Female labor force participation and the role of aggregate demand

Davide Romaniello*, Antonella Stirati**, Anna Vergnano**

Abstract

In recent years, interest upon gender inequality and women's employment has seen a surge in the economic literature. This paper aims at contributing to the literature by focusing on female labor force participation underlying its relationship with aggregate (and labor) demand. We draw from Post-Keynesian theory and claim that growth of the (female) labor supply can be driven by aggregate demand even in the long run. We posit that autonomous demand expansion can drive female labor force participation through three main channels: the creation of jobs in sectors where women tend to be more employed, such as the public sector; the reduction of time devoted to care work as government spending is devoted to the improvement social infrastructures; and through the generalised positive effect that autonomous demand expansions have on employment opportunities. We study the role of autonomous demand expansions on female labor force participation on a panel of 21 OECD countries following two lines of inquiry. First, we adopt a local projection methodology combined with a two-way fixed-effect specification model and analyze the impact of both autonomous demand expansions and contractions on female labor force participation. Then we identify autonomous demand shocks via SVAR methodology and analyse the response again through local projections. We find that autonomous demand expansions have a positive effect on female labor force participation, with elasticities around 0.1 percentage points. Autonomous demand contractions have a slightly larger (negative) effect, as the elasticity reaches 0.12 percentage points. Our results are in line with the premises of demand-led growth models with endogenous adjustment of labor supply.

*University of Campania Luigi Vanvitelli

** University of Roma Tre

Introduction

The entrance of women into the formal workforce is one of the shaping phenomena of the past 150 years for most countries of the globe. Economic theory has on multiple occasions attempted to identify the factors that most contribute to determining female participation in the labor force. The literature on this topic has focused extensively on the determinants of higher rates of female labor force participation at the individual level, producing a several studies which identified a range of factors that go from the role of fertility (Kleven et al., 2019; Barbiellini Amidei et al., 2023; De Philippis and Lo Bello, forthcoming) to the impact of caregiving (Verashchagina and Capparucci, 2013; Ngai and Petrongolo, 2017; De Henau et al., 2010; Del Boca and Yuri, 2007), cultural shifts regarding women's status (Costa, 1988; Camussi, 2013; Pescarolo, 2022), and structural transformations and occupational segregation (Goldin, 1995; Bettio, 2010). Other works have looked at the relationship between economic growth and gender outcomes: traditionally, structural and developmental theories have highlighted the impact of different stages of economic development on female labor force participation (FLFP). For instance, the work of Boserup (1970) and subsequent studies like those of Goldin (1995) and Mammen and Paxson (2000) have placed female labor force participation into the framework of structural changes, providing a well-known theory on the evolution of FLFP along different stages of economic development.

In this paper, we shift perspective and focus on the influence of aggregate demand dynamics on female labor force participation by merging feminist heterodox research lines with the Keynesian principle of effective demand, arguing that autonomous demand plays a fundamental role as a driver (or constraint, in the case of demand shortages) for female labor force participation. The feminist literature has suggested that the relationship between economic growth and female labor force participation is complex, dictated also by the role of care work, and that it greatly depends on the macroeconomic policies that are put in place. Autonomous-demand led growth models argue instead that labor supply growth could also be dependent on the growth rate of autonomous demand

and on the unemployment rate. As these theories are formulated to the population as a whole, we set out to evaluate their soundness for working-age women.

This study empirically tests the impact of autonomous demand on FLFP across 21 OECD countries from 1960 to 2016. We employ two model specifications and methodologies: we start with a two-way fixed-effects model combined with the Local Projection approach (Jordà, 2005) to analyse the medium run effects of demand expansions and contractions on FLFP. Next, we combined the Local Projection methodology with the structural vector autoregressive (SVAR) identification. Both our specifications suggest that demand expansions significantly and persistently increase female labor force participation, with effects becoming particularly pronounced several years after the initial expansion.

