Basic Amenities, Economic Structure, and Female Labor Force Participation: Cross-Regional Panel Evidence

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Abstract

Using a panel of 140 countries over 2000–2020, this paper brings a harmonized basic-amenities measure into a region-comparative macro analysis of FLFPR using a panel of 140 countries for 2000–2020. The main specification uses country fixed effects with Driscoll–Kraay standard errors and runs separately for seven world regions so that income gradients and labor-demand margins can differ by context. Economic development is proxied by ln(GDP per capita) and its squared term, while the employment structure is captured by sectoral employment shares. Living conditions are summarized in a Standard of Living Index (SLI) composed of access to clean cooking, electricity, basic drinking water, and basic sanitation. Across regions, services employment is the most frequent correlate of higher FLFPR, agriculture remains an important participation margin in several regions, and SLI retains explanatory power in selected samples also after conditioning on income terms and sectoral composition. For completeness, a dynamic panel model is reported that describes persistence in FLFPR. With regard to interpretation of determinants, this study grounds the discussion in the fixed-effects results. Results point to policy packages that combine women-accessible job creation with investments that reduce domestic time burdens and ease constraints on mobility and work–family balance.

Keywords: female labor force participation; economic development; employment structure; basic amenities; regional heterogeneity

JEL: J16, J21, O15, C23

1. Introduction

Women account for half of the world's population, yet women's paid work remains uneven across countries and over time. Female labor force participation (FLFPR) matters for equity and for efficiency: economies build long-run growth capacity through how they allocate skills and talent across the population (Psacharopoulos & Tzannatos, 1989; Winkler, 2022). Even with gains in education and health, many regions continue to show persistent gaps in women's engagement with labor markets, and these gaps often move in ways that standard macro indicators do not capture well (Kapsos et al., 2014; Verick, 2018). A central reason is that market work decisions interact with household production and care responsibilities. Women continue to spend large amounts of time on unpaid care work, which constrains the time and flexibility they can devote to paid employment (Ferrant et al., 2014). These constraints operate alongside local labor demand, institutions, and social norms that shape which jobs exist, which jobs are acceptable, and the conditions under which women can participate (Chen et al., 2014; Narayan et al., 2021).

This paper builds a region-comparative panel framework to quantify how development and key constraints move with FLFPR across major world regions. The analysis uses a panel of 140 countries for 2000–2020 and focuses on within-country changes over time. Economic development is represented by ln(GDP per capita) while allowing for nonlinearity, and labor demand is captured through the sectoral composition of employment. The paper adds a measure of living conditions that directly relates to women's daily time burdens and health risks: a Standard of Living Index (SLI) combining access to clean cooking fuels and technologies, electricity, basic drinking-water services, and basic sanitation services into a single amenity-based indicator. The SLI is designed to capture an aspect of development that can diverge from

headline income measures and that is closely tied to constraints on women's time allocation and market work feasibility.

South Asia illustrates why this joint framing is useful. The region combines rapid economic change with slow-moving norms and heterogeneous labor market opportunities. India's female participation has received attention for declining over parts of the growth period despite rising education and changing aspirations, pointing to frictions that go beyond income alone (Mehrotra & Parida, 2017). Neighbouring countries exhibit distinct trajectories shaped by differences in sectoral growth paths, demographic dynamics, and policy environments (Rahman & Islam, 2013). Recent work also highlights how norms, safety, and job structure shape women's work outcomes across South Asian contexts (Boccuzzi, 2021). Comparable cross-country heterogeneity is visible beyond South Asia, including within SSAand island economies in the Pacific, where informality and sector mix vary sharply across countries (Agu & Aguegboh, 2021; Adejumo & Obisanya, 2024). These contrasts motivate an approach that keeps interpretation within regions rather than forcing one global coefficient to represent contexts with different constraint bundles and labor-market structures.

The empirical strategy estimates region-specific fixed-effects panel models and uses Driscoll–Kraay standard errors to address heteroskedasticity, serial correlation, and cross-sectional dependence common in macro panels, complemented by a dynamic panel specification as a robustness layer (Hoechle, 2007; Pesaran, 2007; Born & Breitung, 2016; Arellano & Bond, 1991; Baltagi, 2021). By combining nonlinearity in income, sectoral employment structure, demographic conditions, and the amenity-based SLI in one region-comparative framework, the paper provides a consistent basis for comparing how women's participation moves with development and living conditions across world regions.

The paper is organised as follows. Section 2 reviews the related literature. Section 3 describes the data and methods. Section 4 presents the results and discussion. Section 5 concludes with a summary and policy implications.

2. Literature Review

Literature on cross-country analysis on women's labor force participation has developed around several recurring mechanisms. One line of research focuses on development gradients and the possibility that participation varies nonlinearly with economic development. Early contributions described a path in which women's participation is relatively high in agrarian settings, falls during early industrialization, and rises later with structural change toward services, rising education, and falling fertility (Sinha, 1965; Boserup, 1970; Durand, 1975; Goldin, 1995; Tam, 2011). Later cross-country studies using larger panels and alternative definitions of work treat the nonlinearity as a useful organizing idea while emphasizing that its timing and steepness vary across regions with different institutions, norms, and labor-market structures (Goldin, 1995; Mammen & Paxson, 2000; Gaddis & Klasen, 2014; Verick, 2014; Kapsos et al., 2014; Gasparini & Marchionni, 2015; Verick, 2018). This literature supports flexible income specifications and cautions against interpreting pooled global estimates as if countries share the same development path.

A closely related strand argues that participation depends on the nature of structural change and the types of jobs created during growth. Sectoral employment shares capture shifts in labor demand and can reflect whether expanding sectors generate jobs that women can enter and sustain. Services expansion is frequently discussed as a channel through which paid-work

options widen, whereas growth concentrated in sectors that absorb fewer women or are dominated by informality can limit participation gains (Fox et al., 2013; Kapsos et al., 2014; Verick, 2018). The relevance of these sectoral channels differs across regions. Work on South Asia and the MENA highlights settings where limited suitable jobs, informality, and institutional and social barriers can push women toward unpaid family work or out of the labor force even during growth episodes (Fox & Gaal, 2008; Chatterjee et al., 2018). Studies on advanced economies similarly connect participation trends to sectoral shifts, rising education, and expansion of white-collar and service employment, offering a further explanation for cross-country differences even among high-income contexts (Klasen & Pieters, 2015). This body of work implies that the mapping from employment structure to women's participation is unlikely to be uniform across regions.

A third theme emphasizes demographic change, family constraints, and institutional settings. Fertility and childcare burdens can bind women's labor supply, while policy arrangements—such as childcare provision and parental leave design—can relax or tighten those constraints (Cooke, 2010; Thévenon, 2013; Thévenon & Pero, 2015; Kang, 2017; Paulsen, 2019). Participation outcomes also depend on gender norms, intra-household bargaining, and the extent to which women can translate education into paid employment (Becker, 1993; Duflo, 2012; Heath & Jayachandran, 2016; Kabeer, 2016). Evidence from South Asia stresses that rising education does not necessarily translate into higher participation when labor demand, marriage patterns, informality, and norms jointly constrain women's work choices (Sudarshan, 2014; Mehrotra & Parida, 2017; Rahman & Islam, 2013; Boccuzzi, 2021). Related arguments appear in work on MENA, where social constraints can limit translation of improved conditions into higher female participation (Assaad, 2014; Narayan et al., 2021).

A policy-based literature links women's paid work to basic amenities and infrastructure that affect the time and health costs of household production. Electricity, clean water, sanitation, and clean cooking can reduce time spent collecting fuel and water and lower disease burdens, which can alter the feasible set of market-work options for women in contexts where unpaid care and domestic work is heavily gendered (Ferrant et al., 2014; Koolwal & van de Walle, 2013). Empirical studies show that infrastructural upgrades can coincide with shifts in labor supply and economic opportunity, although patterns vary with local labor-market conditions and institutional environments (Dinkelman, 2011; Grogan & Sadanand, 2013). Evidence from contexts where mobility restrictions and acceptability norms remain binding indicates that amenities may not translate into higher participation when labor demand and social barriers still limit women's work options, which motivates considering amenities jointly with labor demand and demographic constraints (Chen et al., 2014; Fletcher et al., 2017; Narayan et al., 2021).

Methodologically, cross-country panels of FLFPR face heteroskedasticity, serial correlation, and cross-sectional dependence driven by shared shocks and regional co-movement (Hoechle, 2007; Pesaran, 2007; Born & Breitung, 2016). Fixed-effects models are widely used to absorb time-invariant country characteristics, but uncertainty statements can be misleading when macro-panel error structures are ignored (Hausman, 1978; Wooldridge, 2010; Baltagi, 2021). Persistence in participation has also motivated the use of dynamic panel estimators in parts of the broader literature (Arellano & Bond, 1991). These econometric concerns motivate strategies that combine fixed effects with inference procedures suited to macro panels and complementary checks that consider dynamics.

