Countercyclical Fiscal Policy, Women, and the Poor

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May 13, 2025

draft paper for the Bocconi - EIEF World Bank Workshop

'Mend the Gap in Opportunities in Europe and Central Asia,' Rome, May 15-17, 2025

Abstract. A tenet of macroeconomic policy holds that countercyclical policy helps macroeconomic stability and long-term growth. Less is known, however, about how fiscal policy cyclicality affects women and the poor, although limited evidence suggests that these impacts can be significant. This paper aims to contribute to this gap in the literature and explore anew the impact of countercyclical fiscal policies on women and low-income groups, with a focus on Europe and Central Asia (ECA). It highlights how economic cycles disproportionately affect women and the poor, exacerbating income inequality and poverty during downturns. The research provides new empirical evidence on the effects of fiscal policy on female employment and the poor, using a comprehensive, global dataset from the World Bank, IMF, UNU-WIDER and CEIC sources. The key policy implication suggest that countercyclical fiscal policies can, indeed, promote gender inclusiveness and reduce income inequality, particularly in countries with low female labor force participation rates. The paper also discusses the implications for designing gender- and poverty-sensitive fiscal policies to enhance social resilience and shared economic prosperity.

JEL classification codes: E62 (Fiscal Policy), H12 (Crisis Management), (H53 (Government Expenditures and Welfare Programs), J16 (Economics of Gender; Non-labor Discrimination), I32 (Measurement and Analysis of Poverty)

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Key words: fiscal policy, gender, poor, poverty

A GAP AND CONTRIBUTION TO LITERATURE

Countercyclical fiscal policies play a key role in reducing economic volatility and enhancing long-term stability. By tempering cyclical upswings with increased fiscal saving and by offsetting downturns with increased public spending or reduced taxes, these policies aim to stabilize aggregate demand, contributing to stability and long-term growth. Considerable research has generated evidence on macroeconomic dimensions of fiscal cyclicality (e.g., Chari et al., 1994; Riera-Crichton et al., 2015; Aizenman et al., 2019; Bogetić and Naeher, 2024). However, there is limited exploration into the effects of fiscal policy cyclicality on social inclusion, particularly regarding gender equality and poverty alleviation, and the few existing studies in this context tend to focus on broader social linkages with inequality (e.g., Klein 2024). Yet understanding macro-micro linkages related to gender gaps and poverty are crucial in developing and evaluating gender- and poverty-sensitive macro-fiscal policies, especially in developing country contexts characterized by significant gender gaps and poverty.

Evidence suggests that economic cycles impact women and low-income groups more acutely. For instance, in G7 countries, women's employment is more sensitive to economic fluctuations due to their concentration in sectors such as services and retail, which are more vulnerable to business cycles (Akitoby et al. 2019). Procyclical fiscal policies, on the other hand, tend to exacerbate income inequality by cutting social spending during recessions, often when vulnerable groups need support the most, thus entrenching poverty and amplifying inequality (Rasmane, 2015).

In developing economies, where fiscal capacity is often constrained, procyclical policies are particularly detrimental. Economic downturns can severely limit resources for social programs, leaving low-income groups with less protection and exacerbating patterns of poverty (Arnelyn et al., 2015). Moreover, the effects of fiscal cyclicality are not limited to individual incomes but also extend to broader household dynamics. For instance, research on procyclical fertility patterns shows that economic instability can affect family planning decisions, particularly in households where women are primary earners. During economic downturns, women breadwinners are more likely to delay or reduce family expansion, a trend with broader demographic implications (Coskun and Dalgic, 2024). There is also evidence on the interactions between real wage cyclicality and job mobility (Devereux and Hart 2006). This underscores the need for countercyclical policies not only to stabilize the economy but also to strengthen social resilience by helping households maintain stability in uncertain times. The link between fiscal cyclicality and women's participation in the economy and the poor, however, has not been subject of sufficient empirical examination. Yet systematic evidence on these linkages is crucial in understanding and, potentially, fostering gender and distributionally sensitive fiscal policies. This is the focus and contribution of this paper.

Contribution. Building on the literature, this paper aims to contribute to a greater understanding of the impacts of fiscal cyclicality on women and poverty, spotlighting Europe and Central Asia (ECA). the world region with substantial dispersion of aggregate female labor participation and employment rates as well as poverty rates. The paper aims to provide new empirical

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evidence on how fiscal policy impacts female employment and the poor and how economic conditions and different channels may affect those associations. In addition to providing new empirical evidence on the hitherto poorly examined topic, the paper also outlines implications for making fiscal policy more gender and poverty sensitive, in the global sample and in a large and diverse world region.

Countercyclical policies, of course, can reduce macroeconomic vulnerabilities, increase stability, and support long-term growth. But it may also support more equitable outcomes by targeting assistance to those who are disproportionately affected by downturns, including women and low-income households (Diego, 2020). By addressing these inequalities, policymakers could use countercyclical fiscal policy as a tool to enhance both economic *and* social resilience, especially in world regions and countries with limited fiscal capacity and high vulnerability to economic fluctuations (Anmol et al., 2021).

This paper provides a new contribution in this area that may help policymakers broaden their view of the impacts of fiscal policy, highlighting the intersection of macroeconomic stability and social inclusion and associated macro-micro linkages. To this end, the research conducts a panel regression analysis using the largest country level dataset available at the global level (World Bank and IMF data as well as UNU-WIDER data) of the impacts of fiscal cyclicality on women and the poor by providing new, quantitative evidence on different channels of influence (e.g., gender wage gaps, sectoral structure, occupation, public investments, social services, taxation, inequality, and the poor etc.) and their relative importance. In addition to the panel estimates for the global sample, the paper explores specific channels of influence in developing versus developed countries, low- versus middle-income countries, with a spotlight on ECA.

DATA AND METHODOLOGY

1. Data

This paper involves two cross-country datasets: a quarterly dataset for gender employment and a yearly dataset for income distribution.

The quarterly gender employment dataset. We compiled a cross-country, quarterly panel data of 83 countries to study the effect of fiscal cyclicality on gender inclusiveness, with special attention paid to the ECA region. This dataset also allows us to conduct country-level estimates, which bring the analysis and policy implications to the country level. It is hoped that this more granular, regional and country level analysis can provide more specific guidance for policy than standard global regressions.

Specifically, the observational data encompass the following.

- ILO short-term labor statistics, quarterly data for each country from 1996Q1[2]. The main

[2] The panel data is unbalanced due to data availability. See Table A1 in the Appendix for sample period for each country.

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variable of interest is female share of employed persons:

$$female\ share = \frac{\#female\ employment}{\#\ total\ employment} \times 100\%.$$

- CEIC global macroeconomic and fiscal dataset, including quarterly nominal government consumption, nominal government revenue, nominal GDP, real GDP growth, and unemployment rate.

All quarterly data are seasonally adjusted using X13-arima developed by the United States Census Bureau. In addition to these quarterly time series, we also introduce long-run average of female labor force participation rate (LFPR) as a time-invariant country characteristic to capture heterogeneity in overall female participation. The LFPR data comes from ILO labor statistics. Table 1 shows the summary statistics.

Table 1. Summary Statistics of Quarterly Gender Employment Panel

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
Female Share (%)	2,835	46.09	2.831	34.95	53.81
Government Consumption (% of GDP)	2,835	19.65	3.559	9.032	29.19
Tax Revenue (% of GDP)	2,070	25.39	7.127	9.659	98.23
Real GDP Growth (QoQ, %)	2,833	0.564	2.125	-20.33	20.64
Unemployment Rate (%)	2,835	8.246	4.303	2.502	28.10
Long-run Female LFPR (%)	2,696	50.94	7.742	37.02	70.92

Note: Long-run Female LFPR is the average of female LFPR for each country over the whole sample period.

