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Macroeconomic effects of a declining wage share: A meta-analysis of the functional income distribution and aggregate demand

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Abstract

This paper reviews the theoretical and empirical literature on the relationship between the functional distribution of income and aggregate demand, which investigates whether declining wage shares increase ("profit-led") or decrease ("wage-led") demand. It conducts a meta-regression analysis of 33 studies with 578 estimates for total and domestic demand, covering up to 163 years and 59 countries and regions. Our results suggest that, on average and across all countries, total demand is predominantly profit-led and domestic demand mainly wage-led. The effects in the literature range between 0.8 and −0.3 within one standard deviation for domestic demand and between 0.4 and −0.7 for total demand, which are economically significant at the outer bounds. We find mixed evidence for publication selectivity, which may affect the size but not the direction of the results in the literature. If one was to nonetheless correct for this, then total demand would be less profit-led or statistically insignificant. A set of moderator variables, including publication characteristics, estimation strategies, the covariates included in the studies' estimation functions, and, in particular, controls for time and space, help explain the variation in the empirical estimates.

KEYWORDS
aggregate demand, functional income distribution, inequality, meta-regression analysis, profit-led demand regime, wage-led demand regime

JEL CLASSIFICATION
D33, E12, E25, E64

1 | INTRODUCTION

Most industrial countries experienced a long-term fall in their wage shares between the 1970s and the Great Recession of 2008 (Autor et al., 2017; Karabarbounis & Neiman, 2013). Figure 1 depicts the evolution of adjusted wage shares for the Group of Seven (G7) countries and shows the downward trend as well as recent stabilization. A wealth of literature takes this shift in the functional distribution of income as a starting point to ask: Does a falling wage share lead to higher or lower aggregate demand in a given country during a specific time period? This literature on the relationship between the functional distribution of income and demand is commonly referred to as the wage-led versus profit-led demand debate (Hein, 2014; Lavoie, 2017; Oyvat et al., 2018; Stockhammer, 2017). If an increase in the wage share stimulates (depresses) demand, the demand regime is called wage-led (profit-led). Since neither of the two states of demand regimes can be ruled out conceptually a priori, the literature aims to determine the demand regime of economies empirically.

However, the empirical research on this topic shows conflicting results for a number of countries and time periods. While some studies find wage-led demand regimes, others yield profit-led

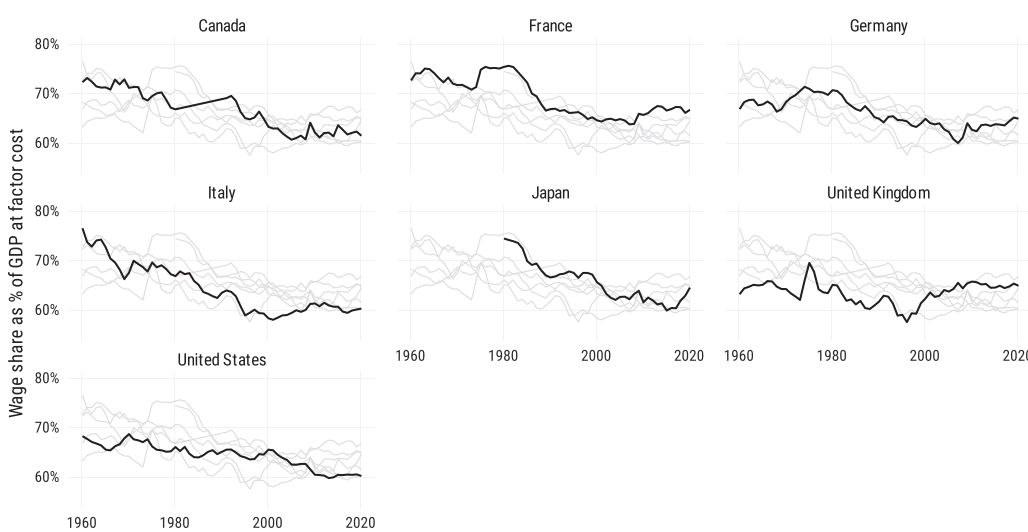

FIGURE 1 Evolution of the wage share for the G7 member states. *Note*: This figure shows the adjusted wage share as a percentage of GDP at current factor cost (ALCD2) from the AMECO Database.
Source: own compilation.

results. These differences might arise due to a number of technical factors, including variable definitions, estimation strategies, econometric methods, data frequency, and the choice of control variables (Blecker, 2016). Moreover, publication selection bias (henceforth also referred to as publication bias) might underlie these results, since editors and referees could favor findings that are statistically significant, confirm prior beliefs, or are particularly surprising (Andrews & Kasy, 2019; Kasy, 2021), which may induce researchers to select and present findings in order to maximize publication chances (Brodeur et al., 2016).

This paper surveys the wage- and profit-led literature and, to the best of our knowledge, is the first to conduct a comprehensive meta-regression analysis (MRA) on this literature strand. Following in the steps of studies such as Stanley and Doucouliagos (2012), we study effect sizes for the relationship between the functional distribution of income and aggregate demand, and assess the impact of various moderator variables on the dispersion of effect sizes. By doing so, we aim to generate a quantitative overview of the average predictions of the empirical wage-led/profit-led literature and provide a more nuanced understanding of factors potentially driving its results.

