Assessing the Effect of Gender Equality before the Law on Female Labor Participation and GDP per capita in Central America, Panama, and the Dominican Republic

Country Department
Central America, Haiti,
Mexico, Panama and the
Dominican Republic

Carlos Vladimir Rodríguez-Caballero
Arnoldo López-Marmolejo

TECHNICAL NOTE Nº
IDB-TN-2128

March 2021

Assessing the Effect of Gender Equality before the Law on Female Labor Participation and GDP per capita in Central America, Panama, and the Dominican Republic

Carlos Vladimir Rodríguez-Caballero
Arnoldo López-Marmolejo

Instituto Tecnológico Autónomo de México, Departamento Académico de Estadística
Inter-American Development Bank

Inter-American Development Bank
Country Department Central America, Haiti, Mexico, Panama and the Dominican Republic

March 2021

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Rodríguez Caballero, Carlos Vladimir.
Assessing the effect of gender equality before the law on female labor participation and GDP per capita in Central America, Panama, and the Dominican Republic / Carlos Vladimir Rodríguez Caballero, Arnoldo López Marmolejo.

p. cm. — (IDB Technical Note; 2128)

Includes bibliographic references.
1. Women-Employment-Law and legislation-Central America-Econometric models. 2. Women-Employment-Law and legislation-Dominican Republic-Econometric models. 3. Gender Mainstreaming-Central America-Econometric models. 4. Gender mainstreaming-Dominican Republic-Econometric models. 5. Gross domestic product-Central America-Econometric models. 6. Gross domestic product-Dominican Republic-Econometric models. I. López-Marmolejo, Arnoldo. II. Inter-American Development Bank. Country Department Central America, Haiti, Mexico, Panama and the Dominican Republic. III. Title. IV. Series.

IDB-TN-2128

JEL Classification: J83, J88, O11.

http://www.iadb.org

Any dispute related to the use of the works of the IDB that cannot be settled amicably shall be submitted to arbitration pursuant to the UNCITRAL rules. The use of the IDB's name for any purpose other than for attribution, and the use of IDB's logo shall be subject to a separate written license agreement between the IDB and the user and is not authorized as part of this CC-IGO license.

Contact email: arnoldol@iadb.org

Assessing the Effect of Gender Equality before the Law on Female Labor Participation and GDP per capita in Central America, Panama, and the Dominican Republic

Carlos Vladimir Rodríguez-Caballero[1]
Arnoldo López-Marmolejo[2]

ABSTRACT

Women's participation in the labor market in Central America is low for the international standard. Increase such participation is on the agenda of many policymakers who want to improve women's access to quality employment. In this paper, we use data from Central America, Panama, and the Dominican Republic to assess whether gender equality in the law helps increasing women's participation in the labor force and, therefore, boosts GDP per capita. The study is based on two econometric methodologies to evaluate distinct aspects of the economic mechanism.

JEL Codes: *J83, J88, O11.*

Keywords: *WBL, gender policies, panel data, panel-VAR.*

[1] Department of Statistics, ITAM, Mexico. Río Hondo No.1, Col. Progreso Tizapán, Álvaro Obregón, CDMX, 01080, México.
[2] Inter-American Development Bank (IDB).

The opinions expressed in this article are the authors' own and do not necessarily reflect the view of the IDB.

1. Introduction

The percentage of adult women (+25 years) occupied as a percentage of the active population -the participation rate- in Central America, Panama, and the Dominican Republic (CAPADOM) is only 50%. Several countries of the region around 45%. These ratios are below the 51% average in Latin America and the Caribbean (LAC) and well below 70.2% in the OECD countries. In the world, women's labor participation is often related to the level of development. However, this does not mean that women's decision to participate in the labor market must not be favored through public policies to overcome the barriers they face (see Duflo, 2012 for a discussion on the needs of empowering women and its benefits for development). Governments can implement childcare, work-life balance, gender roles, gender equality, among many others. However, equality among people begins with their equality before the law. This last aspect has also been one in which CAPADOM has been lagging. Therefore, in this study, we explore how more equality before the law can increase female labor participation and increase the GDP per capita in CAPADOM.

We use the Women, Business, and the Law (WBL, hereafter) index. This index seeks to identify different treatments based on gender to create obstacles for women's economic activity participation. In concrete, this index measures gender inequality in the law predominantly due to barriers women often face in their working life in mobility, salaries, maternity leave, retirement pension, etc. The highest value is 100, and the lowest 0.

In the last 40 years, the countries in CAPADOM have implemented some reforms in their laws to promote more gender equality. As a result, the associated WBL index has increased progressively. Although, there is a relevant heterogeneity among countries in the region, see Figure 1. In 2019, the country with the highest index in CAPADOM was El Salvador (89). Peru (95) was the country with the highest ranking in LAC.

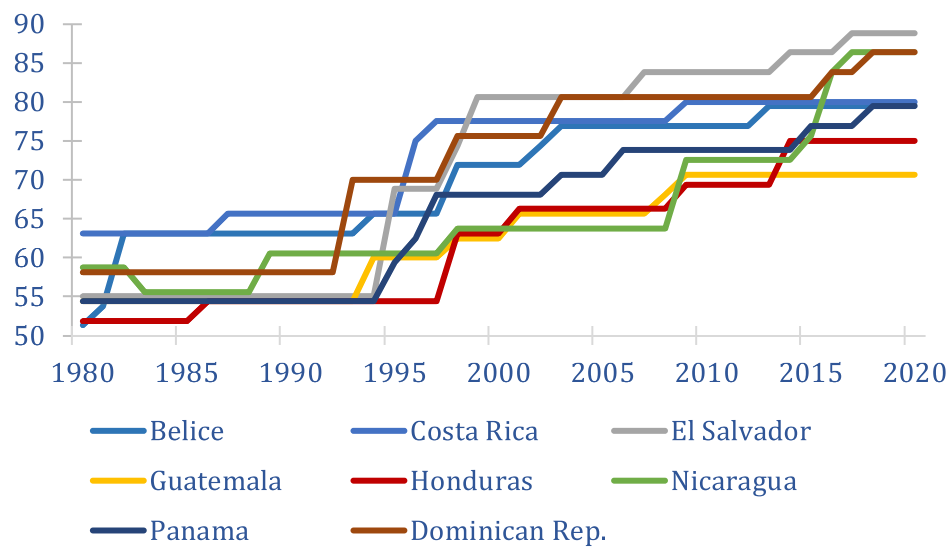


Figure 1. Historic WBL index in the CAPADOM region. Source. World Bank.