The yearly income distribution dataset. This dataset is used to study the association between fiscal policy and income distribution. The data sources include the following.

- The World Income Inequality Database (WIID) gathered by United Nations University World Institute for Development Economics Research (UNU-WIDER). It covers annual income distribution metrics such as Gini coefficients, income shares by percentile, and other inequality measures, allowing for robust cross-country comparisons and longitudinal analysis of inequality trends.
- IMF international financial statistics, including nominal government consumption, nominal government revenue, nominal GDP, and real GDP growth.

The merged panel dataset is unbalanced, and it covers 43 ECA countries from 2000 to 2022. Table 2 displays the summary statistics[3].

[3] Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Moldova, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Ukraine, United Kingdom.

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Table 2. Summary Statistics of Yearly Income Distribution Panel

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Inequality Measures					
Gini Coefficient	609	32.33	4.019	15.16	47.95
Bottom 20% Income Share （%）	609	7.554	1.325	3.229	13.95
Decile Income Shares					
1	609	2.862	0.694	0.695	6.511
2	609	4.692	0.651	2.470	7.441
3	609	5.843	0.559	3.740	8.051
4	609	6.875	0.476	4.900	8.551
5	609	7.915	0.397	6.140	9.041
6	609	9.057	0.334	7.699	9.749
7	609	10.43	0.308	9.269	11.52
8	609	12.22	0.366	11.17	13.41
9	609	15.04	0.634	12.58	16.98
10	609	25.07	2.474	16.66	35.88
Fiscal and Macro Variables					
Government Consumption (% of GDP)	609	18.75	3.898	8.264	27.34
Tax Revenue (% of GDP)	609	20.43	5.231	8.956	36.39
GDP Per Capita Growth (%)	609	2.622	4.215	-14.78	18.88

It is worth noting that we use government consumption as the main measure of fiscal spending. Therefore, the potential effects of social welfare programs and transfer payment programs would not be captured by our results. Our results should be interpreted as the effects of governments directly stimulating final demands via government consumption. This is in line with our purpose to capture the impact of aggregate fiscal policy spending and cyclicality on gender and poverty variables of interest.

2. Vector Autoregression for Each Country

We first apply vector autoregression to each ECA country's quarterly time series to estimate the country-specific effect on government consumption on gender inclusiveness. Then, we apply local projection to the panel data to obtain the average effects. For each ECA country, we run the following structural vector autoregression:

$$BX_t = \sum_{l=1}^{L} A_l X_{t-l} + f(t) + e_t \quad (1)$$

where X_t is a vector reflecting the state of the economy at time t. Specifically, X_t includes government consumption (as percentage of nominal GDP), government revenue (as percentage of GDP), quarter-on-quarter real GDP growth rate, unemployment rate, and female share of employment. B reflects the contemporaneous effects between variables. Following Blanchard and Perotti (2002), we assume that B is lower-triangular, which means that fiscal spending is not affected by other contemporaneous variables. X_{t-l} is the lth lag of X_t, and A_l is the coefficient

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reflecting the influence of the lagged state X_{t-l}. The lag order, L, is chosen by Bayesian information criterion (BIC) and varies from country to country[4]. Following Akitoby et al. (2019), we control for a deterministic time trend up to the second order, denoted as $f(t)$. Finally, $e_t \sim N(0, I)$ is the structural innovation.

3. Local Projection with Quarterly Panel Data

To obtain an estimate of the average effect of government consumption on gender inclusiveness, we apply the following local projection model to the panel data, following Jorda (2005) and Novta and Pugacheva (2021):

$$Y_{i,t+h} - Y_{i,t-1} = \beta_h G_{it} + \sum_{l=1}^{4} \gamma_l^{h\prime} X_{i,t-l} + \alpha_i^h + \lambda_t^h + u_{i,t}^h, \qquad h = 0,1,\dots,10 \tag{2}$$

where $Y_{i,t+h}$ is female share of employment in country i, h quarters after t. G_{it} is government consumption as a percentage of nominal GDP in country i, quarter t. X_{it-l} is a vector of lagged control variables, including lagged female share, real GDP growth, and unemployment rate. α_i^h and λ_t^h are country- and quarter-fixed effects, respectively, which control for all unobserved country-specific time-invariant confounders and all common time trends across countries. β_h is the parameter of interest, which captures the average effect of current government consumption shock on female share h quarters later. We estimate equation (2) separately for different horizons.

We further study the differential effect of government consumption in recession and normal times by interacting the recession indicator with government consumption in equation (2'):

$$Y_{i,t+h} - Y_{i,t-1} = \beta_h^r G_{it} I_{it} + \beta_h^n G_{it}(1 - I_{it}) + \theta I_{it} + \sum_{l=1}^{4} \gamma_l^{h\prime} X_{i,t-l} + \alpha_i^h + \lambda_t^h + u_{i,t}^h \tag{2'}$$

where I_{it} is an indicator for recession. β_h^r then captures the effect of government consumption shock during recession, and β_h^n captures the same effect for normal times. Inspired by Sahm's rule (Blanchflower and Bryson, 2024), we use unusual hike in unemployment rate as the recession indicator. In order to adapt to natural unemployment rate of each country, the recession is identified as the periods when unemployment rate is over 1.5 standard deviation above the country's mean unemployment. We also test the robustness of our results to alternative definitions.

4. Panel Regression of Yearly Income Distribution Data

We apply the two-way fixed effect model to the yearly income distribution data:

$$Y_{it} = \beta_1 G_{it} + \gamma' X_{it} + \alpha_i + \lambda_t + u_{it} \tag{3}$$

where i stands for country and t stands for year. Y_{it} is the outcome of interest. G_{it} is government consumption as a percentage of nominal GDP. X_{it} is a vector of control variable, including tax revenue share of GDP and GDP per capita growth rate. α_i and λ_t are country and year fixed effects, respectively. The outcome of interest includes Gini coefficient, income share of the

[4] Schwarz (1978) proposes BIC, and it offers asymptotically consistent estimate of model order. Another popular information criterion is Akaike information criteria (AIC). Compared with BIC, AIC tends to choose larger lag orders (Stock and Watson, 2020).

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bottom 20%, and income share of each decile.

FISCAL SPENDING AND FEMALE EMPLOYMENT

Our preliminary regression results for the ECA region countries provide three key insights:

(1) Fiscal expansion, defined as increase in current government consumption, generally has a positive effect on female employment share: *for ECA countries, a 1 percentage point increase in government consumption share is associated with an average of about 0.04 percentage point increase in female employment share, and the effect peaks at 0.05 percentage point 4-6 quarters after the shock*. While the effect seems small, with sufficiently large expansion, which, for example, may be called for during deep recessions and conditions of sufficient fiscal space, a 10-percentage point increase in government consumption, it translates into 0.4 percentage point increase in female employment. Since average share of female employment in ECA is 45.6 percent, this employment effect matters on the margin.

(2) Importantly, *the positive effect is stronger during recessions*, suggesting that countercyclical fiscal policy can, indeed, be a potent tool for promoting gender inclusiveness in terms of female employment, especially during the times of general economic hardship.

(3) Finally, there exists substantial heterogeneity in this relationship across countries. Especially, we find evidence that *the effect is stronger if the country's female labor participation rate is low*. This is also a promising result for policy as countercyclical fiscal policy can be especially effective in raising female employment in countries where it matters most—those with low female labor force participation.