Our data set covers 33 studies with 578 estimates for total and domestic demand, which span up to 163 years as well as 59 countries and regions. This paper is thus the most extensive literature review of the (empirical) wage-led/profit-led demand debate to date. Previous literature reviews (e.g., Alvarez et al., 2019; Stockhammer, 2017) find a majority of studies yielding wage-led results for both total demand and domestic demand.[1] In contrast, our data show that the primary literature on average estimates total demand to be predominantly profit-led and domestic demand to be wage-led across all countries, although our regression results suggest that the effect for total demand may not differ statistically significantly from zero (domestic demand remains wage-led). Our contribution is to furthermore document mixed evidence of profit-led publication bias in the literature, which does not affect the direction but the size of the estimated effects. If one would nonetheless correct for it despite the uncertainty linked to our precision measure, this would make estimates somewhat more weakly profit-led or even statistically insignificant for total demand. Finally, our data show that publication characteristics, estimation strategies, controls for time and space, as well as the choice of covariates included in the studies' estimation functions help explain the direction and variation of the primary studies' estimates.

The findings of the wage-led/profit-led literature have important policy implications. Given the long-term shift in the functional distribution towards a lower wage share following the transition from a Fordist[2] to a finance-dominated accumulation regime, countries adapted their growth models to compensate for the demand-dampening loss of labor income. There is evidence of export-led growth models, on the one hand, and debt-led growth models on the other hand, which stabilized growth in the short to medium run through external demand or credit loosening, respectively (Baccaro & Pontusson, 2016; Behringer & van Treeck, 2019; Kapeller & Schütz, 2014). In the long run, however, these growth regimes contributed to the rising current account imbalances and economic instability which led to financial and economic crises (Ascione & Schnetzer, 2021; Brancaccio, 2012).

The remainder of this paper is structured as follows: We provide an overview of the theoretical and empirical wage-led/profit-led debate and its origins in Section 2. In Section 3, we introduce our data set and outline first descriptive results on the coverage and direction of the estimates. In Section 4, we briefly explain our method of meta-regression analysis. Section 5 presents the results of our MRA for total and domestic demand including several robustness checks. Finally, Section 6 concludes and suggests further research avenues.

2 | LITERATURE REVIEW

2.1 | The theoretical debate

Theoretical models of the relationship between the functional distribution of income and aggregate demand were pioneered by economists affiliated with the University of Cambridge such as Michal Kalecki (1971), Nicholas Kaldor (1957), and Joan Robinson (1956). Following classical models, the main assumption of the Cambridge growth models is that the saving rates of workers and capitalists differ. As a result, a higher wage share increases demand through the consumption channel, since workers have a higher marginal propensity to consume out of their income than capitalists. Concerning investment, the basic Cambridge model comprises an autonomous component g_0 and two endogenous terms depending on profitability (captured by the rate of profit r) and capacity utilization u. The resulting equation follows the work of Rowthorn (1981) and Dutt (1984)[3]:

$$g_I = g_0 + \alpha r + \beta u. \tag{1}$$

The savings function then assumes, for simplicity, that workers only earn wage income and capitalists only receive capital income, and that only capitalists save a fraction s of their income, such that:

$$g_s = sr. \tag{2}$$

Note that the profit rate r measures total profits R in relation to invested capital K, that is, R/K, which can be rewritten as $R/K = R/Y \cdot Y/K$ (where Y denotes total income) with $R/Y = \pi$ being the profit share and $Y/K = u$ being interpreted as a measure of capacity utilization. Given the equilibrium condition $g_S = g_I$, this yields:

$$\begin{aligned} s\pi u &= g_0 + \alpha\pi u + \beta u \\ u^* &= \frac{g_0}{\pi(s-\alpha)-\beta} \\ r^* &= \pi\, u^* = \frac{\pi g_0}{\pi(s-\alpha)-\beta} \\ g^* &= g_0 + \alpha r^* + \beta\, u^* = \frac{g_0 \pi s}{\pi(s-\alpha)-\beta} \end{aligned} \tag{3}$$

Taking the derivative of the balanced growth Equation (3), shows that investment reacts negatively to a higher profit share:

$$\frac{\partial g^*}{\partial \pi} = -\frac{g_0 s \beta}{[\pi(s-\alpha)-\beta]^2} < 0. \tag{4}$$

The quintessence of earlier models by Kalecki (1971) and Steindl (1952) is thus that the growth of demand in a (closed) economy reacts positively to an increase in the wage share, which the current literature terms "wage-led growth". Seminal papers in this literature, which contributed to the formalization of the nexus between the functional distribution of income and aggregate demand, are Dutt (1984), Rowthorn (1981), and Taylor (1985).

Two key papers, Bhaduri and Marglin (1990) and the contemporaneous but lesser-known Kurz (1991), opened up the possibilities of different growth regimes. By defining investment as a

function of the profit share (rather than the profit rate as in earlier models), the relationship between the functional distribution of income and investment becomes ambiguous. Investment is then a function of autonomous investment g_0, capacity utilization u, and expected profitability (that is, the profit share π):

$$g_I = g_0 + \alpha\pi + \beta u \tag{5}$$

As savings arise only as a fraction s of profits πu (see Equations (2) and (3)), the new balanced growth rate in these models ($g_S = g_I$) yields $= g_0 + \alpha\pi + \beta u$. The partial derivative of u^* with respect to the profit share is then denoted:

$$\frac{\partial u^*}{\partial \pi} = -\frac{sg_0 + \alpha\beta}{(s\pi - \beta)^2} < 0 \; or > 0 \tag{6}$$