Taken together, existing work provides clear mechanisms for thinking about FLFPR, but three gaps remain salient for cross-regional macro panels. First, amenities are often captured using single indicators or studied mainly through single-country designs, leaving limited cross-regional evidence based on a harmonized bundle of basic services closely tied to time-cost mechanisms (Dinkelman, 2011; Ferrant et al., 2014; Koolwal & van de Walle, 2013). Second, many tests of income nonlinearity do not place amenity constraints and sectoral composition into one regional framework, even though the same income level can coincide with sharply different labor markets and constraint environments across regions (Goldin, 1995; Mammen & Paxson, 2000; Kapsos et al., 2014; Verick, 2018). Third, empirical implementations do not always address cross-sectional dependence and serial correlation at the regional level, which can weaken inference in macro panels (Hoechle, 2007; Pesaran, 2007; Born & Breitung, 2016). This paper responds in three steps. It constructs a Standard of Living Index (SLI) from four amenity indicators—access to clean cooking fuels and technologies, electricity, basic drinking water services, and basic sanitation services—so that living standards relevant to household production constraints enter the analysis in a comparable way across countries and years (Dinkelman, 2011; Ferrant et al., 2014). It then estimates region-specific panel models that include ln(GDPPC) and $\ln(\text{GDPPC})^2$, allowing the income–participation relationship to differ across contexts while embedding sectoral employment structure and amenity conditions in one specification rather than relying on a single global coefficient. Related arguments on heterogeneity across contexts appear in Goldin (1995), Klasen & Pieters (2015), Fox & Gaal (2008), and Chatterjee et al. (2018). Finally, the baseline fixed-effects specification applies Driscoll–Kraay standard errors to address heteroskedasticity, serial correlation, and cross-sectional dependence, and reports a dynamic panel model as a complementary check on persistence (Arellano & Bond, 1991; Hoechle, 2007; Pesaran, 2007; Baltagi, 2021).

3. Materials and Methods

3.1. Data and Variables

The study utilizes panel data for 140 countries spanning the period 2000-2020, sourced from the World Development Indicator (WDI) database. The selection of countries and time frame is based on the availability of the data for the key variables in the full sample analysis. In addition to the full sample, we conduct subsample analysis by disaggregating the dataset into seven regional groups to investigate the factors influencing FLFPR across different regions to account for heterogeneity across different socio-economic and cultural settings. These regional groupings are as follows: Asia (excluding South Asia); Europe; Latin America and Caribbean (LAC); Middle East and North Africa (MENA); Pacific; Sub-Saharan Africa (SSA); and South Asia.

Table 1 highlights the key outcome and independent variables, providing a description, symbol and source of the variables used in the model estimations. The outcome variable, *Female Labor Force Participation rate* (FLFPR), defined as the proportion of women aged 15-64 years who are either employed or actively seeking employment within the same age group. Standard of living Index (SLI) directly influences women's time distribution between domestic obligations and economic undertakings. Enhancements in these amenities alleviate the load of unpaid household chores such as water procurement, meal preparation, and sanitation, thereby affording women greater opportunities to engage in labor market. The employment proportion in the service sectors (EMPSER), industry sector (EMPTIND) and agriculture sector (EMPAG) signify economic diversification and augmented labor market opportunities for women. Economies transitioning from agriculture generally offer superior quality, formal employment alternatives, which are more accessible to women. This structural transformation has been

empirically correlated with elevated female labor participation rates as evidenced in European and East Asian economies (Kühn, 2019).

Table 1. Variable Description and Measurement

Variable	Symbol	Measurement/ Description	Variable Name (Dependent Variable)
Dependent Variable			
Female Labour Force Participation Rate	FLFPR	Proportion of the female ages 15-64 who are in labor force	International Labour Organization (ILO)
Independent Variables			
Standard of Living Index	SLI	Constructed using ACFT, AE, PUBDWS and PUBSS[1] using Principal Component Analysis (PCA)	IEA, IRENA, UNSD, World Bank
Economic Development	GDPPC	GDP per capita in natural log form (constant 2015 US$)	World Bank
Employment in Service	EMPSER	Employment in Service (% of total employment)	ILO
Employment in industry	EMPTIND	Employment in industry (% of total employment)	ILO
Employment in Agriculture	EMPAG	Employment in Agriculture (% of total employment)	ILO
Urban population	UP	Urban population (% of total population)	United Nations Population Division
Unemployment	UMPT	Unemployment, total (% of total labor force)	International Labour Organization
Vocational Enrolment	VET	Vocational Enrolment (% of Total Secondary Enrolment)	UNESCO Institute for Statistics
Fertility rate	FR	number of children that would be born to each woman if she were to live to the end of her childbearing years	United Nations Population Division and Census reports

The unemployment rate (UMPTT) is a pivotal indicator of labor market conditions, affecting women's choices to enter or persist in the labor force. High unemployment rates, particularly among women, deter labor market participation owing to diminished available opportunities and potential discrimination. Urbanisation (UP) enhances access to various employment prospects, infrastructure, and social services, positively correlating with increased FLFPR. Urban areas provide more formal job markets, shorter commuting durations and improved childcare amenities, facilitating participation among women. The fertility rate (FR)

[1] ACFT is Access to clean fuels and technologies for cooking (% of the population), AE is Access to electricity (% of the population), PUBDWS is People using at least basic drinking water services (% of the population) and PUBSS is People using at least basic sanitation services (% of population). Summary statistics of these variables is present in table A1 in appendix.

significantly affects women's labor supply decisions. Declining fertility rates are linked to increased female participation rate due to reduced domestic childcare obligations and increased availability for employment. Vocational education (VET) endows women with specialised, market-responsive competencies, directly augmenting their employability and economic self-sufficiency.

Table 2. Summary Statistics of Variables across Regions

Variable	Mean (Overall)	Std. Dev. (Overall)	Std. Dev. (Between)	Std. Dev. (Within)	Min	Max	Obs.
Full sample							
FLFPR	54.38	17.07	16.81	3.25	6.17	86.25	2940
SLI	0.78	0.28	0.28	0.06	0	1	2940
EMPSER	55.21	17.30	16.97	3.61	10.54	89.15	2940
FR	2.67	1.43	1.40	0.29	0.79	7.73	2940
Ln(GDPPC)	8.74	1.39	1.38	0.19	5.76	11.63	2940
UMPTT	7.57	5.58	5.17	2.14	0.10	37.32	2940
UP	60.82	22.38	22.29	2.71	12.98	100	2940
VET	35.16	26.93	26.84	3.10	0.05	94.55	2940
European							
FLFPR	64.32	10.18	9.82	3.10	24.69	86.25	861
SLI	0.96	0.08	0.08	0.02	0.52	1.00	861
EMPSER	63.08	12.15	11.76	3.53	29	88.86	861
EMPTIND							
FR	1.57	0.25	0.22	0.12	1.08	2.53	861
Ln(GDPPC)	9.68	1.06	1.06	0.19	7.13	11.63	861
UMPTT	9.71	6.15	5.39	3.06	1.81	37.32	861
UP	69.46	12.61	12.61	1.95	41.74	98.08	861
VET	16.98	14.39	14.32	2.61	3.04	65.14	861
LAC							
FLFPR	54.97	9.08	8.60	3.37	36.07	75.67	525
SLI	0.84	0.16	0.15	0.04	0.20	1.00	525
EMPSER	60.63	9.66	9.47	2.66	37.74	80.62	525
FR	2.35	0.63	0.57	0.28	1.36	4.58	525
Ln(GDPPC)	8.71	0.68	0.68	0.15	7.15	9.84	525
UMPTT	7.83	4.74	4.43	1.89	1.20	22.21	525
UP	64.34	17.50	17.59	2.97	18.45	95.52	525
VET	33.93	14.76	14.80	2.65	9.28	76.61	525
Middle East and North Africa							
FLFPR	29.54	15.86	15.73	4.00	6.17	69.23	420
SLI	0.86	0.22	0.21	0.07	0	1	420
EMPSER	60.83	11.64	11.09	4.3	34.7	82.42	420
EMPAG	12.77	11.56	11.46	2.93	0.91	49.62	420
FR	2.87	0.96	0.92	0.34	1.13	6.32	420
Ln(GDPPC)	9.02	1.15	1.17	0.16	6.59	11.2	420
UMPTT	9.36	6.14	5.91	2.11	0.1	29.77	420

UP	75.04	17.81	18.07	2.47	26.27	100	420
VET	19.82	15.96	16.17	2.4	0.05	58.11	420
			Pacific				
FLFPR	58.70	13.59	13.87	3.28	36.08	85.15	210
SLI	0.70	0.30	0.31	0.04	0.04	1.00	210
EMPSER	60.96	17.13	17.76	2.85	28.59	86.76	210
EMPAG	3.21	1.00	1.03	0.22	1.58	4.76	210
Ln(GDPPC)	8.97	1.23	1.29	0.09	7.33	10.98	210
UMPTT	5.10	3.48	3.42	1.23	0.69	15.32	210
UP	47.79	30.26	31.78	1.58	12.98	94.94	210
VET	38.52	25.91	27.14	2.21	9.74	80.37	210
			SSA				
FLFPR	57.37	14.01	14.14	2.76	26.93	85.90	357
SLI	0.26	0.18	0.17	0.06	0	0.75	357
EMPTIND	11.48	5.55	5.41	1.77	2.93	24.88	357
EMPAG	55.91	16.37	16.06	4.94	22.25	85.28	357
FR	5.47	0.92	0.88	0.35	3.55	7.73	357
Ln(GDPPC)	7.02	0.91	0.92	0.14	5.82	9.56	357
UMPTT	6.2	5.69	5.72	1.2	0.32	22.52	357
UP	43.22	17.07	17.17	3.63	16.19	90.09	357
VET	78	15.48	15.73	2.46	30.83	94.55	357
			Asia				
FLFPR	59.98	10.61	10.43	2.95	30.30	78.32	441
SLI	0.78	0.23	0.22	0.08	0.11	1	441
EMPSER	50.84	19.39	19.37	4.23	13.4	89.15	441
FR	2.29	0.98	0.95	0.32	0.79	6.02	441
Ln(GDPPC)	8.5	1.48	1.48	0.28	5.76	11.5	441
UMPTT	4.11	2.64	2.39	1.22	0.14	15.13	441
UP	55.89	25.99	26.39	3.25	18.59	100	441
VET	39.53	24.27	24.26	5.24	3.1	88.54	441
			South Asia				
FLFPR	31.52	15.23	16.24	3.21	15.74	68.50	126
SLI	0.55	0.19	0.14	0.13	0.01	0.90	126
EMPSER	29.92	6.88	6.62	3.25	13.85	40.88	126
EMPAG	53.78	10.19	9.39	5.46	37.42	73.22	126
FR	3.44	1.5	1.51	0.58	1.43	7.53	126
Ln(GDPPC)	6.91	0.51	0.49	0.26	5.87	8.08	126
UMPTT	6.11	3.44	3.57	1.04	0.4	13.08	126
UP	28.65	7.15	7.02	3.11	13.4	42.32	126
VET	73.37	10.69	11.18	3.05	54.36	91.79	126

