Asia-Pacific Economic Cooperation

USAID FROM THE AMERICAN PEOPLE

DATA BRIEF

GENDER AND STRUCTURAL REFORM

Achieving Economic Growth Through Inclusive Policies

Contents

Introduction 1

Discrimination by Creditors on the Basis of Gender in Access to Credit 2

Data and Model 2

Regression Output 6

Provision of Utility Information to Credit Bureaus and Registries 8

Data and Model 8

Regression Output 13

Employment in Non-Traditional Industry Sectors 15

Data and Model 15

Regression Output 19

Job-Protected Maternity Leave 21

Data and Model 21

Regression Output 25

Control Variables 26

Annex 1: Multiple Hurdle Indicator Scoring Results 32

Introduction

This data brief accompanies the Gender and Structural Reform: Achieving Economic Growth through Inclusive Policies report. The report provides quantitative evidence on structural reforms that are likely to have a positive impact on the economic advancement of women, including those of diverse. To be considered for the report, the authors utilized five criteria that are further detailed in the main report.[i] After utilizing those criteria, the authors focused on the GDP impact of four potential structural reforms that cleared all criteria:

1. A law prohibiting gender discrimination in accessing credit

2. A provision allowing utility payments to be reported to credit bureaus and registries as supplemental information to assess credit worthiness

3. A law prohibiting women's exclusion from non-traditional employment in industry, or the removal of policies that restrict women's employment in industry sectors

4. A law guaranteeing women the same or equivalent position after maternity leave, also known as job-protected maternity leave

This data brief provides in-depth information on the data and models used to determine the economic impact of these reforms in terms of GDP growth. The authors ran two ordinary least squares (OLS) regression models and two fixed effects (FE) regression models for each potential structural reform. There was no meaningful difference across the models and as such, for ease of interpretation, the full report and this data brief report results from one OLS model for each potential structural reform.[ii]

Common across all models is the dependent variable: **GDP Growth**. This variable expresses the growth rate of GDP at market prices based on constant local currency, where GDP is defined as the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. GDP is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. These data are gathered from the World Bank as GDP growth (annual %). Annual data from 1990 to 2018 are used. In the following sections where the R-squared values are provided, the authors highlight that low R-squared values are unimportant in this instance as this study does not aim to explain all of the variation in GDP growth. Instead, each of the models focus on one aspect that could influence GDP growth: the policy of interest and the important co-variants. As the authors administer reduced form models rather than general equilibrium models, the low R-squared is less concerning than if the authors were trying to explain all of GDP growth. Overall, the authors consider the low R-squared value to be of low importance given that we are not explaining factors that contribute to GDP growth, but rather the impact of our policies of interest.

The following sections describe each of the models used for the four structural reforms examined. Sections detail the conceptual and empirical models, assumptions, reform of focus, model-specific control variables, variables considered, and variables omitted. Summary statistics and the regression output are provided for each structural reform. The final section describes a set of standard control variables that are used across all four models and includes corresponding summary statistics.

Discrimination by Creditors on the Basis of Gender in Access to Credit

Data and Model

The purpose of this model is to examine the potential relationship between a law that prohibits discrimination by creditors on the basis of gender in access to credit and GDP growth. The model is predicated on the assumption that, when there is reduced discrimination on the basis of gender in accessing credit, more women are able to access credit and/or women are able to access more credit. Increased accessibility of credit would enable more spending, which would stimulate the economy and GDP. Further, greater accessibility of credit can result in more women starting businesses or moving their businesses from the informal to the formal sector, therefore increasing the tax base and contributing to GDP.

CONCEPTUAL AND EMPIRICAL MODEL

This model looks to test differences in GDP growth when an economy affirmatively reports having a law in place that prohibits discrimination by creditors on the basis of gender in access to credit. The null hypothesis for this model is that, despite economies affirmatively reporting that they prohibit discrimination by creditors on the basis of gender in access to credit, there will be no difference in GDP growth. This means that there is no relationship between prohibiting discrimination by creditors on the basis of gender and GDP growth. The alternative hypothesis is that there is a difference in GDP growth when economies prohibit discrimination by creditors on the basis of gender in access to credit. A statistically significant coefficient for the presence of a law prohibiting discrimination by creditors on the basis of gender will indicate support for the alternative hypothesis.

The empirical model is as follows:

$$\text{GDP Growth} = \beta_0 + \beta_{\text{Anti-Discrimination Law}} + \beta_{\text{APEC Anti-Discrimination Law}} + \beta_{\text{Lending Rate}} + \beta_{\text{Controls}} + \epsilon$$

MODEL ASSUMPTIONS

It is assumed that:

- There are only two binary genders.
- There would be no change in GDP growth in the control group if the treatment (adjusting the values of the anti-discrimination law to "Yes") had not been applied.
- Increased access to credit would move some women-owned businesses from the informal to the formal sector.
- Increased access to credit would result in more women starting businesses.
- Increased access to credit would result in higher consumer spending.
- Bank lending rates are responsive to demand for loans, which would be influenced by whether discrimination is reduced through this law.

- The law is enforced with 100% compliance.
- OLS assumptions are satisfied to the greatest extent possible.

INDICATOR

Anti-Discrimination Law is a dichotomous variable that assesses whether the law prohibits discrimination by creditors based on gender or prescribes equal access for both men and women when conducting financial transactions, or entrepreneurial activities or receiving financial assistance. The variable also captures whether the law prohibits gender discrimination when accessing goods and services (including financial services). The source of these data is World Bank Women, Business and the Law. It is also available through the World Bank TCData360 as Does the law prohibit discrimination by creditors on the basis of gender in access to credit? Annual data from 1990 to 2019 are used.

The answer is "yes" if the law prohibits discrimination by creditors based on gender or prescribes equal access for both men and women when conducting financial transactions, or entrepreneurial activities or receiving financial assistance. An economy is counted as not having the law in place ("no") if the law does not prohibit such discrimination or if the law does not provide for effective remedies. The answer is N/A if an economy is not covered by the World Bank. Scoring: Yes=1; No=0; N/A=not scored.

APEC Anti-Discrimination Law represents Anti-Discrimination Law values, as described above, but only for the 21 APEC economies. All non-APEC economies are represented as zero.

CONTROL VARIABLES

The following variable is controlled for in this model:

- **Lending Rate:** This variable measures the average bank rate by country that usually meets the short- and medium-term financing needs of the private sector. This rate is typically differentiated according to creditworthiness of borrowers and objectives of financing. It should be noted that this has limitations in terms of comparing by economy, as the terms and conditions attached to these rates vary by economy. The variable is represented with a percentage value. The data are collected by the World Bank as Lending interest rate (%). Data from 1990 to 2019 are used.
    - This variable is a measure of the cost of borrowing by economy and thus will affect demand for credit.
    - This variable is included because with reduced discrimination, there may be more women business owners seeking loans. Bank interest rates rise and fall partially based on demand. They can also affect an economy and inflation specifically.
    - The World Bank sources these data from the International Monetary Fund, International Financial Statistics and data files.

VARIABLES CONSIDERED

Certain variables were included in various iterations of the regression model, but not included in the final model. These include:

- **Account:** This variable measures the percentage of female respondents ages 15 and older who reported having an account (by themselves or together with someone else) at a bank or another type of financial institution. The data are collected as Financial institution account, female (% age 15+) via the World Bank Findex. Because the data were only collected for three years (2011, 2014, and 2017), the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Borrow:** This variable measures the percentage of female respondents age 15 and older who reported borrowing any money from a bank or another type of financial institution, or using a credit card in the 12 months preceding the survey. The data are collected as Borrowed from a financial institution, female (% age 15+) via the World Bank Findex. Because the data were only collected during three years (2011, 2014, and 2017), the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Business Ownership:** This variable measures the percent of firms with female participation in ownership. The data are collected as Firms with female participation in ownership (% of firms) by the World Bank Enterprise Surveys annually since 2005. However, economies do not have data for each year as the surveys are conducted in different economies each year; for instance, in 2019, the surveys covered 48 economies. As a result, the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Business Ownership OECD:** This variable measures the share of female self-employed who are own-account workers. The data are collected as Share of employed who are own-account workers, by sex by the OECD. Because the data are only collected for OECD economies, there was not enough data coverage to warrant inclusion into the model. Including this variable would severely decrease the integrity of the model.

- **Bias:** This variable measures the presence of gender bias in an economy. More specifically, it asks respondents whether men make better business executives than women do. The data are collected by the World Values Survey. The survey poses a statement: "On the whole, men make better business executives than women do." Respondents selected 1= strongly agree, 2= agree, 3= disagree, or 4= strongly disagree. For purposes of this report, a variable was created to measure the degree of bias, which was the proportion of respondents that answered 1 or 2 to statement posed. While the survey has been undertaken seven times since 1990, the particular survey question used for this variable was only available in the most recent three waves of data, meaning that data were only available to cover three years between 1990 and 2019. As a result, the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Spending:** This variable measures the households and non-profit institutions serving households final consumption expenditure in current US dollars. The data are collected as Households and NPISHs Final consumption expenditure (current US$) by the World Bank. When including this variable in the model, the coefficient on Spending was not statistically significant and therefore added no value to the model as a control variable.