Both components, a higher capacity utilization u and profit share π, feature a positive association with investment (Equation (5)). While it may seem that they are related negatively to each other, an increase in the profit share need not imply a decrease in capacity utilization, because the parameter β can take on negative values (Lavoie, 2014, p. 373). The crucial question is whether the negative demand effect or the positive profitability effect of a rise in the profit share dominates investment (see Equations (7) and (8)):

$$\frac{\partial g^*}{\partial \pi} = \frac{s(\alpha\pi - \beta u^{*)}}{s\pi - \beta} < 0 \; or > 0 \tag{7}$$

$$\frac{\partial g^*}{\partial \pi} \begin{cases} > 0 : \; \alpha\pi > \beta u^* \; (profit - led) \\ < 0 : \; \alpha\pi < \beta u^* \; (wage - led) \end{cases} \tag{8}$$

In the Bhaduri and Marglin model, the total domestic demand effect is thus ambiguous due to a possible negative or positive effect of a change in the wage share on investment.[4] In an open economy, the total effect further depends on net exports, which are assumed to be negatively related to an increase in the wage share. This is because higher real wages and an increase in the wage share result in increased imports and, due to higher labor costs and lower competitiveness, lower exports. Analytically, an economy can thus be either "wage-led" or "profit-led", that is, a change in the functional distribution towards labor or towards capital income may lead to higher growth in aggregate demand.

This empirical question has been tackled by two main strands of the literature. The (neo-)Kaleckian strand typically estimates single equations in order to disentangle the effects of an increase in the wage (or, conversely, profit) share on each component of demand–consumption, investment, and net exports, as discussed above (see also Section 2.2). Some authors view this approach as focusing on the medium term (Stockhammer, 2017) or longer term (Lavoie, 2017), where the functional distribution is exogenously determined. However, Blecker (2016) argues that the estimations in this approach likely include both short-run and long-run effects, and that the exact mix depends on the econometric estimation strategy.

A second strand of the literature are structuralist (also termed neo-Goodwinian) models. In structuralist models, a change in the functional distribution of income affects growth via several so-called closures. Two important closures are profit squeeze and forced saving (Taylor,

1985, 2004), which address structuralists' main critique of wage-led regimes: The positive feedback effects between redistribution towards labor and aggregate demand lead to ever-accelerating demand growth. A profit squeeze reduces profit rates due to competition and higher wages—which in turn result from lower unemployment and higher worker bargaining power (Boddy & Crotty, 1975; Marglin, 1984)—and demand growth due to lower investment. Forced saving reduces the real wage through short-term inflation (Taylor, 1985, 2004), which reduces consumption. These closures hence introduce a stabilizing feedback effect into the distribution-demand growth dynamics to prevent explosive growth trajectories; they thus represent a fundamental theoretical difference between the structuralist and the neo-Kaleckian approach.

For an empirical analysis of wage- or profit-led growth, the structuralist literature applies adapted Goodwin models that incorporate the aforementioned negative feedback effects. Goodwin models are supply-side models that assume full capacity utilization and full employment, so that "Say's law" holds. They are dynamic in nature (in contrast to the comparative statics of the neo-Kaleckian models). Descriptively, so-called Goodwin cycles can be observed in high income countries (Barbosa-Filho & Taylor, 2006; Kiefer & Rada, 2015); that is, a counter-clockwise circular motion of high-income economies in a demand-distribution panel (see also Figure A.1 in the Appendix). Theoretically, the seminal paper by Barbosa-Filho and Taylor (2006) shows that only a profit-led demand regime combined with a profit-squeeze distributional regime yields this pattern while also being dynamically stable in a two-way system of differential equations. Parts of this literature thus treat the functional distribution of income as endogenous (see also Section 2.2) and focus more on short-run business cycle dynamics.

2.2 | The empirical debate

The differences between the theoretical models of (neo-)Kaleckians and the structuralists have direct consequences for their empirical approaches. To estimate the marginal effects of the functional income distribution on aggregate demand, the strand of the literature that follows the Kaleckian models typically estimates the following equation:

$$g = f(d, X) \tag{9}$$

where g is some measure of the change in demand (typically components of gross domestic product, GDP: consumption, investment, imports, and exports), d is the functional income distribution (typically the wage or profit share), and X is a vector of controls. The effects of a change in the functional distribution of income on the sub-components of domestic demand (that is, consumption and investment) and external demand (imports and exports or net exports) are estimated separately. The overall effect of a change in the wage or profit share on aggregate demand is then given by the sum of the partial marginal effects (consumption plus investment plus net exports). On the one hand, the income distribution in these models is usually treated as exogenous, thus introducing possible simultaneity bias (if the wage share is endogenous), and the estimations in this approach omit potential interactions between the variables. On the other hand, these types of estimations assess the effects of a change in the wage share on consumption, investment, and trade separately, and thus provide information on their contribution to overall changes in aggregate demand. Furthermore, these estimations also make it possible to estimate how changes in the functional distribution affect domestic (and not just total) demand (Blecker, 2016). Estimates using this approach make up about two thirds of the estimates for total demand in our data set.