Summary statistics for the full sample and by region are provided for the key variables used in the baseline estimations in Table 2. For the full panel, the FLFPR averages in the mid-50s, while there is significant cross-country dispersion. Similarly, the SLI is very diverse across countries, reflecting large differences in access to basic amenities. Employment structure

variables show distinct heterogeneity: the share of employment in services is relatively higher in advanced regions and lower in agrarian economies, while agriculture is more concentrated in low-income regions. Fertility rates, on the other hand, are lowest in advanced regions and highest in Sub-Saharan Africa, in line with the pattern of demographic transition. Ln(GDPPC) is quite diverse across the sample, with the highest values in Europe and the lowest in SSAand South Asia. Unemployment rates and urban population shares also vary meaningfully across regions, in a way that captures variation in labor-market tightness as well as in the level of urbanization. Vocational enrolment also varies across regions, suggesting variation in skills orientation as well as education systems across regions.

Across regions, Europe has the highest mean SLI and the highest mean income levels, combined with relatively high urbanization and comparatively low fertility. Latin America and the Caribbean, along with the Middle East and North Africa, have intermediate SLI levels, with moderate-to-high urbanization and lower fertility than Sub-Saharan Africa, although female participation differs markedly between the two. The Pacific group exhibits substantial within region dispersion on a number of indicators, reflecting a range of income levels and differential access to infrastructure among island economies. SSA is the region with the lowest mean SLI, the highest fertility, and the lowest mean income levels, as well as a high dependence on agricultural employment. Asia excluding South Asia falls in an intermediate position regarding SLI and income, while the combined characteristics for South Asia include relatively low income and urbanization along with higher fertility compared with most regions outside SSAand a distinct sectoral structure.

3.2. Methodology and Model Specifications

The paper employs the panel data regression to identify the determinants of FLFPR. However, econometric issues such as autocorrelation, endogeneity, and cross-sectional dependence are significant challenges in panel data, which leads to inconsistent coefficient estimations in analysis (Wooldridge, 2012; Baltagi, 2021). Driscoll and Kraay (1998) introduced a covariance matrix estimator robust to cross-sectional dependence, heteroskedasticity, and autocorrelation in panel data analysis. Consider the panel regression model:

$$Y_{it} = X'_{it}\,\beta + \mu_i + \varepsilon_{it}\,, \qquad i = 1,\ldots..,N; \quad t = 1,\ldots\ldots,T \qquad (1)$$

Where Y_{it} is the dependent variable, X'_{it} represents the vector of explanatory variables, β is vector of parameter, and ε_{it} is the error term with potential cross-sectional and temporal dependence. The Driscoll- Kraay estimators is defined as

$$\widehat{\beta_{DK}} = (\mathrm{X`X})^{-1}(\mathrm{X`Y})$$

Where the covariance matrix of estimate, robust of heteroskedasticity and cross-sectional dependence is

$$\widehat{\beta_{DK}} = (\mathrm{X`X})^{-1}[\textstyle\sum_{t=1}^{T}.\sum_{s=1}^{T} K(\frac{t-s}{M}) X_t` \varepsilon_t \varepsilon_s` X_s](\mathrm{X`X})^{-1}$$

Here, K(.) is kernel function with bandwidth M. Thus, the following empirical regression models are estimated using a panel regression technique for different regions. The model is specified as follows:

$$FLFPR_{it} = \alpha_i + \beta_1 SLI_{it} + \beta_2 LnGDPPC_{it} + \beta_3 Ln(GDPPC)^2_{it} + \beta_4 UP_{it} + \beta_5 UMP_{it} + \beta_6 VET_{it} + \beta_7 EMPSER_{it} + \beta_8 FR_{it} + \beta_9 EMPINT_{it} + \beta_{10} EMPAG_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

However, to capture the dynamic nature of FLFPR, the study uses a dynamic panel data regression model incorporating a lagged dependent variable as one of the explanatory variables. The methodology acknowledges the persistence and inertia commonly observed in labour market indicators, addressing the potential endogeneity and autocorrelation by including a lagged dependent variable. We employ the Generalized Methods of Moments (GMM) approach developed by Arellano and Bond (1991) and further refined by Blundell and Bond (1998). The estimators effectively control for unobserved heterogeneity arising from omitted variables or reverse causality. The difference GMM is thus given by,

$$Y_{it} = Y_{it-1} + X'_{it}\beta + \mu_i + \varepsilon_{it} \quad (3)$$

Here, μ_i captures unobserved individual-specific effects. Due to the presence of Y_{it-1}Ordinary Least Squares (OLS), estimates are biased. Differencing removes μ_i,

$$\Delta Y_{it} = \delta \Delta Y_{it-1} + \Delta X'_{it}\beta + \Delta\varepsilon_{it} \quad (4)$$

Moment conditions exploit orthogonality between the differenced errors and lagged levels.

$$E[Y_{it-1}\Delta\varepsilon_{it}] = 0 \qquad \text{for} \qquad s \geq 2;\ t = 3,\ldots\ldots,T$$

Blundell and Bond (1998) improved it with system GMM, using the additional moment conditions for levels

$$E[\Delta Y_{it-1}(\varepsilon_i - \varepsilon_{it})] = 0$$

The GMM estimators is thus given by

$$\widehat{\theta_{GMM}} = (Z`WX)^{-1}(Z`WY)$$

Where Z is the instrument matrix, W is the weighting matrix.

$$FLFPR_{it} = \alpha_i + \delta_1 FLFPR_{it-1} + \delta_2 SLI_{it} + \delta_3 LogGDP_{it} + \delta_4 Ln(GDPPC)^2_{it} + \delta_5 UP_{it} + \delta_6 UMP_{it} + \delta_7 VET_{it} + \delta_8 EMPSER_{it} + \delta_9 FR_{it} + \delta_{10} EMPINT_{it} + \delta_{11} EMPAG_{it} + \mu_i + \varepsilon_{it} \quad (5)$$

Where, $FLFPR_{it}$ is the dependent variable where i denotes the individual/cross sectional units at time t, α_i is the region fixed effect for entity *i*, X'_{it} denotes the vector of independent variables with a (K+1)×1 vector and β denotes the unknown coefficent (K+1) ×1 vector.

4. Results and Discussion

4.1. Descriptive Results

Figure 1 highlights a modest upward shift across 140 countries in the Female Labor Force Participation Rate between 2000 and 2020: the sample mean increases from 52.53 to 55.58, and the median rises from 56.24 to 59.04. Regional averages also exhibit divergent trajectories: Europe increases from 61.23 to 67.82, MENA from 26.83 to 32.38, and Latin America & the Caribbean from 50.82 to 55.39, whereas in SSA it decreases from 58.73 to 54.72 and Asia (excluding South Asia) hovers largely unchanged at 60.18 to 59.94. The low-participation belt remains clear, as South Asia and MENA remain at the lower end of the distribution even after the observed increase; South Asia mean 29.84 to 31.72, MENA mean 26.83 to 32.38. At the country level, two-thirds (66.4%) of countries have higher FLFPR in 2020 relative to 2000, but the overall spread does not narrow: the minimum falls from 10.24 to 6.17, while the maximum shifts slightly from 85.82 to 83.74.