WBL index components point out that the CAPADOM region is lagging-behind on laws and regulations concerning women's salary (56/100 on average) and those that indicate possible limitations

in women's career paths in the years following childbirth (55/100 on average). In the first group of variables, we found those related to gender equality in the workplace (wages, general working conditions, and night shifts). In the second, lack of maternity leave rules of at least 14 weeks of paid weeks in some countries, notably lacks paid parental leave in all states.

The relationship between labor force participation and economic development is complicated due to several economic and social factors. Many authors point out that female labor participation is a relevant driver of growth and development. For example, Bustelo et al. (2019) find that implementing various public policies regarding women's participation in the LAC region's labor force has helped increase the region's largest economies' GDP per capita. Stotsky (2006) claims that reducing gender inequality contributes to higher economic growth and macroeconomic stability. Cuberes and Teignier (2014) estimate that gender gaps imply income losses of 16% in CAPADOM and 27% in the Middle East and North Africa. Elborgh-Woytek et al. (2013) document the macroeconomic benefits of gender equality and propose general measures to increase women's participation in the labor force. However, the changes in laws to promote gender equality affect labor participation have not been estimated. Central America's case could be particularly useful to study this issue as the region would benefit by improving its laws. It has been lagging in this issue (see WJP, 2020) and has low female participation rates.

To assess whether more equal laws increase women's participation in the labor market in CAPADOM, boost economic development (GDP per capita) in the region, we use two different econometric methodologies. We use panel-VAR models to include dynamics in the setup, and panel data model to strengthen the analysis.

Our main findings indicate that the region can increase its GDP per capita between 0.8 and 1.5 pp (percentage points) by introducing some gender policies such as equal remunerations for the same work, paid parental leave, and permitting women to work in all jobs in the same way as men, among other policies.

The paper is organized as follows. The next section presents the data used in the study and the econometric approach. Section 3 presents the estimation results and scenarios on the WBL index's impact on female participation in labor markets and GDP per capita. In section 4, we discuss possible gender policies in the region and conclude.

2. Data and econometric methodologies

2.1. Data

Our dataset includes annual macroeconomic variables from some countries of the CAPADOM region: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Dominican Republic, and Panama. It is obtained from the World Bank and Consejo Monetario Centroamericano (SECMA) databases. Our panel data is unbalanced due to the availability of data and spans the period 1990-2019. Table 1 displays the variables used in the analysis, and Figure 2 shows the time series used along with the paper. Note that macroeconomic variables

are deflated, and net remittances are used rather than simply inflows to get a clearer picture of the country's exposure to these types of inflows.

Variable	Definition	Unity	Transformation
GDPpc	GDP per capita	Constant prices (2010 US$)	First Difference
INF	Inflation	Index	First Difference
Remm	Net remittances	Constant prices (2010 US$)	First Difference
Pub.Expen	Public expenditure	Constant prices (2010 US$)	First Difference
Pre.Sch.Enr	Preprimary school enrollment	Percentage	Level
FemPart	Female participation in the labor market	Percentage	Level
MalPart	Male participation in the labor market	Percentage	Level
WBL	Women, Business and the Law	World Bank Index	Level
FerRat	Fertility rate (births per woman)	Average	Level
Prop.Seats	Percentage of parliamentary seats in a single or lower chamber held by women	Percentage	Level
RoL	Rule of Law	World Bank Index	Level
Educ.years	Number of years of education	Years	Level

Table 1. Economic variables considered in the study. The last column indicates if the variable is treated in level or first differences.

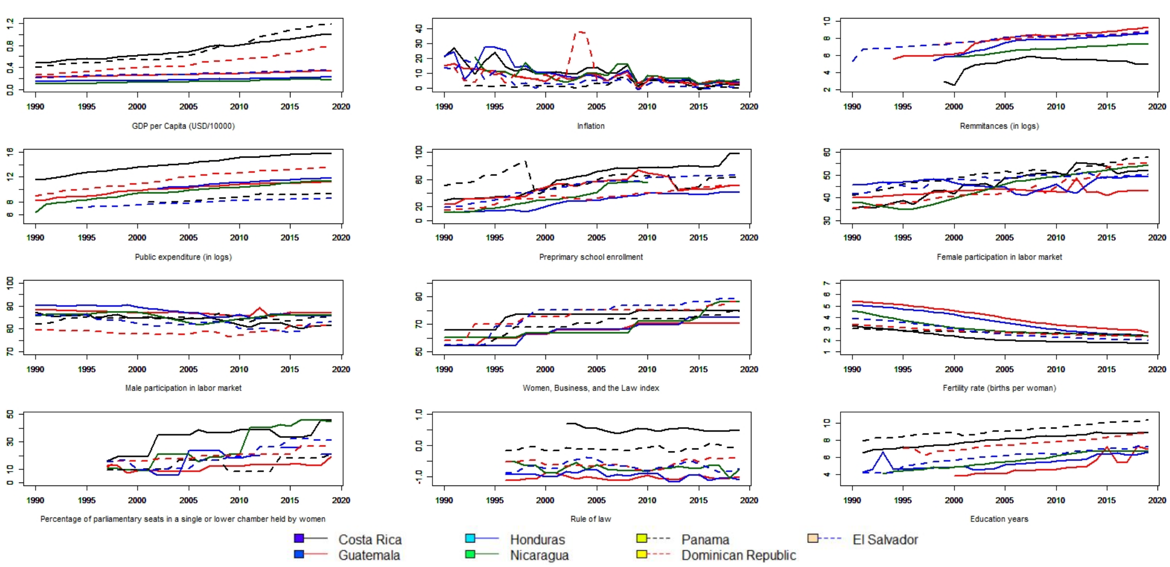


Figure 2. Time series used in the analysis.

2.2. Econometric models

We present the general mechanism from which we assess female participation's impact on the labor force and GDP per capita.