In these models, domestic demand is often found to be wage-led at the country level (Alvarez et al., 2019; Lavoie, 2017; Stockhammer, 2017); the total demand regime thus depends on the effects of a higher wage or profit share on net exports. Total demand for large economies with large domestic markets is usually found to be wage-led, while estimates for smaller open countries are often profit-led (Stockhammer & Onaran, 2013). Thus, the level of aggregation also matters. Lavoie and Stockhammer (2013), for example, argue that the world as a whole—which is a closed economic system with no external trade—is likely to be wage-led; a worldwide increase in the wage share would thus raise demand even in countries under a profit-led demand regime. Razmi (2018), on the other hand, uses a theoretical model to show that this need not necessarily be the case, and that demand can also be profit-led on a global scale. Empirically, Stockhammer et al. (2009) show that individual countries might be profit-led in the euro area, but that the single currency area as a whole is wage-led. Furthermore, Onaran and Galanis (2014) find that individual G20 countries might be profit- or wage-led in isolation, but a simultaneous fall in the wage share for all countries leads to a decline in global growth.

The second strand of the literature in the structuralist tradition typically estimates the relationship between the functional distribution of income and demand in a simultaneous framework. Instead of estimating the effect of an increase in the wage or profit share on each component of demand separately and then adding them up, these studies directly estimate the effect of a change in the wage or profit share on demand. To address the issue of potential simultaneity bias (which is an issue for both additive and simultaneous estimations, see Blecker, 2016), some authors like Barbosa-Filho and Taylor (2006) or Carvalho and Rezai (2015) estimate a two-dimensional system of differential equations in the form of:

$$\begin{aligned} \dot{g} &= f(g, d, X) \\ \dot{d} &= f(g, d, X) \end{aligned} \tag{10}$$

where, again, g is a measure of change in demand (in some cases, capacity utilization is used instead of GDP), d is a measure of the functional income distribution, and X a vector of controls. Besides accounting for simultaneity bias, this approach incorporates feedback effects between the functional distribution of income and aggregate demand. However, the simultaneous approach typically includes few or no control variables, making omitted variable bias a concern, and there is also a lack of information on which demand component is driving results. In general, empirical studies that take a structuralist approach tend to find profit-led demand regimes (Blecker, 2016). The estimates produced by the simultaneous estimation approach make up the remaining one third of the estimates for total demand in our data set.

The literature uses various estimation techniques and control variables in the empirical models testing the wage-led/profit-led hypothesis (see also Table 1). Concerning the dependent variable, some studies (typically in the structuralist tradition) use capacity utilization instead of GDP to estimate the effects of an increase in the wage or profit share on the economy. For the explanatory variable of interest, some studies use real wages instead of the wage share as a measure of the functional distribution of income.

Concerning control variables, any studies' investment functions (in the neo-Kaleckian tradition) may include controls for demand, different kinds of profit variables, or interest rates. The same holds for the import and export (or net export) estimations, where demand, profits, competitiveness (e.g., via unit labor costs), or exchange rate variables can be included. The number of controls has tended to expand over time. For example, some authors now include government spending in their estimations. This might have important implications for the results, since it

TABLE 1 Variable definitions and descriptive statistics.

	Description	Total demand		Domestic demand	
		Mean	S.D.	Mean	S.D.
Dependent variable					
Effect size	Marginal effect between the functional income distribution and aggregate demand	−0.140	0.532	0.272	0.554
Publication characteristics					
Published	D = 1: Study published in peer-reviewed journal	0.633	0.483	0.864	0.343
Insignificant estimate	D = 1: Estimate contains insignificant effects for demand components	0.298	0.459	0.433	0.496
Estimation strategy					
Tackling endogeneity	D = 1: Estimation strategy is suitable for addressing endogeneity	0.725	0.448	0.847	0.360
Simultaneous estimation	D = 1: Simultaneous estimation (D = 0: Additive estimation)	0.317	0.466	0.022	0.148
Mean marginal effect	D = 1: Marginal effect is calculated at the mean over the total observation period	0.853	0.355	0.911	0.285
Quarterly data	D = 1: Estimate is based on quarterly data	0.183	0.388	0.589	0.493
Capacity utilization	D = 1: Dependent variable is capacity utilization (D = 0: GDP)	0.101	0.302	0.006	0.074
Real wages	D = 1: Real wages are used as measure of functional distribution	0.073	0.261	0.044	0.206
Meta-regression controls for time and space					
Early observation period	D = 1: Average year of observation period is before 1990	0.670	0.471	0.844	0.363
OECD country	D = 1: Estimate is for an OECD country	0.729	0.445	0.889	0.315
Studies' controls in investment (I) or net export (X) functions					
Profits (in I)	D = 1: Estimation controls for profits in I (profit share or profit rate)	0.766	0.424	0.861	0.346
Interest rate (in I)	D = 1: Estimation controls for interest rate in I	0.202	0.402	0.150	0.358
Demand (in X)	D = 1: Estimation controls for demand in X	0.899	0.302		
Profits (in X)	D = 1: Estimation controls for profits in X	0.450	0.499		
Unit labor costs (in X)	D = 1: Estimation controls for unit labor costs in X	0.349	0.478		
Exchange rate (in X)	D = 1: Estimation controls for the exchange rate in X	0.330	0.471		

(Continues)

TABLE 1 (Continued)

	Description	Total demand		Domestic demand	
		Mean	S.D.	Mean	S.D.
Other controls					
Government spending	D = 1: Estimation controls for government spending	0.326	0.470	0.067	0.250
Debt and credit	D = 1: Estimation controls for debt and credit in the consumption or investment function	0.037	0.188	0.025	0.156
Personal inequality	D = 1: Estimation controls for a measure of personal inequality	0.032	0.177	0.017	0.128
Wealth effects	D = 1: Estimation controls for wealth effects	0.092	0.289	0.083	0.277

Source: own compilation.

accounts for a sizeable share of GDP in many OECD countries. Feijó et al. (2015) find that, depending on the type of investment (total or only private), the Brazilian economy was either wage- or profit-led before 1968. However, including public investment does not change the demand regime after 1968. Molero-Simarro (2015) includes public investment in his estimations but is not able to analyze the behavior of private investment separately due to data limitations. Obst et al. (2017) show that government spending has a positive effect on private investment in nine EU countries and a negative effect in only one country.[5] Oyvat et al. (2018) find that countries with higher government spending-to-GDP ratios tend be more wage-led. Barbosa-Filho and Taylor (2006) state that government spending is positively related to the wage share.

