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Macroeconomic Effects of Reducing the Gender Pay Gap in an Emerging Economy*

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Abstract

We analyze the macroeconomic effects of reducing gender wage discrimination in Colombia using a small open-economy general equilibrium model with male and female agents that decide jointly over market and home production. Closing the gender gap raises GDP and consumption by increasing female earnings, aggregate labor supply, and investment. The size of these gains depends critically on the substitutability between male and female labor in market and home activities. When reductions in discrimination are implemented through fiscal policy and financed with distortionary taxes, the resulting gains are substantially smaller. This highlights a key policy trade-off: while reducing discrimination promotes growth, the financing mechanism can dampen its benefits, particularly when funding relies on taxes on male labor income. Finally, intrahousehold risk-sharing emerges as an important amplification channel; in its absence, the gains from reducing wage discrimination are substantially reduced.

JEL Classification: J16, E24, H31

Keywords: *Gender wage gap, discrimination, Public Policy, Development*

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Efectos macroeconómicos de reducir la brecha salarial de género en una economía emergente

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Resumen

Analizamos los efectos macroeconómicos de reducir la discriminación salarial por género en Colombia mediante un modelo de equilibrio general de pequeña economía abierta con agentes masculinos y femeninos que deciden conjuntamente sobre la producción de mercado y doméstica. La eliminación de la brecha de género eleva el PIB y el consumo al incrementar los ingresos femeninos, la oferta laboral agregada y la inversión. La magnitud de estas ganancias depende críticamente del grado de sustituibilidad entre el trabajo masculino y femenino en las actividades de mercado y domésticas. Cuando la reducción de la discriminación se implementa mediante política fiscal y se financia con impuestos distorsionadores, los beneficios resultantes son sustancialmente menores. Esto revela una disyuntiva política fundamental: si bien reducir la discriminación fomenta el crecimiento, el mecanismo de financiación puede atenuar sus beneficios, especialmente cuando se basa en impuestos sobre la renta laboral masculina. Finalmente, el reparto de riesgos en el hogar es un canal de amplificación relevante; en su ausencia, las ganancias derivadas de reducir la discriminación salarial disminuyen considerablemente.

Clasificación JEL: J16, E24, H31

Palabras clave: *Brecha salarial de género, discriminación, política pública, desarrollo.*

1 Introduction

Gender disparities in labor force participation, employment, and wages persist globally despite sustained efforts to promote equality (ILO 2022). A growing body of literature documents the adverse economic consequences of these gaps. For instance, Wolszczak-Derlacz (2013) find that sectors with larger gender wage gaps exhibit lower economic growth, while Cuberes and Teignier (2012) show that participation gaps reduce aggregate productivity by limiting entrepreneurial activity. Similarly, Bandara (2015) estimate that increasing the gender gap in labor participation reduces output per worker, particularly in developing regions.

The macroeconomic implications of gender inequality are thus significant. Ostry et al. (2018) argue that closing gender gaps could increase GDP by up to 35% in some countries, with significant gains attributed to productivity improvements. Evidence from the European Union suggests that narrowing the gender activity gap could raise GDP per capita by 3.2–5.5% by 2050, creating millions of jobs (Morais Maceira 2017). In the African context, Fox, Gandhi, and Batmanglich (2021) estimate that aligning female labor force participation with developed-country levels could increase GDP by as much as 50% in countries such as Niger. Fernández-Bastidas and Pycroft (2025) find that a continued reduction in gender gaps in the labor market could significantly mitigate the fiscal impact of population aging in the EU, these effects are equivalent to increasing the retirement age.

Reducing gender disparities is therefore critical for promoting inclusive growth and enhancing welfare. Narrowing wage gaps raises household income, thereby boosting consumption, savings, and capital accumulation. Moreover, persistent wage gaps distort the opportunity costs faced by men and women, influencing decisions regarding childcare, labor force participation, educational attainment, and fertility. These distortions can have long-lasting negative effects on both short- and long-term economic outcomes.

Empirical evidence further suggests that reducing gender inequality improves labor productivity (Lagerlöf 2003; Cuberes and Teignier 2012), encourages investment in women's human capital (Esteve-Volart 2004), and enhances educational outcomes for children (Pervaiz et al. 2011). As shown by Goldin (1994), the long-run female labor supply follows a U-shaped curve over the course of development, reflecting the influence of education, technological change, and evolving social norms. These dynamics underscore the intergenerational and context-specific nature of gender-based economic inequality.

An important driver of the gender wage gap is discrimination, which arises when employers or coworkers exhibit a direct preference or "taste," for interacting with a specific gender, regardless of productivity (Goldberg 1982). Employers acting on such preferences may incur a financial cost—manifested as the wage gap—to avoid hiring or promoting women, even when they are equally qualified. This type of discrimination systematically underpays women for the equivalent work. Colombia is no exception to these disparities. Another type of discrimination is statistical discrimination (based on perceived productivity signals), which also contributes to the observed gender gaps (Bertrand 2020). The focus on discrimination is justified by its prominence in contexts characterized by high occupational segregation and rigid gender norms (Carlana 2019). In Colombia, for example, sectors such as manufacturing and construction exhibit a strong preference for male labor.

This study employs a quantitative model to examine the macroeconomic implications of reducing gender discrimination in Colombia, a developing economy. We formally link the empirically observed "unexplained" component of the gender wage gap to a structural parameter representing employer discrimination. Using this framework, we simulate the general equilibrium effects of reducing this inefficiency, focusing on GDP, consumption, investment, labor market dynamics, home production, and leisure. Our primary contribution lies in developing a model tailored to developing economies, thereby providing new evidence on the macroeconomic costs of the gender wage gap in developing countries. Furthermore, we examine the interaction between discrimination reduction and other factors, such as fiscal policy and structural shocks. The model is designed to be adaptable for analysis in other developing and emerging economies.

To address this, we extend the two-agent household model with home production proposed by Neyer and Stempel (2021) by incorporating capital accumulation, labor adjustment costs, and an open-economy framework. The model is calibrated to replicate key stylized facts and structural features of the Colombian economy.

As a benchmark exercise, we examine the macroeconomic and gender-specific effects of a permanent 50% reduction in the wage gap, lowering it to 6.5%—a level observed in many advanced OECD economies.[1] Assuming that this change incurs no cost, our model predicts substantial efficiency gains. Aggregate GDP rises by approximately 8% in the new steady state, driven by higher female wages, increased labor supply, and greater capital accumulation. Total employment expands by 6%, and capital stock grows by nearly 9%, boosting household income, consumption, and investment, although the short-run adjustment temporarily reduces the trade balance.

The effects on gender outcomes are significant. Women increase their participation in market work and reduce their time in home production, while men allocate more time to home activities. These shifts narrow the wage and time-use gaps, although total home production declines. Both

[1] Our model reproduces a 13% wage gap, consistent with recent estimates by Ramírez (2025), in line with Latin American averages ranging from 12.1% in Chile to 15.4% in Brazil (ILO 2022).

genders experience higher welfare in the long run, with women facing a temporary drop in leisure time during the transition.

The magnitude of these results depends on the elasticities of substitution between male and female labor in both markets and home production. Greater substitutability in final goods production reduces the macroeconomic benefits of closing the wage gap, whereas higher substitutability in home production amplifies these benefits. When financing discrimination reduction through a consumption tax, the gains for GDP are smaller, reflecting a trade-off between taxation and discrimination reduction. Financing through taxes on hiring male labor yields even smaller macroeconomic effects.

The remainder of this paper is organized as follows. In Section 2, before introducing our model, we situate our study within the broader empirical context by reviewing the evidence on the gender wage gap, with a particular focus on its persistence and the prominence of its unexplained component in Colombia. Section 3 introduces the quantitative model, extending Neyer and Stempel (2021) with capital, labor adjustment costs, and an open economy structure. Section 4 describes the calibration strategy for the Colombian economy. Section 5 presents the core results of a 50% reduction in the discrimination gap and explores the sensitivity of these gains to structural parameters. Section 6 turns attention to the trade-offs involved in using fiscal instruments to finance the gap's reduction, revealing how distortionary taxation can offset the benefits. In Section 7, we demonstrate the robustness of our findings through a series of extensions and explore the broader implications of economies with higher initial discrimination. Finally, Section 8 concludes the study.

2 Gender wage gap evidence

Since the 1950s, gender wage discrimination has remained a persistent global issue, with women consistently earning significantly less than men do. In the United States, for example, the wage gap was approximately 35% according to Blau and Kahn (2017). Although this disparity has decreased over time due to sociocultural transformations that have increased women's labor market participation and human capital, it has not been eradicated in industrialized or developing economies. Furthermore, the gap varies significantly across countries due to differences in economic structures. Figure 1 presents the distribution of the Gender Pay GAP in 2018 according to ILO official statistics. In Europe, the average gap was around 13%, with women in Luxembourg, Italy, and Belgium earning nearly the same amount as men, while in Czechia, Austria, and Latvia, they earned approximately 20% less. In Latin America, the average gap is 10%, although there is considerable national variation. Costa Rica has a favorable gap of -5.8%, whereas Brazil has the highest disparity at 20.5%. The pay gap was the most severe in Asia and sub-Saharan Africa, at approximately 30%.

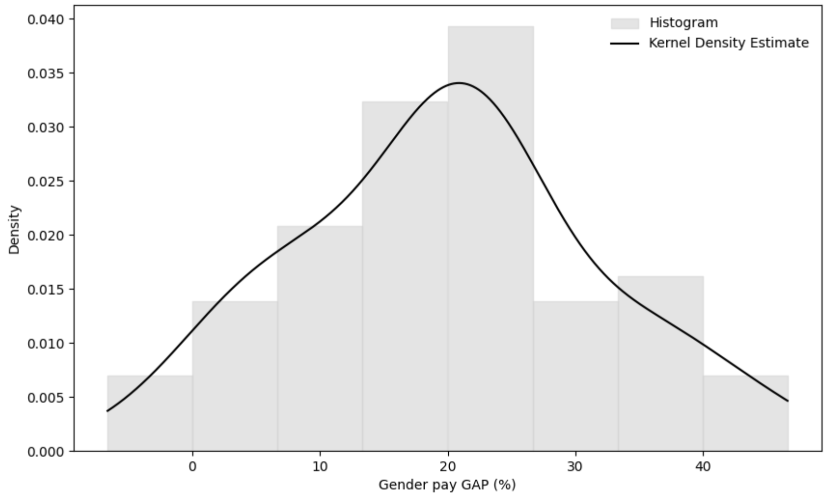

Figure 1: Distribution of the Gender Pay GAP 2018

This gap is significant; however, it may reflect more than just the gender's pay gap. The economic literature suggests that this apparent wage disparity can be partially explained by long-term adjustable factors such as lower levels of female human capital and the concentration of women in economic sectors characterized by lower earnings (the wage structure) Taira (1966), Blau and Khan (1999), and Olivetti and Petrongolo (2016). Additionally, economic duality plays a crucial role in developing economies. These countries often have a large fraction of small, less productive firms, and the wage differential between large and small firms is wider than that in developed countries. Aided by a general labor surplus, developing economies have segmented labor markets, with women being frequently employed in smaller firms. Conversely, at least two factors may cause the true gender pay gap to be larger than the observed difference. First, lower female labor force participation can induce a greater selection bias, as suggested by Olivetti and Petrongolo (2008) for Southern Europe. Second, institutions such as minimum wages and unionization may widen the measured gap by raising the wages of less-skilled workers without a corresponding increase in their human capital Taira (1966) and Angel-Urdinola and Wodon (2006).