First, some improvements in gender policies should make that the WBL index increase. Then, we want to evaluate the impact on female/male participation in labor markets. Consequently, we investigate the next linear relationships:

$$\mathrm{FemPart} = \Gamma_{\mathrm{F0}} + \Gamma_{\mathrm{F}}\,\mathrm{WBL} + \mathrm{B}'\mathrm{Controls},$$
$$\mathrm{MalePart} = \Gamma_{\mathrm{M0}} + \Gamma_{\mathrm{M}}\,\mathrm{WBL} + \mathrm{B}'\mathrm{Controls},$$

where controls may be defined by some of the variables in Table 1. Naturally, the main parameter is given by Γ_{F} that is expected to be positive, guaranteeing a positive impact of various gender policies on the female labor force. The underlying idea is that some policies (measured by WBL) are addressed to increase female labor market participation.

Second, since female participation in labor markets has increased due to such policies, it is expected to impact GDP per capita positively. Then, the mechanism is as follows

$$\mathrm{GDP}_{\mathrm{pc}} = \beta_0 + \mathrm{B}'\ \mathrm{Macroeconomic\ controls} + \lambda_1\mathrm{MalePart} + \lambda_2\mathrm{FemPart} + \Theta'\mathrm{Controls}.$$

The mechanism explained before is studied by two different econometric methodologies, which are introduced in the next.

2.3. Panel Vector Autoregression (Panel-VAR).

Over the past decades, substantial improvements have been proposed in the literature of large dynamic panel models with fixed effects. Today, it is well-known that OLS-based regressions cannot be applied because the Nickell bias does not vanish asymptotically even with $N \to \infty$ and T fixed, see Nickel (1981). Hansen (1982) proposes a very popular way to handle such biases by generalized method of moments (GMM). This method has been used many times to study dynamic panel data models, see, e.g., Arellano and Bond (1991), Arellano and Bover(1995), and Blundell and Bond (1998).

In many empirical studies, a single equation dynamic panel data model may not be appropriate to detect interactions and dynamics between cross-sectional units due to the underlying economic mechanism. A model of dynamic panels with vector autoregressive models (VAR) structures has been a powerful tool in applied macroeconomics in this light. All variables are treated as endogenous and interdependent in such models, although they can also be handled with exogenous variables.

Panel VARs were introduced originally by Holtz-Eakin et al. (1988) and have the same structure as VAR models. All variables are assumed to be endogenous and interdependent. Furthermore, these models also add cross-sectional dependence.

A panel VAR model for $i = 1 \dots N, t = 1 \dots T$ is written as follows:

$$Y_{i,t} = \alpha_{1i0} + \sum_{l=1}^{m} \alpha_{1i,l} Y_{i,t-l} + \sum_{l=1}^{m} \delta_{1i,l} X_{i,t-l} + u_{1i,t},$$

$$X_{i,t} = \alpha_{2i0} + \sum_{l=1}^{m} \alpha_{2i,l} X_{i,t-l} + \sum_{l=1}^{m} \delta_{2i,l} Y_{i,t-l} + u_{2i,t},$$

where α's and δ's are the coefficients of linear projection of Y (X) onto the past values of Y (X) and X (Y). m is the maximum number of lag terms of each variable often decided through information criteria. i indicates the country as a distinctive unit. u's are idiosyncratic terms.

A simple inspection of the model suggests that the specification has three main features. First, lags of endogenous variables for all units enter the model for unit i. Such a feature is called "dynamic interdependencies" in literature. Second, u_{it} are generally correlated across i, then it is called "static interdependences." Also, since the same variables are present in each unit, there are restrictions on the shocks' covariance matrix. Third, the intercept, the slope, and the variance of the shocks may be unit specific. Literature labels this feature as "cross-sectional heterogeneity."

The panel-VAR model's estimation may be executed with ordinary least squares for both equations simultaneously. The model is often extended to include more than two equations accordingly; that is k equations, see Canova, F., & Ciccarelli, M. (2013). Abrigo and Love (2016) provide a STATA routine with the first generation of GMM estimators suggested originally by Anderson and Hsiao (1982) to deal with Nickel Bias. On the other hand, Sigmund, M. and Ferstl, R (2018) provide an extended STATA code based on the first difference GMM estimators of Arellano and Bond (1991); Holtz-Eakin et al., (1988) and the more complex system GMM by Blundell and Bond (1998) for panel-VAR models.

2.4. **Heterogeneous Panel analysis with cross-sectional dependence**

The second econometric methodology used to study the economic design suggested before is given by (no dynamic) panel analysis. With this framework, we want to focus on the main driver in our mechanism without forcing the economic relationship by adding dynamics. We consider this methodology as a type of robustness check.

This panel model assumes that a common factor structure drives the cross-sectional dependence between the countries analyzed. Economic reasons originate such factors. The approach does not necessarily need to identify these reasons. The heterogeneous panel data model is written as follows

$$y_{it} = \alpha_i' d_t + \beta_i' x_{it} + e_{it},$$
$$x_{it} = A_i' d_t + \Gamma_i' F_t + \nu_{it},$$
$$e_{it} = \gamma_{i1} f_{1t} + \cdots + \gamma_{im} f_{mt} + \epsilon_{it} \equiv \Gamma_i' F_t + \epsilon_{it},$$

where d_t is an $N \times 1$ vector that represents common observable, x_{it} is a $k \times 1$ vector of individual observed regressors for the i-th cross-section unit in period t, and e_{it} represent the random shocks that have a common factor structure with $F_t = (f_{1t}, \dots, f_{mt})'$, the m-dimensional vector that includes unobserved common factors, and $\Gamma_i = (\gamma_{i1}, \dots, \gamma_{im})'$ is the $m \times 1$ vector that includes the associated factor loadings.

The model can be estimated following Pesaran & Smith (1995), Mean Group Estimators (MGE), or following Pesaran (2006), Correlated Common Effects Mean Group (CCEMG) estimators, and Rodríguez-Caballero, C.V. (2016) for multilevel models. In this paper, we follow the second methodology.

3. Estimations and analysis

In this section, we present the estimation of the two econometric methodologies explained above.