Other authors focus on the role of debt and credit (or, more generally, financialization) and wealth effects in the empirical literature. Alvarez et al. (2019) argue that ignoring increasing financialization could introduce omitted variable bias in the estimates.[6] They include financial variables in their estimations and find that household debt has a positive effect on consumption and investment. In balance sheet recessions[7], however, debt has the opposite effect: Deleveraging dynamics then result in lower amounts of consumption and investment. Onaran et al. (2011) find that including the effects of financialization in their estimations makes the US economy slightly less wage-led. Tamasauskiene et al. (2017) show that including corporate and household debt in the investment function results in a slightly weaker negative effect of an increase in the wage share on investment. Oyvat et al. (2018) state that economies with higher private credit-to-GDP ratios and higher household debt-to-GDP tend to be more profit-led. Kiefer and Rada (2015) show that higher financialization goes hand in hand with a downward trend in the wage share in a panel of OECD countries. Stockhammer and Wildauer (2015) find that household debt has positive effects on consumption and negative effects on investment, while real property prices have strong positive effects on investment and only small effects on consumption. Stockhammer et al. (2018) show positive wealth effects on consumption for the USA, the UK, France, and Germany. The effects of private wealth on investment, on the other hand, are positive for the USA and the UK, and negative for Germany and France.

Some authors also include measures of personal inequality in their estimations. Stockhammer and Wildauer (2015) note that the effects of higher personal inequality are potentially ambiguous: On the one hand, higher levels of inequality might lead to lower consumption because richer individuals have a lower propensity to consume out of their income. On the other hand, higher

inequality might also result in expenditure cascades, and thus higher total demand, as middle- and lower-income households run into debt in order to emulate the consumption patterns of the rich despite their falling relative wage income. Stockhammer and Wildauer (2015), however, are unable to confirm effects of personal inequality empirically. Oyvat et al. (2018) show that lower wage inequality would make economies more wage-led. Carvalho and Rezai (2015) find that the rise in income inequality in the USA after 1980 made the US economy more profit-led. In addition to personal inequality, the recent wage-/profit-led literature incorporates wealth inequality. It includes mixed income (labor and capital income) for both capitalists and workers, as well as workers saving, and thus both groups accumulate wealth over time in comparative static (Ederer & Rehm, 2020a) and dynamic settings (Ederer & Rehm, 2020b). This literature finds that estimates are more profit-led when wealth inequality is not taken into account (Ederer & Rehm, 2021; Petach & Tavani, 2022).

Another recent debate concerns the effects of overhead labor, which are typically not differentiated from direct labor costs in the available literature (Lavoie, 2017). However, not taking the cyclical nature of labor productivity[8] into account might cause a spurious correlation between productivity and output, which empirically leads to a bias towards profit-led results (Cauvel, 2023). Relatedly, Palley (2017) theorizes that shifts in the wage distribution between workers and managers may affect capacity utilization. Rolim (2019) finds empirically that redistributing income from workers towards managers or supervisors makes an economy more likely to be a profit-led demand regime.

Finally, recent developments in the wage-/profit-led literature emphasize that demand regimes are dynamic; these papers aim to understand the conditions of regime switching. Palley (2014, 2017) argues that analogous to the Lucas critique, the econometrically estimated demand regime depends on past and current economic policy, rather than representing a natural feature of the respective economy.[9] Instead of the demand regimes being only determined by nation-specific characteristics, the lowering of the wage share as well as tax rates on shareholder income has made economies appear more profit-led. Hence, policy efforts to boost the wage share can increase both demand and capacity utilization irrespective of whether the demand regime is wage-led or profit-led, and ultimately switch a country's demand regime from profit-led to wage-led (or vice versa). This means that the growth-inequality trade-off under profit-led demand regimes could be softened or even cancelled out entirely by increases in the wage share (Palley, 2017). The political changes that occurred over time made actual demand regimes more profit-led (Baccaro & Pontusson, 2016), which include in particular the breakdown of the Fordist accumulation regime in the 1970s as well as increased globalization, financialization and other structural, institutional, and political-economic changes in recent decades (Boyer, 2000; Stockhammer, 2008).

Nikiforos (2016) and Carrillo-Maldonado and Nikiforos (2022) concur that a country's demand regime is not stable over time. The argument is threefold: First, the higher the profit share, the less profit-led the demand regime becomes. Second, a more powerful capitalist class is able to increase the profit share over time. Third, the more profit-led an economy is, the more likely it is that the profit share will increase. The demand regime thus lacks stability over time, which will lead to cyclical crises due to ever-increasing profit or wage shares, ultimately resulting in regime switches. Carrillo-Maldonado and Nikiforos (2022) estimate demand regimes of the US economy between 1947 and 2019, allowing for the demand regime to change over time. They find that the US economy behaved in a more profit-led manner until 1970, and became less profit-led (and even wage-led) afterwards.