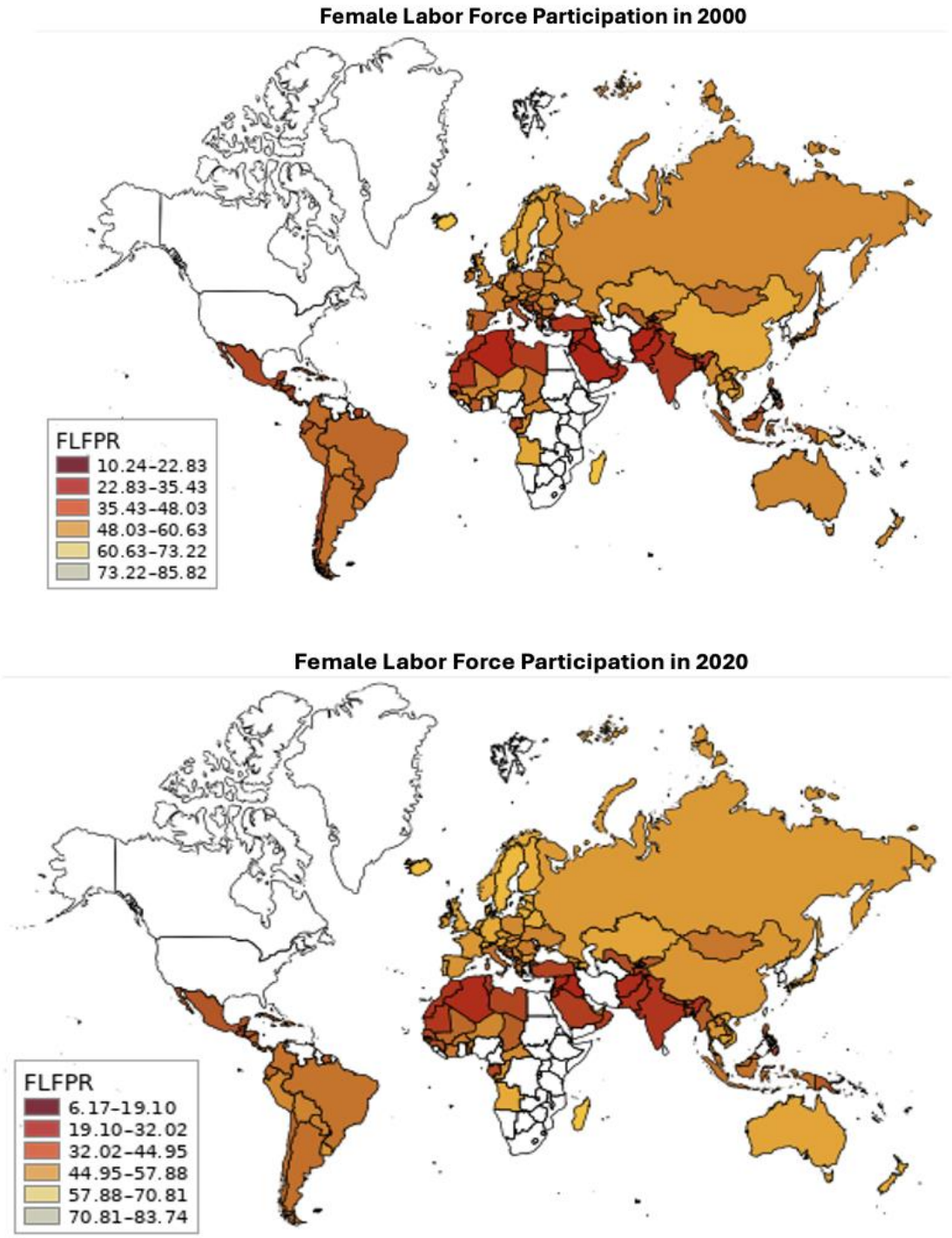
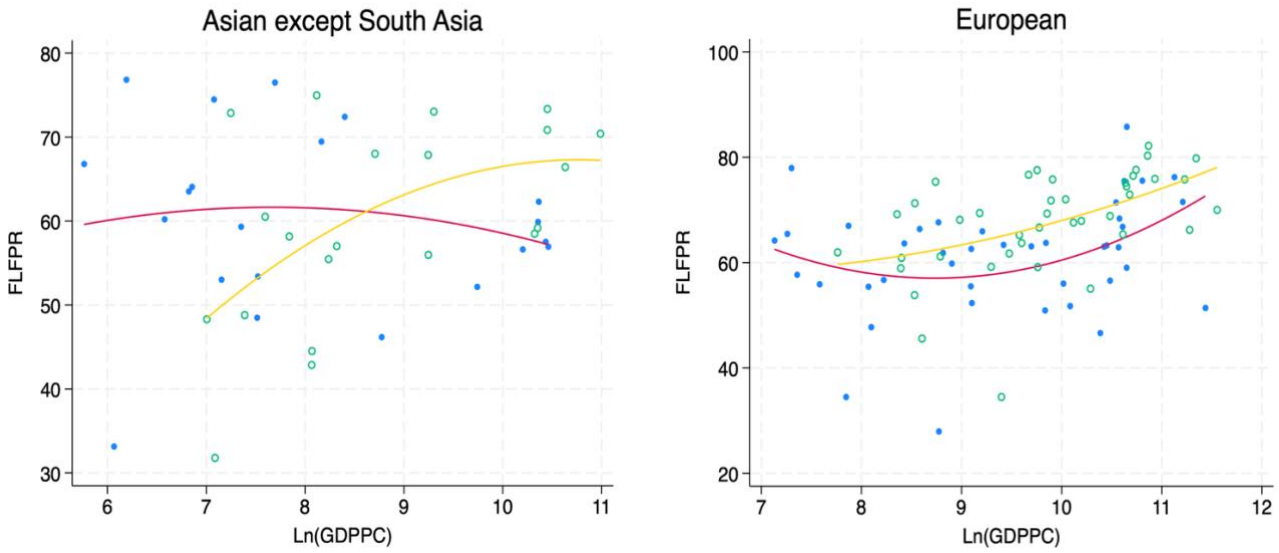


Figure 1. Female labor force participation rate across different regions in 2000 and 2020

Figure 2 provides region-specific scatter plots investigate the relationship between FLFPR and Ln(GDPPC) for 2000 and 2020, with fitted quadratic polynomials superimposed to facilitate comparison of the relationship's shape and position over time. In Europe, the fitted curves are upward sloping across much of the 2020 income range in Latin America and the Caribbean,

signalling higher participation at higher income levels and a more evident "recovery" segment consistent with a U-shaped development pattern. In Asia excluding South Asia, the 2020 curve lies above the 2000 curve at middle-to-high income levels; the 2000 fit is relatively flat, suggesting that participation increased more in the upper portion of the income distribution than at the lower end. The MENA and South Asia display the lowest FLFPR levels across the income spectrum, with upward sloping curves mainly at higher Ln(GDPPC) values, implying that income growth alone is insufficient to raise participation at low-to-middle income levels in these regions. The panels for the Pacific record pronounced curvature and substantial dispersion, reflecting small sample sizes and heterogeneity amongst island economies; accordingly, the steep ascent at higher incomes should be interpreted as descriptive rather than indicative of a stable structural relationship. Overall, the analysis indicates considerable regional differences in the income-participation relationship and changes over time, motivating the estimation of region-specific models and the inclusion of nonlinearity – Ln(GDPPC) and Ln(GDPPC)^2 - within the regression framework.



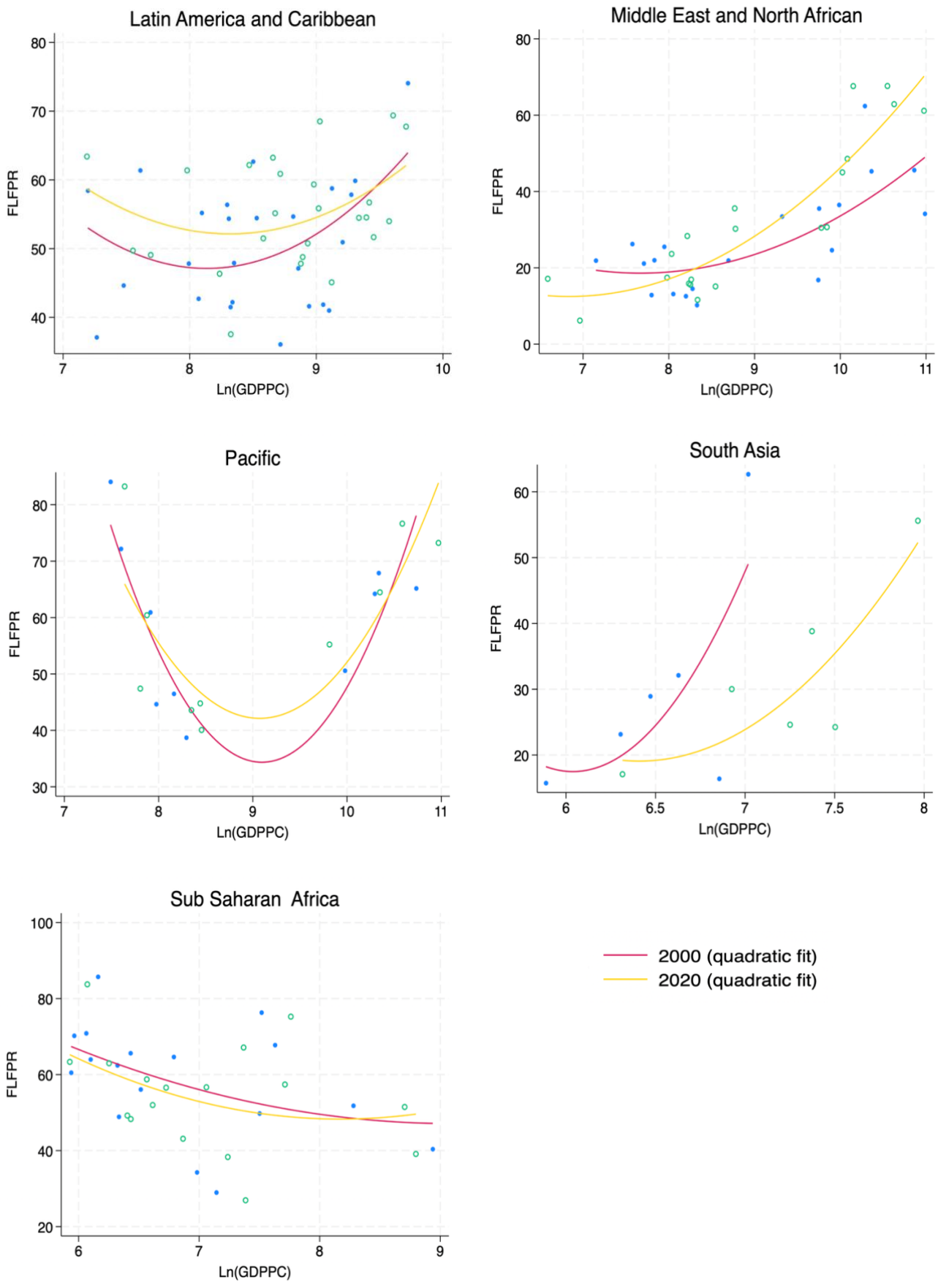

Latin America and Caribbean
FLFPR
Ln(GDPPC)
Middle East and North African
FLFPR
Ln(GDPPC)
Pacific
FLFPR
Ln(GDPPC)
South Asia
FLFPR
Ln(GDPPC)
Sub Saharan Africa
FLFPR
Ln(GDPPC)
2000 (quadratic fit)
2020 (quadratic fit)