3.1. Panel VAR

We consider the following stationary panel VAR model with fixed effects:

$$\mathbf{y}_{i,t} = \mu_i + \mathbf{A}\mathbf{y}_{i,t-1} + \mathbf{B}\mathbf{x}_{i,t} + \epsilon_{i,t} \qquad (1)$$

where $\mathbf{y}_{i,t}$ is a 3×1 vector of endogenous variables (GDPpc, FemPart, and MalPart) for the ith cross-sectional unit at time t. $\mathbf{x}_{i,t}$ is a $k \times 1$ vector of strictly exogenous variables (Remittances, WBL, Inflation, RoL, FerRat, and EducYear). Disturbances $\epsilon_{i,t}$ are independently and identically distributed for all i and t with zero mean and positive semidefinite covariance matrix. Since models are stationary, the unit-roots of $\mathbf{A}$ in equation (1) fall inside the unit circle. We use the STATA package provided by Abrigo and Love (2016). We choose different information criteria to determine the lag order in both panel VAR specification and moment conditions. Table 2 reports the results of the estimation. See Love and Zecchino (2006) and Abrigo and Love (2016) for moment conditions and the GMM estimation procedure.

An impulse-response function (IRF) measures the effect of a shock to an endogenous variable on itself or another endogenous variable. On the other hand, a dynamic-multiplier function, or transfer function, measures the impact of a unit increase in an exogenous variable on the endogenous variables over time. Figure 1 displays the IRF and cumulative IRF from female participation in the labor market to GDP per Capita. Figure 2 shows the dynamic multipliers from WBL to female participation and GDP per capita.

Taable 2: Estimations of the Panel VAR model (1)

Equation for Growth Domestic Product per capita					
	Model 1	Model 2	Model 3	Model 4	Model 5
$GDPc_{t-1}$	-0.243***	-0.281***	-0.237***	-0.546***	-0.676***
	(0.061)	(0.074)	(0.068)	(0.071)	(0.140)
$\log(FemPart)_{t-1}$	0.231***	0.240***	0.177***	0.143***	0.199*
	(0.030)	(0.037)	(0.029)	(0.026)	(0.105)
$\log(MalPart)_{t-1}$	0.303*	0.367***	0.261*	0.299***	-0.214
	(0.120)	(0.138)	(0.103)	(0.107)	(0.228)
$Remittances_{t-1}$	0.001*	0.001*	0.001***	0.001***	<0.000
	<(0.000)	<(0.000)	<(0.000)	<(0.000)	<(0.000)
$\log(WBL)_t$	-0.313***	-0.329***	-0.255***	-0.468***	-0.236
	(0.061)	(0.072)	(0.047)	(0.065)	(0.339)
$Inflation_t$		-0.001			
		(0.001)			
RoL_t			0.015	-0.027*	
			(0.018)	(0.016)	
$FerRat_t$				-0.027***	-0.321***
				(0.007)	(0.105)
$Educyear_t$					-0.406*
					(0.230)

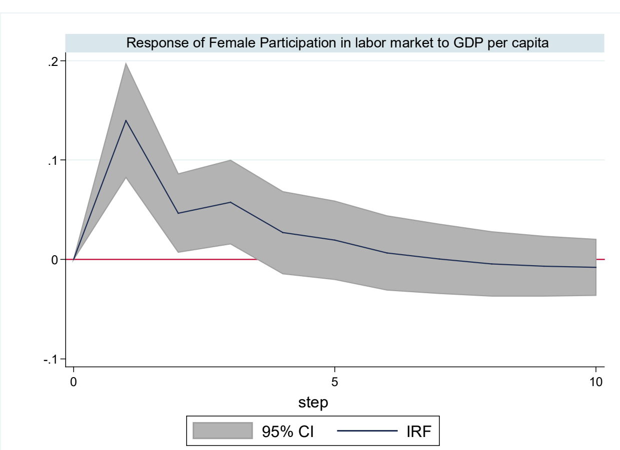
Equation for Female Participation in labor markets					
	Model 1	Model 2	Model 3	Model 4	Model 5
$GDPc_{t-1}$	-0.649***	-0.709***	-0.571***	-0.467***	-0.138
	(0.105)	(0.137)	(0.119)	(0.091)	(0.186)
$\log(FemPart)_{t-1}$	0.645***	0.679***	0.682***	0.743***	-0.027
	(0.064)	(0.073)	(0.055)	(0.043)	(0.225)
$\log(MalPart)_{t-1}$	-0.8***	-0.912***	-0.814***	-0.452*	-0.255*
	(0.212)	(0.269)	(0.204)	(0.202)	(0.122)
$Remittances_{t-1}$	0.001*	0.001	0.001*	<0.001	<0.000
	<(0.000)	<(0.000)	<(0.000)	<(0.000)	<(0.000)
$\log(WBL)_t$	0.148*	0.079	0.190***	0.259***	0.594*
	(0.087)	(0.095)	(0.067)	(0.100)	(0.321)
$Inflation_t$		0.001			
		(0.000)			
RoL_t			0.064***	0.076***	
			(0.024)	(0.023)	
$FerRat_t$				0.016*	0.427*
				(0.007)	(0.214)
$Educyear_t$					0.522*
					(0.303)

Table 2 (continue): Equation for Male Participation in labor markets

	Model 1	Model 2	Model 3	Model 4	Model 5
$GDPc_{t-1}$	-0.057*	-0.069*	-0.039	-0.240***	-0.239
	(0.025)	(0.030)	(0.037)	(0.044)	(0.176)
$\log(FemPart)_{t-1}$	0.036***	0.038***	0.062***	0.100***	-0.340***
	(0.012)	(0.012)	(0.016)	(0.018)	(0.086)
$\log(MalPart)_{t-1}$	0.865***	0.857***	0.801***	0.917***	0.678***
	(0.059)	(0.069)	(0.067)	(0.084)	(0.255)
$Remittances_{t-1}$	0.001***	0.001***	0.001***	0.001*	<0.000***
	<(0.000)	<(0.000)	<(0.000)	<(0.000)	<(0.000)
$\log(WBL)_t$	-0.023	-0.029	-0.018	-0.207***	0.396***
	(0.023)	(0.027)	(0.025)	(0.047)	(0.118)
$Inflation_t$		-0.001			
		<(0.000)			
RoL_t			0.055***	0.038***	
			(0.010)	(0.011)	
$FerRat_t$				-0.015***	0.255***
				(0.003)	(0.054)
$Educyear_t$					0.235***
					(0.081)

Note: $^{*}\ p < 0.1$; $^{**}p < 0.05$; $^{***}\ p < 0.01$. White corrected robust standard errors in parentheses. Model 1-4 are executed using the same panel data. Model 5 used a reduced panel to include the years of education.