However, a portion of the gender pay gap remains unaccounted for by observable factors and is often attributed to elements that are challenging to quantify, such as discrimination and social norms. These may include discriminatory practices in hiring, promotion, and pay-setting, or bias or prejudice that leads employers to perceive hiring women as inherently more costly (taste-based discrimination; Becker (1971)). Additionally, stereotypes regarding female productivity may cause employers to imperfectly infer lower productivity before observing actual performance (statistical discrimination; Arrow (1971) and Phelps (1972)). Discrimination introduces inefficiencies and distorts hiring and wage decisions, despite the fact that, on average, both genders possess comparable productivity. Finally, societal norms that influence career aspirations, negotiation outcomes, and the domestic division of labor disproportionately impact women's career trajectories.

Thus, economic research has analyzed the extent to which observable and unobservable factors contribute to the gender pay gap using different methodologies for different time periods and countries Weichselbaumer and Winter-Ebmer (2005). Among the common findings is that human capital differences were the main contributor to this gap until 1990, with a contribution to the wage gap of approximately 10%. However, as women increase their education and participation in the labor market, these differences fall. In recent decades, the major component of the gender pay gap has been the wage structure, which may explain about 9% of the wage gap by 1990 in the US Blau and Khan (1999). The literature highlights the significant role of the unobservable characteristics associated with discrimination.

Specifically, in Colombia, empirical research showed that wage disparities narrowed between 1994 and 2001 but remained relatively stable until 2006 Hoyos, Ñopo, and Peña (2010). Improvements in women's educational attainment have contributed to narrowing the gender wage gap, especially at the upper end of the wage distribution Abadía Alvarado and De la Rica (2020). Moreover, even after controlling for various sociodemographic and job-related characteristics, a significant portion of the wage gap remains unexplained, ranging from 13% to 23% of the average female wage. This gap is particularly pronounced among low-productivity workers and those requiring flexible work arrangements to participate effectively in the labor market. The gap due to unobservable characteristics is 13% in recent years Ramírez (2025). In this study, we focus on the unexplained component of the pay gap, which is the gender wage differential between women and men of equal productivity. The persistent and significant unexplained wage gap documented in Colombia and other economies suggests the presence of deep-seated inefficiencies such as discrimination. To quantify the macroeconomic consequences of this inefficiency and evaluate potential policies to address it, we develop a quantitative general equilibrium model tailored to a small open economy, such as Colombia's.

3 Model

This section presents the dynamic general equilibrium model used for the quantitative analysis. The model builds on the framework of Neyer and Stempel (2021), adapting it to a small open economy (SOE) setting with capital, trade, and labor adjustment costs. It features a representative household composed of men and women who make decisions regarding consumption, capital investment, and foreign bond holdings. Both men and women allocate their time to market labor, home production, and leisure.

The production process is characterized by a two-layer structure. In the first layer, a representative competitive firm uses capital along with male and female labor to produce a domestic intermediate good, which is subsequently used for domestic final production and exports. This firm incurs labor adjustment costs that smooth fluctuations in labor demand. In the second layer, a perfectly competitive producer combines domestic and foreign intermediates into a single homogeneous good, which is then allocated for consumption and investment. A complete list of the variables is provided in Appendix B.

3.1 Representative Household

The representative household is composed by two agents: Men and Women. Agent G's period utility function depends on the composite consumption of market and non-market goods ($C_{G,t}$) and leisure ($L_{G,t}$).

$$U_{G,t} = \left[\frac{\left((C_{G,t})^b (L_{G,t})^{1-b} \right)^{1-\sigma}}{1-\sigma} + \Omega \right]$$

For $G = \{F, M\}$. The composite consumption index is given by

$$C_{G,t} = \left[\gamma_G \left(C_t^N \right)^{\frac{\sigma_C - 1}{\sigma_C}} + (1 - \gamma_G) \left(C_t^V \right)^{\frac{\sigma_C - 1}{\sigma_C}} \right]^{\frac{\sigma_C}{\sigma_C - 1}}$$

where C_t^N is Household's consumption of market goods and C_t^V is the consumption of home goods (non-market). The parameter $\gamma_G \in [0, 1]$ reflects the preference of agent G for market good consumption, while the elasticity of substitution between both types of consumption is denoted σ_C.

The production of home goods depends on the time allocated by each member to household production $V_{G,t}$ and is given by

$$C_t^V = \left[\gamma_V (V_{F,t})^{\frac{\sigma_V - 1}{\sigma_V}} + (1 - \gamma_V) (V_{M,t})^{\frac{\sigma_V - 1}{\sigma_V}} \right]^{\frac{\sigma_V}{\sigma_V - 1}}$$

$\gamma_V \in [0, 1]$ captures the differences in productivity between men and women, and σ_V denotes the elasticity of substitution between female and male household work.

In each period, agent G faces a time constraint: he/she allocates one unit of time among three activities: market labor $N_{G,t}$, which is compensated at wage rate $W_{G,t}$; household work, which, although unpaid, contributes to household production; and leisure: $1 = N_{G,t} + V_{G,t} + L_{G,t}$

Household Problem:

Following the literature on intra-household bargaining (e.g., Katz (1997) and Antman (2014)), household utility is defined as the weighted average of the utilities of both agents, as follows:

$$U_t = \zeta_{M,t} U_{M,t} + \zeta_{F,t} U_{F,t}$$

where ζ_G represents the bargaining power of agent G which depends on the relative wages of both agents. Specifically, $\zeta_{M,t} = 1.5 - \frac{W_{F,t}}{W_{M,t}}$ and $\zeta_{M,t} + \zeta_{F,t} = 1$. Consequently, when wages are equivalent, that is, $W_{F,t} = W_{M,t}$, bargaining power is equally distributed. Conversely, when wages are not the same, the agent with a higher wage possesses greater bargaining power, thereby exerting a greater influence on the household utility.

Households seek to maximize the present value of their utility. This is achieved by choosing consumption $C_{G,t}$, time shares $N_{G,t}, V_{G,t}$ and $L_{G,t}$ for each member, as well as investment I_t, foreign assets A^f_{t+1}, and capital K_{t+1}. This aggregate utility specification assumes that the household is a single decision-making unit; therefore, there is perfect risk-sharing between genders, that is, full intra-household insurance, stable preferences, and consumption pooling between members.

$$Max_{C_t^N, N_{G,t}, V_{G,t}, L_{G,t}, I_t, A_t^*, K_{t+1}} E_t \sum_{t=0}^{\infty} \beta^t \left(\sum_G \zeta_{G,t} \left[\frac{\left(\left(C_{G,t}\right)^b \left(L_{G,t}\right)^{1-b} \right)^{1-\sigma}}{1-\sigma} + \Omega \right] \right) \tag{1}$$

subject to the time constraints of each agent, the household budget constraint, and the investment adjustment cost (equations 2–5), households allocate resources to consumption (C^N), investment (I), and foreign assets (A^*). Their income sources include male and female labor earnings (W_M, W_F), returns on capital (R^K), returns on foreign assets (R^*), and profits from firm ownership (Π). Because foreign assets are denominated in foreign currency (P^*), the nominal exchange rate (q) is used to convert them into domestic prices.

$$1 = N_{F,t} + V_{F,t} + L_{F,t} \tag{2}$$

$$1 = N_{M,t} + V_{M,t} + L_{M,t} \tag{3}$$

$$P_t(C_t^N + I_t) + P_t^* q_t A_t^* \leq R_{t-1}^* P_{t-1}^* q_t A_{t-1}^* + W_{F,t} N_{F,t} + W_{M,t} N_{M,t} + R_t^K K_t + \Pi_t \tag{4}$$

$$K_{t+1} \leq (1-\delta) K_t + I_t + \frac{\phi_K}{2} \left(\frac{I_t}{I_{t-1}} - 1 \right)^2 \tag{5}$$

Following Schmitt-Grohé and Uribe (2003), we close the model with a debt-elastic foreign interest rate:

$$R_t^* = R_{ss}^* \left(\tilde{\phi} + \phi_A \left(exp \left(\frac{q_t P_t^* A_t^*}{GDP_t} - \frac{q_{ss} P_{ss}^* A_{ss}^*}{GDP_{ss}} \right) - 1 \right) \right) \tag{6}$$

The subscript ss represents variables in the steady state. P is the domestic price of final goods, and P^* is the foreign price of bonds and imports. From the first-order conditions (F.O.Cs), we find the optimality condition for the consumption of market goods:

$$\zeta_{M,t} \frac{b \left(C_{M,t}^b L_{M,t}^{(1-b)} \right)^{1-\sigma}}{C_{M,t}} \gamma_M \left(\frac{C_{M,t}}{C_t^N} \right)^{1/\sigma_C} + \zeta_{F,t} \frac{b \left(C_{F,t}^b L_{F,t}^{(1-b)} \right)^{1-\sigma}}{C_{F,t}} \gamma_F \left(\frac{C_{F,t}}{C_t^N} \right)^{1/\sigma_C} = \lambda_t P_t \tag{7}$$

The marginal utility of the consumption of market goods is a weighted average of male and female marginal utilities, weighted by the bargaining power of each member. In equilibrium, the marginal utility of market consumption for the household is equal to its market price. λ represents the Lagrange multiplier for the budget constraint. We also find the labor supply equations, $N_{M,t}$ and $N_{F,t}$:

$$(1-b) \frac{\left(C_{M,t}^b L_{M,t}^{1-b} \right)^{1-\sigma}}{L_{M,t}} = \lambda_t W_{M,t} \tag{8}$$

$$(1-b) \frac{\left(C_{F,t}^b L_{F,t}^{1-b} \right)^{1-\sigma}}{L_{F,t}} = \lambda_t W_{F,t} \tag{9}$$

and the time allocated for the home production. Households not only consume market goods (C^N) but also produce their own home goods (C^V) using the time of their members (V_F and V_M). This production is an imperfect substitute for market goods production. The key decision for the household is how to allocate the scarce time of its members among three uses: market work (which generates income for C^N), home production (which directly produces C^V), and leisure time. Changes in market wages shift this allocation. For instance, if a woman's wage increases, the opportunity cost of her time spent on home production rises, prompting a reallocation of time within the household.

$V_{M,t}$ and $V_{F,t}$

$$\frac{b \left(C_{M,t}^b L_{M,t}^{(1-b)} \right)^{1-\sigma}}{C_{M,t}} (1-\gamma_M) \left(\frac{C_{M,t}}{C_t^V} \right)^{1/\sigma_C} (1-\gamma_V) \left(\frac{C_t^V}{V_{M,t}} \right)^{1/\sigma_V} = \lambda_t W_{M,t} \tag{10}$$

$$\frac{b \left(C_{F,t}^b L_{F,t}^{(1-b)} \right)^{1-\sigma}}{C_{F,t}} (1-\gamma_F) \left(\frac{C_{F,t}}{C_t^V} \right)^{1/\sigma_C} (1-\gamma_V) \left(\frac{C_t^V}{V_{F,t}} \right)^{1/\sigma_V} = \lambda_t W_{F,t} \tag{11}$$

Notice that time allocation to labor and home activities depends on wages (market valuation) and household outcomes, such as the utility perceived from market and non-market goods.