Figure 2. Female Labor Force Participation Rate and Economic Development: A Regional Comparison (2000 and 2020)
Source: Authors' compilations

Table A2 shows the within-country correlation (ρ) of the annual growth rate of female labor force participation rate (FLFPR) and the annual growth rate of Ln(GDPPC) for each region. The table lists the number of countries in each region and the regional distribution of ρ (mean, minimum, maximum). As discussed earlier, the most important message here is that the average co-movement based on growth rates is positive in most regions, but in quite varying degrees. That is, the mean correlation is largest in Latin America and the Caribbean (mean ρ = 0.4275, N = 25), moderate in the MENA(MENA) region (0.1811, N = 20) and in South Asia (0.1707, N = 6), smaller in Europe (0.0983, N = 41) and in Asia excluding South Asia (0.0565, N = 21), and slightly negative in the Pacific (−0.0439, N = 10). At the same time, the underlying minimum–maximum ranges indicate that most regions contain both positive and negative ρ values-for example, Asia excluding South Asia ranges from −0.8530 to 0.5274, and Europe from −0.6908 to 0.6163-that is, this signals there is significant cross-country heterogeneity within regions.

This heterogeneity is visualized directly in Figure 3 (Upper Panel) by plotting each country's ρ within its region against a zero reference line. The concentration of points above zero is most visible for Latin America and the Caribbean, consistent with its high mean in Table A2, while Pacific shows a noticeable share of countries below zero, matching its slightly negative regional mean. The figure also makes clear that regions with low mean ρ in Table A2 (such as Europe and Asia excluding South Asia) still contain countries with strongly positive and strongly negative correlations, which explains why their averages are close to zero despite wide dispersion. The most extreme negative outliers appear in Asia excluding South Asia and Europe, which is consistent with the low minimum correlations reported in Table A2.

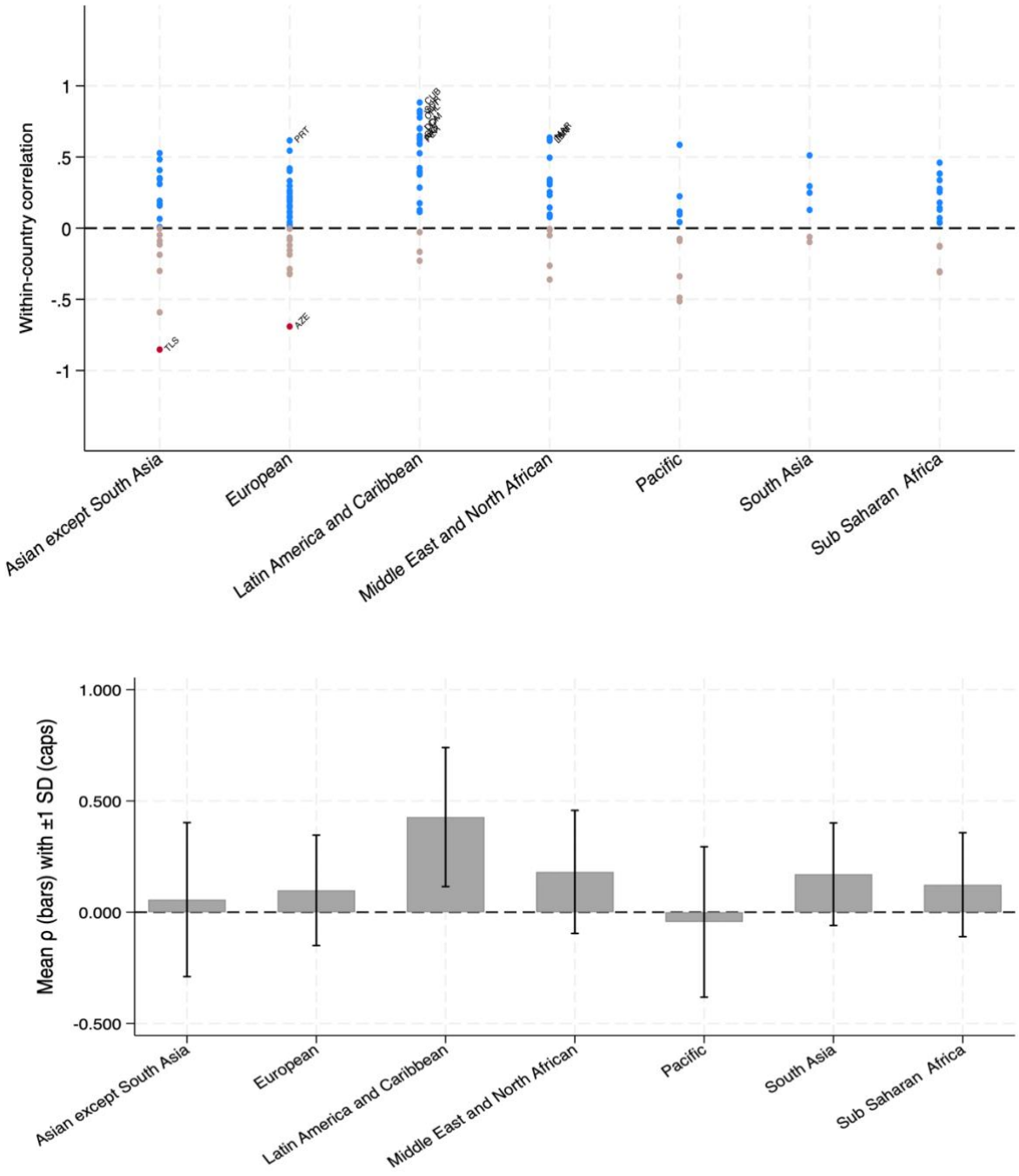


Figure 3. Within-country correlation (ρ) between annual growth in FLFPR and annual growth in Ln(GDPPC), by region. **Upper Panel :** Country-level distribution of ρ (zero line shown). **Lower Panel:** Regional mean ρ with ±1 standard deviation

Lower Panel summarizes Panel A by plotting the regional mean ρ with error bars at ±1 standard deviation. This format conveys whether or not a region has a reasonably common direction of growth co-movement or whether it is highly mixed. In fact, the Latin America and the Caribbean mean is distinctly above zero with a comparatively tighter dispersion band, which

reinforces the notion that many LAC nations are experiencing positive co-movement between FLFPR growth and Ln(GDPPC) growth. Conversely, the Pacific mean is near zero and slightly negative, and the dispersion band straddles both sides of zero, indicating no stable regional direction in growth co-movement. For Europe and Asia excluding South Asia, the mean bars are close to zero but with wide ±1 SD ranges, confirmation that large country-to-country differences are masked in the region-level mean. Taken together, Table A2 and Figure X suggest that from a within-country growth dynamics perspective, the relationship between development and women's participation is not uniform. For a number of regions-most notably for Latin America and the Caribbean-growth in Ln(GDPPC) tends to be associated with increases in FLFPR growth, while for other regions the average association is weak and masks opposing country experiences. This motivates our decision in this paper to estimate region-wise models and to allow for nonlinearity and structural differences, rather than imposing a common pooled relationship.

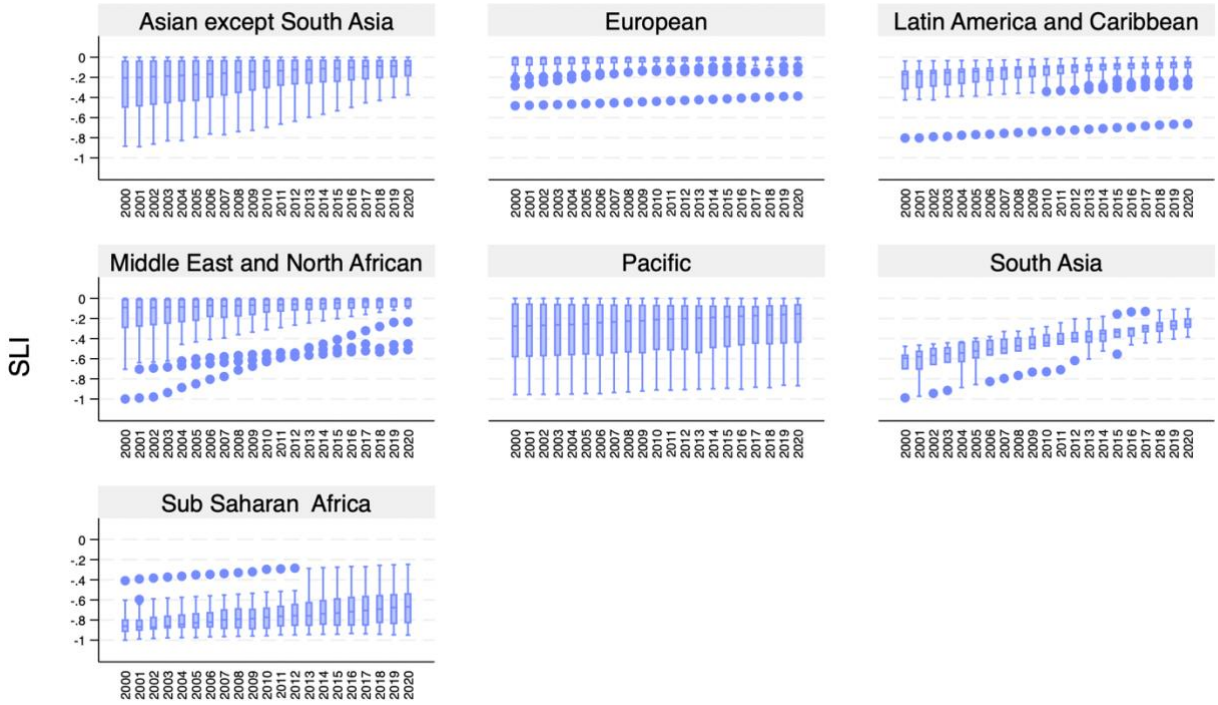


Figure 4. Regional distribution of the Standard of Living Index (SLI) over time, 2000–2020