- **Bank Account:** This variable measures whether a woman can open a bank account in the same way as a man and is collected by the World Bank Women, Business and the Law. When including this

variable in the model, the coefficient on Bank Account was not statistically significant and therefore added no value to the model as a control variable.

- **Register:** This variable measures whether a woman can register a business in the same way as a man and is collected by the World Bank Women, Business and the Law. When including this variable in the model, the coefficient on Register was not statistically significant and therefore added no value to the model as a control variable. Further, the variable was omitted due to collinearity.

- **Contract:** This variable measures whether a woman can sign a contract in the same way as a man and is collected by the World Bank Women, Business and the Law. When including this variable in the model, the coefficient on Contract was not statistically significant and therefore added no value to the model as a control variable. Further, the variable was omitted due to collinearity.

OMITTED VARIABLES

The following variables were considered, but not included in the model:

- **Legal indicators such as women's property rights (women's ability to use, control and own non-land assets):** This is unnecessary to control for given that this is not an issue for APEC economies.

- **Individual debt:** These data were unavailable.

- **Women's individual expenditure:** These data were only available at the household level (as indicated above) and no sex-disaggregated data were available.

- **Perception of women's credit worthiness:** These data were unavailable. Only broader bias variables were available, such as the one selected.

SUMMARY STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPGrowth	2725	4.01	5.07	-62.076	123.14
WBLlawaccesstocredit	2725	.194	.395	0	1
APECWBLlawaccessto~t	2725	.061	.239	0	1
GDPConstant2010USD	2725	3.885e+11	1.549e+12	1.251e+08	1.786e+13
MFIndustryEmployment	2725	2.706	2.176	.209	20.167
MFAgEmployment	2725	3.419	11.18	.302	162.818
MFRatioServicesnoz~o	2725	.873	.279	.172	1.626
Wageandsalariedw~tal	2725	56.161	26.145	5.167	99.592
Wageandsalariedw~mal	2725	54.728	30.365	1.697	99.869
WBLequalpaycorr	2725	.257	.437	0	1
EtoPF	2725	46.776	16.373	5.183	86.011
LendingRate	2725	15.256	15.385	.5	291.06
Population	2725	47385085	1.650e+08	96273	1.393e+09
Children	2725	3.061	1.522	.901	7.612

Urban	2725	2.306	1.988	-3.608	17.763
MalePop	2725	50.012	2.675	46.068	76.711
HIPC	2725	.072	.258	0	1
SIDS	2725	.107	.309	0	1
LDC	2725	.25	.433	0	1
BattleDeaths	2725	179.463	1222.921	0	30704
_IncLevel	.	.	.	.	.
High_income	2725	.229	.42	0	1
Low_income	2725	.15	.357	0	1
Lower_middle_income	2725	.268	.443	0	1
Upper_middle_income	2725	.353	.478	0	1

In this model, fewer than 20 percent of observations show an economy having a law in place banning discrimination by creditors on the basis of gender in accessing credit. However, this is still sufficient variation among economies for the analysis. There is a wide variation in lending rates, which is to be expected because the interest rates for lending depend on an economy's currency and stability, among other factors. The few observations that are extremely high (i.e. above 100 percent) are likely to be instances of hyperinflation where the currency was in a free-fall at the time of data collection and the government increased rates to protect the currency from collapse.

Regression Output

	(1)
VARIABLES	OLS1
WBLlawaccesstocredit	-0.940***
	(0.260)
APECWBLlawaccesstocredit	1.539***
	(0.283)
GDPConstant2010USD	-0***
	(0)
MFIndustryEmployment	0.154***
	(0.0520)
MFAgEmployment	-0.0230
	(0.0151)
MFRatioServicesnozero	-2.822***
	(0.633)
Wageandsalariedworkerstotal	-0.0183
	(0.0221)
Wageandsalariedworkersfemal	0.0114
	(0.0187)
WBLequalpaycorr	-0.256

	(0.267)
EtoPF	-0.0167**
	(0.00710)
LendingRate	-0.0206***
	(0.00757)
Population	1.97e-09***
	(4.04e-10)
Children	-0.372***
	(0.133)
Urban	0.361***
	(0.0799)
MalePop	0.0789
	(0.0610)
HIPC	-1.046***
	(0.378)
SIDS	-0.845***
	(0.268)
LDC	0.494
	(0.306)
BattleDeaths	-9.05e-05
	(0.000122)
2.IncLevel	-0.129
	(0.633)
3.IncLevel	0.122
	(0.465)
4.IncLevel	0.190
	(0.377)
BusinessOwnershipOECD	
Constant	4.099
	(3.500)
Observations	2,725
R-squared	0.070
Number of countryid1	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

F (22, 2702)	9.27
Prob > F	0.0000

Provision of Utility Information to Credit Bureaus and Registries

Data and Model

The purpose of this model is to examine the potential relationship between utility companies providing information to private credit bureaus or public credit registries and GDP growth. The model is predicated on the assumption that women have more limited credit histories, credit experience, and assets than men and therefore will benefit from another source to demonstrate and build credit history in order to improve access to loans. Thus, providing utility payments as an alternative way to build credit history can enable women to access credit that could allow them to be financially empowered and independent, as well as start or grow a business, all of which contribute to the economy and GDP.

CONCEPTUAL AND EMPIRICAL MODEL

This model looks to examine whether there are differences in GDP growth when an economy affirmatively reports that at least one utility company provides information to private credit bureaus or public credit registries. The null hypothesis for this model is that, despite economies affirmatively reporting that at least one utility company provides information to private credit bureaus or public credit registries, there will be no difference in GDP growth. This means that there is no relationship between utility companies providing information to private credit bureaus or public credit registries and GDP growth. The alternative hypothesis is that there is a difference in GDP growth when at least one utility company provides information to private credit bureaus or public credit registries. A statistically significant coefficient for the presence of at least one utility company providing information to private credit bureaus or public credit registries will indicate support for the alternative hypothesis.

The empirical model is as follows:

$$\text{GDP Growth} = \beta_0 + \beta_{\text{Utility Payments Law}} + \beta_{\text{APEC Utility Payments Law}} + \beta_{\text{Anti-Discrimination Law}} + \beta_{\text{Controls}} + \epsilon$$

MODEL ASSUMPTIONS

It is assumed that:

- Private credit bureaus or public credit registries will use the utility payment information to assess credit worthiness.
- There are only two binary genders.
- Women pay utility bills.
- Women have more difficulty building credit than men (or less credit history than men), and therefore, need an alternative source to demonstrate credit history so that they can attain new credit.
- There would be no change in GDP growth in the control group if the treatment (adjusting the values of the utility payments law to "Yes") had not been applied.

- Women seek to own businesses, make large purchases, and/or participate in the economy in ways that require existing credit information.
- Increased access to credit would move some women-owned businesses from the informal to the formal sector.
- Increased access to credit would result in more women starting businesses.
- Increased access to credit would result in higher consumer spending.
- Bank lending rates are responsive to demand for loans, which would be influenced by whether discrimination is reduced through this law.
- The depth and breadth of credit information that public and private credit registries have access to makes a difference in whether someone receives a loan.
- OLS assumptions are satisfied to the greatest extent possible.

INDICATOR

The focus indicator, **Utility Payments Law**, is a dichotomous variable that assesses whether utility companies provide information to private credit bureaus or public credit registries. The source of these data are the World Bank's Ease of Doing Business data and is also available through the World Bank's GovData360 as Do utility companies provide information to private credit bureaus or public credit registries? Annual data from 1990 to 2019 are used.

The answer is "Yes" if at least one private credit bureau or public credit registry in the economy collects information from a utility company. The answer is "No" if there are no utility companies that provide information to credit bureaus or registries. "N/A" denotes no credit bureau or registry in the economy, if the credit bureaus or registries' coverage extends to less than five percent of the adult population, or if an economy is not covered by the World Bank. Scoring: Yes=1; No=0; N/A= not scored.

APEC Utility Payments Law represents Utility Payments Law values, as described above, but only for the 21 APEC economies. All other non-APEC economies are represented as zero.

CONTROL VARIABLES

The following variable is controlled for in this model:

- **Anti-Discrimination Law:** This variable measures whether or not the law prohibits discrimination by creditors based on gender or prescribes equal access for both men and women when conducting financial transactions, or entrepreneurial activities or receiving financial assistance, or when accessing goods and services (including financial services). The variable is represented by Yes=1 if the economy has a law covering discrimination in at least one of these areas, and No=0 if the law does not prohibit such discrimination, or if the law does not provide for effective remedies. The source of these data are the World Bank Women, Business and the Law. It is also available through the World Bank TCData360 as Does the law prohibit discrimination by creditors on the basis of gender in access to credit? Annual data from 1990 to 2019 are used.
    - Based on the WBL 2018 data, there are four APEC economies that have the utility law in place but do not have anti-discrimination in accessing credit based on sex/gender law.