Finally, the Euler equations for investment, capital, and foreign bonds are

$$\mu_t = E_t\beta\left(\lambda_{t+1}R^K_{t+1} + \mu_{t+1}(1-\delta)\right) \tag{12}$$

$$P_t\lambda_t = \mu_t\left(1 - \phi_K\left(\frac{I_t}{I_{t-1}} - 1\right)\frac{1}{I_{t-1}}\right) + E_t\beta\mu_{t+1}\phi_K\left(\frac{I_{t+1}}{I_t} - 1\right)\frac{I_{t+1}}{(I_t)^2} \tag{13}$$

$$\lambda_t P^*_t q_t = E_t\beta\lambda_{t+1}P^*_t q_{t+1}R^*_t \tag{14}$$

In this model, households can smooth consumption through investment in capital or foreign assets. These equations represent the marginal utility of consumption today versus consumption in the future. In equilibrium, households are indifferent between investment and foreign assets.

3.2 Final Good Producers

A perfectly competitive, representative firm produces final goods for consumption and investment by combining domestic (X^H) and imported (X^{IM}) intermediates. The production technology is a Constant Elasticity of Substitution (CES) aggregator, following the trade literature (Armington 1969; Anderson 1979).

$$Y_t = \left(\omega^{1/\sigma_H}\left(X^H_t\right)^{\frac{\sigma_H-1}{\sigma_H}} + (1-\omega)^{1/\sigma_H}\left(X^{IM}_t\right)^{\frac{\sigma_H-1}{\sigma_H}}\right)^{\frac{\sigma_H}{\sigma_H-1}}$$

The optimization problem of the representative firm is

$$\max_{X^H_t, X^{IM}_t} P_tY_t - P^H_tX^H_t - P^*_tq_tX^{IM}_t$$

From the F.O.C.s, we have the demand for domestic and foreign inputs.

$$X^H_t = \omega\left(\frac{P^H_t}{P_t}\right)^{-\sigma_H} Y_t \tag{15}$$

$$X^{IM}_t = (1-\omega)\left(\frac{q_tP^*_t}{P_t}\right)^{-\sigma_H} Y_t \tag{16}$$

These equations state that the demand for each input depends negatively on its relative price and positively on the aggregate demand shifter, as in any gravity equation. Finally, the price of final goods is a weighted average of domestic and foreign prices, weighted by the home bias parameter ω.

$$P_t = \left[\omega(P^H_t)^{1-\sigma_H} + (1-\omega)(q_tP^*_t)^{1-\sigma_H}\right]^{\frac{1}{1-\sigma_H}} \tag{17}$$

Finally, the market clearing condition is as follows:

$$Y_t = C_t + I_t \tag{18}$$

3.3 Producers of Domestic Intermediates

Domestic intermediate goods are produced by a competitive firm that combines capital, male labor, and female labor and sells them in domestic and foreign markets. Following Neyer and Stempel (2021) and Gordon and Morton (1974), wage discrimination is captured in this problem on the demand side: firms perceive hiring female workers as costlier than hiring male workers; therefore, they pay an additional cost to hire female workers, measured by D_F. As shown in Appendix C the macroeconomic channels through which this type of discrimination affects economic aggregates are equivalent to those from statistical discrimination.

Additionally, to capture rigidities in the labor market and the slow transition to the steady state, we consider that the firm faces an adjustment cost for changing male or female employment. These costs are expressed in units of labor and capture any rigidity in the labor market, which reduces the response of labor demand in the short run. Factor adjustment costs are inspired by the trade literature on dynamic trade elasticities, as in Drozd, Kolbin, and Nosal (2021), and reduce the short-run response of factor demand.

Accordingly, the representative firm minimizes the present value of production costs, given by

$$Max \sum_{j=0}^{\infty} E_t \beta^j \Bigg(P^H_{t+j} X^H_{t+j} + q_{t+j} P^{EX}_{t+j} X^{EX}_{t+j} - R^K_{t+j} K_{t+j} - (W_{F,t+j} + D_F) N^d_{F,t+j} -$$

$$W_{M,t+j} N^d_{M,t+j} - (W^F_{t+j} + D_F) \frac{\phi_F}{2} \left(\frac{N^d_{F,t+j}}{N^d_{F,t+j-1}} - 1 \right)^2 - W^M_{t+j} \frac{\phi_M}{2} \left(\frac{N^d_{M,t+j}}{N^d_{M,t+j-1}} - 1 \right)^2 \Bigg)$$

subject to

$$X_t = X^H_t + X^{EX}_t = A_t L_t^{1-\alpha} K_t^{\alpha} \tag{19}$$

$$L_t = \left(\theta \left(N^d_{F,t} \right)^{\frac{\sigma_L - 1}{\sigma_L}} + (1-\theta) \left(N^d_{M,t} \right)^{\frac{\sigma_L - 1}{\sigma_L}} \right)^{\frac{\sigma_L}{\sigma_L - 1}} \tag{20}$$

$$P^H_t = q_t P^{EX}_t \tag{21}$$

The first two restrictions represent the technology constraint, while the last equation comes from the law of one price, given by $rer_t = \frac{q_t P^{EX}_t}{P^H_t} = 1$. The production function features two layers of aggregation: in the first layer, male and female labor are combined into a composite labor factor, L_t. Two parameters are central to this aggregation: the relative productivity of male labor, that is, the weight of the male contribution to total labor input θ and given our assumption that both types of labor are equally productive, we have $\theta = 0.50$. The second parameter is the elasticity of substitution between male and female labor, σ_L. A high value indicates that male and female labor is easily substitutable. In the second layer, this composite labor is combined with capital in a Cobb-Douglas fashion to produce domestic goods, which are then allocated to domestic use and exports.

In the model, firms perceive an additional 'cost' D_F when hiring women, even if they are as productive as men. This means that for a firm to hire a woman, her marginal product must be high enough to compensate for her wage W_F and the discriminatory cost D_F. In practice, this manifests as a lower demand for female labor at any given wage level and a lower equilibrium wage for women at the same level of productivity. In contrast, the demand for male labor is not subject to this distortion.

From the F.O.Cs we find the demands for capital,

$$P_t^H \alpha \frac{X_t}{K_t} = R_t^K \tag{22}$$

for female labor,

$$\begin{aligned} P_t^H (1-\alpha) \frac{X_t}{L_t} \theta \left(\frac{L_t}{N_{F,t}^d} \right)^{\frac{1}{\sigma_L}} = {} & (W_{F,t} + D_F) \left(1 + \frac{\phi_F}{N_{F,t-1}^d} \left(\frac{N_{F,t}^d}{N_{F,t-1}^d} - 1 \right) \right) \\ & - \beta E_t (W_{F,t+1} + D_F) \phi_F \left(\frac{N_{F,t+1}^d}{N_{F,t}^d} - 1 \right) \frac{N_{F,t+1}^d}{(N_{F,t}^d)^2} \end{aligned} \tag{23}$$

and for male labor,

$$\begin{aligned} P_t^H (1-\alpha) \frac{X_t}{L_t} (1-\theta) \left(\frac{L_t}{N_{M,t}^d} \right)^{\frac{1}{\sigma_L}} = {} & W_{M,t} \left(1 + \frac{\phi_M}{N_{M,t-1}^d} \left(\frac{N_{M,t}^d}{N_{M,t-1}^d} - 1 \right) \right) \\ & - \beta E_t W_{M,t+1} \phi_M \left(\frac{N_{M,t+1}^d}{N_{M,t}^d} - 1 \right) \frac{N_{M,t+1}^d}{(N_{M,t}^d)^2} \end{aligned} \tag{24}$$

In the absence of labor adjustment costs, the labor demand equations imply that the marginal product of each type of labor is equal to the real wage. With adjustment costs, the marginal cost of hiring an additional unit of labor affects future labor costs. In the case of female labor demand, the labor costs also include a discrimination factor.

Finally, in equilibrium, the total labor supply from each gender equals the labor demand, which includes adjustment costs. This captures the existence of rigidities in labor costs, as suggested by Anderson, Banker, and Janakiraman (2003). These can be significant and involve search, hiring, and training costs, as well as dismissal costs and productivity losses Manning (2006) and Ghaly, Anh Dang, and Stathopoulos (2017).

$$N_{F,t} = N^d_{F,t} + \frac{\phi_F}{2}\left(\frac{N^d_{F,t}}{N^d_{F,t+1}} - 1\right)^2$$

$$N_{M,t} = N^d_{M,t} + \frac{\phi_M}{2}\left(\frac{N^d_{M,t}}{N^d_{M,t+1}} - 1\right)^2$$

4 Parametrization

In this section, we discuss how the model is parameterized to replicate the Colombian economy. Specifically, we use a combination of parameters drawn from the literature and values obtained through target matching (calibration). For the former, Neyer and Stempel 2021 is the main reference for the inverse of the intertemporal elasticity of substitution (σ), as well as the elasticities of substitution between male and female labor in home production, and between male and female labor in the market (σ_V, σ_L). Other parameters are taken from González et al. 2011, which svalues for the discount factor (β) and capital depreciation rate (δ). Table 1 lists the values of the model parameters, including those obtained from the literature and those obtained through calibration.

Parameter	Definition	Value	Source
β	Discount factor	0.99	González et al. (2011)
δ	Capital depreciation	2.5%	González et al. (2011)
σ	Inverse IES	2.00	Neyer and Stempel (2021)
σ_C	Elast. of Subs. Market and Non-market	1.80	Neyer and Stempel (2021)
σ_V	Elast. of Subs. F&M in Home	16.8	Neyer and Stempel (2021)
σ_L	Elast. of Subs. F&M in Market	4.33	Albanesi (2025)
α	Capital share	0.31	Calibrated
b	Share of C in utility	0.75	Calibrated
γ_F	Female taste for market goods	0.57	Calibrated
γ_M	Male taste for market goods	0.57	Calibrated
γ_V	Female share in Home production	0.50	Normalization
A_{ss}	Total factor productivity	1.09	Calibrated
D_F	discrimination	0.38	Calibrated
ω	Home bias	0.83	Calibrated

Table 1: Parameters

The remaining parameters are calibrated to replicate the key macroeconomic targets in the steady state. To minimize the impact of short-term fluctuations and better reflect long-run conditions, the calibration was based on data from 2010 to 2019. The model operates at a quarterly frequency, and we assume no growth in steady state. The aggregate targets include the investment-to-output ratio (I/Y), trade openness ($(EX + IM)/GDP$), and debt-to-GDP ratio (D/Y). The parameters used to match these moments are the capital share in the production function (α), home bias parameter (ω), and long-run level of foreign debt (A^f_{ss}). The data for these targets are sourced from the National Accounts published by the Colombian National Administrative Department of Statistics (DANE, Spanish acronym). For simplicity, GDP is normalized to one in the steady state, and total factor productivity (A_{ss}) is selected to satisfy this condition.

We also targeted some moments, as shown in Table 2. To reflect the overall allocation of time among market work, home production, and leisure, we use data from the National Time Use Survey conducted by DANE between 2016 and 2017.[2] In this survey, individuals report the activities they typically perform and the amount of time allocated to each activity. These activities are classified into three categories: paid work, unpaid work, and personal activities. In our analysis, we map paid work to market work in the model, unpaid work to time dedicated to home production, and define leisure as residual.

To replicate these moments, we calibrate the taste for market goods and the share of consumption in the utility function, denoted by $\gamma_F = \gamma_M$ and b. To abstract from gender heterogeneity in home production, we assume equal productivity of men and women, setting the home production weight to $\gamma_V = 0.5$.