Figure 3. Impulse response function (left) and cumulative impulse response function of female participation in the labor market to GDP per capita. Confidence bands are estimated using Gaussian approximation based on 500 Monte Carlo draws from the fitted Panel-VAR model 4 in Table 2.



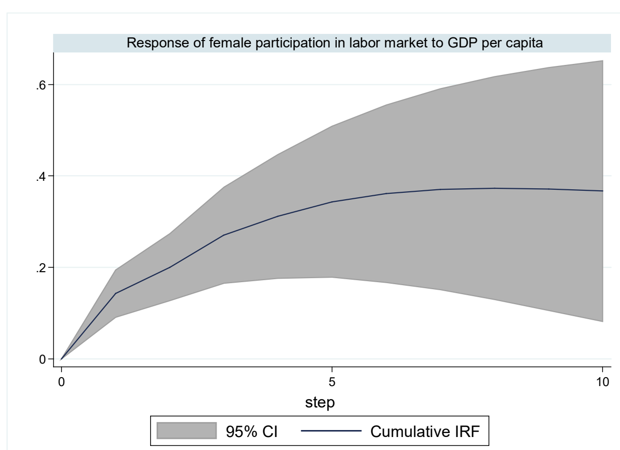
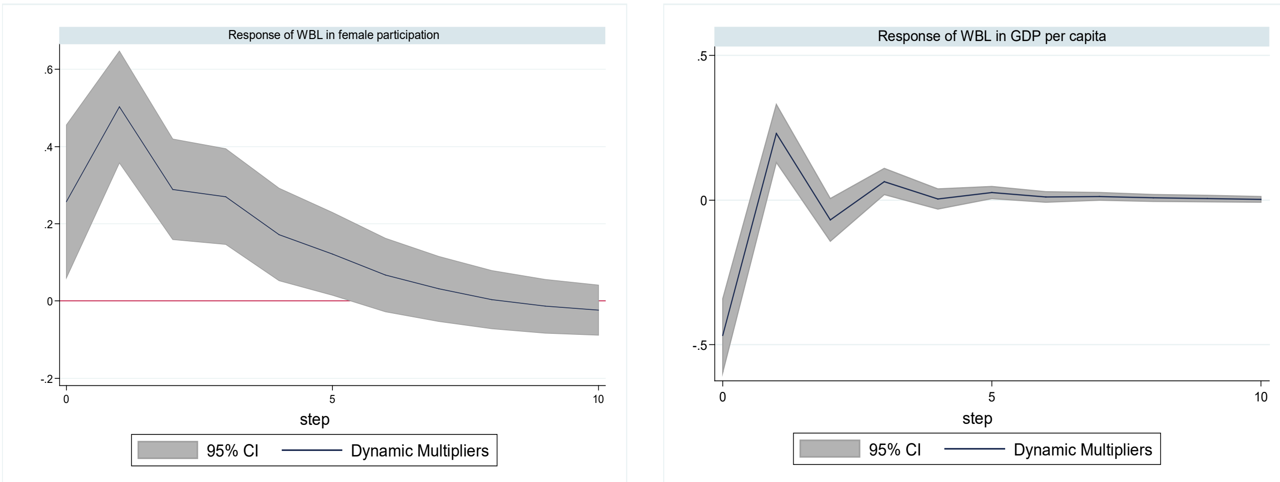


Figure 4. Dynamic multipliers. Impulse of the exogenous variable Women Business and the Law index in endogenous variables female participation in the labor market and GDP per capita. Confidence bands are estimated using Gaussian approximation based on 500 Monte Carlo draws from the fitted panel VAR model 4 in Table 2.



We focus on panel-VAR model 4 in Table 2. In the model, we find that improvements in gender policies (measured by WBL) will positively affect female participation in the labor market, which will help boost GDP per capita. Parameters are significant and show correct signs for economic intuition. Nevertheless, to measure the impact of WBL in FemPart and GDPpc correctly, we should analyze the IRFs and dynamic multipliers, which are shown in Figures 1 and 2.

The impulse response functions and the dynamic multiplier functions are analyzed in terms of standard deviations. Table 3 displays standard deviations of the Women Business and the Law index, female participation in the labor markets, and the growth rate of GDP per capita in each country of the region and the average region. For clarity of ideas, in Table 4, we show the levels of WBL and FemPart, assuming an increase of one and two standard deviations from the last observation.

Table 3.Standard Deviations

	WBL	FemPart	GDPpc (rate)
Costa Rica	1.268	3.614	1.790%
Salvador	4.553	1.403	1.214%
Guatemala	3.454	1.361	1.120%
Honduras	3.860	2.981	2.012%
Nicaragua	3.668	2.900	2.555%
Dom. Rep.	3.043	5.363	2.669%
Panama	2.346	2.874	2.382%
Region	3.170	2.928	1.963%

Table 4. Last observation of WBL and female participation in labor markets

plus one and two standard deviations.

	Women Business and the Law			Female participation		
	WBL(2018)	$+1\sigma$	$+2\sigma$	FemPart(2019)	$+1\sigma$	$+2\sigma$
Costa Rica	80.00	81.27	82.54	52.21	55.82	59.43
Salvador	88.80	93.35	97.91	50.31	51.71	53.12
Guatemala	70.60	74.05	77.51	43.08	44.44	45.80
Honduras	75.00	78.86	82.72	49.39	52.37	55.35
Nicaragua	86.30	89.97	93.64	54.27	57.17	60.07
Dom. Rep.	86.30	89.34	92.39	55.26	60.63	65.99
Panama	79.40	81.75	84.09	57.56	60.44	63.31
Region	80.91	84.08	87.25	51.72	54.65	57.58

Table 4 helps us to identify the magnitude of impacts through IRF and dynamic multipliers. For example, suppose we want to measure the impact of two standard deviations from WBL to FemPart in the region. In that case, we are assuming that some gender policies will increase the WBL index in the area from 80.91 to 87.25, for instance.