VARIABLES CONSIDERED

Certain variables were included in various iterations of the regression model, but not included in the final model. These include:

- **Account**: This variable measures the percentage of female respondents ages 15 and older who reported having an account (by themselves or together with someone else) at a bank or another type of financial institution. The data are collected as Financial institution account, female (% age 15+) via the World Bank Findex. Because the data were only collected for three years (2011, 2014, and 2017), the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Borrow:** This variable measures the percentage of female respondents age 15 and older who reported borrowing any money from a bank or another type of financial institution, or using a credit card in the 12 months preceding the survey. The data are collected as Borrowed from a financial institution, female (% age 15+) via the World Bank Findex. Because the data were only collected during three years (2011, 2014, and 2017), the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Business Ownership:** This variable measures the percent of firms with female participation in ownership. The data are collected as Firms with female participation in ownership (% of firms) by the World Bank Enterprise Surveys annually since 2005. However, economies do not have data for each year as the surveys are conducted in different economies each year; for instance, in 2019, the surveys covered 48 economies. As a result, the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Business Ownership OECD:** This variable measures the share of female self-employed who are own-account workers. The data are collected as Share of employed who are own-account workers, by sex by the OECD. Because the data are only collected for OECD economies, there was not enough data coverage to warrant inclusion into the model. Including this variable would severely decrease the integrity of the model.

- **Bias:** This variable measures the presence of gender bias in an economy. More specifically, it asks respondents whether men make better business executives than women do. The data are collected by the World Values Survey. The survey poses a statement: "On the whole, men make better business executives than women do." Respondents selected 1= strongly agree, 2= agree, 3= disagree, or 4= strongly disagree. For purposes of this report, a variable was created to measure the degree of bias, which was the proportion of respondents that answered 1 or 2 to statement posed. While the survey has been undertaken seven times since 1990, the particular survey question used for this variable was only available in the most recent three waves of data, meaning that data were only available to cover three years between 1990 and 2019. As a result, the number of observations was too few for the regression. The variable could not be included without severely reducing the integrity of the model.

- **Spending:** This variable measures the households and non-profit institutions serving households final consumption expenditure in current US dollars. The data are collected as Households and NPISHs Final consumption expenditure (current US$) by the World Bank. When including this variable in the model, the coefficient on Spending was not statistically significant and therefore added no value to the model as a control variable.

- **Bank Account:** This variable measures whether a woman can open a bank account in the same way as a man and is collected by the World Bank Women, Business and the Law. When including this variable in the model, the coefficient on Bank Account was not statistically significant and therefore added no value to the model as a control variable.

- **Register:** This variable measures whether a woman can register a business in the same way as a man and is collected by the World Bank Women, Business and the Law. When including this variable in the model, the coefficient on Register was not statistically significant and therefore added no value to the model as a control variable. Further, the variable was omitted due to collinearity.

- **Contract:** This variable measures whether a woman can sign a contract in the same way as a man and is collected by the World Bank Women, Business and the Law. When including this variable in the model, the coefficient on Contract was not statistically significant and therefore added no value to the model as a control variable. Further, the variable was omitted due to collinearity.

OMITTED VARIABLES

The following variables were considered, but not included in the model:

- **Legal indicators such as women's property rights (women's ability to use, control and own non-land assets):** This is unnecessary to control for given that this is not an issue for APEC economies.

- **Individual debt:** These data were unavailable.

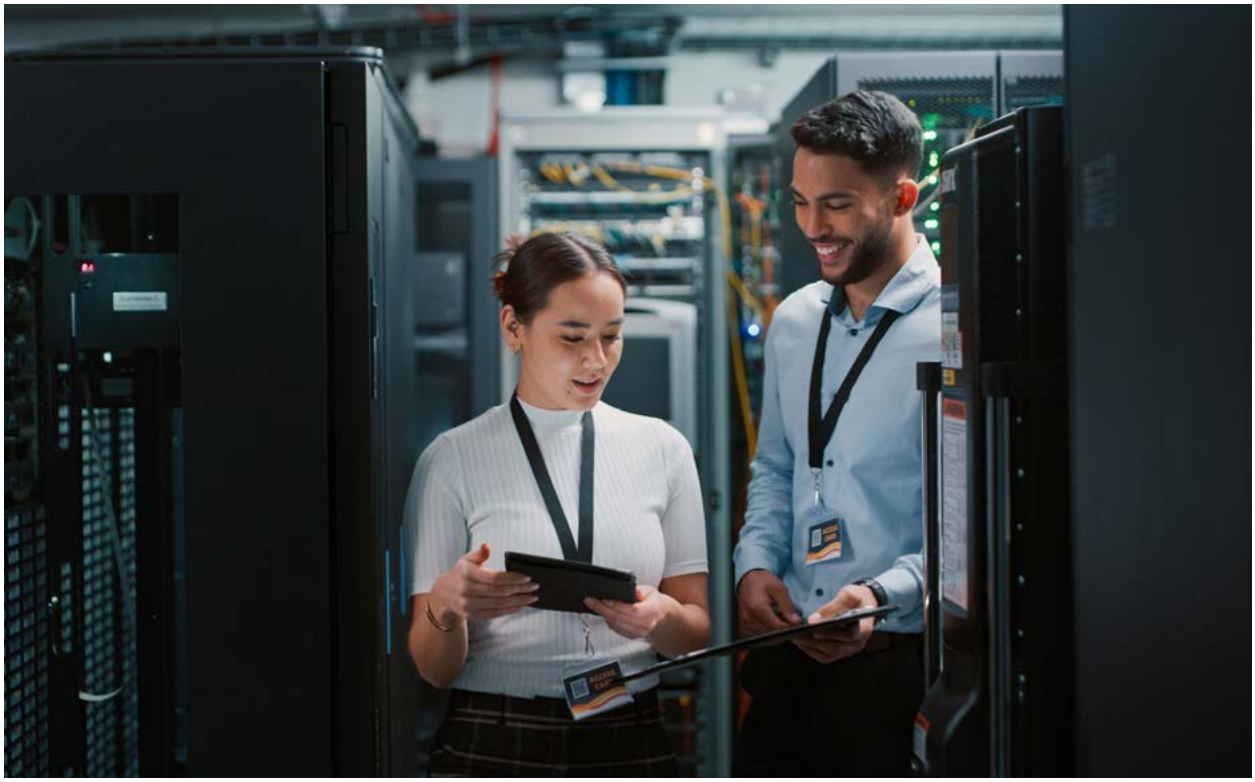
- **Women's individual expenditure:** These data were only available at the household level (as indicated above) and no sex-disaggregated data were available.

- **Women's credit scores:** Data are not publicly available and credit scores are a concept used in only some APEC economies, such as the U.S. and Australia.

SUMMARY STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPGrowth	3881	4.008	5.917	-62.076	149.973
UtilityPaymentsPLUS	3881	.194	.395	0	1
APECUtilPLUS	3881	.041	.199	0	1
WBLlawaccesstocredit	3881	.212	.409	0	1
GDPConstant2010USD	3881	3.586e+11	1.346e+12	1.251e+08	1.786e+13
MFIndustryEmployment	3881	2.707	2.045	.209	20.167
MFAgEmployment	3881	3.984	16.21	.279	195.222
MFRatioServicesnoz~o	3881	.874	.286	.137	1.626
Wageandsalariedw~tal	3881	56.512	27.703	5.167	99.592
Wageandsalariedw~mal	3881	55.05	32.026	.791	99.953
WBLequalpaycorr	3881	.312	.463	0	1
EtoPF	3881	47.239	16.322	4.458	86.011
Population	3881	38671343	1.395e+08	96273	1.393e+09
Children	3881	3.052	1.598	.901	7.716
Urban	3881	2.249	2.008	-4.078	17.763
MalePop	3881	49.95	2.934	45.435	76.711
BattleDeaths	3881	186.478	1262.332	0	30704
HIPC	3881	.1	.301	0	1
SIDS	3881	.087	.282	0	1
LDC	3881	.253	.435	0	1
_IncLevel	.	.	.	.	.
High_income	3881	.296	.457	0	1
Low_income	3881	.156	.363	0	1
Lower_middle_income	3881	.258	.438	0	1
Upper_middle_income	3881	.289	.454	0	1

In this model, 19.4 percent of observations indicate a private credit bureau or public credit registry collects information from a utility company in an economy. Though fewer than 20 percent of economies have this reform in place, this is still sufficient variation among economies for the analysis. Fewer than 20 percent of observations show an economy having a law in place banning discrimination by creditors on the basis of gender in accessing credit. The descriptive statistics demonstrate that these policies have not been widely implemented between 1990 and 2019.