Finally, to determine the wage gap, we calibrate the discrimination parameter, $D_F = 0.38$ to replicate the magnitude of the unexplained wage gap. As Ramírez (2025) reported, the portion of the gender wage gap that cannot be explained by observable characteristics, as identified through a decomposition regression analysis based on the methodology proposed by Ñopo (2008), is 13%. The calibrated value of D_F is the wedge required in the model's equilibrium to generate a 13% wage gap between equally productive male and female workers, thereby structurally representing the discrimination identified in the data. This parameter captures unobserved costs arising from employer preferences, which—particularly in high-informality economies such as Colombia, where 55% of female employment is informal—may be amplified by the weak enforcement of anti-discrimination regulations (Gaddis and Pieters 2017). To give some sense of the magnitude of this parameter, it is equivalent to 17% of female wages.

Due to the high dimensionality of the model, an analytical solution is not feasible; therefore, we rely on numerical methods. Specifically, we solved a system of 16 equations for 16 unknowns.

[2] Although a more recent wave of this survey was conducted between 2020 and 2021, we rely on the earlier version to avoid potential distortions in time-use patterns caused by the pandemic.

Target	Value	Source	Parameter (targeted)
GDP	1.0	Normalization	A_{ss}
Investment/GDP	0.22	DANE	α
Trade Openness	0.35	DANE	ω
Debt/GDP	-0.5/4	DANE	A^f_{ss}
Market labor (average)	0.345	DANE	$\gamma_F = \gamma_M$
Home labor (average)	0.226	DANE	b
Wage Gap (discrimination)	13%	Ramírez (2025)	D_F

Table 2: Targeted Moments

The numerical solution of the steady state involves solving a core system of 10 equations, while the remaining 6 equations are used to target specific moments in the long-run equilibrium of the model.[3]

5 Results

In this section, we examine the impact of reducing the wage gap by 50% on the dynamics of the main macroeconomic variables and some gender outcomes. This reduction results in a wage gap of 6.5%, similar to that in most advanced OECD economies. Note that this shock comes at no cost and represents a reduction in the source of inefficiency in the economy. In Subsection 5.1, we explore the economic advantages of reducing such discrimination. Subsection 5.2 assesses how our baseline results are affected by the elasticities of substitution between male and female labor in the production of final and home goods.

5.1 Baseline Scenario: A Costless Reduction

According to the model setup, wage discrimination constitutes an inefficiency in the economy that primarily affects the hiring of female workers. However, due to general equilibrium effects, this inefficiency affects the entire economy. In this section, we analyze the macroeconomic implications of permanently reducing inefficiency by half. We assume that this reduction incurs no cost. Figure 2 presents the transition paths of the main macroeconomic variables along with some gender-specific outcomes.

As reported in panel (a) of figure 2, total GDP increases both on impact and throughout the transition to the new long-run equilibrium. Reducing discrimination by half raises real production by approximately 8% in the steady state. This economic gain results from two

[3]We use the *fsolve* function in Matlab that solves a system of non-linear equations.

main factors. First, firms hire more female labor, as shown in Panel (f), which increases household income through higher wages paid to both men and women (Panel (i)). Second, higher household income boosts present and future consumption, leading households to allocate more resources to capital investment and stimulating domestic economic activity. More labor in the production function increases the marginal productivity of capital, which reinforces households' incentives to move some resources into investment. Decomposing the effects, total employment rises by 6%, while the capital stock increases by 8.9%. These two forces combined explain the overall increase in the total GDP. Notice that in the short run, higher investment is financed in the foreign markets, which decreases the trade balance (panel e.)

In terms of gender-specific outcomes, reducing discrimination against female labor affects men and women differently. While women work more in the labor market and reduce their time in home production, men do the opposite (Panels (f) and (g)). Lower discrimination at the firm level increases the demand for female labor, leading to higher wages for women. As previously mentioned, this raises the overall household income. In response to this income increase, households choose to allocate less male labor to the market and more to home production. This shift explains why male wages have also increased. However, the increase in male home labor is insufficient to offset the decline in the time females spend at home. Consequently, total home production decreases. The last three panels of figure 2 show that different gaps shrink with the shock, including wages, time in the labor market, and time assigned to leisure.

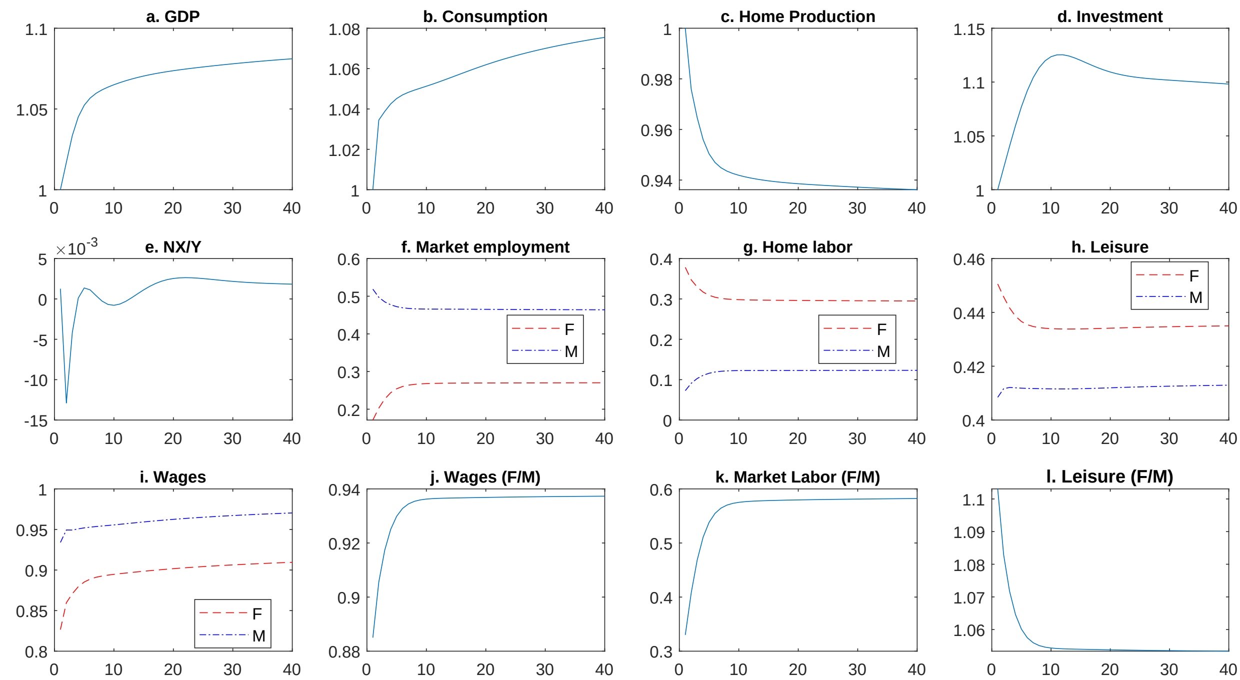

Figure 2: Macroeconomic effects of reducing discrimination

Finally, we report the static utility of both household members in Figure 3. As shown, both male and female agents experience higher utility on impact and in the new equilibrium after the reduction in discrimination. However, differences emerged during this transition. Specifically, while male welfare increases steadily throughout the adjustment period, female welfare declines temporarily during certain periods. This temporary drop is mainly explained by the reduction in the time allocated to leisure activities. In the new steady state, despite the decrease in home production (home consumption), both household members are better off because of higher market consumption. Men, in particular, benefit from increased consumption and additional leisure time.

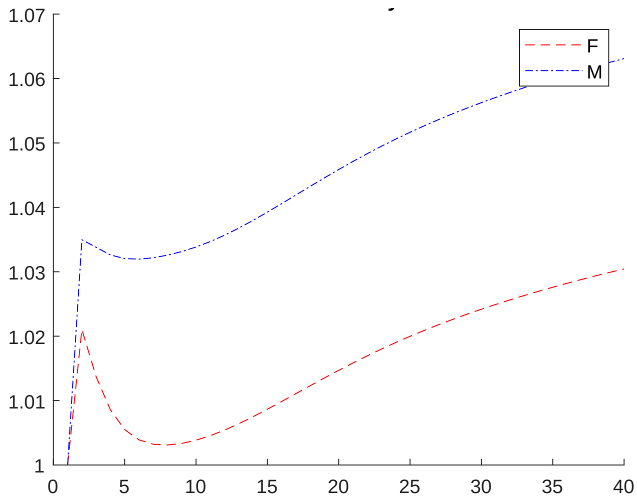

Figure 3: Static Utility of reducing discrimination

5.2 The Role of Economic Structure: Sensitivity Analysis

The baseline results demonstrate substantial potential gains from reducing the discrimination. However, the magnitude of these gains is contingent on the key structural parameters of the economy. To assess the robustness of our findings and understand which economic features most influence the outcomes, we conduct a sensitivity analysis on two crucial technological factors: the elasticity of substitution between male and female labor in the market and home production.[4]

First, we evaluate how the substitution between male and female labor in the production of final goods, σ_L, affects our results by comparing the benchmark results with those from scenarios with lower and higher substitution. In our benchmark scenario, we set the value of this elasticity to 4.33, following Albanesi (2025). We examine two alternative cases, $\sigma_L \in \{2.0, 8.0\}$. The first, with lower elasticity, reflects a more complementary role of both types of work in the production process. Ostry et al. (2018) show that Women may bring new skills to the workplace, which result in larger economic gains than previously thought. While the second value implies a higher

[4]In Appendix C we report how our benchmark results change under alternative model specifications.

elasticity, it would be considered that both works are similar and can be highly substitutable. Second, we analyze the sensitivity of our results to the elasticity of substitution between male and female labor in home production (σ_V). While our benchmark value is 16.8, following Neyer and Stempel (2021), we also examine two cases with lower substitutability: $\sigma_V \in 4.0, 8.0$.

In all alternative scenarios, the model was recalibrated to replicate the same targets in the initial steady state. The recalibrated parameters are presented in Table 3. We observe that most parameters remain close to their values in the benchmark scenario. The big difference in the table is that as male and female labor becomes less substitutable in the production of final goods, the model requires a higher value of the discrimination parameter to replicate the observed wage gap (columns two and three). In other words, when the two types of labor are more complementary within the production structure, firms must apply a stronger discriminatory bias against one type of labor to generate the same degree of wage inequality. Similarly, a lower elasticity of substitution in home production σ_v implies a smaller steady-state value for D_F columns (four and five).

Parameter	Benchmark	$\sigma_L = 2.0$	$\sigma_L = 8.0$	$\sigma_V = 8.0$	$\sigma_V = 4.0$
b	0.76	0.77	0.75	0.75	0.75
$\gamma_F = \gamma_M$	0.54	0.56	0.53	0.53	0.52
A_{ss}	1.09	1.12	1.08	1.07	1.07
ω	0.83	0.83	0.83	0.83	0.83
D_F	0.38	0.73	0.256	0.26	0.20

Table 3: Re-calibrated parameters for alternative values of σ_L and σ_v

The effect of reducing discrimination by 50% on the macroeconomic, gender, and labor market variables for the benchmark case and the two alternative scenarios are presented in Figures 4 and 5. Given that the mechanisms are the same, we only focus on the long-run effect on the main variables of the reduction in discrimination. The blue bar represents the benchmark scenario, the yellow bar represents lower substitutability in the production of final goods, and the orange bar represents higher substitutability. The purple and green bars represent lower and lowest home production substitutability, respectively. As shown in the figures, all long-run responses exhibit similar qualitative dynamics. Thus, the main difference across scenarios lies in the magnitude of the effects.