1. Economic growth, aggregate demand and gender

Our work proposes a novel understanding of the relationship between female labor force participation and economic growth which emerges from the combination of different strands of literature, namely feminist heterodox contributions on the relationship between care work and economic growth and the demand-led growth models. In this section we present a review of the literature on female labor force participation and economic growth, with an emphasis on the two strands of literature that influenced our work most.

The relationship between economic growth and gender outcomes has been widely explored in the literature. Structural and developmental approaches, rooted in the seminal research of Boserup (1970), focus on how different stages of economic development influence female labor force participation (Goldin, 1995; Mammen and Paxson, 2000). At early stages of economic development, economies rely on agriculture and much of the production is based on subsistence. Here, women contribute significantly to production in family enterprises, although the recognition of their work is not always proportional. As economies shift towards industry, women are pushed

out of the labor market: industrialization brings about great changes in terms of relocation of production (from the countryside to the city), better opportunities and higher salary for men, who can now provide for their whole families (Goldin, 1995). This leads women to leave the labor market and dedicate to domestic and care work. With further economic development and increasing women's education levels, female labor force participation rises again as service-oriented jobs become more available.

Recent, promising, research is instead studying the gender effects of economic growth by adopting Post-Keynesian and Kaleckian perspectives. In these models, growth can negatively affect female employment. For instance, rising female wages in export sectors may reduce competitiveness, leading to lower profits, reduced investments, and a contraction in employment (Seguino, 2000). More recent models incorporate the role of social reproduction, considering the organization of care work as a factor influencing aggregate demand and long-term productivity growth (Braunstein et al., 2011; Braunstein et al., 2020). These heterodox feminist models highlight that the relationship between economic growth and gender gaps is strictly dependent on the policies that accompany such growth (Seguino, 2021). Studies have examined the gendered effects of various macroeconomic policies, including inflation targeting (Braunstein and Heintz, 2008), exchange rate policies (Erten and Metzger, 2018), and social sector public spending (Antonopoulos et al., 2011; İlkkaracan et al., 2015; Oyvat and Onaran, 2022).

In this paper, we merge the feminist heterodox research lines with the extension to the long run of the principle of effective demand. Such principle, originally proposed for the short run only by Keynes in the *General Theory* (1936), states that the level of production of the economy is strictly determined by aggregate demand, as firms can only produce what they expect to be absorbed in the market. Variations in aggregate demand induce variations in the degree of capacity utilization and, in the long run, they can lead to creation or destruction of installed productive capacity (Garegnani, 1992). The extension of the principle of effective demand to the long run is integral to

supermultiplier models (Serrano, 1995; Cesaratto et al., 2003; Freitas e Serrano, 2015; Serrano e Freitas, 2017), where the growth rates of income and of productive capacity are determined by the growth rate of autonomous demand. While these models have been insightful in analyzing stagnation and mature economies (Allain, 2015; Lavoie, 2016; Fazzari et al, 2020; Deleidi e Mazzucato, 2021), they typical overlook labor supply. Recent studies (Fazzari et al., 2020; Fazzari and Gonzalez, 2023; Di Domenico et al., 2024) show instead that labor supply is endogenous to the growth process: they model the growth rate of labor supply as per equation (1), stating that it depends directly on the unemployment rate and, therefore, on autonomous demand.

$$g^{LS} = \theta_0 - \theta_1 u_{t-1} \tag{1}$$

Female labor force participation is included in the coefficient θ_0, meaning that it is understood as exogenous, but we argue that it is also driven by autonomous demand and by employment opportunities, challenging the role of labor supply as a growth constraint in mature economies, were most working-age men are already working.

We expect autonomous demand to positively impact female labor force participation through three main channels of transmission. First, aggregate demand expansions can boost investments and employment, particularly when labor market slack exists (Girardi et al., 2020). Second, increased public spending in sectors like healthcare and education reduces the burden of unpaid care work, allowing women to enter paid employment (Oyvat and Onaran, 2020). Lastly, public sector growth creates jobs in areas where women are more represented, directly increasing female labor participation (De Henau, 2022).