1. Average Effects for ECA Countries

The local projection analysis in Figure 1 estimates the average treatment effect across all countries. Results show a statistically significant, positive impact of government consumption on female employment share, with the effect reaching its maximum around 4-6 quarters post-shock. This finding provides robust evidence for the gender-inclusive, employment benefits of fiscal expansion (Figure 1).

Figure 1. Average Effect of Government Consumption Shock on Female Share of Employment

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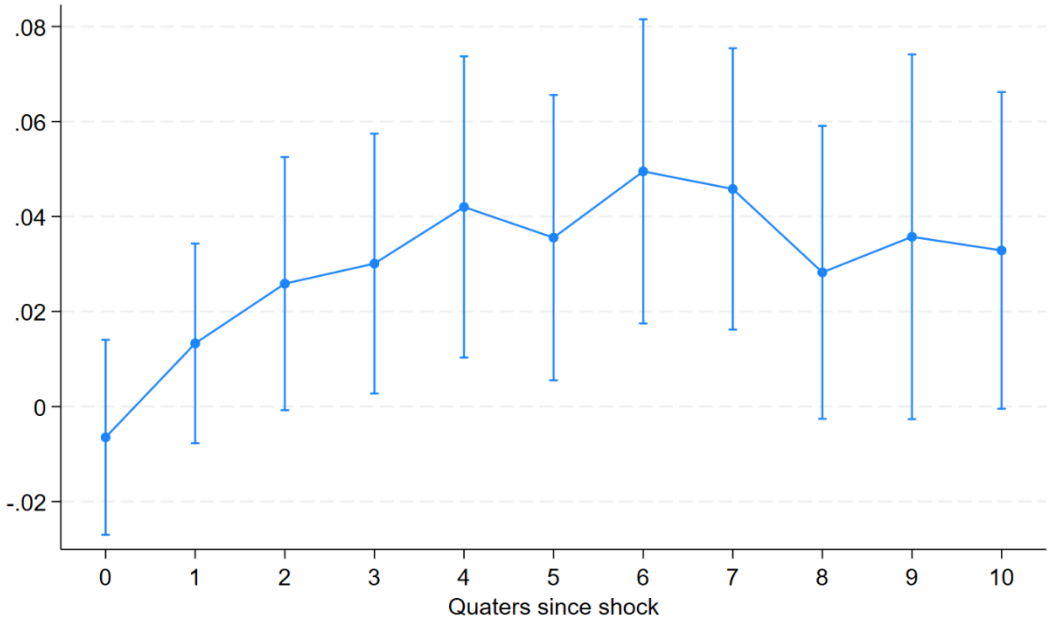
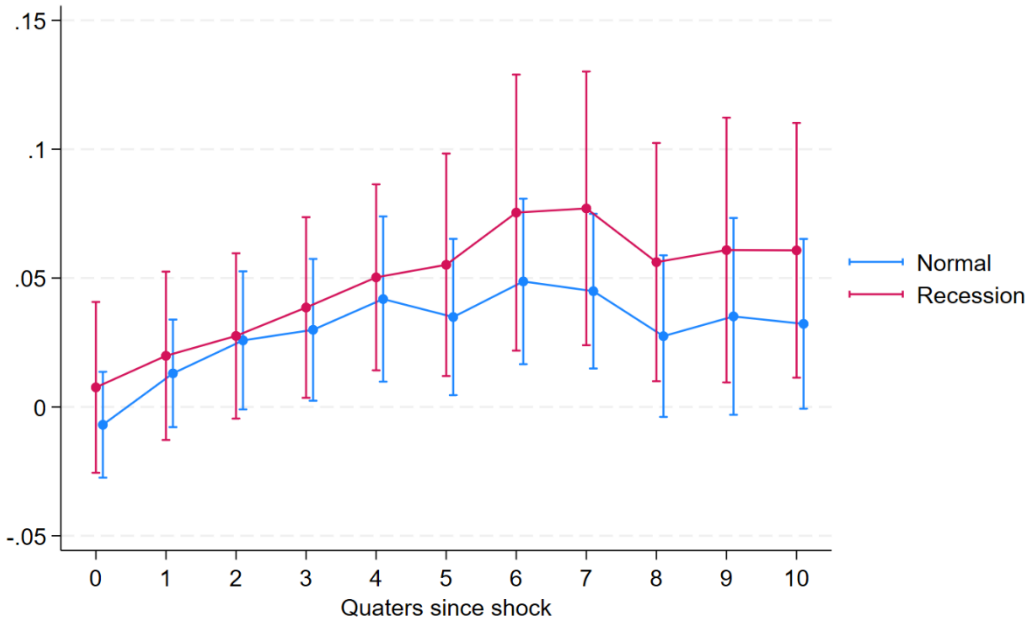


Note: This figure displays the average effect of government consumption on female share among ECA countries. The estimation equation is (2). Standard errors are clustered at country level.

Most notably, Figure 2 reveals that the *impact of government consumption is asymmetric across economic conditions. The effect on female employment share is approximately twice as large during recessions compared to normal times.* This finding carries important policy implications, suggesting that countercyclical fiscal policy can serve as an effective tool for maintaining and promoting gender inclusiveness of employment during economic downturns (Figure 2).

Figure 2. Effect of Government Consumption Shock on Female Employment Share during Normal Times and Recessions



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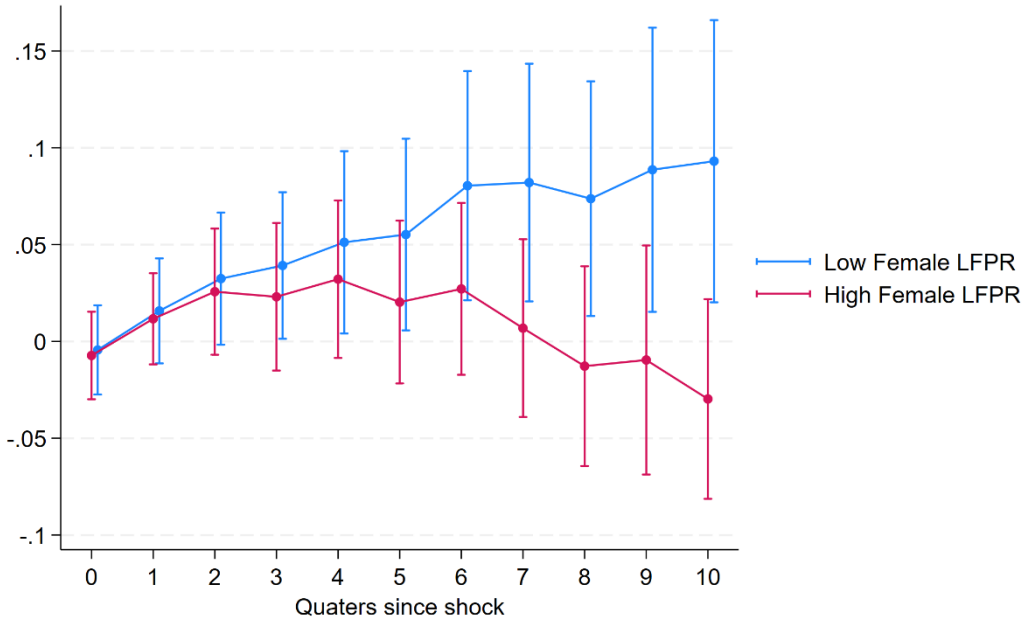
Note: This figure displays the average effect of government consumption on female share during normal times and recessions. The estimation equation is (2'). Standard errors are clustered at country level.