Quantitatively, the macroeconomic gains from reducing discrimination are larger when male and female labor are less substitutable in the production of final goods, but they are more substitutable in home production. The increase in output ranges from approximately 5% to nearly 15%, depending on the values of σ_L and σ_v, as shown in Panel (a). When female labor is less substitutable for male labor in the production of the final good, reducing discrimination leads to a larger increase in total employment because male employment declines less, panel (b) of Figure 5, and has a stronger impact on capital accumulation (panel (d) of Figure 4), driven by the higher marginal productivity of capital.

Although discrimination is reduced by half, the implications for the wage gap vary across scenarios. As shown in panels (e and f) of Figure 5, the wage gap narrows significantly when the elasticity of substitution is greater. When male and female labor are less substitutable in the production of final goods, male working hours decrease less, while their wages increase more (Panel (f) in Figure 5). This closer relationship between the two types of labor causes both wages to rise by similar magnitudes, resulting in a smaller reduction in the wage gap.

With respect to the elasticity of substitution in home production, a lower value of this parameter raises the opportunity cost of working in the market. The household's optimal response, as shown in Figure 5, is for men to allocate more time to home production and women less, but for both genders, the response is lower than in the benchmark scenario (Panels c and d). This reallocation directly impacts the labor supply: women's participation increases, whereas men's participation decreases (Panels a and b). Faced with a reduced supply of male labor, firms increase their demand for the now more abundant female labor to maintain their output, but the increase in labor supply for women is lower than in the benchmark. This shift in the relative labor supply and demand narrows the wage gap mechanically, meaning that a lower discrimination parameter (D_F) is sufficient to replicate the initial observed wage gap.

The macroeconomic effects intensify with a higher elasticity of substitution in home production (σ_v). As Figure 4 shows, GDP, market consumption, and investment exhibit stronger growth, whereas home production declines more substantially. The mechanism is straightforward: greater substitutability allows households to reallocate time from home to market work more efficiently, significantly increasing the total labor supply, particularly female employment, and thereby boosting capital accumulation and economic activity. In contrast, the response of wages is broadly similar across different values of σ_v (Figure 4, panels (e) and (f)). This suggests that the wage gap dynamics are influenced more strongly by the elasticity of substitution in the final goods sector (σ_L) than in home production. This is intuitive, as the initial discriminatory shock is located in the market production function, making labor demand in that sector the primary channel for wage determination.

In summary, a reduction in the unexplained gender wage gap generates macroeconomic expansion in the Colombian economy. Our baseline scenario shows that halving the gap can increase GDP by approximately 8%, driven by a larger labor supply—particularly among women—and stronger capital accumulation. However, these gains are not uniform; they are significantly

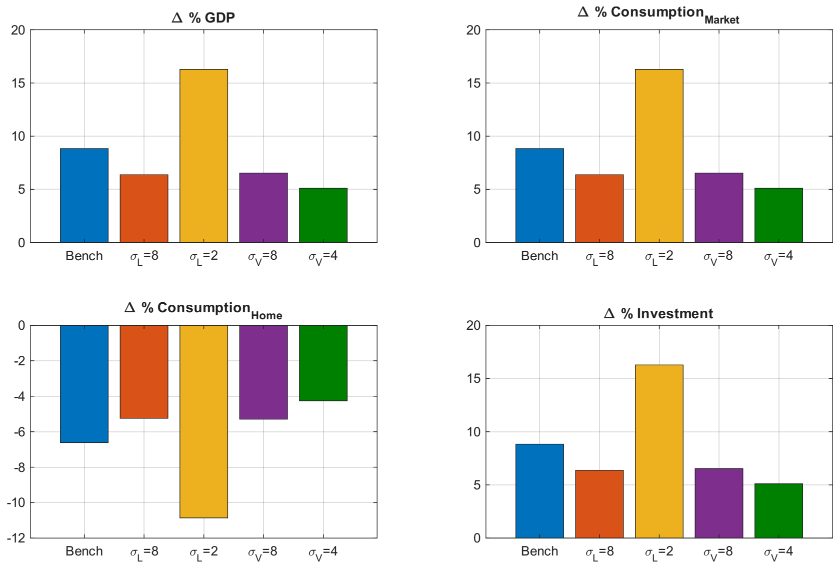

Figure 4: Sensitivity: Parameters - Reducing d_F by half

shaped by the underlying economic structure, specifically the ease with which firms and households can substitute between male and female labor in market and home production. Lower substitutability in final production and greater home production magnify the results. These results represent an upper-bound scenario because they assume that discrimination can be eliminated at no cost. In the following section, we introduce a more realistic framework by examining the trade-offs that emerge when public policy is used to finance the reduction of the wage gap, thereby introducing potential distortions in the tax system.

5.3 Reducing the wage gap with public policy

While the costless reduction analyzed in the previous section illustrates the potential efficiency gains from closing gender wage gaps, real-world policy interventions require financing and may therefore introduce distortions. In this section, we consider more realistic scenarios in which reductions in discrimination are implemented through fiscal policy, and we analyze the trade-offs associated with alternative financing mechanisms. Specifically, we study how the gender wage gap can be reduced when the government provides transfers or subsidies that offset firms' aversion to hiring female workers. To this end, we introduce a third agent—the government—which collects taxes (on consumption or on hiring male workers) and grants subsidies to intermediate producers conditional on their employment of female workers. The government is assumed to operate under a balanced-budget constraint.

Doorley and Keane (2024) study the effect of tax-benefit policy on gender differences in income in the EU27 countries and the UK. Recent work on gendered fiscal incidence shows that taxes and transfers play a limited role in closing gender income gaps. Using microsimulation for five

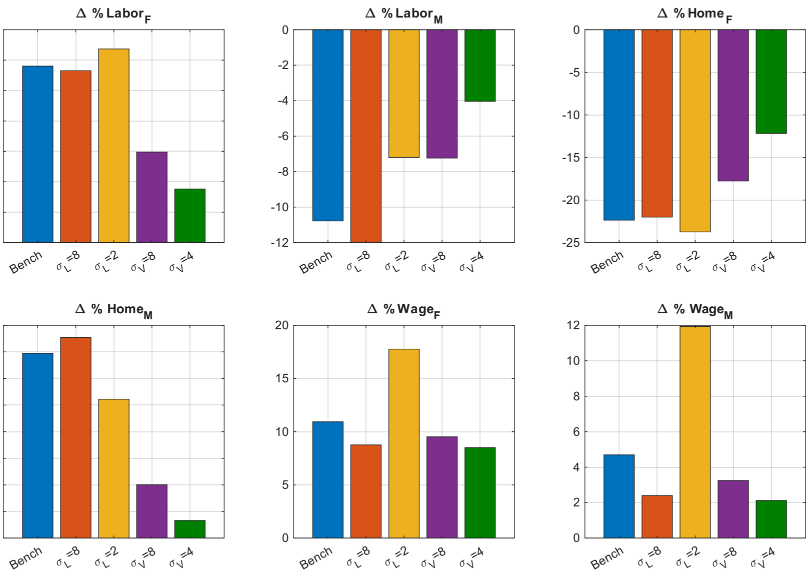

Figure 5: Sensitivity: Parameters - Reducing d_F by half

Central American countries, Deza et al. (2024) find that labor income differences remain the main source of inequality, with Costa Rica as a partial exception.

The profit-maximization problem of the intermediate producer is accordingly modified: firms are *compensated* for hiring female workers through a subsidy, denoted by τ_s, which partially offsets the bias against female labor. To finance this policy, we consider two alternative taxation schemes. Under the first scheme, the government levies a tax on male labor hiring, τ_M, which enters the firm's problem as an additional labor cost. Under the second scheme, consumption is taxed at a rate τ_c, requiring a reformulation of the household budget constraint in Equation 4. For completeness, both modifications are incorporated in the equations below, although the two financing schemes are analyzed separately.[5]

$$Max \sum_{j=0}^{\infty} E_t \beta^j \Bigg(P^H_{t+j} X^H_{t+j} + q_{t+j} P^{EX}_{t+j} X^{EX}_{t+j} - R^K_{t+j} K_{t+j} - (W_{F,t+j} + D_F - \tau_s) N^d_{F,t+j} -$$

$$(1+\tau_M) W_{M,t+j} N^d_{M,t+j} - (W^F_{t+j} + D_F) \frac{\phi_F}{2} \left(\frac{N^d_{F,t+j}}{N^d_{F,t+j-1}} - 1 \right)^2 - W^M_{t+j} \frac{\phi_M}{2} \left(\frac{N^d_{M,t+j}}{N^d_{M,t+j-1}} - 1 \right)^2 \Bigg)$$

$$P_t((1+\tau_c) C^N_t + I_t) + P^*_t q_t A^f_{t+1} \leq R^*_{t-1} P^*_t q_t A^*_t + W_{F,t} N_{F,t} + W_{M,t} N_{M,t} + R^K_t K_t + \Pi_t \quad (25)$$

Finally, the balanced budget equation for the government is as follows:

[5] Specifically, we isolate the effects of each financing mechanism by considering either a tax on male labor only ($\tau_M > 0, \tau_c = 0$) or a consumption tax only ($\tau_c > 0, \tau_M = 0$).

$$\tau_c P_t C_t + \tau_M W_{M,t} N^d_{M,t} = \tau_s N^d_{F,t} \tag{26}$$

To assess the permanent effects of each tax scheme, we compare steady-state outcomes across key macroeconomic and gender-related variables. We study policies that reduce the gender wage gap—measured by the female-to-male wage ratio W_F/W_M—from its current level toward zero, corresponding to wage parity.

Figure 6 relates the wage gap to steady-state GDP, tax rates, market and home consumption, investment, and total employment. Panel (a) shows a nonlinear relationship between the wage gap and macroeconomic outcomes. Fiscal interventions generate an inverted U-shaped response in GDP, implying an *optimal* degree of gap reduction. Financing through consumption taxes yields larger aggregate gains than the taxation of male labor and supports a greater optimal reduction in the gap. At low tax rates, subsidizing female labor via consumption taxes raises GDP because higher household income more than offsets the tax burden, increasing aggregate consumption (Panel d). As tax rates rise, however, the marginal costs of further gap reduction dominate. Consequently, the maximum GDP gain under consumption-tax financing is limited to 3.7%, compared to 8% in the baseline case. This residual *optimal* gap reflects an efficiency–equity trade-off: consumption taxes generate welfare losses that may outweigh the marginal benefits of eliminating discrimination in developing economies Jayachandran (2021). This result is consistent with evidence of persistent 4–5% "unexplained" wage gaps even in competitive markets Hsieh et al. (2019).

Panel (b) indicates that narrowing the wage gap through consumption taxes is convex, requiring progressively larger tax increases for additional reductions. This nonlinearity explains why policy gains diminish beyond a threshold. Employment also exhibits an inverted U-shaped response: initial gap reductions increase female labor demand (Panel d of Figure 7) and total employment, but higher taxes eventually reduce labor supply—particularly male labor (Panel c of Figure 7)—lowering overall employment. As market employment declines, time reallocates toward home production, producing a U-shaped response in home output.