Responses of one and two standard deviations of the WBL index in the female participation in labor markets are shown in tables 5 and 6, respectively.

Table 5. Impact of one standard deviation of WBL index in female participation in labor markets, according to Model 4 in Table 2.

	Impact of one standard deviation of WBL in Female Participation				
	Año 1	Año 2	Año 3	Año 4	Año 5
Costa Rica	54.95	56.00	56.98	57.60	58.04
Salvador	51.38	51.78	52.16	52.40	52.58
Guatemala	44.12	44.51	44.88	45.11	45.28
Honduras	51.66	52.52	53.33	53.84	54.20
Niacaragua	56.48	57.31	58.10	58.60	58.95
RepDom	59.34	60.90	62.35	63.27	63.92
Panama	59.75	60.58	61.36	61.85	62.20
Region	53.95	54.79	55.59	56.09	56.45

Table 6. Impact of two standard deviations of WBL index in female participation in labor markets, according to Model 4 in Table 2.

	Impact of two standard deviations of WBL in Female Participation				
	Año 1	Año 2	Año 3	Año 4	Año 5
Costa Rica	57.70	59.79	61.75	62.99	63.88
Salvador	52.45	53.26	54.02	54.50	54.84
Guatemala	45.15	45.94	46.67	47.14	47.47
Honduras	53.93	55.65	57.26	58.29	59.02
Nicaragua	58.68	60.36	61.93	62.93	63.63
Dom Rep	63.42	66.53	69.43	71.27	72.58
Panama	61.93	63.60	65.15	66.14	66.84
Region	56.17	57.87	59.45	60.46	61.17

Finally, tables 7 and 8 display the response of one and two standard deviations of female participation in the growth rate of GDP per capita.

Table 7. Impact of one standard deviation of female participation in labor markets in the growth rate of GDP per capita, according to Model 4 in Table 2.

	GDPpc	Impact of one standard deviation of FemPart in GDP				
	2015-2019	Año 1	Año 2	Año 3	Año 4	Año 5
Costa Rica	2.22%	0.255%	0.358%	0.484%	0.557%	0.615%
Salvador	1.88%	0.173%	0.243%	0.328%	0.378%	0.417%
Guatemala	1.69%	0.160%	0.224%	0.303%	0.349%	0.385%
Honduras	2.02%	0.287%	0.403%	0.544%	0.626%	0.691%
Niacaragua	-0.13%	0.364%	0.512%	0.691%	0.796%	0.878%
RepDom	4.79%	0.380%	0.535%	0.722%	0.831%	0.917%
Panama	2.79%	0.339%	0.477%	0.645%	0.742%	0.818%
Region	2.18%	0.280%	0.393%	0.531%	0.611%	0.674%

Table 8. Impact of two standard deviations of female participation in labor markets in the growth rate of GDP per capita, according to Model 4 in Table 2.

	GDPpc	Impact of two standard deviations of FemPart in GDP				
	2015-2019	Año 1	Año 2	Año 3	Año 4	Año 5
Costa Rica	2.22%	0.510%	0.717%	0.969%	1.114%	1.229%
Salvador	1.88%	0.346%	0.486%	0.657%	0.756%	0.834%
Guatemala	1.69%	0.319%	0.449%	0.606%	0.697%	0.769%
Honduras	2.02%	0.573%	0.806%	1.089%	1.253%	1.382%
Niacaragua	-0.13%	0.728%	1.024%	1.383%	1.591%	1.755%
RepDom	4.79%	0.760%	1.069%	1.444%	1.662%	1.833%
Panama	2.79%	0.679%	0.954%	1.289%	1.483%	1.636%
Region	2.18%	0.559%	0.786%	1.062%	1.222%	1.348%

To explain the mechanism, let's take Honduras. However, the examination may be followed naturally for all countries.

According to Table 4, Honduras' last WBL index is 75 (in 2018). Suppose we assume that some gender policies generate a change of two standard deviations in the WBL index. In that case, it moves from 75 to 82.72, slightly over the regional average. Such an increase in the WBL index would help female participation grow by 4.54 percentage points only in the first year (from 49.39 to 53.93). Finally, if we assume that some changes in policies make the female participation increase from 49.39 to 55.35% (a magnitude related to two standard deviations), Honduras' GDP per capita would increase by .573% in the first year.

Note that the impact of two standard deviations in WBL boosts the female participation almost in the same level as its two standard deviations in the first year (53.93% vs. 55.35%, respectively), and slightly over for the second year (55.65%). Consequently, it is possible to argue that changes in gender policies that move the WBL index in Honduras from 75 to slightly over the regional average will help to increase the GDP per capita by 0.573% in the first year and 0.806% in the second year.

In CAPADOM, let increase the WBL in two standard deviations (from 80.91 to 87.25). The latter implies that after two years, Female Participation would go from 51.72 to 57.87 (6.15 percentage points). Such an increase is similar to two standard deviations in female participation (i.e., to 57.58), implying that the GDP per capita in the region would increase around 0.559 pp in the first year, 0.786 pp in the second year, and 1.348 pp after five years.

3.2. Heterogeneous Panel analysis with cross-sectional dependence

As an exercise of robustness check, we examine a non-dynamic panel model to consider only contemporaneous effects. We study two separate equations. The first one is to analyze the impact of WBL in female participation in the labor force, while the second is to investigate the effect of FemPart on GDP per capita.

Then, we assume the following two no-related stationary heterogeneous panel models with fixed effects and cross-sectional dependence.

$$\log(\Delta FemPart)_{it} = \alpha_{0i} + \lambda_i f_{t,FP} + \alpha_{1i}\log(WBL)_{it} + controls + \epsilon_{it,FP}, \quad (2)$$

$$\log(\Delta GDPpc)_{it} = \beta_{0i} + \mu_i f_{t,GDP} + \beta_{1i}\log(WBL)_{it} + controls + \epsilon_{it,GDP}. \quad (3)$$

We assume that countries are not independent with each other and have a cross-sectional dependence driven by common components ($\lambda_i f_{t,FP}$, or $\mu_i f_{t,GDP}$ as the case may be), which can be related to cultural phenomena, similar gender policies, etc.