Blecker (2016) argues that the time horizon matters for estimating the distributional effects on aggregate demand: The positive demand effects of a higher profit share on investment and net

exports are especially likely to be realized in the short run, while the effect on consumption will likely increase in size over time. Hence, aggregate demand is more likely to be profit-led in the short run and wage-led in the longer term.

The literature on demand regimes has thus evolved substantially over the past decades, with plenty of alternative specifications suggested for empirical estimations. This paper uses meta-regression analysis to (1) investigate potential publication selection bias, (2) provide a "true" value, which corrects—as far as possible—for publication selectivity, and (3) use moderator variables to explain the variance in the primary estimates. By doing so, we aim to contribute to the existing literature by providing an aggregate (corrected) estimate of demand regimes for total and domestic demand, as well as explaining the impact of different specifications for the direction of estimates.

3 | DATA

For the data collection, regression specification and analysis of the results, we follow the MAER-NET guidelines proposed by Havránek et al. (2020). In order to compile our data set, we comprehensively sampled JSTOR, EconLit, RePEc, and Google Scholar databases for publications that empirically estimate the relationship between the functional distribution of income and aggregate demand. In our search, we used the main keywords commonly found in this literature. Specifically, the keywords used for the literature search were "wage-led", "wage-led growth", and "wage-led regime". All search phrases were repeated for "profit-led", and without hyphen. Additionally, we searched for literature containing the terms "stagnationist" and "exhilarationist", which the older literature employed for wage- and profit-led growth. Furthermore, we conducted a search using the keyword "Goodwin cycle" (with hyphen), which sometimes denotes profit-led growth. This search process yielded 274 studies in the form of published studies, working papers, book chapters, and reports that contained both theoretical models as well as empirical estimations and literature reviews. Furthermore, we snowballed from the overviews of the empirical literature in Lavoie and Stockhammer (2013), Stockhammer and Onaran (2013), Hein (2014), Yilmaz (2015), Lavoie (2017), Stockhammer (2017), Alvarez et al. (2019), Oyvat et al. (2018), and Stockhammer et al. (2018), and searched for papers that cite the seminal profit-led paper by Barbosa-Filho and Taylor (2006). This process resulted in an additional 62 studies. The cut-off publication date was October 1st, 2019.[10]

Our raw sample thus contains 336 studies, whose years of publication (not necessarily in journals) range from 1975 to 2019. We used these papers as a guide to select additional moderator variables in our analysis. Out of these 336 studies, however, only 85 provide estimations of the effect in question, while the rest often consists of theoretical models further expanding the basic framework. Out of these 85 studies, 25 were duplicate results, for example, in the form of multiple working paper versions and/or subsequently published versions. Omitting these from our sample leaves 60 papers containing empirical estimates, published between 1995 and 2019.

The consistent effect measured for our meta-regression analysis is the marginal effect of the wage share on demand. For papers measuring the functional distribution as the profit share, we invert the estimates by multiplying them by −1, since the profit share is by definition the inverse of the wage share.[11] To be included in our data set, studies must report (1) the marginal effect of the wage (or profit) share on total and/or domestic demand (components) and (2) the number of observations[12] since standard errors are not available in the vast majority of cases (see Section 4). Studies that use single equation estimations often explicitly state the marginal effect of changes in the functional income distribution and were thus included in most cases. In contrast, studies

using VAR methodologies often do not report marginal effects, which means that these studies could not be included as often. Furthermore, to ensure comparability, we do not use estimates that include a (Keynesian) multiplier (Naastepad, 2006) and exclude estimates that are based on parallel increases of the wage or profit share in multiple countries (Onaran & Galanis, 2014; Onaran & Obst, 2016), other simultaneously simulated policy changes (Obst et al., 2017), simultaneous increases and/or decreases of components of the wage or profit share (Onaran et al., 2011), or interactions with productivity regimes (Hartwig, 2013). This reduces the overall number of studies that could be included from 60 to 33.[13] Nevertheless, our data set covers more than half of the available empirical studies.

Sampling the marginal effects reported in individual primary studies,[14] we generate our database which comprises 218 estimates for total demand and 360 estimates for domestic demand from 33 studies. Our total number of 578 observations is thus well above the average (403) and three times the median (191) number of estimates suggested by Ioannidis et al. (2017) for meta-analyses. All estimates were coded and revised by at least two authors with random control checks by the two other authors.[15]

The variables covered, their definitions as well as means and standard deviations distinguished by total and domestic demand are presented in Table 1. The dependent variables are the marginal effect between the functional distribution of income and either domestic demand (that is, the change in consumption plus investment) or total demand (that is, domestic demand plus net exports). We group control variables into (1) publication characteristics, (2) estimation strategy, (3) meta-regression controls for time and space, (4) controls used by the studies in the investment or net export functions, and (5) other controls. All meta-regression controls are coded as dummies, with 1 defined as the "best case" wherever possible. The mean of the respective dummy denotes the relative frequency of the dummy. For example, a mean of 0.729 of the dummy variable "OECD country" in Table 1 implies that about 73% of all total demand estimates are for OECD countries.