When financing through taxes on male labor, firms' demand for this type of labor consistently falls, which is not the case under a consumption tax. As taxes increase, firms find male workers less attractive to hire, and their wages decrease. Unlike consumption taxes, in this case, the wage gap narrows primarily because male wages fall (panel a of Figure 7), rather than because female wages rise (panel b of Figure 7). Another difference between the two schemes is the behavior of household consumption (panel e of Figure 6). When financing with τ_M, the U-shaped pattern is clearer. In this scenario, female home labor declines less than it does under consumption tax financing. Consequently, the additional increase in male home labor raises

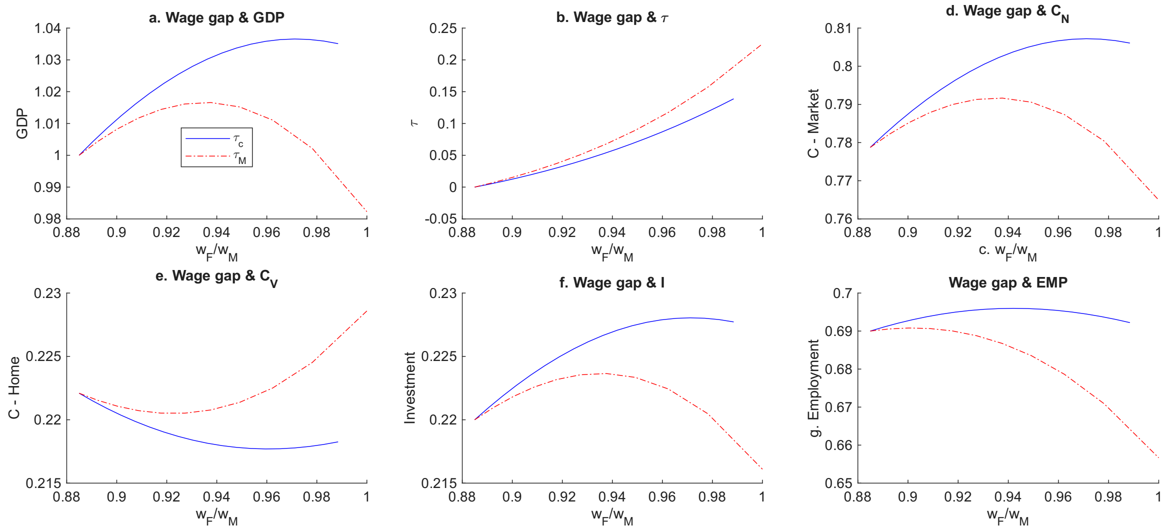

Figure 6: Macroeconomic effects of reducing the gender wage gap financed with taxes

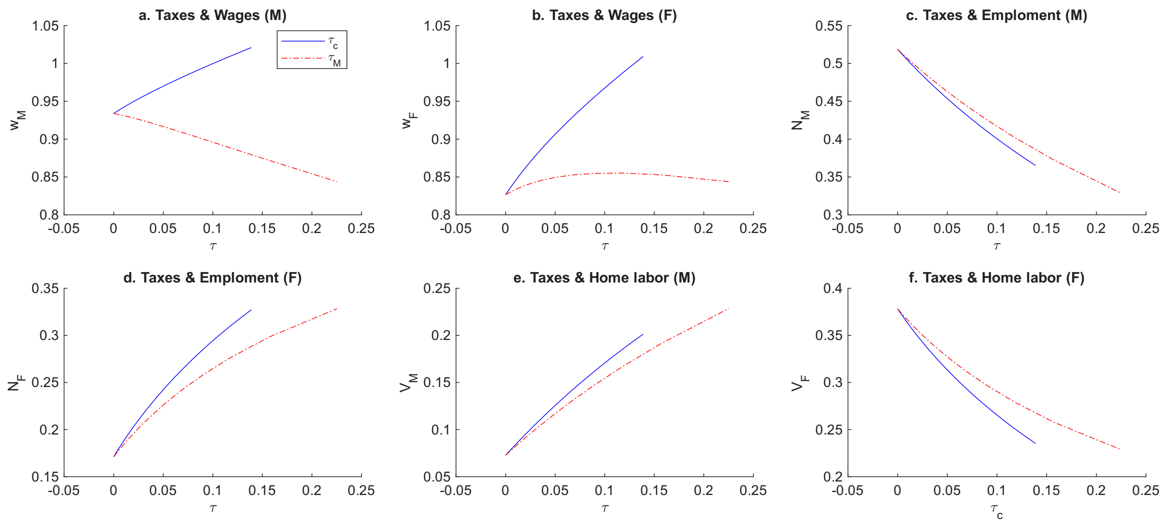

Figure 7: Gender outcomes of reducing the gender wage gap financed with taxes

home production.

6 Conclusions

Over the past few decades, gender discrimination has declined worldwide. However, significant gender disparities persist in many countries, particularly in emerging and developing markets. Reducing gender gaps, especially those arising from inefficiencies such as discrimination, can promote economic growth by increasing female labor force participation.

In this study, we extend the model of Neyer and Stempel (2021) by adapting it to a small open economy that incorporates capital, labor adjustment costs, and differentiated domestic and foreign goods. We calibrate the model to Colombia—a developing economy with an unexplained gender wage gap of approximately 13% in favor of male labor—and analyze the macroeconomic effects of halving discrimination.

The analysis reveals that reducing discrimination reshapes gender-specific behaviors: women substantially increase their labor market participation, while men reallocate time toward leisure and home production as household income rises. Quantitatively, reducing the wage gap to 6.5% results in an 8% increase in GDP. These gains are driven by higher employment, mainly among women, and marginal productivity gains in capital. Importantly, these effects occur without any intervention costs. Our results are sensitive to model parameters; for instance, when the elasticity of substitution between male and female labor in final goods production is higher, the magnitude of the effects increases.

A more realistic assumption for reducing the wage gap is the intervention of public policy. Our results highlight the trade-offs involved in closing gender wage gaps through fiscal intervention. Subsidizing female labor via consumption taxes can raise GDP and employment when tax rates are moderate. However, excessive taxation reduces aggregate welfare and generates a residual wage gap due to efficiency–equity trade-offs. By contrast, taxing male labor achieves narrower gaps primarily by lowering male wages, with weaker effects on aggregate activity and stronger shifts toward household production.

Overall, the findings suggest that while public policies can reduce gender wage disparities and improve aggregate outcomes, the choice of financing instruments is crucial. Financing subsidies for female employment through consumption taxes is generally more effective than taxing male labor, as it better stimulates female labor-force participation and aggregate output. However, this approach faces diminishing returns and nonlinear welfare costs at higher tax rates, revealing a structural limit to achieving absolute wage parity through fiscal means. These results point to structural limits in achieving wage parity and underscore the need to complement fiscal measures with broader reforms that directly target discriminatory practices in the labor market.

The results presented in this paper show that reducing discrimination yields important economic benefits for the society as a whole. At a time when global economic growth is slowing due to demographic transitions, narrowing gender gaps could serve as a counteracting force to declining participation rates, especially in countries where these disparities remain high.

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A Complete Model

$$P_t = 1 \tag{1}$$

$$1 = N_{F,t} + V_{F,t} + L_{F,t} \tag{2}$$

$$1 = N_{M,t} + V_{M,t} + L_{M,t} \tag{3}$$

$$C_{F,t} = \left[\gamma_F \left(C_t^N\right)^{\frac{\sigma_C - 1}{\sigma_C}} + (1-\gamma_F)\left(C_t^V\right)^{\frac{\sigma_C - 1}{\sigma_C}}\right]^{\frac{\sigma_C}{\sigma_C - 1}} \tag{4}$$

$$C_{M,t} = \left[\gamma_M \left(C_t^N\right)^{\frac{\sigma_C - 1}{\sigma_C}} + (1-\gamma_M)\left(C_t^V\right)^{\frac{\sigma_C - 1}{\sigma_C}}\right]^{\frac{\sigma_C}{\sigma_C - 1}} \tag{5}$$

$$C_t^V = \left[\gamma_V \left(V_{F,t}\right)^{\frac{\sigma_V - 1}{\sigma_V}} + (1-\gamma_V)\left(V_{M,t}\right)^{\frac{\sigma_V - 1}{\sigma_V}}\right]^{\frac{\sigma_V}{\sigma_V - 1}} \tag{6}$$

$$K_{t+1} = (1-\delta)K_t + I_t + \frac{\phi_K}{2}\left(\frac{I_t}{I_{t-1}} - 1\right)^2 \tag{7}$$

$$\zeta_t = 1.5 - \frac{w_{F,t}}{w_{M,t}} \tag{8}$$

$$R_t^* = R_{ss}^*\left(\tilde{\phi} + \phi_A\left(exp\left(\frac{q_t P_t^* A_t^*}{GDP_t} - \frac{q_{ss} P_{ss}^* A_{ss}^*}{GDP_{ss}}\right) - 1\right)\right) \tag{9}$$

$$\frac{q_t P_t^*}{P_t} = rer_t \tag{10}$$

$$\zeta_t \frac{b\left(C_{M,t}^b L_{M,t}^{(1-b)}\right)^{1-\sigma}}{C_{M,t}} \gamma_M \left(\frac{C_{M,t}}{C_t^N}\right)^{1/\sigma_C} + (1-\zeta_t)\frac{b\left(C_{F,t}^b L_{F,t}^{(1-b)}\right)^{1-\sigma}}{C_{F,t}} \gamma_F \left(\frac{C_{F,t}}{C_t^N}\right)^{1/\sigma_C} = \lambda_t P_t \tag{11}$$

$$(1-b)\frac{\left(C_{M,t}^b L_{M,t}^{1-b}\right)^{1-\sigma}}{L_{M,t}} = \lambda_t w_{M,t} \tag{12}$$

$$(1-b)\frac{\left(C_{F,t}^b L_{F,t}^{1-b}\right)^{1-\sigma}}{L_{F,t}} = \lambda_t w_{F,t} \tag{13}$$

$$\zeta_t \frac{b\left(C_{M,t}^b L_{M,t}^{(1-b)}\right)^{1-\sigma}}{C_{M,t}} (1-\gamma_M) \left(\frac{C_{M,t}}{C_t^V}\right)^{1/\sigma_C} (1-\gamma_V)\left(\frac{C_t^V}{V_{M,t}}\right)^{1/\sigma_V} = \lambda_t w_{M,t} \tag{14}$$

$$(1-\zeta_t) \frac{b\left(C_{F,t}^b L_{F,t}^{(1-b)}\right)^{1-\sigma}}{C_{F,t}} (1-\gamma_F) \left(\frac{C_{F,t}}{C_t^V}\right)^{1/\sigma_C} (1-\gamma_V)\left(\frac{C_t^V}{V_{F,t}}\right)^{1/\sigma_V} = \lambda w_{F,t} \tag{15}$$

$$\lambda_t P_t^* q_t = E_t \beta \lambda_{t+1} P_t^* q_{t+1} R_t^* \tag{16}$$

$$\mu_t = E_t \beta\left(\lambda_{t+1} P_{t+1} R_{t+1}^K + \mu_{t+1}(1-\delta)\right) \tag{17}$$

$$P_t \lambda_t = \mu_t \left(1 - \phi_K\left(\frac{I_t}{I_{t-1}} - 1\right)\frac{1}{I_{t-1}}\right) + E_t \beta \mu_{t+1} \phi_K \left(\frac{I_{t+1}}{I_t} - 1\right)\frac{I_{t+1}}{(I_t)^2} \tag{18}$$

$$X_t^H = \omega \left(\frac{P_t^H}{P_t}\right)^{-\sigma_H} Y_t \tag{19}$$

$$X_t^* = (1-\omega) \left(\frac{q_t P_t^*}{P_t}\right)^{-\sigma_H} Y_t \tag{20}$$

$$P_t = \left[\omega (P_t^H)^{1-\sigma_H} + (1-\omega)(q_t P_t^*)^{1-\sigma_H}\right]^{\frac{1}{1-\sigma_H}} \tag{21}$$