The empirical literature that tested the relationship described in equation (1) has found mixed evidence. Using a Local Projection methodology, Brückner and Pappa (2012) find that government spending has a positive impact on labor force participation, but that it also leads to an increase in

the unemployment rate. Girardi et al. (2020) focus instead on the role of autonomous demand and find that demand expansions stimulate both an increase in labor supply and a reduction in the unemployment rate. This results concern the population as a whole: there are a few studies that isolated the impact of fiscal policy on gendered outcomes, among which, Akitoby et al. (2019) find that positive government spending shocks lead to an increase in the female share of employment in the countries of the G-7; Oyvat and Onaran (2020) perform a structural vector autoregression analysis (SVAR) on the role of public infrastructure spending in South Korea, finding positive effects on female labor force participation; and lastly, Reljic and Zezza (2024), focusing on the regional divide in Italy, highlight a partial role of public spending in social infrastructures in reducing the gender employment gap in Southern Italy.

2. Empirical analysis

Data

The empirical analysis of the medium- and long-term effects of autonomous demand on female labor force participation will be conducted on an unbalanced panel of 21 OECD countries from 1960 to 2016. Data availability, as shown in Table 1, depends on the historical availability of data on female labor force participation.

Table 1. Countries of the panel

Country	*Data availability*
Australia	1966 - 2016
Austria	1980 - 2016
Belgium	1983 - 206
Canada	1976 - 2016
Denmark	1983 - 206
Finland	1963 - 2016
France	1975 - 2016
Germany	1991 - 2016
Greece	1981 - 2016
Irland	1983 - 2016
Italy	1960 - 2016
Japan	1968 - 2016
South Korea	1980 - 2016

Netherlands	1971 - 2016
New Zealand	1986 - 2016
Norway	1972 - 2016
Portugal	1974 - 2016
Spain	1972 - 2016
Sweden	1963 - 2016
United Kingdom	1983 - 2016
United States	1960 - 2016

Following Girardi et al. (2020), the variable representing autonomous demand is constructed as the sum of government spending and exports, both considered in real terms. Government spending includes public consumption, net of interest payments on debt, and public investment expenditures.

2.1. Two-way fixed effect model

In an initial exploratory analysis of the role of aggregate demand in determining female labor force participation, we focus on episodes of strong autonomous demand expansion and contraction, comparing female labor force participation between countries and years in which those episodes took place and in which they did not (Girardi et al., 2020; Paternesi Meloni et al., 2022).

Strong autonomous demand *expansions* are defined as deviations that significantly differ from the national average variation which satisfy the following two criteria:

1) $\Delta Z_{i,t} > \mu(\Delta Z) + \sigma(\Delta Z)$

2) $\Delta Z_{i,t-1} > 0; \ \Delta Z_{i,t-2} > 0$

The first criterion requires that during the expansion, the annual change in autonomous demand is at least one standard deviation above the national average annual change. The second criterion ensures that the variation is positive in the two preceding years in order to exclude expansion years that are merely recoveries following a sharp decline from the identification.

Simmetrically, periods of contraction are defined by applying criteria 3 and 4, where the identified episodes must showcase a significant negative variation in autonomous demand:

3) $\Delta Z_{i,t} < \mu(\Delta Z) - \sigma(\Delta Z)$

4) $\Delta Z_{i,t} < 0$

In such analyses, observation units consist of year-country pairs. Years with an expansion (or contraction) are treated as the "treated" group, while, within the same country, years without an expansion (or contraction) serve as the "control" group. To identify "treated" units, we build a dummy $S_{i,t}$ which represents the state of economy and takes value 1 if the unit experienced an expansion (or contraction) in autonomous demand. We identify 29 episodes of strong contraction and 123 episodes of expansion; before moving on with the estimation of the effects on female labor force participation, we first assess the representativeness of the treated units through a comparison of the linear regression in equation (2)

$$\Delta AD_{i,t} = \theta S_{i,t} + \alpha_i + \delta_i + \varepsilon_{i,t} \qquad (2)$$

Where $\Delta AD_{i,t}$ is the variation in autonomous demand, $S_{i,t}$ has already been introduced as state dummy, and the variables α_i and δ_i represent country and time fixed effects respectively. For both equations, the representativeness of the treated sample is assessed by testing the significance of the parameter θ. The test is carried out using three models: a GLS, a model that only controls for country fixed-effects (Country FE), and a two-way fixed-effects model that incorporates year fixed-effects (Two-way fixed-effects). The difference between the average growth of autonomous demand of the treated units (for which episodes of expansions and contractions took place) and the rest of the sample are reported in Table 2 and Table 3.