The first two groups of control variables regarding publication characteristics and estimation methods include several dummies that depict characteristics of the primary studies. *Published* denotes whether the primary study was published in a peer-reviewed journal (before October 1st, 2019). This dummy could be perceived as a proxy for higher study quality, but it may also capture publication selection bias. *Insignificant estimate* shows whether some of the partial effects (i.e., individual effects for consumption, investment and net exports) are insignificant and thus treated as zero in calculating the overall marginal effect for total or domestic demand; this is only an issue for single equation estimations (see for example Hein & Vogel, 2009). *Tackling endogeneity* represents estimates where the chosen estimation strategy is capable of addressing potential endogeneity issues between the estimand and the estimator; we pool the estimation techniques found in the literature into those which may (i.e., ARDL, ECM, GMM, VAR, VECM, 2SLS) and those which do not address potential endogeneity (i.e., GLS, OLS, PLS, WLS). *Simultaneous estimation* reports whether an estimate is obtained using a simultaneous estimation strategy, that is, estimating the effects of a change in the wage or profit share on the components of aggregate demand simultaneously, or separately. In single equation estimations, effect sizes typically have to be transformed into marginal effects by multiplying them with the shares of consumption, investment, and net exports in the countries studied. Typically, average shares over whole periods are used here (e.g., the average share of consumption in GDP from 1960 to 2000), but studies sometimes also apply shares at the beginning or end of the period. We thus include a dummy *Mean marginal effect* that checks for the type of share used for estimating the marginal effects.

Quarterly data denotes whether the estimate is obtained using quarterly (versus annual) data. As some studies look at the effect of changes in the wage or profit share on the level of GDP, while

others use changes in capacity utilisation, we include the dummy *Capacity utilization*, which distinguishes whether capacity utilization is the dependent variable (instead of GDP). Finally, *Real wages* indicates whether estimates use real wages instead of the wage or profit shares.

Second, meta-regression controls of time and space attempt to control for potential changes in regimes — that is, whether economies were more wage- or profit-led at a certain point in time — by controlling for an *Early observation period*, that is, whether the average year of the period covered in the estimates is before 1990. The reason is that the underlying character of the political regime, which enables a more wage-led or a more profit-led demand regime, may have changed over time. While demand was likely more wage-led under a Fordist accumulation regime, more globalized and financialized regimes (after East-West rivalry had ended) are more conducive to profit-led demand growth. This may for instance be due to rising profit and manager shares (Palley, 2017). We also control for possible differences between higher and lower-income regions by including an *OECD* dummy for whether a country is part of the OECD.

Finally, two blocks of controls take the covariates of the studies covered in our meta-regression into account, aiming to approximate their quality. These are, first, whether the investment and export functions include controls for profits and the interest rate; and whether the export function controls for demand, profits, unit labor costs as a measure of competitiveness, and the exchange rate. Second, we control for studies' inclusion of variables for government spending, debt and credit, personal inequality, or wealth effects. See Table A.1 in the Appendix for a more detailed description of the variables subsumed in these dummies.

Regarding the effect of these potential explanatory variables on demand, the direction is not clear a priori in most cases. A moderator variable that may lead to more profit-led results is *Simultaneous estimation*, since structuralist studies, which typically find more profit-led results, tend to use simultaneous estimation frameworks. Regarding time and space, an *Early observation period* may make results more wage-led if growth regimes are not stable over time and economic policies have become more "profit-led oriented", as discussed above. Furthermore, non-*OECD* countries are likely to be more profit-led, potentially because many of them rely on export-oriented growth strategies rather than domestic demand. Finally, including *Unit labor costs (in exports)* may lead to more wage-led results since omitting the competitiveness aspect of higher wages should dampen the negative effect of an increase in the wage share on exports. For the other moderator variables, no a priori expectations can be formed, since there either is no clear economic effect (for example *Quarterly data*) or the effect is expected to depend on the realization of the included control variables. For example, including interest rates in the investment functions (*Interest rate (in investment)*) does not necessarily lead to more wage-led or profit-led results, since theory predicts opposite effects of low versus high interest rates on investment.

As Figure 2 (panel a) shows, the estimates in our database jointly cover a time span of 163 years. While most of the 33 studies use data beginning in the 1960s, one article relies on data going back to the 19th century for the UK, France and Germany (Stockhammer et al., 2018).[16]

The distribution of initial years and sample periods for the individual estimates is shown in panel (b) of Figure 2. Most estimates are based on an observation period of around 40 to 50 years beginning between 1960 and 1970. Only a few estimates include very long-term data, indicated by the top left quadrant. The majority of studies are concentrated in the post-World War II period, and some studies, shown in the bottom right corner, provide estimates for rather short periods starting in the 1970s, 80s, or 90s.

The studies in our sample cover a wide regional variation. In total, there are estimates for 59 countries and regions in our database. Figure 3 shows that high-income countries, especially the United States, European countries, and, more generally, OECD states (which make up 83% of our