2. *Cross Country Heterogeneities*

The fiscal multiplier on female employment exhibits significant heterogeneity across countries with various levels of female integration into the labor market. As shown in Figure 3, *government spending generates substantially larger and more persistent positive effects on female employment in countries with low female labor force participation rates* compared to those with high participation rates. To obtain these results, we calculated each country's long-run average of year-adjusted female labor force participation rate and divided the sample into two groups using the mean as the threshold.[5] While both groups show similar initial responses, their trajectories diverge markedly after 4-5 quarters. Countries with low female LFPR maintain a strong positive trajectory, reaching approximately 0.09 percentage points by quarter 10, whereas high-LFPR countries experience declining effects after quarter 6, eventually turning insignificant. This pattern suggests that fiscal policy may be particularly effective at enhancing female employment in economies where structural barriers have historically limited women's workforce participation, potentially by creating job opportunities in sectors more accessible to women or by alleviating constraints through public services (Figure 3).

Figure 3. Female Labor Force Participation Rate and Spending Effects



Note: This figure displays the average effect of government consumption on female share in countries

[5] We first regress female LFPR to a series of year dummies, removing global trends. Then we collect the residuals and calculate the time-series mean for each country. This long-run LFPR measure captures the country's time-invariant factors affecting female labor market participation, including culture and norms.

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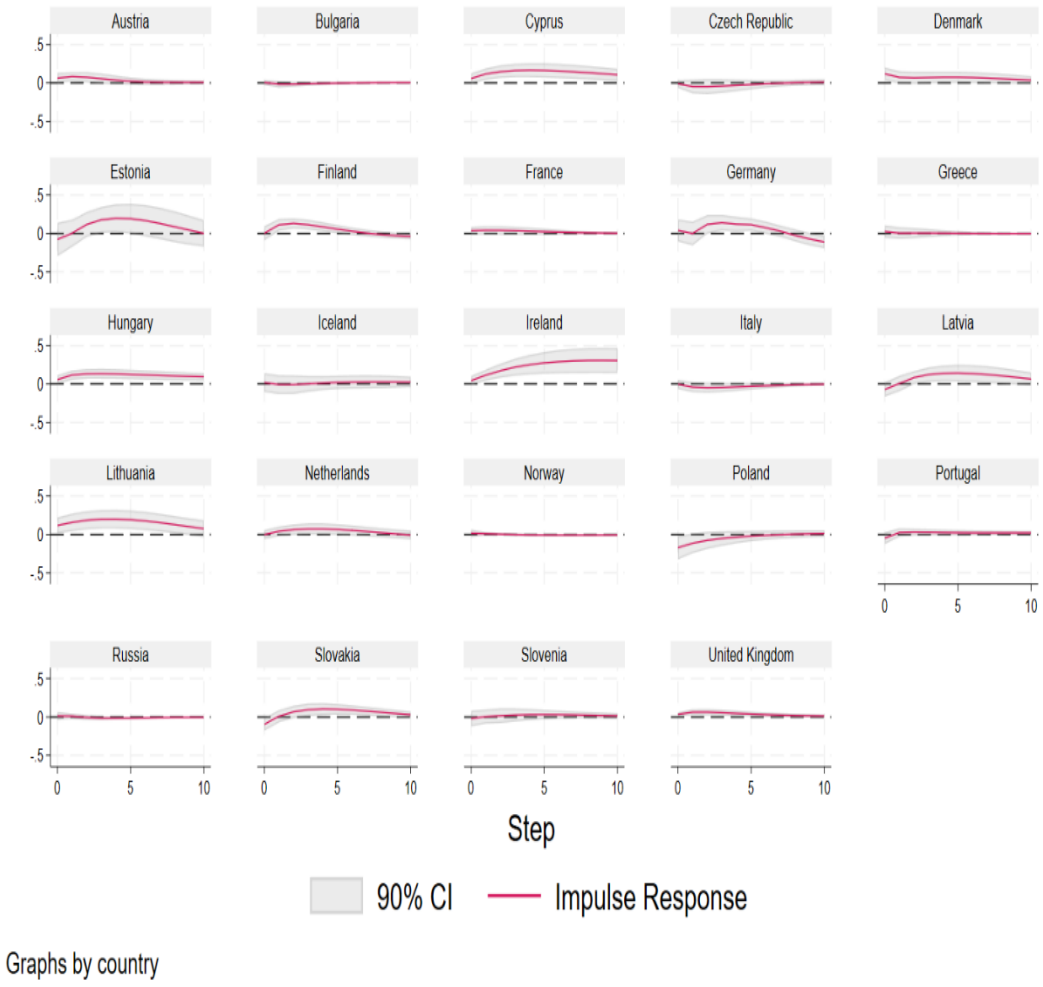
with historically low vs high female labor market participation. Standard errors are clustered at country level.

3. Country specific effects

We further conduct a country-specific VAR analysis to investigate the heterogeneity at a granular level and provide country-specific insights. Figure 4 reveals diverse patterns of impulse response functions across ECA countries. These dynamic responses of female employment share to government consumption shocks demonstrate varied trajectories in both magnitude and persistence, highlighting the heterogeneity and complexity of fiscal policy transmission to female employment (Figure 4).

Figure 4. Effects of Government Consumption Shock on Female Share, Separately for Each Country



Note: This figure displays the impulse response function (government consumption to female share of

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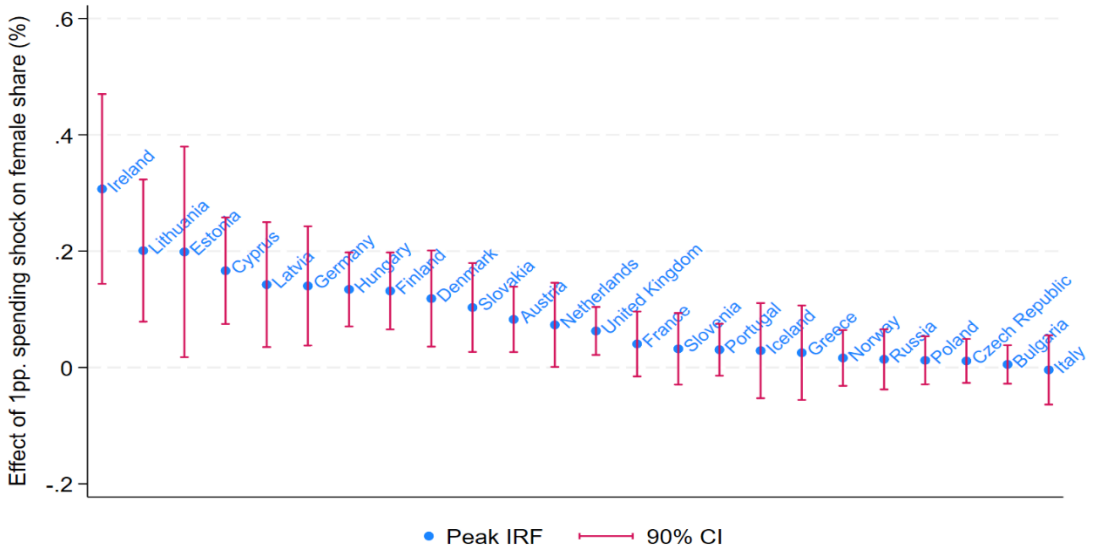
employment) for each ECA country. We separately estimate equation (1) for each ECA country and derive the corresponding impulse response function (Figure 2).

This cross-country heterogeneity is further quantified in Figure 5, which plots the peak effects within a 12-quarter horizon for each country. While the predominantly positive peak responses indicate that government consumption generally enhances female labor market participation, the *substantial variation in magnitudes suggests that country-specific factors play crucial roles in determining policy effectiveness* (Figure 5).