We use the CCEMG of Pesaran (2006) to estimate models 2 and 3. Tables 9 and 10 show these results.

Table 9. Panel model for Female participation

	Dependent variable:							
	log(Female Participation in labor market)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(WBL)	0.877***	0.744***	0.665***	1.122***	0.646***	0.689***	0.759***	0.419***
	(0.147)	(0.131)	(0.118)	(0.142)	(0.069)	(0.125)	(0.076)	(0.133)
log(Educ. years)		0.507***	0.474***	0.236***	0.079***	0.203***	0.110***	0.571***
		(0.058)	(0.058)	(0.038)	(0.041)	(0.055)	(0.032)	(0.101)
Rule of Law			0.088***	-0.031	0.070***	0.036***	0.007	0.010
			(0.029)	(0.024)	(0.021)	(0.031)	(0.024)	(0.026)
log(Fert. Rate)				-0.816***				-0.049
				(0.110)				(0.166)
log(Pre.Sch.Enr)					0.042		0.032	
					(0.033)		(0.032)	
log(Prop.Seats)						0.065***	0.029***	0.016
						(0.012)	(0.007)	(0.014)
Remittances								<0.000***
								<(0.000)
Growth								0.001
								(0.002)

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.
Newey-West corrected robust standard errors in parentheses.

Table 10. Panel model for GDP per capita

	Dependent variable:			
	log(GDP per capita)			
	(1)	(2)	(3)	(4)
Inflation		-0.003***	0.010***	-0.008***
		(0.001)	(0.001)	(0.001)
Remmitances		<0.000***	0.228***	0.054***
		(0.003)	(0.005)	(0.003)
log(Pub. Expen.)			0.011***	-0.024***
			(0.001)	(0.001)
log(FemPart)	0.859***	0.041	0.461***	0.079***
	(0.106)	(0.364)	(0.030)	(0.028)
log(MalPart)	-2.006***	-0.124	-1.160***	-0.328***
	(0.232)	(0.191)	(0.087)	(0.100)
Education years				0.083***
				(0.004)
Rule of Law				0.087***
				(0.014)
Constant	3.408	17.909*	9.591***	7.148***
	(3.157)	(9.472)	(2.500)	(2.689)

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.
Newey-West corrected robust standard errors in parentheses.

Here, we focus on the model (8) for the female participation equation (in Table 9) and model (3) for the GDP per capita equation (in Table 10).

Table 11 shows the impact of an increase of 1, 5, 10, and 15 percent in the WBL index to female participation. Table 12 shows the effects of these same levels of percentage increases in female participation in GDP per capita.

Table 11. Impact of WBL on Female participation in labor markets in the region

		New WBL indexes after some scenarios			
	WBL 2018	1%	5%	10%	15%
Costa Rica	80.00	80.80	84.00	88.00	92.12
Salvador	88.80	89.69	93.24	97.68	102.25
Guatemala	70.60	71.31	74.13	77.66	81.30
Honduras	75.00	75.75	78.75	82.50	86.36
Nicaragua	86.30	87.16	90.62	94.93	99.37
Dom. Rep.	86.30	87.16	90.62	94.93	99.37
Panama	79.40	80.19	83.37	87.34	91.43
Region	80.91	81.72	84.96	89.00	93.17
	Increase in Female Participation (on average) of				
	Region	0.42%	2.10%	4.19%	6.29%

Table 12. Impact of Female participation to GDP per Capita in the region

		New Female Participation after some scenarios			
	FemPart 2019	1%	5%	10%	15%
Costa Rica	52.21	52.73	54.82	57.43	60.11
Salvador	50.31	50.81	52.83	55.34	57.93
Guatemala	43.08	43.51	45.23	47.39	49.61
Honduras	49.39	49.88	51.86	54.33	56.87
Nicaragua	54.27	54.81	56.98	59.70	62.49
Dom. Rep.	55.26	55.82	58.03	60.79	63.64
Panama	57.56	58.14	60.44	63.32	66.28
Region	51.72	52.24	54.31	56.89	59.56
		Increase in GDP per capita (on average) of			
	Region	0.46%	2.31%	4.61%	6.92%

To explain the mechanism through both panel models, we consider the case of Honduras again. Assume that Honduras reaches the regional average concerning the WBL index. An external shock (i.e., some changes in gender policies) boosts Honduras' WBL index by 7.88%, from 75 pts to 80.91 pts. Such an improvement in the WBL index makes female

participation in labor markets increase by 3.30%, from 49.39% to 51.02%. Finally, this increase in female participation will help that GDP per capita (on average) increases by 1.52%.

Table 13 compares findings for Honduras through both methodologies to see results in perspective. In the panel VAR model(1), the impact of one standard deviation in the WBL index (3.17 points) is 2.27 pp in female participation in the first year, and it is similar to an effect of 5% increase (4.04 points) in the WBL using the panel model with 2.10 pp. Similarly, an impact of two standard deviations in the first year in the panel VAR model will be similar to an increasing of 10% in the panel model.

Concerning the impacts of female participation in GDP per capita, the panel VAR model provides more conservative scenarios than the panel model. An effect of 1% in the female participation (0.52 pp) in the panel model is similar to an impact of one standard deviation (2.92 pp) in the Panel VAR model after two years. However, the panel model's higher impacts are not similar to any year in the panel VAR model, even considering the aggressive scenario of two standard deviations.

Table 13. Comparatives of impacts through both methodologies

Impact of WBL in Female Participation				
Panel-VAR model			Panel model	
	1σ	2σ	Scenario	
Year 1	2.27	4.54	↑1%	0.42
Year 2	3.13	6.26	↑5%	2.10
Year 3	3.94	7.87	↑10%	4.19
Year 4	4.45	8.90	↑15%	6.29

Impact of Female Participation in GDP per capita				
Panel-VAR model			Panel model	
	1σ	2σ	Scenario	
Year 1	0.287%	0.573%	↑1%	0.46%
Year 2	0.403%	0.806%	↑5%	2.31%
Year 3	0.544%	1.089%	↑10%	4.61%
Year 4	0.626%	1.253%	↑15%	6.92%

4. Policy implications and concluding remarks

Identifying the laws that can be improved to give women equal treatment compared to men could be the first step on a development agenda of gender equality in the region.