REGRESSION OUTPUT

VARIABLES	(1) OLS1
UtilityPaymentsPLUS	-0.276
	(0.196)
APECUtilPLUS	0.821***
	(0.269)
WBLlawaccesstocredit	-0.386*
	(0.207)
GDPConstant2010USD	-0***
	(0)
MFIndustryEmployment	0.118***
	(0.0447)
MFAgEmployment	-0.00444
	(0.00853)
MFRatioServicesnozero	-4.194***
	(0.674)
Wageandsalariedworkerstotal	-0.0426*
	(0.0251)

Wageandsalariedworkersfemal	0.0261
	(0.0191)
WBLequalpaycorr	-0.234
	(0.219)
EtoPF	-0.0253***
	(0.00823)
Population	1.83e-09***
	(4.41e-10)
Children	-0.133
	(0.141)
Urban	0.539***
	(0.110)
MalePop	-0.0791
	(0.0648)
BattleDeaths	-0.000204**
	(9.40e-05)
HIPC	-1.415***
	(0.372)
SIDS	-0.913***
	(0.285)
LDC	1.358***
	(0.399)
2.IncLevel	-3.908***
	(1.386)
3.IncLevel	-1.798**
	(0.852)
4.IncLevel	-0.339
	(0.368)
BusinessOwnershipOECD	
Constant	13.93***
	(4.019)
Observations	3,881
R-squared	0.072
Number of countryid1	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

F (22, 3858)	13.62
Prob > F	0.0000

Non-Traditional Employment in Industry Sectors

Data and Model

The purpose of this model is to examine the potential relationship between a legal environment that prohibits or restricts women from holding jobs in specific industry sectors, but that does not prohibit men from holding these jobs, and GDP growth. The model is predicated on assumption that, when women have a wider menu of options for employment, more women can participate in the formal labor force. This model theorizes that, when economies reduce restrictions on women's access to employment in industry sectors, women have a greater menu of employment opportunities available, resulting in a larger population of women in the formal labor force contributing to the economy and GDP.

CONCEPTUAL AND EMPIRICAL MODEL

This model assesses differences in factors contributing to an economy's GDP that may exist as a result of an economy's reduced barriers to women's industry sector employment. The model was constructed by considering the specific factors that relate both to an economy's labor force participation rate and the economy's GDP, such as wages, productivity, and savings. The model tests differences in GDP growth when an economy affirmatively reports a legal environment that allows women to hold industry sector jobs in the same way as men. The null hypothesis for this model states that there is no relationship between restricting industry employment on the basis of gender and GDP growth. Practically applied, the null hypothesis asserts that, if economies affirmatively report a legal environment that allows women to seek and attain the same industry employment options as men, there will be no difference in GDP growth. The alternate hypothesis is that there is a difference in GDP growth when economies do not legally restrict women's opportunities for industry employment. A statistically significant coefficient for the presence of a legal environment that allows women to hold industry sector jobs in the same way as men will indicate support for the alternative hypothesis.

The empirical model is as follows:

$$\text{GDP Growth} = \beta_0 + \beta_{\text{Industry Law}} + \beta_{\text{APEC Industry Law}} + \beta_{\text{Gross Domestic Savings}} + \beta_{\text{Industry Value-added}} + \beta_{\text{Agriculture Value-added}} + \beta_{\text{Controls}} + \epsilon$$

MODEL ASSUMPTIONS

It is assumed that:

- There are only two binary genders.
- Women between the ages of 15 and 64 are eligible to be members of the economy's formal labor force.
- The women seeking employment in the applicable industries are non-pregnant and non-nursing. The data available for analysis is limited to non-pregnant, non-nursing women.
- There would be no change in GDP in the control group if the treatment (adjusting the values of the industry employment access to "Yes") had not been applied.
- OLS assumptions are satisfied to the greatest extent possible.

INDICATOR

Industry Law is a dichotomous variable that assesses whether the economy's legal environment allows women to work in the mining, construction, manufacturing, energy, water, agriculture, and transportation sectors in the same way as men. The data available for analysis is limited to non-pregnant, non-nursing women. The indicator also considers if women can work night hours and/or in industrial undertakings, and if ministers/ministries have the power to restrict women from occupying certain jobs. The source of these data is World Bank Women, Business and the Law. Annual data from 1990 to 2019 are used.

The answer is "Yes" if there are no restrictions preventing women from working in the mining, construction, manufacturing, energy, water, agriculture, and transportation sectors in the same way as men. The answer is "No" if the law prohibits women from working in the mining, construction, manufacturing, energy, water, agriculture, and transportation sectors in the same way as men, and/or if the law places restrictions barring women's employment in these industries, such as by prohibiting night hours for women, prohibiting women from working in industrial undertakings, and/or by granting ministers/ministries the power to restrict women from occupying certain jobs. The answer is N/A if an economy is not covered by the World Bank. Scoring: Yes=1; No=0; N/A=not scored.

The focus indicator in this investigation, **APEC Industry Law** represents Industry Law values, as described above, but only for the 21 APEC economies. All non-APEC economies are represented as zero.

CONTROL VARIABLES

The following variables are controlled for in this model:

- **Gross Domestic Savings:** This variable measures an economy's GDP less final consumption expenditure. The data were gathered from The World Bank as Gross domestic savings (% of GDP). Annual data from 1990 to 2018 are used. The data were transformed to reflect a decimal, rather than a percentage value.
    - Research suggests that each percentage point increase in share of household income generated by women increases aggregate domestic savings by 15 percentage points (Lemmon and Vogelstein 2017). Allowing women to access employment in industry affects women's income generation and women's share of household income. As Gross Domestic Savings is defined as GDP less consumption and net transfers, changes to an economy's gross domestic savings would in turn affect the economy's GDP.
- **Industry Value Added:** This variable measures value added, defined as the net output of the industry sectors (ISIC divisions 10-45) after adding all outputs and subtracting all intermediate inputs, in mining, manufacturing, construction, electricity, water, and gas. Deductions for depreciated fabricated assets or depleted and degraded natural resources are not included when calculating value added. The data were gathered from The World Bank as Industry (including construction), value added (current US$). Annual data from 1990 to 2018 are used.
    - This variable is included to capture changes in industrial employment and output. Industrial output affects profits while employment affects wages, both of which are contributors to GDP.
- **Agriculture Value Added:** This variable measures value added, defined as the net output of the agriculture sectors (ISIC divisions 1-5) after adding all outputs and subtracting all intermediate inputs, in forestry, hunting, fishing, crop cultivation, and livestock production. Deductions for depreciated fabricated

assets or depleted and degraded natural resources are not included when calculating value added. The data were gathered from The World Bank as Agriculture, forestry, and fishing, value added (current US$). Annual data from 1990 to 2018 are used.

- This variable is included to capture changes in agricultural employment and output. Agricultural output affects profits while employment affects wages, both of which are contributors to GDP.

VARIABLES CONSIDERED

Certain variables were included in various iterations of the regression model, but not included in the final model. These include:

- **Female Foreign-born Employment:** This variable measures the share of employed foreign-born females aged 15-64 in the total foreign-born population (active and inactive persons) of the same age. The considered data, Foreign-born employment, Women, % of foreign-born population, is collected by the OECD. The data are only available only for OECD economies from 2000-2018. Therefore, the number of observations was too few and including this variable would severely decrease the integrity of the model.

- **Female Graduates in Industry Sector-Related Fields:** This variable was intended to serve as a proxy for labor shortage. This variable measures the number of females who graduated from an education program at any level (short-cycle tertiary education, Bachelor's or equivalent level, Master's or equivalent level, Doctoral or equivalent level) in a relevant industry sub-sector (manufacturing and processing, architecture and construction, agriculture, forestry, fisheries, transport services). The data were gathered from The OECD as Graduates by field. The data are only available for the OECD economies and five other economies from 2005-2017. Therefore, the number of observations was too few and including this variable would severely decrease the integrity of the model.

- **Female Labor Force Participation (FLFP):** This variable measures the proportion of the female population aged 15 and older that is economically active. To be included as "actively engaged," a person must either be currently employed or looking for work in the formal sector. The variable is represented with a percentage value and is disaggregated by age in five-year bands. All data available were used, which is for 1990 through 2019, and is a model estimate from the International Labour Organization. The data were gathered from The World Bank as Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate). FLFP and the Female Wage and Salaried Workers variable (a control variable) are highly collinear, such that only one could be included in the final regression model. The Female Wage and Salaried Workers variable was chosen for the final model due to the relationship of wages as a contributing factor to GDP (GDP = wages + rent + interest + profits + sales taxes + depreciation + net foreign factor income).

- **Wage Gap:** This variable measures the difference between median earnings of men and women relative to median earnings of men. The data were gathered from The OECD as Gender wage gap, Employees, Percentage. The data are only available for the OECD economies from 1990-2018. Therefore, the number of observations was too few and including this variable would severely decrease the integrity of the model. The Equal Pay Law variable (a control variable) was used as a proxy for Wage Gap in the final model.

OMITTED VARIABLES

The following variables were considered, but not included in the model:

- **Transportation Value Added:** The World Bank data source classifies transportation as a sub-sector under services, and other services sectors are not considered in the definition of the focus indicator. Similar data specific to transportation was not available from other sources.