Figure 5. Peak Effect of Government Consumption Shock on Female Share for Each Country



Note: This figure displays the peak effect of government consumption on female share for each country. We separately estimate equation (1) for each ECA country and derive the corresponding impulse response function. Then, for each country, we plot the peak impulse response during 12 quarters after the shock.

FISCAL SPENDING AND INCOMES OF THE POOR

In the literature, studies document inequality reducing effects of social spending, transfers and subsidies as well as progressive taxes. Lustig (2017) in a summary of 25 country studies using commitment to equity, fiscal incidence approach, finds that these fiscal instruments, indeed, have a negative impact on inequality, but not always on poverty. Importantly, these impacts are found to be driven by n primarily by the share of social spending to GDP in each country and also the degree of targeting of transfers and subsidies to the poor as well as targeting of direct taxes to the rich. These findings are now well established. However, there is also a possibility that fiscal spending may increase inequality and adversely impact the poor if such spending may benefit disrporprortionately the middle- and higher-income groups and sectors, such as public sector workers, higher education or advanced healthcare facilities, which may not be accessible to poorer populations. Also, fiscal

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policies that increase government "unproductive spending", without effective redistributive mechanisms, can lead to greater income inequality. The reasons behind such effects are complex and likely having to do with political economy of government spending in settings where the middle class and the rich may have more influence on government consumption than the poor.

In this analysis, we explore anew this link between government spending and inequality anew using the same, narrow measure of government consumption used in other analyses above—which notably excludes social transfers and subsidies, which are typically most redistributive and inequality reducing components of fiscal spending.

In a nutshell, we ding find that *increases in government consumption, perhaps surprisingly, is associated with a significant increase in income inequality.* We emphasize that our analysis focuses on government consumption only and not the most redistributive government spending. As shown in Table 3 column (1) and (2), a one percentage point increase in government consumption share leads to a 0.357 percentage point rise in the Gini coefficient and reduces the bottom 20% income share by 0.117 percentage points. This inequality-widening effect may occur because government consumption stimulates final demand primarily satisfied by large firms, benefiting high-income groups disproportionately. The decile-level analysis in Table 4 confirms this pattern: government consumption expansion significantly reduces income shares for the bottom four deciles while increasing shares for the 9th decile (0.047 pp) and the top decile (0.163 pp). These findings warrant careful interpretation since government consumption represents only a subset of total government expenditure, excluding important redistributive spendings such as social welfare programs and transfers.

The *inequality-worsening impact of government consumption is significantly smaller during economic downturns*. To capture this differential effect, the study employs an interaction term between government consumption and economic slack, with slack computed using yearly data and the Hodrick-Prescott filter to separate cyclical components from trend. Recession is specifically defined as periods with negative output gap, when actual output falls below potential output. Column (3) and (4) of Table 3 reveals that when the economy operates below potential, the coefficient on the interaction term (-0.103) partially offsets the main effect on the Gini coefficient, reducing the inequality-widening impact by nearly 30%. Similarly, for the bottom 20%, the interaction term (0.0235) partially counteracts the negative main effect, indicating that government consumption during recessions is less detrimental to lower-income groups. This suggests that countercyclical fiscal policy—expanding government consumption during economic slack—can serve as an effective tool for mitigating income inequality, demonstrating its value beyond traditional macroeconomic stabilization (Table 3).

Table 3. Fiscal Policy and Income Inequality

	(1)	(2)	(3)	(4)
VARIABLES	Gini	Bottom 20% Income Share	Gini	Bottom 20% Income Share

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Government Consumption (% of GDP)	0.313***	-0.108***	0.357***	-0.117***
	(0.103)	(0.0313)	(0.111)	(0.0344)
Recession×Government Consumption (% of GDP)			-0.103**	0.0235*
			(0.0442)	(0.0129)
Tax Revenue (% of GDP)	-0.0757	0.0181	-0.0825	0.0191
	(0.0541)	(0.0147)	(0.0532)	(0.0140)
Recession×Tax Revenue (% of GDP)			0.0245	-0.00509
			(0.0297)	(0.00900)
Recession			1.475	-0.375
			(0.975)	(0.299)
GDP Per Capita Growth (%)	0.0675*	-0.0230**	0.0762**	-0.0256**
	(0.0356)	(0.0106)	(0.0376)	(0.0107)
Observations	609	609	609	609
R-squared	0.838	0.874	0.839	0.875
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: This table presents the association between government consumption and income inequality. Each column represents a separate OLS regression using yearly income distribution data. Recession is an indicator of negative output gap. Standard errors are clustered at country level. *** p<0.01, ** p<0.05, * p<0.1

The decile-level analysis in Table 4 further substantiates these findings with detailed distributional evidence. A 1 percentage point increase in government consumption disproportionately harms lower-income groups (deciles 1-4) while benefiting the highest income groups (deciles 9-10) during normal economic conditions. However, the positive and significant interaction coefficients for deciles 1-7 indicate that during recessions, this regressive impact is substantially reduced. For example, while the 2nd decile loses 0.0525 percentage points of income share per unit of government consumption in normal times, this effect is offset by 0.0127 percentage points during recessions. Likewise, the top decile's disproportionate gain (0.163) is reduced by 0.0705 percentage points during downturns, further confirming that countercyclical fiscal policy can mitigate distributional inequities (Table 4).

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Table 4. Fiscal Policy and Decile Income Share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Decile Income Share (%)									
VARIABLES	1	2	3	4	5	6	7	8	9	10
Government Consumption (% of GDP)	-0.0645***	-0.0525***	-0.0411***	-0.0304**	-0.0209	-0.0144	0.000615	0.0131	0.0471***	0.163*
	(0.0183)	(0.0168)	(0.0151)	(0.0148)	(0.0148)	(0.0124)	(0.0106)	(0.00943)	(0.0123)	(0.0886)
Recession×Government Consumption (% of GDP)	0.0108	0.0127**	0.0108*	0.0107*	0.0109**	0.0102**	0.00681*	0.00500	-0.00745	-0.0705**
	(0.00690)	(0.00628)	(0.00561)	(0.00535)	(0.00499)	(0.00466)	(0.00353)	(0.00383)	(0.00490)	(0.0325)
Tax Revenue (% of GDP)	0.00993	0.00921	0.00760	0.00781	0.00854	0.0119	0.00998*	0.00537	-0.0110*	-0.0593
	(0.00751)	(0.00685)	(0.00613)	(0.00658)	(0.00795)	(0.00768)	(0.00574)	(0.00577)	(0.00557)	(0.0456)
Recession×Tax Revenue (% of GDP)	-0.00385	-0.00124	-0.000970	-0.00116	-0.00220	-0.00387	-0.00361	-0.00416	0.00229	0.0188
	(0.00486)	(0.00444)	(0.00385)	(0.00348)	(0.00331)	(0.00296)	(0.00288)	(0.00313)	(0.00426)	(0.0216)
Recession	-0.149	-0.225	-0.197*	-0.167	-0.144	-0.104	-0.0482	-0.0162	0.110	0.941
	(0.156)	(0.146)	(0.116)	(0.101)	(0.0904)	(0.0833)	(0.0761)	(0.0694)	(0.103)	(0.664)
GDP Per Capita Growth (%)	-0.0138**	-0.0118**	-0.00771	-0.00392	-0.00432	-0.00483	-0.00333	-0.000536	0.00647	0.0438
	(0.00570)	(0.00524)	(0.00486)	(0.00473)	(0.00458)	(0.00438)	(0.00437)	(0.00464)	(0.00606)	(0.0305)
Observations	609	609	609	609	609	609	609	609	609	609
R-squared	0.868	0.873	0.863	0.815	0.744	0.697	0.654	0.773	0.866	0.738
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table presents the association between government consumption and income inequality. Each column represents a separate OLS regression using yearly income distribution data. Recession is an indicator of negative output gap. Standard errors are clustered at country level. *** p<0.01, ** p<0.05, * p<0.1

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ROBUSTNESS CHECKS

1. Comparing Government Consumption vs Primary Expenditure

This paper primarily utilizes government consumption, corresponding to the G component in the national income identity (GDP=C+I+G+NX), as the main measure of government spending. However, a broader definition of fiscal activity includes public investments and transfer payments in addition to consumption. To assess whether the scope of the fiscal measure influences the estimated effects on female employment, we also employ government primary expenditure (total government expenditures net of interest payments, obtained from fiscal data) as an alternative indicator. This comparative approach allows for an examination of potential differences arising from these distinct definitions of government spending. The study uses a yearly panel dataset, sourcing government consumption data from CEIC and primary expenditure data from the IMF's *Public Finances in Modern History* dataset (Mauro et al., 2015).