In line with Girardi et al. (2020), the average growth of autonomous demand of treated is larger by 5 percentage points in the case of expansions, and the average decline greater by almost 6 percentage points during contractions, even after controlling for country and year fixed effects.

Table 2. Size of treatment (expansion)

Difference treated-control

VARIABLES	OLS	Country FE	Two-way FE
Autonomous demand	6.26***	6.37***	5.09***
	(0.47)	(0.46)	(0.54)
Exports	12.62***	12.78***	8.52***
	(1.17)	(1.16)	(1.47)
Government primary current expenditure	4.81***	4.79***	1.76*
	(0.64)	(0.67)	(0.67)
Government gross capital formation	6.30***	6.26***	4.48**
	(1.17)	(1.19)	(1.46)

Standard errors in parenthesis

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

Table 3. Size of treatment (contraction)

	Difference treated-control		
VARIABLES	OLS	Country FE	Tw-way FE
Autonomous demand	-7.88***	-7.93***	-5.78***
	(0.54)	(0.58)	(0.61)
Exports	-15.10***	-15.49***	-8.26***
	(1.13)	(1.15)	(1.32)
Government primary current expenditure	-2.52***	-2.69 ***	-1.44 **
	(0.70)	(0.70)	(0.63)
Government gross capital formation	-6.95***	-7.16***	-6.23**
	(1.75)	(1.75)	(1.75)

Standard errors in parenthesis

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

An additional challenge stems from the possible endogeneity of autonomous demand expansions and contractions. Expansion and contraction periods are likely not randomly assigned but could instead reflect a set of macroeconomic conditions that favoured their emergence. We test the extent of the endogeneity by analysing the initial macroeconomic condition and investigating whether they could dictate an increased probability for strong autonomous demand expansions and contractions to take place. We estimate equation (3) for each variable of interest and compare its mean between the treated and the rest of the sample

$$y_{i,t+n} = \alpha_i + \delta_{t-1} + \beta S_{i,t} + \varphi y_{i,t-1} + \varepsilon_{i,t-1} \qquad (3)$$

Where y is the vector of macroeconomic variables of interest; $S_{i,t}$ is the state dummy and α_i and δ_{t-1} are country and year fixed-effects. The results are reported in Table 4

Table 4. Analysis of the initial macroeconomic conditions (difference-control comparison)

	Difference treated-controls		
VARIABLES	*OLS*	*Country FE*	*Two-way FE*
Real GDP growth	1.60***	1.62***	0.06
	(0.37)	(0.38)	(0.30)
Productivity growth	1.26***	1.28***	-0.05
	(0.35)	(0.34)	(0.38)
Unemployment rate	-1.69***	-1.42***	0.14
	(0.52)	(0.43)	(0.22)
Real interest rate	-0.85**	-0.92**	0.08
	(0.40)	(0.38)	(0.35)
Female participation rate	-2.99**	-4.42***	-0.30
	(1.40)	(1.01)	(0.37)
Public debt (% of GDP)	-14.88***	-16.75***	-2.14
	(4.78)	(5.00)	(1.41)
Employment growth (hours)	0.40	0.40	0.17
	(0.25)	(0.24)	(0.26)
Employment growth (persons)	0.42**	0.40**	0.09
	(0.19)	(0.21)	(0.21)
Capital stock growth	1.35***	1.28***	-0.08
	(0.26)	(0.26)	(0.15)
CPI inflation rate	1.38***	1.33***	0.72*
	(0.41)	(0.43)	(0.36)
REER (% change)	-1.45**	-1.35**	-1.61***
	(0.54)	(0.54)	(0.55)
Autonomous demand growth	2.45***	2.49***	1.16***
	(0.33)	(0.32)	(0.36)
Observations	1,116	1,116	1,116
n.exp.	118	118	118
Number of country_id		33	33

Standard errors in parenthesis.