- **Labor shortage:** These data were unavailable. Proxies for this variable were tested in various iterations of the model, but there were too few observations for the proxies that could adequately capture the same effects as a labor shortage variable.

SUMMARY STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPGrowth	3497	3.818	4.291	-46.082	54.158
IndustryLaw	3497	.471	.499	0	1
APECIndustryLaw	3497	.066	.248	0	1
GDPConstant2010USD	3497	3.864e+11	1.367e+12	2.913e+08	1.735e+13
MFIndustryEmployment	3497	2.715	2.211	.209	22.652
MFAgEmployment	3497	3.529	14.822	.279	195.222
MFRatioServicesnoz~o	3497	.878	.285	.137	1.626
Wageandsalariedw~tal	3497	56.81	27.646	5.167	99.592
Wageandsalariedw~mal	3497	55.567	32.051	.791	99.691
GDS	3497	.188	.182	-1.42	.773
IndustryValueAdded	3497	.275	.122	.021	.878
AgValueAdded	3497	.128	.123	0	.79
WBLequalpaycorr	3497	.335	.472	0	1
EtoPF	3497	47.257	16.242	7.78	86.011
Population	3497	41916770	1.463e+08	96273	1.393e+09
Children	3497	2.997	1.602	.901	7.716
Urban	3497	2.17	1.894	-4.078	17.499
MalePop	3497	49.804	2.693	45.435	76.711
BattleDeaths	3497	171.559	1050.792	0	25000
SIDS	3497	.055	.229	0	1
HIPC	3497	.101	.301	0	1
LDC	3497	.221	.415	0	1
_IncLevel	.	.	.	.	.
High_income	3497	.309	.462	0	1
Low_income	3497	.157	.364	0	1
Lower_middle_income	3497	.249	.433	0	1
Upper_middle_income	3497	.285	.451	0	1

In this model, nearly half of the observations indicate an economy having a legal environment that allows women to work industry sector jobs in the same way that men can hold these jobs. The descriptive statistics demonstrate that these policies have been moderately implemented between 1990 and 2019, which is suitable variability to measure a potential relationship between the structural policies and/or reform and GDP growth.

Regression Output

	(1)
VARIABLES	OLS1
IndustryLaw	-0.260
	(0.174)
APECIndustryLaw	0.666***
	(0.243)
GDPConstant2010USD	-0***
	(0)
MFIndustryEmployment	0.0421
	(0.0409)
MFAgEmployment	-0.000724
	(0.00734)
MFRatioServicesnozero	-2.149***
	(0.581)
Wageandsalariedworkerstotal	-0.0290
	(0.0195)
Wageandsalariedworkersfemal	0.0302*
	(0.0160)
GDS	1.761**
	(0.748)

IndustryValueAdded	2.108
	(1.302)
AgValueAdded	2.802
	(2.148)
WBLequalpaycorr	-0.181
	(0.152)
EtoPF	-0.0106*
	(0.00621)
Population	2.43e-09***
	(4.00e-10)
Children	-0.157
	(0.118)
Urban	0.314***
	(0.0690)
MalePop	-0.112**
	(0.0529)
BattleDeaths	-0.000148
	(0.000111)
SIDS	-0.231
	(0.256)
HIPC	-1.049***
	(0.315)
LDC	0.816***
	(0.296)
2.IncLevel	-0.340
	(0.605)
3.IncLevel	0.345
	(0.372)
4.IncLevel	0.210
	(0.225)
Constant	10.12***
	(2.464)
Observations	3,497
R-squared	0.077
Number of countryid1	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

F (24, 3472)	12.08
Prob > F	0.0000

Job-Protected Maternity Leave

Data and Model

The purpose of this model is to examine the potential relationship between a law that guarantees a woman's ability to return to the same position after maternity leave and GDP. The model is predicated on assumption that, when economies guarantee the same position after maternity leave, women are more likely to remain in the formal workforce. In essence, as a result of this law, women are not required to choose between career trajectory and family life, resulting in a decrease of maternal labor market detachment. If true, women's return to the labor force may influence GDP because the GDP calculation relies on labor force participation, particularly for measures of economic output.

CONCEPTUAL AND EMPIRICAL MODEL

This model tests the differences (if any) on GDP growth if an economy reports having a law that guarantees that women the same or an equivalent job after returning from maternity leave. The model was formulated by integrating variables that may influence GDP growth and hold constant these values to measure the effect of a maternity leave law on GDP growth. This model looks to test differences in GDP when an economy affirmatively reports the legal area of focus (whether an economy guarantees women the same position after returning from maternity leave). The null hypothesis for this model is that, despite economies affirmatively reporting that they guarantee the same job for women after maternity leave, there will be no difference in GDP. This means that there is no relationship between guaranteeing mothers the same position after maternity leave and GDP. The alternative hypothesis is that there is a difference in GDP when economies guarantee women the same position after maternity leave. The primary variable of interest was GDP growth on an annual basis, but additional variables for five-year and ten-year GDP growth amounts were also included as two separate, distinct regressions with all other variables consistently carried from the primary empirical model. A statistically significant coefficient for the presence of a law guaranteeing women the same or an equivalent job after returning from maternity leave will indicate support for the alternative hypothesis.

The empirical model is as follows:

$$\text{GDP Growth} = \beta_0 + \beta_{\text{Return}} + \beta_{\text{APEC Return}} + \beta_{\text{Controls}} + \epsilon$$

MODEL ASSUMPTIONS

It is assumed that:

- Only women can become pregnant and there are only two binary genders.
- OLS assumptions are satisfied to the greatest extent possible.
- Women have three choices when they become pregnant: 1) they stay in their job after giving birth, continues working without taking leave; 2) they can take leave and return to a job after; or 3) they can quit their jobs. In the affirmative, this model assumes that, when presented with the opportunity to take maternity leave, she pursues Choice 2 and takes the leave and returns to her job after.
- Women only take leave for the stipulated amount of time as mandated by the government, no less time and no more time, and they only take this leave immediately after birth.

- The longer women stay in the workforce, the more likely they are to be in managerial positions.
- Women give birth between the ages of 20 and 44.
- There would be no change in GDP in the control group if the treatment (adjusting the values of the industry employment access to "Yes") had not been applied.

INDICATOR

Return is a dichotomous variable that assesses whether an employer has a legal obligation to reinstate a returning employee after paid or unpaid maternity leave in an equivalent or better position and salary than the employee had pre-leave. The source of these data is World Bank Women, Business and the Law. Annual data from 1990 to 2019 are used. Where the data were not available from Women, Business and the Law, individual economy legislation was reviewed to fill in the informational gaps.

The answer is "Yes" if the economy has a law that requires a woman who returning from paid or unpaid maternity leave must return to an equivalent or better position and salary than prior to her leave. The answer may also be in the affirmative if a there is an explicit denotation in a maternity leave policy regime that a returning employee may not be indefinitely replaced. Similarly, if the maternity leave policy regime stipulates a temporary suspension of an employee's contract whereby the contract resumes after leave, the answer will also be coded as "Yes." Lastly, in economies with parental leave, whereby the leave is available to both parents, not just the mother, and the law guarantees return, but does not explicitly denote after maternity leave (versus the parental leave regime), the value will be coded as "Yes." The answer is "No" if no law could be located that guarantees women returning from maternity the equivalent or better position and salary than prior to her leave. The answer is "N/A" if there is no paid or unpaid maternity leave policy regime in an economy or if an economy is not covered by the World Bank. Scoring: Yes=1; No=0; N/A=not scored.

APEC Return Law represents Return Law values, as described above, but only for the 21 APEC economies. All non-APEC economies are represented as zero.

CONTROL VARIABLES

This model does not include any control variables specific to this model. The variables that are controlled for in this model are used in all models and are therefore explained in the following section on control variables.

VARIABLES CONSIDERED

Certain variables were included in various iterations of the regression model, but not included in the final model. These include:

- **Female Labor Force Participation:** This is a measure of the proportion of women in the total working age population actively engaged in the formal labor force. To be included as "actively engaged," a person must either be currently employed or looking for work in the formal sector. The variable is represented with a percentage value and is disaggregated by age in five-year bands. All data available were used, which is for 1990 through 2019, and is a model estimate from the International Labour Organization. This variable was transformed by averaging five-year intervals from 20-24, 25-29, 30-34, 35-39, and 40-44 for each economy utilizing the data for Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate). Ultimately, this variable was not utilized because it did not have a meaningful effect on the results. FLFP and the Female Wage and Salaried Workers variable (a control variable) are highly

collinear, such that only one could be included in the final regression model. The Female Wage and Salaried Workers variable was chosen for the final model due to the relationship of wages as a contributing factor to GDP (GDP = wages + rent + interest + profits + sales taxes + depreciation + net foreign factor income).

- **Wage Gap:** This variable measures the difference between median earnings of men and women relative to median earnings of men. The data were gathered from the OECD as Gender wage gap, Employees, Percentage. The data are only available for the OECD economies for 1990-2018. Therefore, the number of observations was too few and including this variable would severely decrease the integrity of the model. The Equal Pay Law variable (a control variable) was used as a proxy for Wage Gap in the final model.