Table 5 examines the impact of fiscal spending on the female employment share using two alternative measures: government consumption in Panel A and primary expenditure (total expenditures net of interest payments) in Panel B. The analysis spans from the year of the spending shock (t+0) to three years post-shock (t+3). Panel A indicates that on the yearly frequency, government consumption does not have a statistically significant association with the female employment share during non-recessionary periods across the observed timeframe (t+0 to t+3). However, the interaction term between government consumption and the recession indicator is positive and statistically significant in years t+0 ($p<0.05$), t+1 ($p<0.05$), t+2 ($p<0.05$), and t+3 ($p<0.10$). This suggests that increases in government consumption during recessions are associated with a significantly more positive effect on the female employment share compared to non-recessionary periods. Panel B presents results using primary expenditure. Similar to Panel A, primary expenditure alone does not show a significant relationship with the female employment share outside of recessions. The interaction term with the recession indicator is again positive and statistically significant in years t+1 ($p<0.10$), t+2 ($p<0.01$), and t+3 ($p<0.10$). This indicates that higher primary expenditure during recessions is also linked to a relative increase in the female employment share compared to non-recessions, with the strongest effect observed two years post-shock (Table 5).

Consistent with the findings for both measures, fiscal expansion demonstrates a significantly more favorable association with the female share of employment during economic downturns compared to non-recessionary periods. While both government consumption (Panel A) and primary expenditure (Panel B) exhibit this pattern, government consumption directly represents the government's contribution to aggregate demand within the national accounts. A potential mechanism driving these results involves the cyclical nature of labor demand. Fiscal stimulus inherently boosts aggregate demand and, consequently, labor demand. If the sectors stimulated by government spending during recessions, or the pool of workers entering employment in response to this stimulus, disproportionately includes women, then fiscal expansion would indeed yield a relatively larger positive impact on the female employment share specifically during these downturns. This hypothesis aligns with the positive and significant coefficients observed on the interaction terms in both panels.

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Table 5: Primary Expenditure as Alternative Measure of Fiscal Spending

	(1)	(2)	(3)	(4)
	Dep. Var: Female Share (%)			
	Year t+0	Year t+1	Year t+2	Year t+3
Panel A. Government Consumption				
Government Consumption (% of GDP)	-0.0273	-0.0361	-0.0598	-0.0471
	(0.137)	(0.131)	(0.122)	(0.110)
Government Consumption (% of GDP)×Recession	0.0464**	0.0594**	0.0590**	0.0339*
	(0.0194)	(0.0233)	(0.0245)	(0.0196)
Observations	1,223	1,219	1,213	1,206
R-squared	0.918	0.919	0.920	0.919
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Panel B. Primary Expenditure (Net of Interest Payment)				
Primary Expenditure (% of GDP)	-0.0167	-0.0275	-0.0404	-0.0335
	(0.0558)	(0.0535)	(0.0510)	(0.0514)
Primary Expenditure (% of GDP)×Recession	0.0174	0.0291*	0.0441***	0.0246*
	(0.0159)	(0.0168)	(0.0138)	(0.0134)
Observations	1,086	1,081	1,075	1,069
R-squared	0.902	0.904	0.905	0.905
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: This table displays the estimated effects of government spending on female employment share, from the current year of the spending shock to three years after the shock. In panel A, government spending is measured by government consumption in the national account; in panel B, government spending is measured by primary expenditure net of interest payment. Recession is an indicator which equals 1 if the estimated output gap is negative. All regressions include the recession indicator and lagged per-capital GDP growth rate as controls. Standard errors clustered at country level. *** p<0.01, ** p<0.05, * p<0.1

2. Long-term Effect of Fiscal Cyclicality on Female Employment

This section gives supportive evidence on the long-run effect of countercyclical fiscal policy on gender inclusiveness of the labor market. One empirical challenge of identifying the effect of fiscal cyclicality on gender inclusiveness is that fiscal cyclicality is not observed yearly. In fact, the fiscal cyclicality of a country can only be estimated using the time series correlation between fiscal spending and output gap in a given period. In previous sections, we establish that the effect of fiscal spending is more pro-female in recession compared with non-recession periods. Therefore, in the long run, a more counter-cyclical fiscal policy should result in higher female employment share.

We use cross-country macroeconomic data from 1990 to 2019 and the long-difference (LD) regression to estimate the long-run relationship between fiscal cyclicality and female employment share[6]. The LD regression is best suited for capturing long-term effects of slowly-evolving variables, such as demographics (Acemoglu and Restrepo, 2022) and climate (Burke and Emerick, 2016).

[6] We exclude data from 2020-2024 to avoid data irregularities caused by the COVID pandemic.

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Besides, differencing helps remove all country-specific time-invariant confounders. In this paper, the LD regression is run on country level, where the dependent variable is the change in female share and the independent variable is the change in fiscal cyclicality. Specifically, we evenly split the sample period into two periods: 1990 to 2004 and 2005 to 2019. For each country in each period, we estimate their fiscal cyclicality by regressing the cyclical component of logged government consumption on the cyclical component of logged real output (i.e. output gap), following the methodology of Carnazza et al. (2020). Then we estimate the following regression:

$$\Delta Female\ Share_i = \beta_0 + \beta_1 \Delta \widehat{Cyclicality}_i + \gamma' X_i + u_i \quad (4)$$

where i stands for country, $\Delta Female\ Share_i$ is the change in average female share between the two periods: $\Delta Female\ Share_i = \overline{Female\ Share}_{i,2005-2019} - \overline{Female\ Share}_{i,1990-2004}$. Similarly, $\Delta \widehat{Cyclicality}_i$ is the change in the estimated fiscal cyclicality in the two periods. X_i is a vector of control variables, including change in government consumption, change in tax revenue, and baseline level of GDP per capita. These variables control for the direct effect of government fiscal expenditure or revenue on female employment share as well as the potentially uneven pace toward gender inclusiveness due to initial level of economic development.