$$X_t = X_t^H + X_t^{EX} \tag{22}$$

$$P_t^H (1-\alpha)\frac{X_t}{L_t}\theta \left(\frac{L_t}{N_{F,t}}\right)^{\frac{1}{\sigma_L}} = (W_{F,t} + D_F)\left(1 + \frac{\phi_F}{N_{F,t-1}}\left(\frac{N_{F,t}}{N_{F,t-1}} - 1\right)\right) \tag{23}$$

$$-\beta E_t (W_{F,t+1} + D_F)\phi_F \left(\frac{N_{F,t+1}}{N_{F,t}} - 1\right)\frac{N_{F,t+1}}{(N_{F,t})^2}$$

$$P_t^H (1-\alpha)\frac{X_t}{L_t}(1-\theta) \left(\frac{L_t}{N_{M,t}}\right)^{\frac{1}{\sigma_L}} = W_{M,t}\left(1 + \frac{\phi_M}{N_{M,t-1}}\left(\frac{N_{M,t}}{N_{M,t-1}} - 1\right)\right) \tag{24}$$

$$-\beta E_t W_{M,t+1}\phi_M \left(\frac{N_{M,t+1}}{N_{M,t}} - 1\right)\frac{N_{M,t+1}}{(N_{M,t})^2}$$

$$X_t = A_t L_t^{1-\alpha} K_t^{\alpha} \tag{25}$$

$$L_t = \left(\theta \left(N_{F,t}\right)^{\frac{\sigma_L - 1}{\sigma_L}} + (1-\theta)\left(N_{M,t}\right)^{\frac{\sigma_L - 1}{\sigma_L}}\right)^{\frac{\sigma_L}{\sigma_L - 1}} \tag{26}$$

$$P_t^H = q_t P_t^{EX} \tag{27}$$

$$q_t P_t^{EX} X^{EX} - q_t P_t^F X_t^* = R_{t-1}^* P_t^* q_t A_t^* - P_t^* q_t A_{t+1}^* \tag{28}$$

$$NX = q_t P_t^{EX} X^{EX} - q_t P_t^F X_t^* \tag{29}$$

Endogenous variables: $P, P^H, N_F, N_M, V_F, V_M, L_F, L_M, C_F, C_M, C^N, C^V, K, I, \zeta, R^*, q, \lambda, \mu,$ $NX, w_F, w_M, R^K, L, X^H, X_t^*, X^{EX}, X, rer, A^*$

Exogenous variables: P^*, P^{EX}, A

Parameters: $\gamma_F, \gamma_M, \sigma_C, \gamma_V, \sigma_V, \beta, \delta, \alpha, b, \phi_K, \tilde{\phi}, \phi_A, \sigma, \sigma_L, \theta, d_F, R_{ss}^*, P_{ss}^f$

A.1 Steady State

$$P = 1 \tag{1}$$

$$1 = N_F + V_F + L_F \tag{2}$$

$$1 = N_M + V_M + L_M \tag{3}$$

$$C_F = \left[\gamma_F \left(C^N\right)^{\frac{\sigma_C - 1}{\sigma_C}} + (1-\gamma_F)\left(C^V\right)^{\frac{\sigma_C - 1}{\sigma_C}}\right]^{\frac{\sigma_C}{\sigma_C - 1}} \tag{4}$$

$$C_M = \left[\gamma_M \left(C^N\right)^{\frac{\sigma_C - 1}{\sigma_C}} + (1-\gamma_M)\left(C^V\right)^{\frac{\sigma_C - 1}{\sigma_C}}\right]^{\frac{\sigma_C}{\sigma_C - 1}} \tag{5}$$

$$C^V = \left[\gamma_V \left(V_F\right)^{\frac{\sigma_V - 1}{\sigma_V}} + (1-\gamma_V)\left(V_M\right)^{\frac{\sigma_V - 1}{\sigma_V}}\right]^{\frac{\sigma_V}{\sigma_V - 1}} \tag{6}$$

$$I = \delta K \tag{7}$$

$$\zeta = 1.5 - \frac{w_F}{w_M} \tag{8}$$

$$\frac{A^f}{Y} = \frac{A^f_{ss}}{Y_{ss}} \tag{9}$$

$$\frac{qP^*}{P} = 1 \tag{10}$$

$$\zeta \frac{b\left(C_M^b L_M^{(1-b)}\right)^{1-\sigma}}{C_M} \gamma_M \left(\frac{C_M}{C^N}\right)^{1/\sigma_C} + (1-\zeta)\frac{b\left(C_F^b L_F^{(1-b)}\right)^{1-\sigma}}{C_F} \gamma_F \left(\frac{C_F}{C^N}\right)^{1/\sigma_C} = \lambda P \tag{11}$$

$$(1-b)\frac{\left(C_M^b L_M^{1-b}\right)^{1-\sigma}}{L_M} = \lambda w_M \tag{12}$$

$$\left(\frac{C_M^b L_M^{1-b}}{C_F^b L_F^{1-b}}\right)^{1-\sigma} \frac{L_F}{L_M} = \frac{w_M}{w_F} \tag{13}$$

$$\zeta \frac{b\left(C_M^b L_M^{(1-b)}\right)^{1-\sigma}}{C_M} (1-\gamma_M) \left(\frac{C_M}{C^V}\right)^{1/\sigma_C} (1-\gamma_V)\left(\frac{C^V}{V_M}\right)^{1/\sigma_V} = \lambda w_M \tag{14}$$

$$\frac{\zeta}{1-\zeta}\left(\frac{C_M^b L_M^{1-b}}{C_F^b L_F^{1-b}}\right)^{1-\sigma} \frac{C_F(1-\gamma_M)}{C_M(1-\gamma_F)} \left(\frac{C_M}{C_F}\right)^{1/\sigma_C} \left(\frac{V_F}{V_M}\right)^{1/\sigma_V} = \frac{w_M}{w_F} \tag{15}$$

$$R^* = 1/\beta \tag{16}$$

$$P\lambda = \mu \tag{17}$$

$$R^K = 1/\beta - (1-\delta) \tag{18}$$

$$X^H = \omega \left(\frac{P^H}{P} \right)^{-\sigma_H} Y \tag{19}$$

$$X^* = (1-\omega) \left(\frac{qP^*}{P} \right)^{-\sigma_H} Y \tag{20}$$

$$P = \left[\omega (P^H)^{1-\sigma_H} + (1-\omega)(qP^*)^{1-\sigma_H} \right]^{\frac{1}{1-\sigma_H}} \tag{21}$$

$$X = X^H + X^{EX} \tag{22}$$

$$P^H(1-\alpha)\frac{X}{L}(\theta) \left(\frac{L}{N_F} \right)^{\frac{1}{\sigma_L}} = W_F + D_F \tag{23}$$

$$P^H(1-\alpha)\frac{X}{L}(1-\theta) \left(\frac{L}{N_M} \right)^{\frac{1}{\sigma_L}} = W_M \tag{24}$$

$$P^H \alpha \frac{X}{K} = R^K \tag{25}$$

$$X = AL^{1-\alpha} K^\alpha \tag{26}$$

$$L = \left(\theta \left(N_F \right)^{\frac{\sigma_L - 1}{\sigma_L}} + (1-\theta) \left(N_M \right)^{\frac{\sigma_L - 1}{\sigma_L}} \right)^{\frac{\sigma_L}{\sigma_L - 1}} \tag{27}$$

$$P^H = qP^{EX} \tag{28}$$

$$qP^{EX} X^{EX} - qP^F X_t^* = R^* P^* q A^F - P^* q A^F \tag{29}$$

$$NX = qP^{EX} X^{EX} - qP^F X_t^* \tag{30}$$

B List of variables

Variable	Definition	Variable	Definition
N_G	Market employment of agent $G \in \{F, M\}$	K	Capital stock
L_G	Leisure of agent $G \in \{F, M\}$	I	Investment
V_G	Home labor of agent $G \in \{F, M\}$	R^*	Foreign interest rate
C^N	Consumption of market goods	P^*	Import prices in foreign currency
C^V	Consumption of home goods (home production)	P^{EX}	Export prices in foreign currency
C_G	Static utility of agent $G \in \{F, M\}$	q	Nominal exchange rate
w_G	Real wage of agent $G \in \{F, M\}$	P	Domestic price of final goods
R^K	Real return on capital	λ	Lagrange multiplier on the budget constraint
μ	Lagrange multiplier on the investment constraint	X^H	Domestic demand for home goods
X^*	Domestic demand for foreign goods	X	Domestic goods production
X^{EX}	Exports	L	Labor aggregator
NX	Net exports	A^*	Foreign assets

Table B.1: Model Variables

C Alternative Modeling Assumptions

In this section, we analyze how the benchmark results change under alternative modeling assumptions. The policy trade-offs identified in our main results underscore the importance of ensuring that our core results are robust to different modeling assumptions and economic conditions.

In this section, we prove the robustness of our findings along two dimensions: the role of labor market frictions and the effect of productivity shocks in economies with different levels of initial discrimination.

C.1 The Importance of Labor Market Frictions

In this section, we analyze how labor adjustment costs shape the short-run responses of key macroeconomic variables and gender-related outcomes. To do so, we compare the benchmark economy with a scenario in which these costs are eliminated. Specifically, we modify the intermediate producer's optimization problem by removing the quadratic labor adjustment costs. Without these frictions, the labor demand problem is static.

$$P_t^H X_t^H + q_t P_t^{EX} X_t^{EX} - R_t^K K_t - (W_{F,t} + D_F) N_{F,t}^d - W_{M,t} N_{M,t}^d$$

By construction, both scenarios converge to the same long-run equilibrium. However, their short-run dynamics differ significantly, as shown in Figures C.1 and C.2. In the absence of labor adjustment costs, the transition is faster and is driven solely by investment dynamics. Regarding GDP, we observe an immediate increase of nearly 6% following the shock, accounting for approximately 75% of the total transition. In contrast, in the benchmark case, the initial impact represents only approximately 25% of the full adjustment.

As shown in Figure C.1, labor, wages, and leisure adjust instantaneously once the distortion is reduced, jumping directly to their new equilibrium levels. In this frictionless scenario, firms can rapidly modify labor contracts, increasing female employment and reducing male employment. Consequently, the quantitative experiment became nearly static, effectively turning into a steady-state comparison. This scenario may approximate conditions in developed economies, where lower labor market friction enables quicker adjustments. In contrast, in economies with significant market rigidities, incorporating labor adjustment costs provides a more realistic representation, as they capture the frictions that slow labor market responses.