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

As before, the analysis is at first carried out by means of OLS, then country-specific fixed-effects and time fixed-effects are gradually introduced. In the first column of Table 4, endogeneity can be

easily spotted, as the difference in pre-conditions between treated and control units is significant. As fixed-effects are added, the difference between the units becomes insignificant and endogeneity virtually disappears. The growth of autonomous demand and the real exchange rate are the only two variables that remain significant even in the two-way fixed-effects model. The significance of the exchange rate can be explained by the fact that a reduction in the exchange rate prior to the expansion, indicated by the negative sign, may have stimulated exports and thus directly contributed to the expansion of autonomous demand. The significance of autonomous demand, on the other hand, reflects a certain persistence in the dynamics of autonomous demand over time.

Model 1: estimation strategy and results

To estimate the effect of variations in autonomous demand on female labor force participation we employ the local projection methodology by Jordà (2005). Local projections allow for the assessment of the average treatment effect of autonomous demand expansions and contractions over different time horizons and their impact on female labor force participation can be displayed through impulse response functions (IRFs). The local projection equation estimated is represented in equation (4)

$$\Delta FLFP_{i,t+h} = \alpha_i^h + \delta_t^h + \beta^h S_{i,t} + \sum_{j=1}^{n} \theta_j^h \Delta FLFP_{i,t-j} + \sum_{j=1}^{n} \varphi_j^h x_{i,t-j} \qquad (4)$$
$$+ \varepsilon_{i,\ t+h}$$

Where $\Delta FLFP_{i,t+h}$ represents the variation of female labor force participation, of country i at time $t + h$; $S_{i,t}$ is the state dummy that takes value 1 for all country-year pairs in which an expansion or a contraction of autonomous demand took place and the parameter β represent its effect on the variable of interest. A set of country and year fixed-effects are introduced, as well as a set of control variables ($x_{i,t-j}$). We also control for a pre-existing trend in female labor force participation by

