$. The parameter η measures the span of control of entrepreneurs, and since it is smaller than one, the entrepreneurial technology involves an element of diminishing returns. On the other hand, an agent with talent x who chooses to become self-employed uses the amount of capital $\tilde{k}(x)$, produces $\tilde{y}(x)$ units of output and earns profits $\tilde{\pi}(x) = \tilde{y}(x) - r\tilde{k}(x)$. The technology he or she operates is

$$\tilde{y}(x) = \tau x \tilde{k}(x)^{\alpha\eta}, \quad (\text{A2})$$

where τ is the self-employed productivity parameter.¹⁶ One interpretation of this parameter is that self-employed workers must spend a fraction of their time on management tasks, which would imply that τ is equal to the fraction of time available for work to the power $(1 - \alpha)\eta$. As explained below, we estimate this parameter to match the average fraction of self-employed in the data.

Appendix A.1. Agents' Optimization

Employers choose the units of labor and capital they hire in order to maximize their current profits π . The optimal number of workers and capital stock, $n(x)$ and $k(x)$, respectively, depend positively on the productivity level x , as Equations (A3) and (A4) show:

$$n(x) = \left[x\eta(1 - \alpha) \left(\frac{\alpha}{1 - \alpha} \right)^{\alpha\eta} \frac{w^{\alpha\eta-1}}{r^{\alpha\eta}} \right]^{1/(1-\eta)}, \tag{A3}$$

$$k(x) = \left[x\eta\alpha \left(\frac{1 - \alpha}{\alpha} \right)^{\eta(1-\alpha)} \frac{r^{\eta(1-\alpha)-1}}{w^{\eta(1-\alpha)}} \right]^{1/(1-\eta)}. \tag{A4}$$

When we solve the problem of a self-employed agent with talent x who wishes to maximize his or her profits, we find

$$\tilde{k}(x) = \left(\frac{\tau x \alpha \eta}{r} \right)^{\frac{1}{1-\alpha\eta}}. \tag{A5}$$

Figure 1 displays the shape of the profit functions of employers ($\pi_e(x)$) and self-employed ($\pi_s(x)$) along with wage earned by workers as a function of talent x .¹⁷ The figure also shows the relevant talent cutoffs for the occupational choices. Here, we present the equations that define these thresholds: the first one, z_1 , defines the earnings such that agents are indifferent between becoming workers or self-employed, and it is given by

$$w = \tau z_1 \tilde{k}(z_1)^{\alpha\eta} - r \tilde{k}(z_1). \tag{A6}$$

If $x \leq z_1$ agents choose to become workers, while if $x > z_1$ they become self-employed or employers. The second cutoff, z_2 , determines the choice between being self-employed or an employer, and it is given by

$$\tau z_2 \tilde{k}(z_2)^{\alpha\eta} - r \tilde{k}(z_2) = z_2 x \left(k(z_2)^\alpha n(z_2)^{1-\alpha} \right)^\eta - r k(z_2) - w n(z_2) \tag{A7}$$

so that if $x > z_2$ an agent wants to become an employer.

Appendix A.2. Competitive Equilibrium

A competitive equilibrium in this economy is a pair of cutoff levels (z_1, z_2), a set of quantities $[n(x), k(x), \tilde{k}(x)], \forall x$, and prices (w, r) such that all agents maximize their earnings, and labor and capital markets clear. The market-clearing conditions in this modified economy are as follows. The capital market-clearing condition is given by

$$\begin{aligned} k &= \frac{1}{2} \left[\phi \int_{z_2}^{\infty} k(x) d\Gamma(x) + \int_{z_1}^{z_2} \tilde{k}(x) d\Gamma(x) + (1 - \theta) \int_B^{z_1} \tilde{k}(x) d\Gamma(x) \right] \\ &+ \frac{\lambda}{2} \left[\phi \int_{z_2}^{\infty} \mu k(x) d\Gamma(x) + (\mu + (1 - \mu)\mu_0) \int_{z_1}^{z_2} \tilde{k}(x) d\Gamma(x) \right] \\ &+ \frac{\lambda}{2} \left[(1 - \mu)\mu_0 \int_{z_2}^{\infty} \tilde{k}(x) d\Gamma(x) + (1 - \theta)(\mu + (1 - \mu)\mu_0) \int_B^{z_1} \tilde{k}(x) d\Gamma(x) \right], \tag{A8} \end{aligned}$$

where k denotes the aggregate capital endowment (in per capita terms). The upper term of Equation (A8) is the demand for capital by men and the two lower terms are the women's demand for capital, assuming that women represent half of the population in the economy and that there is no unemployment. The demand for capital by male-run firms has three components: the first one represents the capital demand by employers, while the second

and third terms represent the demand by self-employed. i.e., those who have the right ability to be self-employed, plus the capital demand by those who become self-employed because they could not find a job as workers.¹⁸ These out-of-necessity self-employed demand the optimal amount of capital given their talent or ability. The demand for capital by female-run firms has four components, each of them multiplied by the fraction of women in the labor force, $\frac{\lambda}{2}$. The first one represents the capital demand by female employers, i.e., those with enough ability to be employers and who are allowed to be so, while the second term represents the capital demand by women who have the right ability to be self-employed and are allowed to work. The third term shows the capital demand by women who become self-employed because they are excluded from employership and, finally, the last term shows the fraction of females who would like to be workers, but since they are “excluded” from this occupation, they choose to become out-of-necessity self-employed if they are not excluded from entrepreneurship.