Table 6 reports the summary statistics of estimated cyclicality and female employment share in our regression sample. *Comparing 2005-2019 (Panel B) with 1990-2004 (Panel A), the average fiscal cyclicality decreased from 0.127 to nearly zero. Meanwhile,, the average female employment share increased from 41.11% to 43.81%.*

Table 6: Summary Statistics of Estimated Cyclicality and Female Employment Share

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
Panel A: 1990-2004					
Female Share (%)	31	41.11	5.822	28.29	51.63
Cyclicality	31	0.127	0.567	-0.554 (United Kingdom)	4.806 (Moldova)
Panel B: 2005-2019					
Female Share (%)	31	43.81	5.496	28.82	52.55
Cyclicality	31	-0.00499	0.235	-0.490 (Luxemburg)	0.525 (Romania)

Table 7 presents the estimated impact of expenditure cyclicality on the female share of employment. The result in column (2) indicates that a *one-unit decrease in cyclicality is associated with a statistically significant 1.973 percentage point increase in the female employment share* ($p<0.05$). To put this magnitude into perspective, this effect is comparable to the estimated impact of a 3-percentage-point increase in government consumption or a 4.4-percentage-point cut in tax revenue (both relative to GDP). This suggests that the cyclical pattern of government spending is at least as consequential for the female share in employment as the overall levels of government consumption or taxation.

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Table 7: Long-difference Regression of Female Share on Expenditure Cyclicality

VARIABLES	(1)	(2)
	Dep. Var.= Δ Female Share (%)	
Δ Cyclicality	-1.569*	-1.973**
	(0.835)	(0.792)
Δ Government Consumption		0.651**
		(0.309)
Δ Tax Revenue		-0.445**
		(0.206)
Log(Initial GDP per capita)	2.182***	1.997***
	(0.541)	(0.499)
Constant	-19.05***	-17.64***
	(5.401)	(4.981)
Observations	31	31
R-squared	0.368	0.510

Note: This table displays results from long-difference regressions. Each column corresponds to one weighted least square (WLS) regression using population as sample weights. The dependent variable is the change in the female share (expressed as a percentage), calculated as the average value from 2005-2019 minus the average value from 1990-2004. The symbol Δ indicates this same long-difference calculation (average 2005-2019 minus average 1990-2004) for the independent variables it precedes (Cyclicality, Government Consumption, Tax Revenue). Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

SUMMARY DISCUSSION AND CONCLUSION

This paper provides new empirical evidence on the impact of countercyclical fiscal policies on women and low-income groups, with a focus on Europe and Central Asia (ECA). The research highlights how fiscal policy, measured by government consumption, can disproportionately affect women and the poor, both positively, by increasing female share of employment but it also shows potentially negative effects on income inequality and poverty. The findings suggest that countercyclical fiscal policies, especially during recession, can promote gender inclusiveness and reduce income inequality, particularly in countries with low female labor force participation rates. Fiscal expansion generally has a positive effect on female employment share, with the effect being stronger during recessions. However, government consumption, which excludes social transfers and social assistance, is also associated with an increase in income inequality, although this effect is significantly smaller during economic downturns. An implication is that social transfers and social assistance, with their well known redistributive impacts, would likely strengthen these impacts. The paper underscores the importance of designing gender- and poverty-sensitive fiscal policies to enhance social resilience and shared economic prosperity.

The detailed analysis reveals that fiscal expansion, defined narrowly as an increase in government consumption, generally has a positive effect on female employment share. For ECA countries, a 1 percentage point increase in government consumption share is associated with an average of about 0.04 percentage point increase in female employment share, with the effect peaking at 0.05 percentage point 4-6 quarters after the shock. Importantly, the positive effect is stronger during recessions, suggesting that countercyclical fiscal policy can be a potent tool for promoting gender inclusiveness in terms of female employment, especially during times of economic hardship. The analysis also shows substantial heterogeneity in this relationship across countries, with the effect

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being stronger in countries with low female labor participation rates.

On the other hand, government consumption is associated with a significant increase in income inequality. A 1-percentage-point increase in government consumption share leads to a 0.357 percentage point rise in the Gini coefficient and reduces the bottom 20% income share by 0.117 percentage points. This inequality-widening effect may occur because government consumption stimulates final demand primarily satisfied, for example, by large firms, also benefiting higher-income groups and sectors disproportionately. However, the inequality-worsening impact of government consumption is significantly smaller during economic downturns, suggesting that countercyclical fiscal policy can serve as an effective tool for mitigating income inequality.

In conclusion, the paper highlights the importance of countercyclical fiscal policies in promoting gender inclusiveness and reducing income inequality. Policymakers should consider designing gender- and poverty-sensitive fiscal policies to enhance social resilience and shared economic prosperity, particularly in countries with low female labor force participation rates and high vulnerability to economic fluctuations. Specifically, the following policy implications may be of interest.

1. *Ensure Countercyclicality of Fiscal Policies:* Governments should adopt countercyclical fiscal policies to stabilize the economy during downturns and promote long-term growth. This includes increasing public spending or reducing taxes during recessions to boost aggregate demand and support economic recovery, as well as strengthening automatic stabilizer and progressive income tax structures.

2. *Focus on Gender-Inclusive Policies:* Policymakers should design fiscal policies that are sensitive to or specifically target female employment, especially in country contexts of low female labor force participation. This can be achieved by investing in sectors where women are predominantly employed, such as healthcare, education, and social services, which happen to be sectors that broadly benefit the welfare of households, including that of women and the poor. Additionally, providing support for childcare and family-friendly workplace policies, and access to finance can help increase female labor force participation.

3. *Enhance Social Protection Programs:* Strengthening social protection programs, such as unemployment benefits, social assistance, and targeted cash transfers, can help mitigate the adverse effects of economic downturns on low-income groups. These programs should be designed to be well targeted and targeted and fiscally affordable and responsive to economic cycles, with automatic stabilizers that increase support during recessions.

4. *Promote Inclusive Growth*: Governments should prioritize inclusive growth by investing in infrastructure and public services that benefit low-income communities. This includes improving access to education, healthcare, finance, and affordable housing, which can help reduce income inequality and promote social mobility.

5. *Monitor and Evaluate Policy Impact*: It is essential to continuously monitor and evaluate the impact of fiscal policies on gender equality and poverty reduction. This can be done through regular data collection and analysis, as well as engaging with stakeholders, including civil society organizations and affected communities, to gather feedback and

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make necessary adjustments.

By implementing these policies, policymakers can enhance the effectiveness of countercyclical fiscal policies in promoting gender inclusiveness and reducing income inequality, ultimately contributing to greater social resilience and shared economic prosperity.

Finally, we highlight limitations of the present analysis and scope for refinement and future research.

1. *Data Constraints*: The analysis relies on cross-country datasets that may have limitations in terms of data availability and quality. The quarterly gender employment dataset and the yearly income distribution dataset are unbalanced due to varying data availability across countries. This may affect the robustness and generalizability of the findings.

2. *Scope of Fiscal Policy Measures:* The study primarily focuses on government consumption as a measure of fiscal spending. This approach does not capture the potential effects of social welfare programs and transfers, which are crucial components of fiscal policy aimed at reducing poverty and inequality. Therefore, the results should be interpreted as the effects of governments directly stimulating final demands via government consumption only.

3. *Heterogeneity Across Countries*: The analysis reveals substantial heterogeneity in the relationship between fiscal policy and gender inclusiveness across countries. While the study provides insights into the average effects, the country-specific factors that influence these relationships are complex and require more granular analysis, including the role played by institutions, to fully understand the dynamics at play.

4. *Economic Conditions:* The study finds that the adverse impact of government consumption on income inequality is significantly smaller during economic downturns. However, the definition of recession and economic slack may vary across countries, and the interaction effects may not fully capture the nuances of different economic conditions.

Future research can address some of these limitations and provide more nuanced and additional insights in the relationship between fiscal policy, gender, and the poor.

One straightforward extension is incorporating social welfare programs and compare and contrast the results with those found based on government consumption. This would provide a more comprehensive understanding of how different components of fiscal policy affect gender inclusiveness and income inequality.