- **Manage:** This variable measures the proportion of women's employment in managerial positions as a percentage of total management. The ILO utilizes the International Standard Classification of Occupations to calculate this percentage. Two different measures are presented: one referring to total management (category 1 of ISCO-08 or ISCO-88), and another one referring to senior and middle management only, thus excluding junior management (category 1 in both ISCO-08 and ISCO-88 minus category 14 in ISCO-08 and minus category 13 in ISCO-88). Because this indicator was available only for select economies from 2000 to 2019 there was not enough data coverage to warrant inclusion into the model and no changes in results were evident with its inclusion. Including this variable would severely decrease the integrity of the model.

- **Productivity:** This variable conveys the annual growth rate of output per worker, as indicated by GDP constant 2010 U.S. Dollars, and conveys an economy's labor productivity. The variable demonstrated the total volume of output (GDP) produced per unit of labor (number of employment persons) during a specific timeframe. All data available were used, which is from 1991 through 2019. Ultimately, this variable was not utilized because it did not have a meaningful effect on the results.

- **Lagged GDP:** Utilizing the GDP Constant 2010 USD variable, this indicator was transformed into two different variables to measure the difference in GDP growth over five years and ten years. As a result, GDP data were utilized from 1990 to 2019, but the regression utilized a lagged approach. There was no difference in the results found for either the five-year or ten-year lags compared to the annual GDP growth estimates. As a result, these results have not been reported.

OMITTED VARIABLES

The following variables were considered, but not included in the model:

- **Maternity leave repetition:** This refers to the number of times a woman takes maternity leave over her career. These data were not available with comparable or significant coverage.

- **Proportion of women who leave the workforce after maternity leave:** These data were not available with comparable or significant coverage.

- **Proportion of women who remain in the workforce after maternity leave:** These data were not available with comparable or significant coverage.

- **Data on when in their careers women are likely to take maternity leave:** No data available.

- Female labor participation rate for mothers: These data were not available with comparable or significant coverage.

- Influence of parental or paternity leave on maternity leave decision making: No data available.

SUMMARY STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPGrowth	3702	4.007	5.962	-62.076	149.973
Return	3702	.454	.498	0	1
APECReturn	3702	.052	.221	0	1
GDPConstant2010USD	3702	3.752e+11	1.376e+12	1.251e+08	1.786e+13
MFIndustryEmployment	3702	2.812	2.318	.209	22.652
MFAgEmployment	3702	4.199	16.683	.279	195.222
MFRatioServicesnoz~o	3702	.883	.29	.137	1.626
Wageandsalariedw~tal	3702	56.82	27.847	5.167	99.592
Wageandsalariedw~mal	3702	55.379	32.156	.791	99.953
WBLequalpaycorr	3702	.313	.464	0	1
EtoPF	3702	46.945	16.728	4.458	86.011
Children	3702	3.062	1.582	.901	7.716
Urban	3702	2.308	1.957	-4.078	17.763
MalePop	3702	50.006	2.997	45.435	76.711
BattleDeaths	3702	191.637	1280.719	0	30704
SIDS	3702	.075	.264	0	1
HIPC	3702	.099	.299	0	1
LDC	3702	.242	.428	0	1
_IncLevel	.	.	.	.	.
High_income	3702	.301	.459	0	1
Low_income	3702	.16	.367	0	1
Lower_middle_income	3702	.244	.43	0	1
Upper_middle_income	3702	.295	.456	0	1

In this model, nearly half of the observations include a law that allows women to return to the same or equivalent position after maternity leave. The descriptive statistic results also provide sufficient variability between the other measures, including income level. This variability allows for the generalization of the expected GDP growth results to all economies.

Regression Output

VARIABLES	(1) RetOLSL0
ReturnPLUS	0.189
	(0.269)
APECReturnPLUS	0.321
	(0.287)
GDPConstant2010USD	-0
	(0)
MFIndustryEmployment	0.0948**
	(0.0401)
MFAgEmployment	-0.00913
	(0.00830)
MFRatioServicesnozero	-4.515***
	(0.723)
Wageandsalariedworkerstotal	-0.0540**
	(0.0251)
Wageandsalariedworkersfemal	0.0366*
	(0.0195)
WBLequalpaycorr	-0.317
	(0.244)
EtoPF	-0.0267***
	(0.00791)
Children	-0.128
	(0.148)
Urban	0.554***
	(0.113)
MalePop	-0.0288
	(0.0615)
BattleDeaths	-0.000183**
	(9.27e-05)
SIDS	-0.495*
	(0.256)
HIPC	-1.604***
	(0.386)
LDC	1.644***
	(0.495)
2.IncLevel	-3.976***
	(1.500)

3.IncLevel	-1.664*
	(0.900)
4.IncLevel	-0.268
	(0.402)
Constant	11.59***
	(3.697)
Observations	3,702
R-squared	0.071

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

F (20, 3681)	14.06
Prob > F	0.0000

Control Variables

In addition to the model-specific indicators and controls, each model incorporates a set of simple, standard, demographic and economic control variables. These variables have been chosen based on their prevalence in academia and existing economic impact assessments, and for their observable correlations with an economy's GDP irrespective of gendered law and policy implementation.

VARIABLE ASSUMPTIONS

It is assumed that:

- There are only two binary genders.
- There would be no change in GDP in the control group if the treatment (increasing or decreasing the observed value of the variable) had not been applied.

CONTROL VARIABLES

The following variables are controlled for in all models:

- **Battle Deaths:** This variable measures the battle-related deaths, which are deaths in battle-related conflicts between warring parties in the conflict dyad (two conflict units that are parties to a conflict). Typically, battle-related deaths occur in warfare involving the armed forces of the warring parties. All deaths--military as well as civilian--incurred in such situations, are counted as battle-related deaths. The data are collected by the World Bank as Battle-related deaths (number of people). Data from 1990 to 2018 are used.
    - This variable is included as a proxy for conflict; it enables the modes to control for when economies that experience conflict or war, which can impact GDP.
- **Children:** This variable measures the total fertility rate, which represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year. The data are collected by the World Bank as Fertility rate, total (births per woman) and are based on data on registered live births from vital registration systems or, in the absence of such systems, from censuses or sample surveys. Data from 1990 to 2018 are used.
    - This variable is included because the number of children that women have can impact their time spent in and decision to return to the formal workforce.
- **Employment:** This variable measures the employment to population ratio, which is the proportion of an economy's population that is employed. Employment is defined as persons of working age (ages 15 and older) who, during a reference period, were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period (i.e., who worked in a job for at least one hour) or not at work due to temporary absence from a job, or to working-time arrangements. The data were transformed to reflect a decimal, rather than a percentage value. The data are collected by the World Bank as Employment to population ratio, 15+, female (%) (modeled ILO estimate) via the ILOSTAT database. Data from 1991 to 2019 are used.

- **Equal Pay Law:** This is an indicator variable that measures whether an economy's legal environment mandates equal remuneration for work of equal value. "Work of equal value" refers not only to the same or similar jobs but also to different jobs of the same value. A value of 1 is assigned if employers are legally obliged to pay equal remuneration to male and female employees who perform work of equal value in accordance with these definitions. A value of 0 is assigned if the law limits the principle of equal remuneration to equal work, the same work, similar work, or work of a similar nature. A value of 0 is also assigned if the law limits the broad concept of "remuneration" to only basic wages or salary, or if the law limits the principle of equal remuneration for work of equal value to the same place of business or same employer. The data are collected by the World Bank Women, Business and the Law as Law Mandates Equal Remuneration For Females And Males For Work Of Equal Value (1=Yes; 0=No). Annual data from 1990 to 2019 are used.
    - This variable is used as a proxy for the gender wage gap, as the legal environment for equal remuneration often predicates the size of an economy's gender wage gap.
    - This variable is controlled to mitigate the effect of other gender bias on women's access to and success in attaining formal employment.
- **GDP Constant** (2010 USD): This variable measures GDP at purchaser's prices, which is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used. The data are collected by the World Bank as GDP (constant 2010 US$) using national accounts data and OECD national accounts data files. Annual data from 1990 to 2018 are used.
    - This variable is included to account for the fact that more developed economies tend to grow more slowly as they reach higher levels of development.
- **Heavily Indebted Poor Countries:** This variable measures whether an economy is classified as a Heavily Indebted Poor Country (HIPC) by the International Monetary Fund (IMF). This means that the economy has high levels of poverty but is committed to poverty reduction and is eligible for debt relief from the IMF. Currently, there are 39 economies considered to be HIPCs. This is an indicator variable where 1 is an affirmative label, meaning that an economy is an HIPC. This classification is from the IMF. Annual data from 1996 to 2019 are used.
- **Income Level:** Using the World Bank's classification of income level for each economy, the models use this categorical variable (specified for each level of income). The income levels are low income, lower middle income, upper middle income, and high income (with high income as the reference category). The classification is based on Gross National Income (GNI) per capita (current US$) calculated using the Atlas method. The classification is updated annually. Data from 1991 to 2019 are used.
    - This variable is included because GDP growth trends can differ by income level of economies.
- **Least Developed Countries:** This variable measures whether an economy is classified by the United Nations as a Least developed country (LDC). LDCs are low-income economies confronting

severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human capital. There are currently 47 economies classified as LDCs. A review and reclassification is conducted every three years. This is a categorical variable where 1 is an affirmative label, meaning that an economy is an LDC. The classification is from the UN. Annual data from 1990 to 2019 are used.