The figure 4 highlights the regional distribution of SLI, 2000 to 2020. Each box shows the median and interquartile range, with whiskers illustrating the overall dispersion and individual points indicating countries which fall outside the central cluster of the regional distribution. In conjunction with values in the Analysis file, SLI shows improvement through time in all regions, but the largest gain is observed in South Asia, where the regional mean rises by 0.40 from 2000 to 2020, with respectable gains in Asia excluding South Asia, at +0.19, and Sub-Saharan Africa, at +0.16. Europe starts from a relatively high baseline and sees a modest increase(+0.03 in the mean) with a visibly tighter distribution over time, which suggests that countries in this region remain bunched near the top of the index throughout the period. Latin America and the Caribbean and the MENAsee upward shifts in both the median and the upper tail of the distribution-mean changes of approximately +0.12 for each region-suggesting broad-based improvement with fewer countries remaining at very low SLI levels by 2020. SSAstarts off at the lowest levels; while the upward shift is clear, the widening spread in the later years suggests more heterogeneity in progress among constituent countries, reflected in longer whiskers and more dispersed data points. The Pacific region similarly exhibits an improvement-mean +0.08-but because a small set of countries with quite different trajectories underlies the regional average, the regional profile is highly sensitive to country experiences.

4.2. Econometrics Results and Discussion

Table 3 reports country fixed-effects estimates with Driscoll–Kraay standard errors for the full sample and regional subsamples. With country fixed effects, coefficients reflect within-country changes over time, net of time-invariant country characteristics. Driscoll–Kraay inference is used to accommodate heteroskedasticity, serial correlation, and cross-sectional dependence that are common in macro panels due to shared shocks and regional co-movement (Driscoll & Kraay, 1998; Hoechle, 2007; Pesaran, 2004, 2007). The Standard of Living Index (SLI) is

normalized to the [0,1] interval and is interpreted directionally: higher values mean better access to basic amenities. In Table 3, SLI is positive and statistically significant in the full sample (8.409, $p < 0.01$) and in Europe (23.34, $p < 0.01$), Asia excluding South Asia (14.27, $p < 0.01$), and South Asia (18.96, $p < 0.05$), while it is not precisely estimated in LAC, MENA, the Pacific, and SSA. The estimates imply that improvements in amenity access co-move with higher FLFPR in several regions once income, sectoral employment shares, and other controls are held constant (Dinkelman, 2011; Koolwal & van de Walle, 2013; Ferrant et al., 2014). The amenity channel is also consistent with broader accounts that treat infrastructure and basic services as part of women's inclusion constraints, including time burdens, health exposure, and access frictions that affect whether job search and work are feasible (UN Women, 2015; World Health Organization, 2014; Casado, 2023). Since SLI is scaled to [0,1] with higher values indicating better amenity access, a 0.10 increase in SLI corresponds to an implied change of about +0.84 percentage points in FLFPR in the full sample (8.409 × 0.10). Using the same scaling, the implied change is about +2.33 points in Europe (23.34 × 0.10), +1.43 points in Asia excluding South Asia (14.27 × 0.10), and +1.90 points in South Asia (18.96 × 0.10). When interpreting SLI magnitudes, it is also useful to keep in mind that improvements in water, sanitation, and clean energy can shift illness burdens and productivity constraints alongside time burdens, particularly where disease exposure and nutrition constraints are salient (World Health Organization, 2014).

Table 3: Panel data regression results with Driscoll-Kraay standard error: Determinants of female labor force participation rate (FLFPR)

Variables	Full sample	Europe	LAC	MENA	Pacific	SSA	Asia except South Asia	South Asia
SLI	8.409***	23.34***	2.663	-4.137	12.54	5.218	14.27***	18.96**
	(1.679)	(6.048)	(6.371)	(2.993)	(9.664)	(3.682)	(3.941)	(9.514)
EMPSER	0.066*	0.061	0.148**	0.062	0.879***		0.144**	0.684***
	(0.033)	(0.076)	(0.069)	(0.050)	(0.284)		(0.053)	(0.148)
EMPTIND		-0.638***				-0.023		
		(0.139)				(0.059)		

EMPAG				0.417*	0.788***	0.229***		0.910***
				(0.209)	(0.257)	(0.045)		(0.148)
FR	0.147	1.866***	0.815	-4.295***		3.511***	-1.286**	-6.325***
	(0.283)	(0.649)	(0.813)	(0.690)		(0.640)	(0.542)	(1.922)
Ln(GDPPC)	2.484***	1.043	15.63***	8.606***	6.494**	-7.019***	-3.292***	-15.65***
	(0.488)	(0.844)	(1.400)	(1.475)	(3.095)	(0.970)	(1.022)	(4.260)
Ln(GDPPC)^2	2.921***	1.716***	0.670	-0.876*	5.477***	1.560**	2.710***	-12.619***
	(0.277)	(0.483)	(0.527)	(0.468)	(1.635)	(0.551)	(0.146)	(1.168)
UMPTT	0.021	-0.140***	0.198**	-0.334***	0.356**	-0.787***	-0.685***	0.697*
	(0.065)	(0.039)	(0.094)	(0.089)	(0.154)	(0.231)	(0.192)	(0.391)
UP	0.171***	0.452***	-0.010	0.274***	0.894***	0.163***	0.071**	1.340***
	(0.025)	(0.038)	(0.055)	(0.064)	(0.106)	(0.046)	(0.029)	(0.148)
VET	0.0885***	-0.177***	-0.0504	0.118	0.518***	-0.584***	0.116**	-0.961***
	(0.0258)	(0.0480)	(0.0450)	(0.116)	(0.140)	(0.0678)	(0.0547)	(0.170)
Constant	6.109	36.31***	-91.65***	-64.15***	-141.5***	107.6***	62.92***	176.3***
	(4.699)	(8.240)	(11.77)	(17.55)	(34.82)	(12.77)	(8.813)	(33.55)
Observations	2,940	861	525	420	210	357	441	126
Number of countries	140	41	25	20	10	17	21	6
R-squared	0.085	0.588	0.484	0.225	0.427	0.443	0.229	0.410
F-test	383.98***	244.62***	111.94***	108.82***	292.52***	450.47***	130.48***	77.26***
Hausman	71.94***	72.24***	84.94***	1.45	1.40	0.27	43.67***	776.93***
Breusch-Pagan Heteroskedsaticity	58.71***	37.65***	0.83	35.49***	8.47**	18.86***	1.48	
Wooldridge Autocorrelation	217.148***	183.548***	59.050***	97.062***	13.798**	12.048**	49.305***	304.418***
Cross-section Dependency	23.859***	4.483***	1.095	7.844***	-0.311	-0.404	0.203	-1.182

Note: *, **, and *** indicates p<0.1, p<0.05 and p<0.01respectively. Driscoll-Kraay Standard errors in parentheses. Further, which sector is excluded from which region is presented in Table A3.

Source: Authors' compilation

Sectoral composition of employment exhibits patterns that match region-specific labor-demand structures. Given the mechanical interrelations among sector shares, the regional specifications incorporate sectoral variables in combinations designed to mitigate near-collinearity while capturing the relevant employment margin within each region. Employment in services (EMPSER) is positive and statistically significant across various samples. In the full sample (0.066*), LAC (0.148**), the Pacific (0.879***), Asia excluding South Asia (0.144**), and South Asia (0.684***). This implies that, within countries, a shift toward services employment tends to go hand in hand with higher female labor force participation in many regions, reinforcing the idea that the growth of services can give rise to job types that more easily absorb female labor across diverse contexts (Kapsos et al., 2014; Verick, 2018; Piras & Ripani, 2016; Bustelo et al., 2019). In addition, where services expansion involves higher customer-facing work and urban market density, entrepreneurship and local demand conditions can shape

women's entry margins (Ghani et al., 2014). Industry employment (EMPTIND) is negative and significant in Europe (−0.638***). Given restructuring and composition changes in European industry, this result is best read as within-country co-movement rather than a general claim that "industry reduces women's work"; the gender content of industrial growth depends on the type of manufacturing and the jobs created (Kahanec & Zimmermann, 2011). Agriculture employment is positive and statistically significant in the MENA (0.417*), the Pacific (0.788***), SSA(0.229***), and South Asia (0.910***), in a way that is consistent both with women's economic activity being captured through agricultural and family-based work in these contexts and with observed changes in agricultural employment shares tracking shifts in participation (Fao, 2011; Fox & Gaal, 2008). In such contexts, rural non-farm expansion, market access, and local specialization also matter for how women's work is classified and remunerated (Lanjouw & Lanjouw, 2001; Fafchamps & Shilpi, 2005). Where informality is large, women's participation may also move through flexible and precarious employment rather than formal wage jobs, which affects how structural change shows up in participation statistics (Standing, 1999).