According to the WBL index components, no country in the region has a mandate in the law to guarantee equal remuneration for work of equal value. Furthermore, nor any country provides paid parental leave (i.e., both parents are legally entitled to some form of full-time parental leave, either shared between mother and father or as an individual entitlement). If these measures were implemented in the region, the average WBL would increase to 86.3 from 80.7 in 2020 (+5.6 pp). If all countries in the region allowed women to work in jobs deemed dangerous in the same way as men, the index would increase 1.6 pp, reaching a level of 87.9 (+7.2pp). The next table shows the index components, which are not satisfied by at least one country of the CAPADOM region.

	Whether a woman can apply for a passport in the same way as a man	Whether the law prohibits discrimination in employment based on gender.	Whether there is legislation on sexual harassment in employment	Whether there are criminal penalties or civil remedies for sexual harassment in employment	Whether the law mandates equal remuneration for work of equal value	Whether women can work the same night hours as men	Whether women can work in jobs deemed dangerous in the same way as men	Whether women can work in the same industries as men	Whether a woman can obtain a judgment of divorce in the same way as a man
Belice	X	X	.	.	X	.	.	X	.
Costa Rica	.	.	.	.	X	X	X	.	.
Dominican Rep.	.	.	.	.	X	.	.	.	X
Guatemala	.	X	X	X	X	.	X	.	X
Honduras	.	.	.	.	X	.	X	.	.
Nicaragua	.	.	.	.	X	.	.	.	.
Panama	.	.	.	.	X	.	X	.	.
El Salvador	.	.	.	.	X	.	.	.	.

	Whether a woman has the same rights to remarry as a man	Whether paid leave of at least 14 weeks is available to mothers	Whether the government administers 100% of maternity leave benefits	Whether paid leave is available to fathers	Whether there is paid parental leave	Whether the law prohibits discrimination in access to credit based on gender	Whether the ages at which men and women can retire with full pension benefits are equal	Whether the ages at which men and women can retire with partial pension benefits are equal	Whether periods of absence from work due to child care are taken into account in pension benefits
Belice	.	.	.	X	X	X	.	.	.
Costa Rica	.	.	X	X	X	X	.	.	.
Dominican Rep.	.	.	X	.	X	.	.	.	X
Guatemala	.	X	.	.	X	X	.	.	X
Honduras	X	X	X	X	X	.	X	.	X
Nicaragua	.	X	X	.	X	.	.	.	X
Panama	X	.	.	.	X	X	X	X	.
El Salvador	X	.	.	.	X	.	X	.	.

Table 14. No satisfied WBL components by at least one country in the CAPADOM region. The symbol x indicates not compliance.

Our estimations indicate that an increase in the WBL of a magnitude of +7 pp would increase the region's female participation rate between 3 and 5 percentage points. Then, in turn, it would increase the GDP per capita between 0.8 and 2.3 pp (after two years).

In sum, the region can increase its GDP per capita by improving the laws to promote equality among men and women. An egalitarian legal system can take advantage of the vital resource that the region has in its women.

References

Abrigo, M., & Love, I. (2016). Estimation of panel vector autoregression in Stata. The Stata Journal, 16(3), 778–804.

Anderson, T. W., & Hsiao, C. (1982). Formulation and estimation of dynamic models using panel data. Journal of Econometrics, 18(1), 47–82.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: MonteCarlo evidence and an application to employment equations. The Review of Economic Studies, 58(2), 277–297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error components models. Journal of Econometrics, 68(1), 29–51.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1), 115–143.

Canova, F., and M. Ciccarelli. 2013. Panel vector autoregressive models: A survey. In Advances in Econometrics: Vol. 32—VAR Models in Macroeconomics—New Developments and Applications: Essays in Honor of Christopher A. Sims, ed. T. B. Fomby, Kilian, and Murphy, 205–246. Bingley, UK: Emerald.

Duflo, E. (2012). Women Empowerment and Economic Development. Journal of Economic Literature, 50 (4), 1051-079.

Elborgh-Woytek, K., Newiak, M., Kochhar, K., Fabrizio, S., Kpodar, K., Wingender, P., Clements, B., Schwartz, G. (2013). Las mujeres, el trabajo y la economía: Beneficios macroeconómicos de la equidad de género. Documento de Análisis del Personal Técnico del FMI SDN/13/10.

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. Econometrica, 50(4), 1029–1054.

Holtz-Eakin, D., Newey, W., & Rosen, H. S. (1988). Estimating vector autoregressions with panel data. Econometrica, 56(6), 1371–1395.

Love, I., & Zicchino, L. (2006). Financial development and dynamic investment behavior: Evidence from panel VAR. The Quarterly Review of Economics and Finance, 46(2), 190–210

Nickell, S. (1981). Biases in dynamic models with fixed effects. Econometrica, 49(6),1417–1426.

Pesaran, M. H. (2006). Estimation and inference in large heterogeneous panels with a multifactor error structure. Econometrica, 74(4), 967-1012.

Pesaran, M. H., & Smith, R. (1995). Estimating long-run relationships from dynamic heterogeneous panels. Journal of econometrics, 68(1), 79-113.

Rodríguez-Caballero, C. V. (2016). Panel Data with Cross-Sectional Dependence Characterized by a Multi-Level Factor Structure. On Factor Analysis with Long-Range Dependence.

Sigmund, M., & Ferstl, R. (2019). Panel Vector Autoregression in R with the package panel var. The Quarterly Review of Economics and Finance.

Stotsky, J. (2006). Gender and Its Relevance to Macroeconomic Policy: A Survey. IMF Working Paper 06/233. Washington, DC.

Teignier M. and Cuberes D. (2014). Aggregate Costs of Gender Gaps in the Labor Market: A Quantitative Estimate. Collecció d'Economia E14/308. Universitat de Barcelona.

WJP (2020). WJP Rule of Law Index 2020. World Justice Proyect.