including its lags into the equation. The IRFs reported in Figure 1 confirm the persistence of the expansion and contraction episodes. Figure 2 suggests that autonomous demand expansions have a positive, permanent effect on female labor force participation; on the other hand, autonomous demand contractions lead to a significant reduction in female labor force participation up to 10 years after the initial variation in autonomous demand.
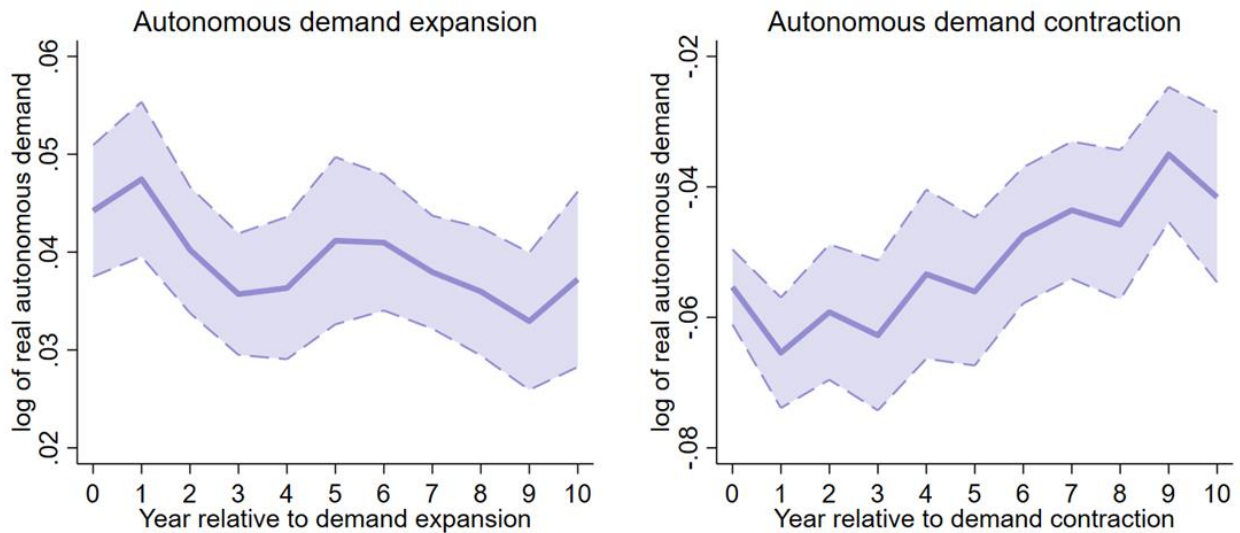
Figure 1. Persistence of the expansion and contraction
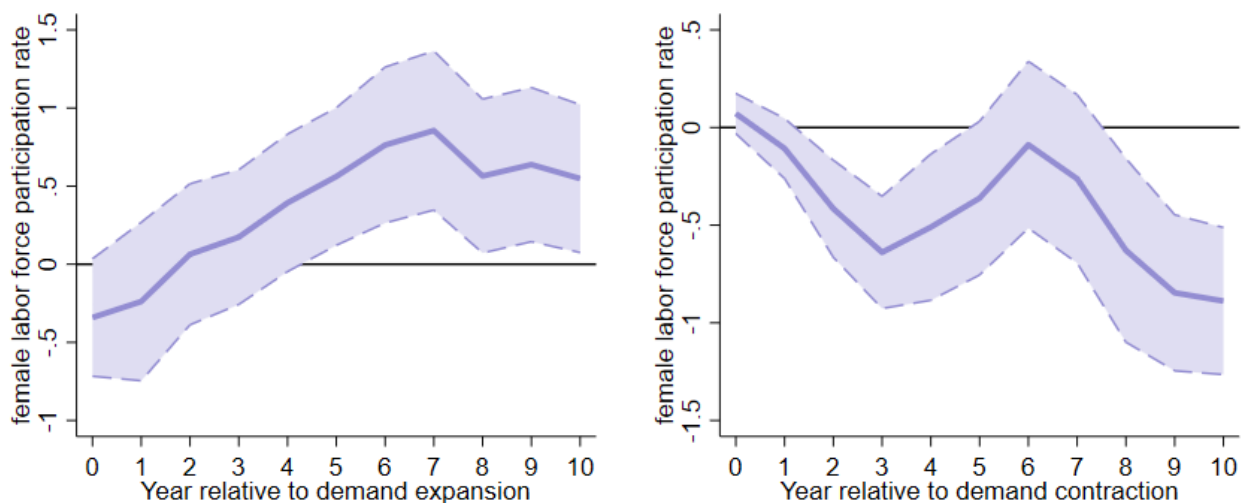
Figure 2. Dynamic effect of autonomous demand expansions and contractions on female labor force participation

The estimates suggest that expansions in autonomous demand lead to significant and persistent increases in female labor force participation starting from the third year after the expansion. The delay between the autonomous demand expansion and its positive effect on female labor force participation can be explained by considering other labor market variables, such as the unemployment rate and the employment rate. At the aggregate level, without gender decomposition, Girardi et al. (2020) find that an initial increase in autonomous demand leads to higher employment and reduced unemployment. The absorption of large pockets of unemployed workers can have an initially counterintuitive effect on female labor supply: due to the complementary role women often play in household income, the reabsorption of unemployed individuals due to increased demand may initially lead to a contraction in female labor supply.

The effect of autonomous demand expansion peaks nine years after the shock, during which the increase in female labor force participation exceeds that of the control group (where no expansion occurred) by 0.53 percentage points (using a less restrictive identification approach).