For the income terms, the marginal association of ln(GDPPC) with FLFPR is given by $\beta_1 + 2\beta_2 \cdot \ln(\text{GDPPC})$. In Table 3, the estimated quadratic structure implies that the income–participation relationship is not uniform across regions, but the implied "turning points" generally fall outside the observed support of ln(GDPPC) in this dataset. In practical terms, this means that for most regions the estimated relationship over the sample is effectively monotonic rather than exhibiting a clear interior U-shape within the data range. Notably, the MENA specification has a positive linear term and a negative quadratic term, implying a concave pattern with a turning point below the observed ln(GDPPC) range; evaluated at typical sample income levels, the implied marginal association is negative. SSA and Asia excluding

South Asia have a negative linear term and a positive quadratic term, but the implied turning points also lie well below the observed ln(GDPPC) range, so the marginal association over the sample is positive. In South Asia, both the linear and quadratic terms are negative, which implies a negative marginal association throughout the observed range. Given these patterns, the discussion is kept region-specific and the quadratic term is treated as capturing curvature in within-country co-movement rather than as evidence of a common U-shaped trajectory across regions.

Impact of fertility rate on female particiaption shows pronounced regional variation. In the MENA region, the fertility-rate (FR) coefficient is negative and precisely estimated, indicating that within countries, fertility increases coincide with lower FLFPR. This fits a setting where caregiving constraints remain binding and labor markets provide limited flexible options for women (Thévenon, 2013; Del Boca & Wetzels, 2007). Asia excluding South Asia also shows a negative and statistically significant FR coefficient. Europe shows a positive FR coefficient, which can be read in light of institutional settings that can reduce the employment penalty of childbearing, allowing fertility changes to occur alongside policies and labor-market conditions that support women's attachment (Thévenon & Pero, 2015; Cooke, 2010). Demographic relationships also reflect longer-run transitions in education, household structure, and context-specific fertility preferences, so cross-region differences in fertility–participation co-movement should not be interpreted as a single behavioral parameter (Götmark & Andersson, 2020).

Unemployment also varies by region in sign, reflecting competing channels. The unemployment coefficient is negative and statistically significant in Europe, MENA, SSA, and Asia excluding South Asia, indicating that on average within countries, weaker labor-market conditions come with lower female participation. This is in line with discouragement and

reduced demand. In LAC, the Pacific, and South Asia, by contrast, the unemployment coefficient is positive (and statistically significant in South Asia), in line with an added-worker co-movement where household labor supply increases in response to economic stress. Since unemployment and participation can be interdependent, this pattern should be presented as a difference in within-country co-movement across contexts, rather than as evidence of a structural behavioral parameter. Urbanisation has emerged as one of the most stable covariates in Table 3. UP enters positively and statistically significantly in the full sample and in nearly all regional panels. This aligns with the view that urban labour markets provide greater occupational variety and access to services that facilitate market work, while also reflecting that urbanisation itself can proceed without commensurate formal job creation in some settings.

VET is negative and significant in Europe, Sub-Saharan Africa, and South Asia; positive in the Pacific; and weak elsewhere. This is plausible because vocational systems differ widely in quality, field composition, and links to employers, so growth in enrolment can coincide with very different skill–job matching environments across countries and time (Coxhead et al., 2010). Education quality and institutional features that shape returns to skills can also affect how VET changes translate into labour-market outcomes (Glewwe & Muralidharan, 2016). In addition, skills constraints increasingly include digital and information-access channels, which can shape women's market access even when schooling expands (Losh, 2004). For these reasons, VET coefficients are interpreted as context-specific co-movement rather than as universal evidence that VET expansion raises or lowers women's participation.

Table 4: Dynamic Panel Data Regression results: Determinants of FLFPR

VARIABLES	Full Sample	Europe	LAC	Middle East and North Africa	Pacific	SSA	Asia except South Asia	South Asia
FLFPR $_{t-1}$	0.834***	0.961***	0.583***	0.654***	0.978	0.993***	0.869***	0.245
	(0.0934)	(0.0422)	(0.0926)	(0.133)	(2.944)	(0.316)	(0.0952)	(0.621)

Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,940	820	500	400	200	340	420	120
Number of countries	140	41	25	20	10	17	21	6
Wald Chi	53856.15***	2.23e+06***	34150.88***	14.38*	12.76*	16086.62***	5.72	1.25e+06
AR(1)	-4.47***	-4.25***	-2.48**	-0.75	-0.19	-0.92	-1.54	0.75
AR(2)	-0.72	-0.19	-0.57	0.99	-0.51	0.32	-0.77	0.16
Sargan test	272.30***	45.16***	174.04***	82.29***	32.48*	40.89***	78.64***	57.01***

Note: Standard errors in parentheses. *, **, *** indicates p<0.1, p<0.05, p<0.01 respectively
Source: Authors' compilation

Table 4 presents the dynamic panel regression to explore the Female Labor Force Participation Rate (FLFPR) persistence across regional groups, employing the Generalized Method of Moments (GMM). The dynamic specification incorporates a lagged dependent variable, $FLFPR_{t-1}$, which effectively captures the dynamic persistence and adjustment inherent in the decision of female participation rate in the labor force. The coefficient of the $FLFPR_{t-1}$ for the full sample highlights the substantial inertia in FLFPR, as evidenced by the highly significant positive coefficient (0.834). This indicates that last year's labor force participation strongly influenced the current participation decision, a result consistent with the existing literature that emphasises the impact of historical experiences and social norms as the key determinants of FLFPR across countries (Klasen & Pieters, 2015).

The Arellano–Bond tests provide partial support for the dynamic specification. Significant AR(1) statistics are expected in first-differenced dynamic models, while the absence of significant AR(2) across panels suggests no evidence of second-order serial correlation in the differenced residuals (Arellano & Bond, 1991). However, the Sargan tests reject the null of instrument validity across all panels, which cautions against treating the dynamic estimates as a basis for strong inference on determinants. Accordingly, Table 4 is used primarily to document persistence in FLFPR, while the discussion of covariate effects relies on the fixed-effects models with Driscoll–Kraay standard errors reported in Table 3. Across regions, the lag coefficient is high and precisely estimated in Europe (0.961***), SSA(0.993***), and Asia

excluding South Asia (0.869***), implying slow adjustment of participation rates over time in these panels. For Pacific and South Asia, the lag coefficients are imprecisely estimated, likely reflecting small regional samples and limited effective variation; these estimates are therefore interpreted cautiously and are not used to draw substantive conclusions about regional differences in persistence.

5. Conclusion

This paper decomposes female labor force participation rates for 140 countries over the period 2000–2020 and shows that participation dynamics differ across regions when income, living conditions, and employment structure are considered together. Two findings stand out. First, the relationship between development and participation is nonlinear and depends on the region. Employing the quadratic income specification in order to evaluate turning points, curvature is significant within the observed income range in some regions, while in others, the implied turning point falls outside the observed support; hence, interpretation should focus on the slope over the actually observed income range. South Asia stands out as being unusually different in pattern, with an inverted-U shape within its income support, consistent with a context where growth does not automatically translate into sustained participation gains when labor demand and constraints evolve unevenly. Second, the employment structure meaningfully explains why regions do not fall on a single trajectory. Shifts toward services employment co-occur with higher FLFPR in several regional panels, while agriculture remains an important margin in regions in which women's work is often captured through farm- and family-based activity. The SLI-constructed via principal components analysis from access to clean cooking, electricity, basic drinking water, and sanitation-remains significant in some regions even after accounting for income nonlinearity and sectoral composition, though the direction and magnitude of its effect vary across contexts. This is suggestive that improvements in amenities do not

automatically translate to higher participation in the absence of concurrent changes in labor demand and access channels. Additional controls-fertility, unemployment, urbanization, and vocational enrolment exhibit heterogeneous signs across regions, underlining the value of region-specific estimation alongside pooled analyses.

Because income, sector shares, urbanization, unemployment, and living conditions can move jointly with FLFPR, the results are best read as within-country conditional relationships rather than as causal effects. Fixed-effects estimates with Driscoll–Kraay standard errors are the main basis for inference, and the dynamic panel results are used to document persistence rather than to derive determinant claims. Policy implications follow this heterogeneity. A uniform "growth-led" prescription is not credible; policy design needs to target the binding margins in each region. Where services expansion coincides with higher FLFPR, policy priorities include translating sectoral growth into women-accessible jobs through safer mobility, workplace safety, anti-discrimination enforcement, effective job matching, and care support such as childcare and maternity protections (UN Women, 2015; Abbott & Malunda, 2016; Raghavendra, Duvvury, & Ashe, 2017). Where agriculture remains the participation margin, priorities include raising returns to women's work through land and tenancy security, access to credit and inputs, extension services targeted to women, and better market access, while recognizing that measured participation can reflect unpaid or low-paid family labor (Fao, 2011). Finally, while amenity improvements matter for welfare and time use, the SLI results caution against expecting infrastructure upgrades alone to raise FLFPR; conversion of time savings into paid work depends on whether labor markets provide accessible opportunities and whether social constraints allow women to take them up (Nussbaum, 2000; Moser, 1993; Malhotra, Schuler, & Boender, 2002; Kabeer, 2012; Perez, 2019). Given strong persistence in

FLFPR, reform design should assume realistic horizons, since durable changes are more likely to emerge gradually rather than within short cycles (Seguino, 2010).