Another research avenue would be exploring country-specific factors in greater depth. Further studies could delve into the country-specific factors that influence the relationship between fiscal policy and gender inclusiveness. This could involve case studies or more detailed country-level analyses to identify the unique characteristics and policy environments that drive these observed relationships.

Further, longitudinal analysis could add another dimension to these relationships**.** Conducting longitudinal studies that track the impact of fiscal policy over longer periods could provide deeper insights into the long-term effects of countercyclical fiscal policies on gender inclusiveness and income inequality.

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The present research could be expanded with more granular sectoral analysis. Investigating the sectoral impacts of fiscal policy on female employment and income distribution could help identify which sectors are most responsive to fiscal interventions and how these sectors contribute to overall gender inclusiveness and poverty reduction.

Finally, further research is needed on policy design and implementation. It could focus on the design and implementation of gender- and poverty-sensitive fiscal policies. This could involve developing frameworks and guidelines for policymakers to create more effective and inclusive fiscal policies.

By addressing these limitations and exploring these future research directions, policymakers and researchers can gain a more comprehensive understanding of the impacts of countercyclical fiscal policies on women and low-income groups, ultimately contributing to more effective and inclusive policy design and effectiveness.

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APPENDIX

Table A1. Sample Period for Each ECA Country in the Quarterly Panel

Country	First Observation	Last Observation
Albania	2012q1	2023q4
Armenia	2014q1	2017q4
Austria	1999q1	2024q3
Belgium	1999q1	2024q3
Bosnia and Herzegovina	2020q1	2024q2
Bulgaria	2000q1	2024q3
Croatia	2002q1	2024q3
Cyprus	2004q2	2024q3
Czech Republic	1993q1	2024q3
Denmark	1999q1	2024q3
Estonia	2000q1	2024q3
Finland	1998q1	2024q3
France	2003q1	2024q3
Georgia	2017q1	2020q4
Germany	2005q1	2019q4
Greece	1998q1	2024q3
Hungary	1999q1	2024q3
Iceland	2003q1	2024q3
Ireland	1998q1	2024q3
Italy	1997q2	2024q3
Kosovo	2012q1	2023q4
Latvia	2001q4	2024q3
Lithuania	2001q4	2024q3
Luxembourg	2003q1	2024q3
Moldova	2010q1	2024q2
Montenegro	2011q1	2022q4
Netherlands	2000q1	2024q3
Norway	2000q1	2024q3
Poland	2000q1	2024q3
Portugal	1996q2	2024q3
Romania	1999q1	2024q3
Russia	2010q1	2023q4
Serbia	2013q4	2024q2
Slovakia	1998q1	2024q3
Slovenia	1999q1	2024q3
Spain	1996q1	2024q3
Sweden	2001q1	2024q3
Switzerland	2010q1	2024q3
United Kingdom	1999q2	2024q2

REFERENCES

Abdon, Arnelyn, Gemma Estrada, and Minsoo Lee. (2015). Fiscal Policy and Growth in Developing Asia.

Official Use Only

In *Inequality, Inclusive Growth, and Fiscal Policy in Asia*, edited by Donghyun Park, Sang-Hyop Lee, and Minsoo Lee, 69–89. London: Routledge.

Acemoglu, D., & Restrepo, P. (2022). Demographics and automation. *The Review of Economic Studies*, *89*(1), 1–44.

Aizenman, J. (2019). A modern reincarnation of Mundell-Fleming's trilemma. *Economic Modelling*, *81*, 444-454.

Akitoby, B., Honda, J., & Miyamoto, H. (2019). Countercyclical fiscal policy and gender employment: evidence from the G-7 countries. International Monetary Fund.

An, Z., Bluedorn, J., & Ciminelli, G. (2022). Okun's law, development, and demographics: Differences in the cyclical sensitivities of unemployment across economy and worker groups. *Applied Economics*, 54(36), 4227-4239.

Anmol Bhandari, David Evans, Mikhail Golosov, Thomas J. Sargent, (2021). Inequality, Business Cycles, and Monetary-Fiscal Policy, *Econometrica*, Econometric Society, vol. 89(6), pages 2559-2599, November

Bhandari, A., Evans, D., Golosov, M., & Sargent, T. J. (2021). Inequality, Business Cycles, and Monetary-Fiscal Policy. *Econometrica*, 89(6), 2559-2599.

Blanchard, O., & Perotti, R. (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *Quarterly Journal of Economics*, 117(4), 1329-1368.

Blanchflower, D. G., & Bryson, A. (2023). The Sahm rule and predicting the Great Recession across OECD countries. *National Institute Economic Review*, 264, 8-58.

Bogetić, Ž., & Naeher, D. (2024). *Is Escaping the Fiscal Pro-Cyclicality Trap Possible? Evidence from the Middle East and North Africa* (No. 10959). The World Bank.

Burke, M., & Emerick, K. (2016). Adaptation to climate change: Evidence from US agriculture. *American Economic Journal: Economic Policy*, *8*(3), 106–140.

Cao, M., Duan, K., & Ibrahim, H. (2025). Constraining effects of local government debt on bank loan growth. *Economic Analysis and Policy*, 85, 371-382.

Carnazza, G., Liberati, P., & Sacchi, A. (2020). The cyclically-adjusted primary balance: A novel approach for the euro area. *Journal of Policy Modeling*, *42*(5), 1123–1145.

Coskun, S., & Dalgic, H. C. (2024). The emergence of procyclical fertility: The role of breadwinner women. *Journal of Monetary Economics,* 142, 103523.

Devereux, P. J., & Hart, R. A. (2006). Real wage cyclicality of job stayers, within-company job movers, and between-company job movers. *ILR Review*, *60*(1), 105-119.

Dincă, G., Dincă, M. S., Dauti, B., Baba, M. C., & Popione, C. (2020). Cyclicality of fiscal policy in the European Union. *Romanian Journal of Economic Forecasting*, 23(1), 75.

Klein, L. C. (2024). Do fiscal rules influence income inequality? Evidence from advanced and emerging

Official Use Only

economies.

Lustig, Nora (2017). Fiscal Policy, Inequality and the Poor, Commitment to Equity (CEQ) Institute, Tulane University, Working Paper, October 2016, revised 2017.

Mauro, P., Romeu, R., Binder, A., & Zaman, A. (2015). A modern history of fiscal prudence and profligacy. *Journal of Monetary Economics*, *76*, 55–70.

Novta, N., & Pugacheva, E. (2021). The macroeconomic costs of conflict. *Journal of Macroeconomics*, 68, 103286.

Park, D., Lee, S. H., & Lee, M. (Eds.). (2015). Inequality, inclusive growth, and fiscal policy in Asia. Routledge.

Rasmane Ouedraogo. (2015). Does pro-cyclical fiscal policy lead to more income inequality? An empirical analysis for sub-saharan Africa. *Economics Bulletin*, vol. 35(2), pages 1306-1317.

Riera-Crichton, D., Vegh, C. A., & Vuletin, G. (2015). Procyclical and countercyclical fiscal multipliers: Evidence from OECD countries. *Journal of International Money and Finance*, *52*, 15-31.

Rojas, Diego and Vegh, Carlos A. and Vegh, Carlos A. and Vuletin, Guillermo Javier. (2020). The Macroeconomic Effects of Macroprudential Policy: Evidence from a Narrative Approach. NBER Working Paper No. w27687

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, 461-464.

Stock, J. H., & Watson, M. W. (2020). *Introduction to Econometrics*. Pearson.

V. V. Chari, Lawrence J. Christiano, Patrick J. Kehoe (1994). Optimal Fiscal Policy in a Business Cycle Model. *Journal of Political Economy*, Vol. 102, No. 4, pp. 617-652

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