2.2. SVAR-identified Local Projection

We propose a further estimation of the effects of autonomous demand on female labor force participation using the same data which propose a different identification strategy from the previous analysis. The methodology adopted here, greatly adopted by the literature, consists in identifying exogenous shocks using a combined SVAR-LP approach: in particular, shocks are estimated through Structural Vector Autoregressive (SVAR) models and then included in the Local Projection equations (Auerbach and Gorodnichenko, 2013; 2017; Ramey and Zubairy, 2018; Deleidi et al., 2021, 2023; Romaniello and Stirati, 2024).

We estimate structural autonomous demand shocks $S_{i,t}$ following a recursive ordering (Bachmann and Sims, 2012) and Cholesky factorization (Caldara and Kamps, 2017). The autonomous demand shock is estimated following the specification in equation (5):

$$B_{0i}y_{i,t} = \begin{bmatrix} . & 0 & 0 & 0 & 0 \\ . & . & 0 & 0 & 0 \\ . & . & . & 0 & 0 \\ . & . & . & . & 0 \end{bmatrix} \begin{bmatrix} AD_t \\ GDP_t \\ un_t \\ lfp\_f_t \end{bmatrix} \tag{5}$$

Autonomous demand (AD), ordered first, is the most exogenous variable in the model, followed by gross domestic product (GDP), the unemployment rate (un) and female labor force participation (lfp_f). The first assumption is justified by the fact that autonomous demand is composed of exports, which are exogenous to the other variables, and government spending, which is usually planned in advance and does not react immediately to changes in GDP or the unemployment rate (Blanchard and Perotti, 2002; Ciaffi et al., 2024). Unemployment is endogenous to the evolution of autonomous demand and gross domestic product and, following economic theory on the Sraffian Supermultiplier and demand-led growth models, labor force participation is the most endogenous variable in the model.

The identified shocks are introduced in the LP equation (6), from which the IRFs are derived

$$y_{i,t+h} = \alpha_i^h + \delta_t^h + \beta^h S_{i,t} + \sum_{j=1}^{p} \theta_j^h y_{i,lfp_{t-j}} + \sum_{j=1}^{p} \xi_j^h x_{i,t-j} + \varepsilon_{i,t+h} \ per \ h \tag{6}$$
$$= 1, 2, \dots, 10$$

In equation (6), $y_{i,t+h}$ represent the vector of the variables of interest; $S_{i,t}$ is the exogenous shock of autonomous demand and β^h is the coefficient that describes the dynamic effect of the shock on the variable of interest, from which IRFs are derived; $x_{i,t}$ is the vector of control variables; α_i^h and δ_t^h are a series of country and time fixed-effects. Our estimation strategy produces Driscoll Kraay

standard errors (1998) that are robust to heteroskedasticity as well as autocorrelation in a cross-sectional setting.