Similarly, the labor-market-clearing condition is given by

$$\frac{1}{2} \left[\phi \int_{z_2}^{\infty} n(x) d\Gamma(x) \right] + \frac{\lambda}{2} \left[\phi \int_{z_2}^{\infty} \mu n(x) d\Gamma(x) \right] = \frac{1}{2} \theta \Gamma(z_1) + \frac{\lambda}{2} \theta \left[\Gamma(z_1) + \int_{z_1}^{\infty} ((1 - \mu)(1 - \mu_0)) d\Gamma(x) \right], \quad (A9)$$

where the first line represents the aggregate labor demand and the second line represents the aggregate labor supply. The first term of Equation (A9) is the labor demand by male employers, and the second one corresponds to the labor demand by female employers, i.e., those women with enough ability to be employers who are allowed to choose their occupation freely. The first term of the labor supply shows the fraction of men who choose to become workers, while the second and third show the fraction of female workers. The latter terms are the fraction of females who, given their talent, want to be workers, as well as the fraction of females who have enough ability to be employers or self-employed but are excluded from both occupations.

Notes

- ¹ See the World Development Report 2012 (World Bank 2012) for a comprehensive review of these and other gender gaps. Cuberes et al. (2019b), for example, summarize the existing literature on gender gaps in entrepreneurship.
- ² Cuberes and Teignier (2014) provide comprehensive reviews of this literature.
- ³ Data sources: Estimations based on Armenia: Integrated Living Conditions Survey. Georgia: Integrated Household Survey. Azerbaijan: ILOSTAT. For the case of Armenia, only individuals with information in the labor module are included in the estimations.
- ⁴ In all cases, we only consider the working-age population, i.e., individuals in the 15–64 age bracket.
- ⁵ https://rshiny.ilo.org/dataexplorer15/?lang=en&id=EMP_2EMP_SEX_STE_NB_A (accessed on 28 September 2024).
- ⁶ The Appendix A contains a more detailed description of the model and its equilibrium conditions.
- ⁷ It can also be shown that the employer profit function is more convex than the self-employed one.
- ⁸ We abstract from the possibility that men and women have different distribution functions, which could be the case if gender gaps in education fields generated differences in managerial ability.
- ⁹ We use the term “banned” in a rather loose way. These barriers may reflect some sort of discrimination in society that does not allow some women to become entrepreneurs, but it is also possible that women optimally choose not to work in this occupation. Disentangling the two is beyond the objectives of this paper.
- ¹⁰ Using data from the Global Entrepreneurship Monitor survey, Poschke (2013) found that necessity entrepreneurs represent almost 50% of all entrepreneurs in non-OECD countries.
- ¹¹ Please note that in our framework, all individuals excluded from employership choose to become self-employed unless they are also restricted from that occupation.
- ¹² The top 10 income share in these countries are: 25.3% in Armenia (2007), 25.6% in Armenia (2013), 30.5% in Georgia (2007), 29.9% in Georgia (2014), and 19.9% in Azerbaijan (2015).

- ¹³ Low education includes less than primary education, primary education, and generalized secondary education. High education, on the other hand, includes specialized secondary education and tertiary education.
- ¹⁴ The only exception is Azerbaijan, where the ratio of females to males participating in the labor market is slightly larger for households with dependents.
- ¹⁵ In what follows we will refer to an entrepreneur as someone who works as either an employer or a self-employed.
- ¹⁶ The consumption good produced by the self-employed and the capital they use is the same as the one in the employers' problem. However, it is convenient to denote them \tilde{y} and \tilde{k} to clarify the exposition.
- ¹⁷ In order to construct this figure, we are implicitly using values for the parameters τ , α , and η , such that the three occupations are chosen in equilibrium.
- ¹⁸ As explained in Section 3, a fraction $(1 - \theta)$ of both males and females with ability below z_1 become self-employed because they would like to be workers but are not allowed to do so and choose their second-best option. Note that this setup implies that a fraction $(1 - \theta)(1 - \mu)(1 - \mu_o)$ are excluded from all employment categories and, hence, are forced out the labor force.

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