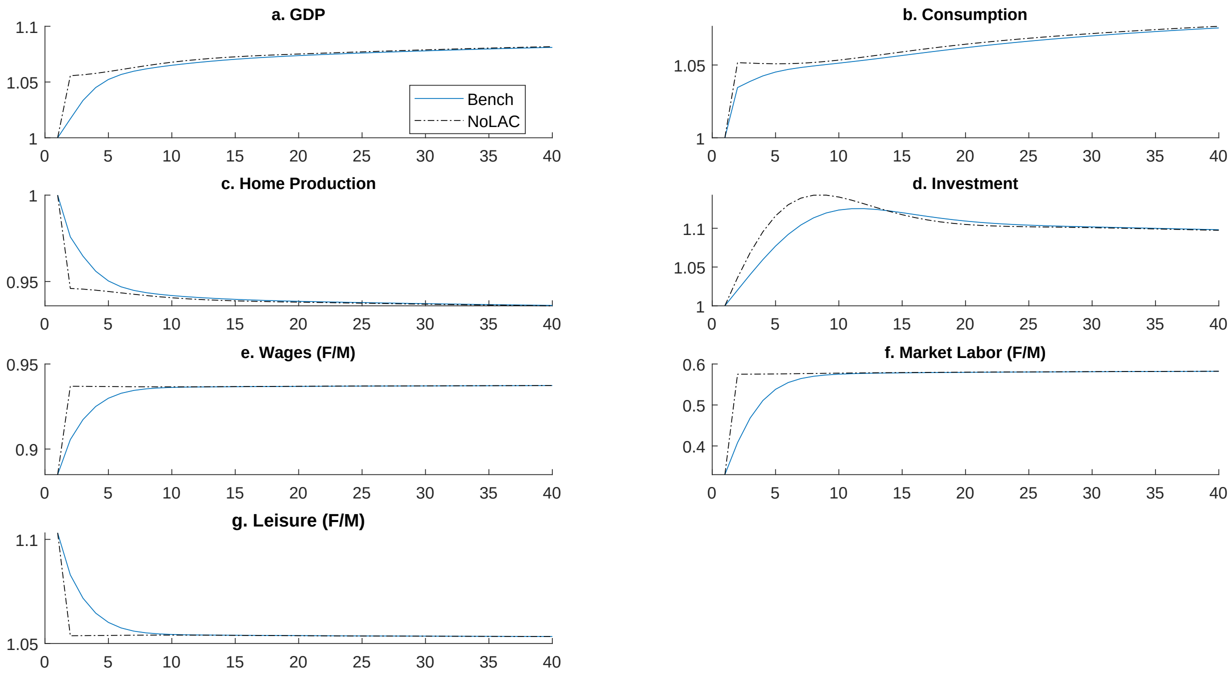

Figure C.1: Macroeconomic effects of reducing discrimination

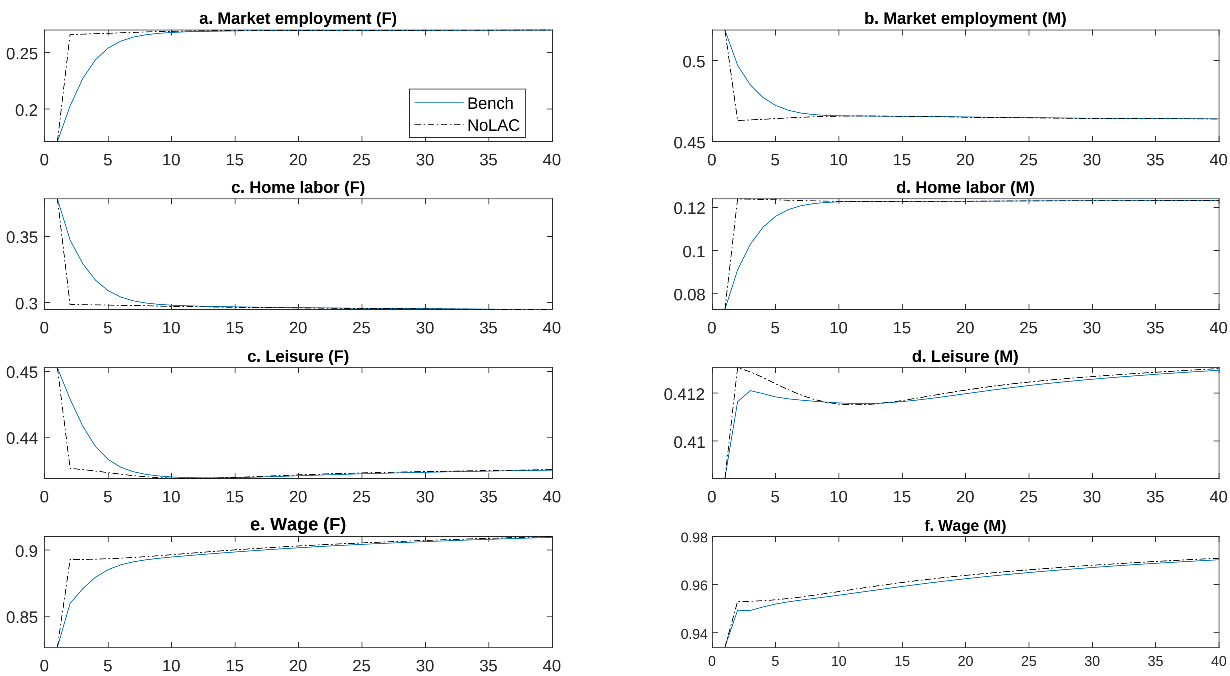

Figure C.2: Gender outcomes of reducing discrimination. Models with and without labor adjustment costs.

C.2 Model Extensions

In this section, we consider three extensions of the model: statistical discrimination, two households, and greater heterogeneity. In the first scenario, we assume that firms cannot fully observe female productivity ex-ante, which biases their hiring decisions. Once hired, however, true female productivity is revealed, leading to higher production than that initially expected by firms. Under this setup, female labor demand is given by

$$P_t^H(1-\alpha)\frac{X_t}{L_t}\theta s\left(\frac{L_t}{N_{F,t}^d}\right)^{\frac{1}{\sigma_L}} = (W_{F,t}+D_F)\left(1+\frac{\phi_F}{N_{F,t-1}^d}\left(\frac{N_{F,t}^d}{N_{F,t-1}^d}-1\right)\right) - \beta E_t(W_{F,t+1}+D_F)\phi_F\left(\frac{N_{F,t+1}^d}{N_{F,t}^d}-1\right)\frac{N_{F,t+1}^d}{(N_{F,t}^d)^2} \tag{C.1}$$

where $s \in \{0,1\}$ is a noisy signal observed by firms. We calibrate this parameter such that the initial wage gap matches the benchmark.

In the second scenario, we introduce two households: one composed of men and the other of women. In this case, there is no intra-household smoothing; however, both households have access to capital accumulation and international financial markets.

Finally, in the third scenario, we allow greater heterogeneity in households' preferences. The model is calibrated to match the observed time allocations in Colombia for men and women, as well as the aggregate wage gap. The calibration targets are listed in Table C.1. Relative to the benchmark case, b—the share of consumption in utility relative to leisure—is higher for women and lower for men, while the taste for market goods γ is higher for women and lower for men.

Target	Value	Parameter	Value
Market labor (F)	0.32	b_F	0.80
Market labor (M)	0.37	b_M	0.71
Home labor (F)	0.32	γ_F	0.74
Home labor (M)	0.13	γ_M	0.51
Wage gap w_F/w_M	0.83	d_F	0.35

Table C.1: Targeted moments and parameter values in the model with greater heterogeneity.

The steady-state simulation results are shown in Figures C.3 and C.4. A key finding is that the qualitative results for reducing the wage gap are equivalent between the benchmark taste-based and statistical discrimination models. The results were not only qualitatively similar but also quantitatively similar. This robustness confirms that the macroeconomic consequences are not uniquely tied to Beckerian "taste" microfoundation. Instead, the effects are driven by the presence of the wedge itself—the D_F parameter, which is calibrated to match the empirical unexplained gap. Whether this wedge originates from animus or imperfect information, its reduction yields similar aggregate efficiency gains. This reinforces our core conclusion that reducing the unobserved component of the wage gap has significant macroeconomic benefits for the economy.

Second, the qualitative results are consistent across all four versions of the model, meaning that the mechanisms behind reducing discrimination are robust to alternative modeling assumptions. However, the magnitudes differ across scenarios. For instance, when men and women are split into two separate households, there is no intra-household bargaining, and the aggregate benefits of reducing inequality are smaller. In this case, men do not increase their home labor as much as in the benchmark, and women reduce their home labor less significantly. Consequently, the aggregate effects on total consumption, investment, and GDP are reduced. In contrast, when the model is calibrated to match the observed heterogeneity in Colombian data, the aggregate effects of reducing inequality are magnified. One possible explanation for this result is women's stronger preference for market goods: as female wages rise, household income increases, and women demand more market consumption goods. This, in turn, increases production, investment, and GDP, while home production declines.

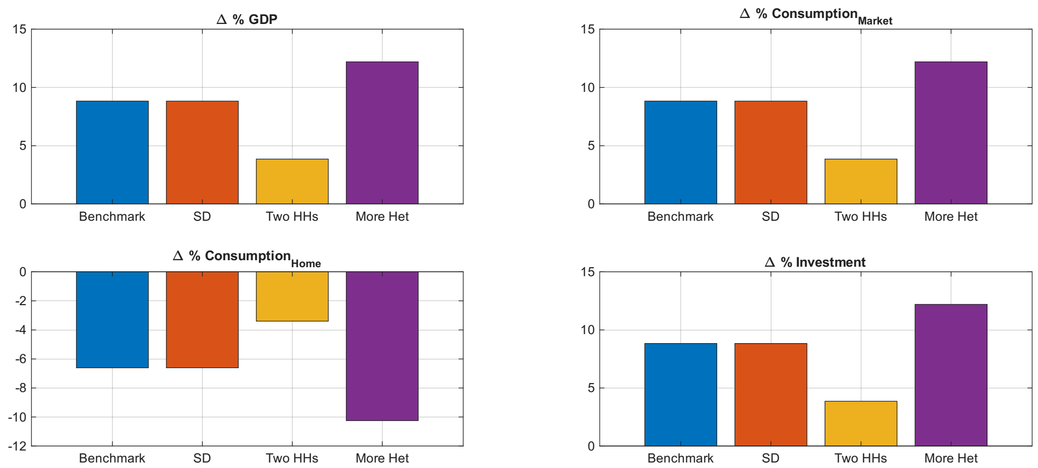

Figure C.3: Long run comparison. Different scenarios. Main macroeconomic variables

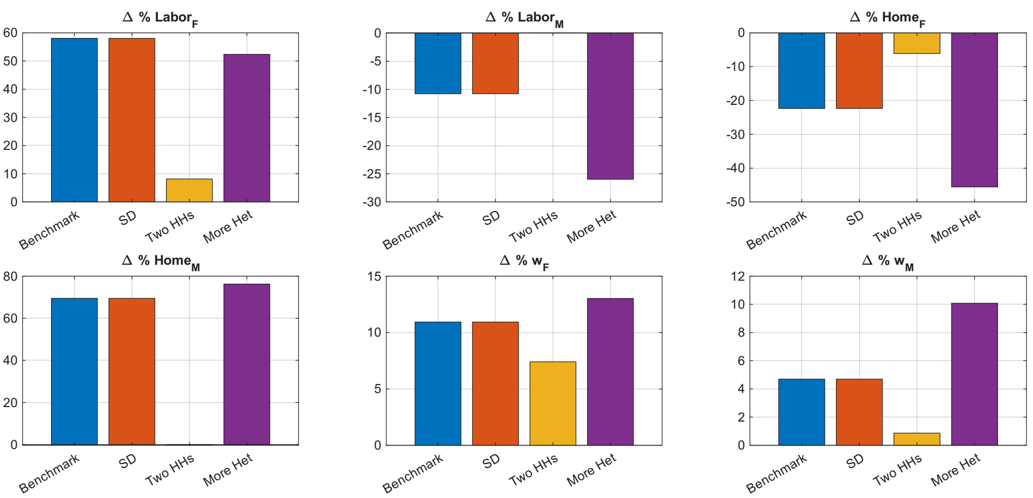

Figure C.4: Long run comparison. Different scenarios. Main gender specific variables