- **Male Population:** This variable measures the percentage of an economy's total population that is male. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The data were transformed to reflect a decimal, rather than a percentage value. The data are from the World Bank as Population, male (% of total population). Annual data from 1990 to 2018 are used.

- **Population**: This variable measures the total population based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values are midyear estimates. The data are collected by the World Bank as Population, total and population estimates are typically based on national population censuses. Annual data from 1990 to 2019 are used.

- **Ratio Agriculture Employment:** This variable measures the proportion of men to women who are employed in agriculture, hunting, forestry, and fishing, following division 1 (ISIC 2), categories A-B (ISIC 3) or categories A (ISIC 4). An individual is considered employed if they are engaged in any activity to produce goods or services for pay or for profit, whether they are actively working during the time period or not working due to a formally-arranged temporary absence from the job. The data are from The World Bank as Employment in agriculture, male (% of male employment) (modeled ILO estimate) and Employment in agriculture, female (% of female employment) (modeled ILO estimate). Annual data from 1991 to 2019 are used. The data were transformed by dividing male employment in agriculture by female employment in agriculture to arrive at the ratio of male to female agriculture employment.

    - This variable captures the representation of males and females in agricultural sub-sector employment to isolate the relationship between the independent variable in question and the dependent variable.

- **Ratio Industry Employment:** This variable measures the proportion of men to women who are employed in mining and quarrying, manufacturing, construction, electricity, gas, and water, following divisions 2-5 (ISIC 2), categories C-F (ISIC 3) or categories B-F (ISIC 4). An individual is considered employed if they are engaged in any activity to produce goods or services for pay or for profit, whether they are actively working during the time period or not working due to a formally-arranged temporary absence from the job. The data are from The World Bank as Employment in industry, male (% of male employment) (modeled ILO estimate) and Employment in industry, female (% of female employment) (modeled ILO estimate). Annual data from 1991 to 2019 are used. The data were transformed by dividing male employment in industry by female employment in industry to arrive at the ratio of male to female industry employment.

    - This variable captures the representation of males and females in industry sub-sector employment to isolate the relationship between the independent variable in question and the dependent variable.

- **Ratio Services Employment:** This variable measures the proportion of men to women who are employed in wholesale and retail trade and restaurants and hotels; transport, storage, and communications; financing, insurance, real estate, and business services; and community, social, and personal services, in accordance with divisions 6-9 (ISIC 2) or categories G-Q (ISIC 3) or categories G-U (ISIC 4). An individual

is considered employed if they are engaged in any activity to produce goods or services for pay or for profit, whether they are actively working during the time period or not working due to a formally-arranged temporary absence from the job. The data are from The World Bank as Employment in services, male (% of male employment) (modeled ILO estimate) and Employment in services, female (% of female employment) (modeled ILO estimate). Annual data from 1991 to 2019 are used. The data were transformed by dividing male employment in industry by female employment in industry to arrive at the ratio of male to female services employment.

  - This variable captures the representation of males and females in services sub-sector employment, which in turn affects women's wage earnings, a contributor to GDP. The transportation sector, which is included as an "industry" sector in the Restrictions on Non-traditional Employment in Industry model focus indicator, is captured in this "services"-related variable. And, when considered in tandem, the Ratio Industry Employment, Ratio Agriculture Employment, and Ratio Services Employment variables capture the representation of males and females in an economy's total formal labor force.

- **Small Island Developing State:** This variable measures whether the economy is a small island developing state (SIDS) based on the United Nations' classification. This is an indicator variable where 1 is an affirmative label, meaning that an economy is an SIDS. This classification is designated by the United Nations.

- **Urban Population:** This variable measures urban population growth. Urban population refers to people living in urban areas as defined by national statistical offices. It is calculated using World Bank population estimates and urban ratios from the United Nations World Urbanization Prospects. The data were transformed to reflect a decimal, rather than a percentage value. The data are from The World Bank as Urban Population Growth (annual %). Annual data from 1990 to 2018 are used.

  - Urbanization correlates with shift from agriculture-based economies to mass industry, technology, and services-generating economies. These additional sectors generate jobs and income, therefore contributing to GDP. In addition, there are observable relationships between urbanization and opportunities for higher education, social mobilization, and women's empowerment, therefore building human capital and productivity effects, further contributing to GDP.

- **Wage and Salaried Workers:** This variable measures the proportion of total employment that represents workers who receive wages and salaries. Wage and salaried workers hold "paid employment jobs," where the incumbents hold explicit or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they work. The data are from The World Bank as Wage and salaried workers, total (% of total employment). Annual data from 1991 to 2019 are used. The data were transformed to reflect a decimal, rather than a percentage value.

  - This variable captures the impact of women seeking and attaining formal labor force positions, specifically those compensated through wages and salaries. With greater formal employment opportunities for women, more workers earn wages and contribute to output resulting in profit, both of which are contributors to GDP.

- **Wage and Salaried Workers, Female:** This variable measures the proportion of total female employment that represents female workers who receive wages and salaries. Wage and salaried workers hold "paid employment jobs," where the incumbents hold explicit or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they

work. The data are from The World Bank as Wage and salaried workers, female (% of female employment). Annual data from 1991 to 2019 are used. The data were transformed to reflect a decimal, rather than a percentage value.

- This variable captures the impact of women seeking and attaining formal labor force positions, specifically those compensated through wages and salaries. With formal employment, the women in these positions earn wages and contribute to output resulting in profit, both of which are contributors to GDP.

VARIABLES CONSIDERED

- **Education:** Several education variables were considered including lower secondary education attainment, primary education attainment, primary school completion rate, primary school enrollment, and secondary school enrollment. All data were gathered from the World Bank. Lower secondary education attainment and primary education attainment were excluded because the number of observations were too few for the regression. The variables could not be included without severely reducing the integrity of the model. Primary school completion rate, primary school enrollment, and secondary school enrollment were excluded because the coefficients on them were not statistically significant and therefore added no value to the models as control variables.

- **Fragile and Conflict Affected States (FCS):** This variable indicated whether an economy is classified as a fragile and conflict affected state by the World Bank. When including this variable in the model, the coefficient on FCS was not statistically significant and therefore added no value to the models as a control variable.

- **GDP:** Several alternative GDP variables were considered, including GDP Constant LCU, GDP Current LCU, and GDP Current US$. All data were gathered from the World Bank. These were excluded because they did not add value to the model.

- **MFaverage:** This variable is an average of ratio agriculture employment, ratio industry employment, and ratio services employment. In other words, this variable measures the average of the proportion of men to women who are employed in agriculture, industry, and services. The data are collected from the World Bank. This variable was omitted due to collinearity with the individual ratio agriculture employment, ratio industry employment, and ratio services employment variable.

- **Global Gender Gap Index:** This variable measures the gap between men and women in 14 indicators across four categories. The categories are economic participation and opportunity, educational attainment, health and survival and political empowerment. The variable provides a score between 0 (inequality) and 1 (equality) for each economy. Because the data were only collected since 2006, the number of observations were too few for the regression. The variable could not be included without severely reducing the integrity of the model. Further, when including this variable in the model, the coefficient on it was not statistically significant and therefore added no value to the models as a control variable.

- **Productivity:** This variable measures the annual growth rates of labor productivity. Labor productivity represents the total volume of output (measured in terms of Gross Domestic Product, GDP) produced per unit of labor (measured in terms of the number of employed persons) during a given time reference period. The data were gathered from the ILO as SDG indicator 8.2.1 - Annual growth rate of output per

worker (GDP constant 2010 US $) (%) – Annual. The data were transformed to a moving average of the variable. The variable was excluded because the estimates contained large standard errors, most likely due to collinearity.

- **Women, Business and the Law Index:** This variable measures an economy's laws and regulations affecting women's economic opportunity. It scores each economy on a scale of 0 to 100 based on sub-scores in eight areas: mobility, workplace, pay, marriage, parenthood, entrepreneurship, assets, and pension. The data were gathered from the World Bank Women, Business and the Law. When including this variable in the model, the coefficient on it was not statistically significant and therefore added no value to the models as a control variable.