Authors Contribution:

Meghna: conceptualized, analyzed the data, prepared figures and tables, and wrote the manuscript.

Kalandi Charan Pradhan: conceptualized, supervised and reviewed.

Declarations:

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Data Declaration: The datasets analysed during the current study are available in the public domain and freely accessible from the gateway to WDI:

https://databank.worldbank.org/source/world-development-indicators

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Appendix

Table A1. Summary Statistics of Variables used in SLI

Variable	Mean (Overall)	Std. Dev. (Overall)	Std. Dev. (Between)	Std. Dev. (Within)	Min	Max	Obs.
				Full sample			
ACFT	70.97	35.88	35.48	6.15	0.4	100	2,938
AE	85.03	26.2	25.38	7.01	1.28	100	2,938
PUBDWS	88.32	16.16	15.78	3.77	28.17	100	2,938
PUBSS	77.74	27.56	27.09	5.27	4.19	100	2,938
				European			
ACFT	94.35	13.3	12.82	4.04	38.7	100	861
AE	99.53	1.58	1.34	0.87	88.09	100	861
PUBDWS	98.13	3.3	3.02	1.4	73.59	100	861
PUBSS	95.5	5.64	5.14	2.45	62.28	100	861
				LAC			
ACFT	79.45	24.46	24.44	4.91	2.5	100	525
AE	91.16	13.38	12.82	4.6	31.54	100	525
PUBDWS	91.68	7.99	7.51	3.04	56.24	100	525
PUBSS	79.62	15.93	15.5	4.61	16.75	100	525
				Middle East and North Africa			
ACFT	96.13	9.85	9.79	2.58	55.5	100	420
AE	95.85	10.02	9.46	3.88	49.24	100	420
PUBDWS	92.58	11.69	11.54	3.13	40.88	100	420
PUBSS	90.88	12.09	11.77	3.78	45.24	100	420
				Pacific			
ACFT	43.8	36.91	38.74	6.42	5.5	100	210
AE	76.94	32.17	32.52	8.86	4.68	100	210
PUBDWS	88.03	18.69	19.51	2.25	33.13	100	210
PUBSS	76.42	29.8	31.19	2.85	18.11	100	210
				Sub Saharan Africa			
ACFT	16.59	21.54	21.86	3.61	0.4	89.3	357
AE	33.61	22.08	21.45	7.27	1.28	91.06	357
PUBDWS	58.56	12.21	11.18	5.49	36.27	85.34	357
PUBSS	24.39	15.83	15.7	5.27	4.19	66.31	357
				Asia			
ACFT	60.55	35.15	34.23	11.06	1.2	100	429

AE	88.94	20.2	18.35	9.31	9.53	100	429
PUBDW S	86.74	14.26	13.42	5.63	46.14	100	429
PUBSS	81.17	21.59	20.51	7.72	9.84	100	429
			South Asia				
ACFT	31.84	19.59	17.47	11.28	5.5	86	126
AE	68.99	23.25	11.73	20.62	4.45	100	126
PUBDW S	82.83	16.89	16.96	6.61	28.17	97.7	126
PUBSS	45.27	15.86	9.52	13.24	13.96	76.61	126

Table A2. Summary of within-country correlations (ρ) between annual growth in FLFPR and annual growth in Ln(GDPPC), by region

Country Code	Region	rho	Country Code	Region	rho	Country Code	Region	rho	Country Code	Region	rho	Country Code	Region	rho
MNG	Asian except South Asia	0.1716	**AZE***	European	-0.6908	**GRC**	European	0.2202	**DZA**	MENA	0.3255	**PAK**	South Asia	-0.0974
SGP	Asian except South Asia	0.0084	**ISL**	European	0.2464	**CYP**	European	0.0762	**JOR**	MENA	-0.0139	**NPL**	South Asia	0.5116
PHL	Asian except South Asia	0.5274	**IRL**	European	0.0277	**COL**	LAC	0.3972	**LBN***	MENA	0.6143	**BTN**	South Asia	0.2951
CHN	Asian except South Asia	0.0654	**BGR**	European	0.2508	**PAN**	LAC	0.2851	**IRN**	MENA	0.0821	**AGO**	SSA	0.3827
THA	Asian except South Asia	-0.0896	**HRV**	European	-0.0711	**BRB**	LAC	0.1140	**EGY**	MENA	-0.0099	**CIV**	SSA	0.0420
KHM	Asian except South Asia	0.0030	**BEL**	European	0.4020	**URY**	LAC	0.3866	**KWT**	MENA	0.2540	**BEN**	SSA	-0.3040
MAC	Asian except South Asia	0.3431	**BIH**	European	0.2167	**JAM**	LAC	0.4220	**MLT**	MENA	0.2325	**GIN**	SSA	-0.1244
KOR	Asian except South Asia	0.4832	**POL**	European	-0.1859	**DOM***	LAC	0.6994	**SYR**	MENA	-0.2632	**CAF**	SSA	0.1795
HKG	Asian except South Asia	-0.0476	**GEO**	European	0.0445	**CHL***	LAC	0.7775	**OMN**	MENA	-0.0508	**COG**	SSA	0.2538
BRN	Asian except South Asia	-0.3007	**ALB**	European	0.1129	**PER***	LAC	0.6195	**SAU**	MENA	0.0958	**MLI**	SSA	0.3838
JPN	Asian except South Asia	0.1923	**ARM**	European	-0.3163	**CUB***	LAC	0.8830	**LBY**	MENA	0.3072	**MDG**	SSA	0.3376
KGZ	Asian except South Asia	-0.1871	**RUS**	European	0.1933	**CRI**	LAC	0.1752	**YEM**	MENA	-0.3611	**TGO**	SSA	0.2771
TLS*	Asian except South Asia	-0.8530	**CHE**	European	-0.0044	**HND**	LAC	-0.1661	**MAR***	MENA	0.6365	**GNQ**	SSA	0.1425
KAZ	Asian except South Asia	0.3520	**TUR**	European	-0.1554	**MEX**	LAC	0.5916	**IRQ**	MENA	0.0933	**BFA**	SSA	-0.1299
LAO	Asian except South Asia	0.3102	**BLR**	European	0.1116	**BOL**	LAC	0.1166	**PSE**	MENA	0.4957	**SEN**	SSA	0.0707
MMR	Asian except South Asia	-0.1148	**NOR**	European	0.1156	**SUR***	LAC	0.8248	**TUN***	MENA	0.6243	**TCD**	SSA	0.0376
MYS	Asian except South Asia	0.1589	**FIN**	European	0.2035	**TTO**	LAC	0.5977	**QAT**	MENA	-0.0062	**NER**	SSA	-0.3096
TJK	Asian except South Asia	-0.0015	**NLD**	European	0.0150	**ECU**	LAC	0.3772	**PYF**	Pacific	0.0426	**MRT**	SSA	0.1300
IDN	Asian except South Asia	0.4082	**MKD**	European	0.2192	**VCT***	LAC	0.8063	**AUS**	Pacific	0.2244	**GAB**	SSA	0.2702
UZB	Asian except South Asia	-0.5918	**LUX**	European	-0.2866	**LCA***	LAC	0.7019	**NZL**	Pacific	0.5856	**GNB**	SSA	0.4600
VNM	Asian except South Asia	0.3490	**FRA**	European	0.1457	**GTM**	LAC	-0.0283	**FJI**	Pacific	-0.0751			
ROU	European	-0.0825	**SVK**	European	-0.0653	**HTI**	LAC	0.5261	**TON**	Pacific	0.0962			
SVN	European	0.2659	**CZE**	European	-0.1210	**ARG**	LAC	0.3961	**PNG**	Pacific	-0.0898			

DNK	European	0.4035	**SWE**	European	0.3320	**NIC***	LAC	0.6342	**SLB**	Pacific	-0.4882
PRT*	European	0.6163	**GBR**	European	0.0211	**SLV***	LAC	0.6505	**VUT**	Pacific	-0.5138
DEU	European	0.2973	**ITA**	European	0.4199	**PRY**	LAC	-0.2292	**GUM**	Pacific	0.1167
SRB	European	0.0846	**ESP**	European	0.1588	**BRA**	LAC	0.1278	**WSM**	Pacific	-0.3379
UKR	European	0.5445	**AUT**	European	0.1860	**BHR**	MENA	0.0782	**BGD**	South Asia	0.2484
LVA	European	0.1575	**LTU**	European	-0.3231	**ARE**	MENA	0.1450	**IND**	South Asia	-0.0616
HUN	European	0.2226	**EST**	European	0.0213	**ISR**	MENA	0.3417	**AFG**	South Asia	0.1282

Table A3. Sector variables included in Table 3 by region

Region	EMPSER	EMPTIND	EMPAG
Full sample	Yes	No	No
Europe	Yes	Yes	No
LAC	Yes	No	No
Middle East & North Africa	Yes	No	Yes
Pacific	Yes	No	Yes
Sub-Saharan Africa	No	Yes	Yes
Asia excl. South Asia	Yes	No	No
South Asia	Yes	No	Yes

Note: Sector shares are mechanically related because the major sectors jointly account for total employment (up to measurement error). Including all three simultaneously can create near-linear dependence and unstable estimates. For that reason, each regional regression includes the sectoral terms that are empirically most relevant for that region's employment structure while avoiding redundancy; the excluded sector can be read as the residual category.