Model 2: results

This section displays the results of the local projection estimation. The equations are estimated for 10 years after the initial shock ($h = 10$) and the IRFs in Figure 3 report the dynamic evolution of the parameter β^h. In line with the results from Girardi et al (2020) and Fazzari and Gonzalez (2023), our findings show that autonomous demand can stimulate not only economic growth and employment, but also a greater participation of females into the labor force. The impact of an autonomous demand shock is significant on all variables of the model; the effect on female labor force participation becomes significant 1 year after the initial shock, probably due to the presence of a lag between the improvement of opportunities and the ability of women to enter the labor force. The effect on the unemployment rate is negative, we therefore notice a reduction in the unemployment rate that is significant up to 9 years after the initial shock. The rise in the unemployment rate that takes place from 8 years after the shock is simply due to the increase in labor force participation.
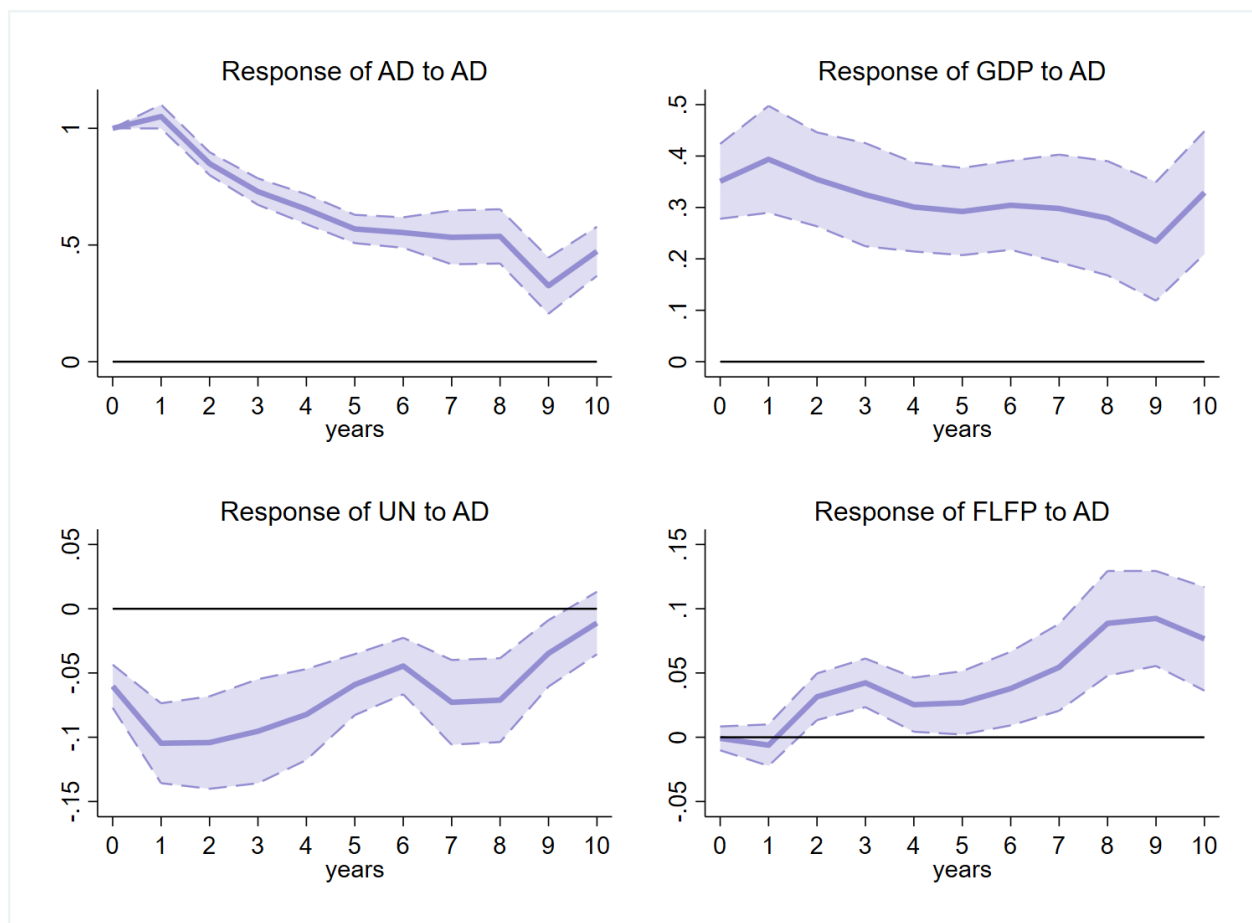
Figure 3. Impulse response functions, 68% confidence intervals

3. Conclusion

This paper has provided empirical and theoretical arguments that reinforce the importance of aggregate demand as a significant driver of female labor force participation. By integrating feminist heterodox theories with Keynesian principles, this paper demonstrates that shifts in autonomous demand can substantially influence FLFP over time. Our empirical analysis of 21 OECD countries from 1960 to 2016 shows that demand expansions lead to persistent and significant increases in female labor participation, and that, symmetrically, demand contractions lead to a fall in participation. The results are robust to a specification of the model in which autonomous demand shocks are identified via SVAR identification, recursive ordering and Cholesky factorization. Our results enrich the theoretical literature on autonomous demand-led growth models, signalling that

female labor force participation is not exogenous and that it is instead dependent on employment opportunities. Demand-side factors should be incorporated into the analysis of FLFP, as focusing solely on individual-level determinants or traditional supply-side explanations may overlook critical drivers.

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