Endnotes

i The full scoring results for the criteria is provided in Annex 1.

ii The authors considered fixed effects as our primary model, but decided against this decision because the data lacked year-to-year variation by economy. Because the intra-economy change is only one instance at most per economy, there was not much variation and fixed effect models depend on that variation. As a result, the computational cost of using fixed effects was too high and pooled OLS allowed the authors to investigate further with lower variation between year-to-year. We ran a fixed effects model alongside the pooled OLS to confirm whether the findings were consistent and that was confirmed. With no substantial differences between pooled OLS and the fixed effects models, pooled OLS fit our model needs better and became the chosen solution.

Annex 1: Multiple Hurdle Indicator Scoring Results

The following table provides the selection scoring for all 106 potential reforms.

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Unmarried women and unmarried men have equal rights to property (Y/N)	1	1	0			2
Married women and married men have equal rights to property (Y/N)	1	1	0			2
Equality of inheritance rights between sons and daughters (Y/N)	1	1	0			2
Equality of inheritance rights between husbands and wives (Y/N)	1	1	0			2
Proportion of women population ages 15 and older that is economically active (%)	0					0
Ratio of female to male labor force participation (in %)	0					0
Female mandatory retirement age	1	0				1
Commercial banks (per 100,000 adults)	0					0
SIGI "Access to Credit" measurement of women's right and de facto access to bank loans (Score =0, .5, or 1)	0					0
Existing law against discrimination by creditors on the basis of sex or gender in access to credit (Y/N)	1	1	1	1	1	5
Existing law against discrimination by creditors on the basis of marital status in access to credit	1	1	1	1	0	4
Saved at a financial institution, female (% age 15+)	0					0
Loan from a financial institution, female (% age 15+)	0					0

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Minimum loan amounts required to be included in credit bureau (% of income per capita)	0					0
Reporting of formal micro-loans to credit bureaus (Y/N)	1	1	0			2
Reporting of retail loan satisfaction to credit bureaus (Y/N)	1	1	1	1	0	4
Reporting of utility bill payments to credit bureaus (Y/N)	1	1	1	1	1	5
Improved water source (rural %)	0					0
Use of improved sanitation facilities (rural %)	0					0
Improved water source (urban %)	0					0
Use of improved sanitation facilities (urban %)	0					0
Effectiveness of anti-monopoly policy (scale of 1-7)	0					1
Extent of market dominance (scale of 1-7)	0					1
Intensity of local competition (scale of 1-7)	0					1
Access of domestic companies to international markets (scale of 0-100)	0					0
Proportion of contributing family members (% of total employed)	0					0
Female unemployment rate (% of female labor force, modeled ILO estimate)	0					0
SIGI "Access to Public Space" measurement of restrictions women face in accessing public space (Score 0, 0.5, or 1)	0					0

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Existing laws mandating non-discrimination based on gender in hiring (Y/N)	1	1	0			2
Wage equality between women and men for similar work (score of 0 to 1)	0					0
Whether non-pregnant and non-nursing women can do the same jobs as men under the law (Y/N)	1	1	1	0		3
Whether non-pregnant and non-nursing women can work in mining in the same way as men (Y/N)	1	1	1	0		3
Whether non-pregnant and non-nursing women can work in construction in the same way as men (Y/N)	1	1	0			2
Whether non-pregnant and non-nursing women can work in factories in the same way as men (Y/N)	1	1	0			2
Whether non-pregnant and non-nursing women can work in jobs requiring lifting weights above a threshold in the same way as men (Y/N)	1	1	0			2
Whether women can work the same night hours as men (Y/N)	1	1	0			2
How close women are to achieving parity with men in literacy; net primary school enrollment; net secondary school enrollment; and gross tertiary enrollment (scale of 0-100)	0					0
Mean scores of girls in math (scale of 700)	0					0
Mean scores of girls in reading (scale of 700)	0					0

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Ratio of boys' scores to girls' scores in math	0					0
Ratio of boys' scores to girls' scores in reading	0					0
Percentage of female secondary education, vocational pupils (%)	0					0
Prevalence of anemia among women of reproductive age (% of women ages 15-49)	0					0
Maternal mortality (ratio, per 100,000 live births)	0					0
Female population 15+ living with HIV/AIDS (%)	0					0
Hospital Beds (per 10,000 population)	0					0
Attended births (% of live births)	0					0
Whether there is legislation that specifically addresses domestic violence (Y/N)	1	1	0			2
Whether there is a specialized court or procedure for cases of domestic violence (Y/N)	1	1	0			2
Existence of legislation against sexual harassment in employment (Y/N)	1	1	0			2
Existence of women's legal protection from domestic violence such as rape, assault, and harassment (score of 0,.25, .5, .75, or 1)	1	0				1
Whether economies maintain continuous, permanent, compulsory and universal recording of vital events (notably, live births, deaths and causes of death)	1	0				1

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Whether a married woman apply for a passport in the same way as a married man (Y/N)	1	1	0			2
Can an unmarried woman apply for a passport in the same way as an unmarried man (Y/N)	1	1	0			2
Can a married woman sign a contract in the same way as a married man (Y/N)	1	1	0			2
Can an unmarried woman sign a contract in the same way as an unmarried man (Y/N)	1	1	0			2
Can a married woman register a business in the same way as a married man (Y/N)	1	1	0			2
Can an unmarried woman register a business in the same way as an unmarried man (Y/N)	1	1	0			2
Does a woman's testimony carry the same evidentiary weight as a man's (Y/N)	1	0				1
Is there a small claims court or a fast track procedure for small claims (Y/N)	1	0				1
Average time spent on unpaid work, female (minutes per day)	0					0
Whether the law mandates equal remuneration for men and women for work of equal value (Y/N)	1	1	1	0		3
Whether it is illegal for an employer to ask about family status during a job interview (Y/N)	1	1	1	1	0	4

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Whether there are laws penalizing or preventing the dismissal of pregnant women (Y/N)	1	1	0			2
Whether employers must give employees an equivalent position when they return from maternity leave (Y/N)	1	1	1	1	1	5
Whether the law mandates paid or unpaid maternity leave (Y/N)	1	1	0			2
Mobile phone subscriptions as percentage of the population, total (%)	0					0
Percentage of total population covered by a mobile network signal (%)	0					0
Percentage of population who are internet users, total (%)	0					0
Percentage of population who are internet users, female (%)	0					0
Used the internet to pay bills or buy something online in the past year, female (% age 15+)	0					0
Used the internet to pay bills or buy something online in the past year, male (% age 15+)	0					0
Received digital payments in the past year, female (% age 15+)	0					0
Affordability: Mobile cellular tariffs, average per-minute cost ($ PPP)	0					0
Government online service (scale of 0-1)	0					0

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Impact of ICTs on access to basic services (access of all citizens basic online services – health, education, financial) (scale of 1-7)	0					0
Use of virtual social media networks (how widely used) (scale of 1-7)	0					0
Percentage of female graduates from tertiary education graduating from STEM fields, female (%)	0					0
Percentage of female graduates from tertiary education graduating from Engineering, Manufacturing and Construction female (%)	0					0
Percentage of women researchers (%)	0					0
Percentage of women R&D personnel (%)	0					0
Household air quality (scale of 0-100)	0					0
Exposure to air pollution (scale of 0-100)	0					0
Wastewater treatment (scale of 0-100)	0					0
Pesticide regulation (scale of 0-100)	0					0
Fish stocks (scale of 0-100)	0					0
Does the law grant spouses equal administrative authority over assets during marriage? (Y/N)	1	1				2
Can a woman be head of household in the same way as a man? (Y/N)	1	0				1
Does the law provide for the valuation of nonmonetary contributions? (Y/N)	1	1				2

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Is the mandatory retirement age for men and women equal? (Y/N)	1	1				2
Are the ages at which men and women can retire with full pension benefits equal? (Y/N)	1	1				2
Are the ages at which men and women can retire with partial pension benefits equal? (Y/N)	1	1				2
Are women able to work in the same industries as men? (Y/N)	1	1	1	1	1	5
Are periods of absence due to childcare accounted for in pension benefits? (Y/N)	1	1	1	1	0	4
Can a woman open a bank account in the same way as a man? (Y/N)	1	1				2
Can women work in jobs deemed dangerous in the same way as men? (Y/N)	1	1				2
Are women able to work in the same types of jobs as men? (Y/N)	1	1	1	1	0	4
Can parents work flexibly? (Y/N)	1	0				1
Is paid leave of at least 14 weeks available to women? (Y/N)	1	0				1
Does the government administer 100% of maternity leave benefits? (Y/N)	1	0				1
Does the law mandate nondiscrimination based on gender in promotions? (Y/N)	1	1	1	1	0	4
Does the law mandate nondiscrimination based on gender in dismissal? (Y/N)	1	1	1	1	0	4

Indicator	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Score
	Legal Basis	Appropriate for EC	Improvement and Variation	Data Availability	Evidenced	
Is paid leave available to fathers? (Y/N)	1	0				1
Can a woman obtain a judgment of divorce in the same way as a man? (Y/N)	1	0				1
Does a woman have the same rights to remarry as a man? (Y/N)	1	0				1
Are there criminal penalties or civil remedies for sexual harassment in employment? (Y/N)	1	0				1
	55	*42*	*14*	*11*	*4*