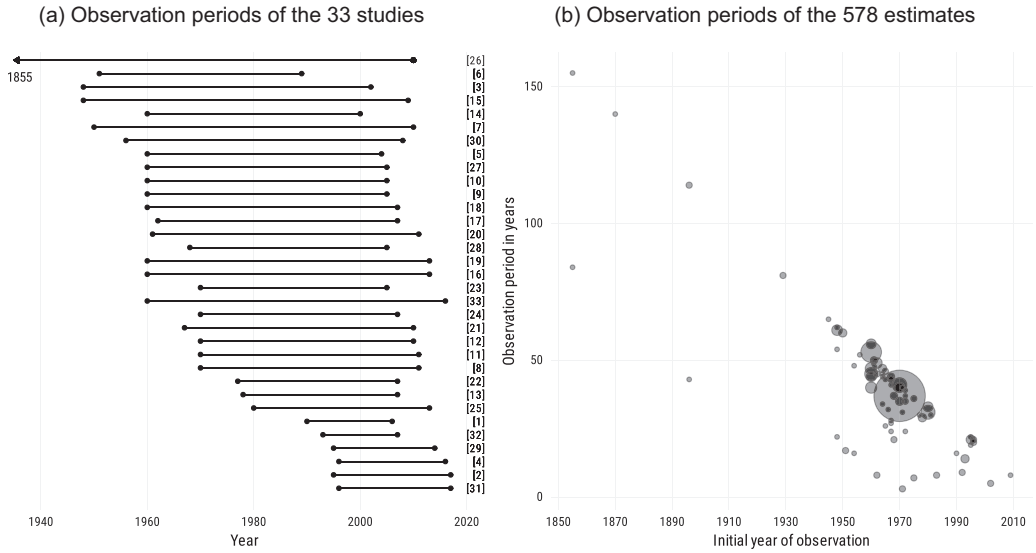

FIGURE 2 Starting year and sample period of estimates and studies. *Note*: This graph shows the observation period of each study in our database, with the study ID according to the paper list in the Appendix (left-hand side panel), and the observation period against the initial year for all estimates, with the size of the circles indicating the number of observations (right-hand side panel).
Source: own compilation.

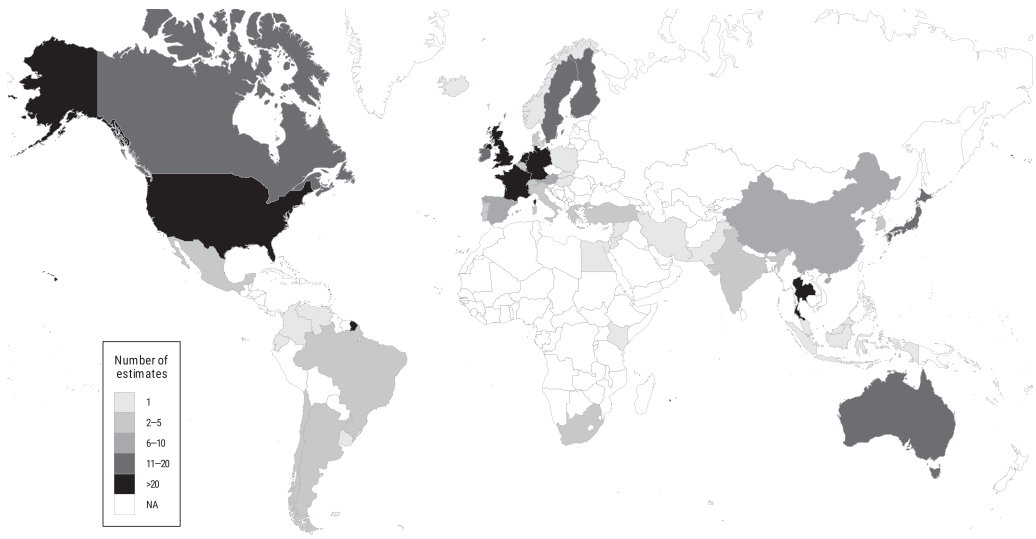

FIGURE 3 Countries covered by our database. *Note*: This graph shows the geographical coverage of the effect sizes in our data.
Source: own compilation.

estimates) are overrepresented. While South and Latin America as well as South and South-East Asia, and the Middle East are also covered, the most notable global gaps are African countries and the former Soviet Union, for which there are almost no estimates available.

4 | METHODOLOGY

Meta-regression analysis (MRA) is a commonly applied approach to synthesize research from multiple empirical studies. MRA aims to answer three underlying questions: First, is there publication selection bias, since studies reporting statistically significant findings are more likely to be published in peer-reviewed journals and editors may be predisposed to accept papers consistent with the conventional view within the respective literature (Andrews & Kasy, 2019; Stanley & Doucouliagos, 2012)?[17] Second, if one controls for publication selection bias, does the primary literature still find a genuine economic effect? Finally, MRA assesses whether specific covariates explain part of the variation in effect sizes between studies.

The possible existence of publication selection bias has no trivial consequences for economics research. The higher likelihood of publication for statistically significant results means that researchers are more likely to select and present findings consistent with the conventional view in the field in order to maximize the chances of publication (Brodeur et al., 2016). In addition, published studies have a higher probability of being included in a conventional literature review.

To detect whether estimates suffer from publication selectivity, the standard approach in MRA is to regress effect sizes on the standard error in the FAT-PET (Funnel-Asymmetry Precision-Effect Test) specification, and the variance in PEESE (Precision-Effect Estimate with Standard Error) specification. The FAT-PET regression equation to detect publication selection bias while controlling for heterogeneity in the studies is:

$$e_{ij} = \beta_0 + \beta_1 SE_{ij} + \beta_2 X_{ij} + \varepsilon_{ij}, \tag{11}$$

where e_{ij} is estimate i for the marginal effect of a rising wage share on aggregate demand in study j, β_0 serves as an approximate measure for the "true" effect size adjusted for publication selection bias, SE is the standard error, and X is a vector of controls comprising the five sets of publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions, as well as studies' other controls. Each of these sets contains several control variables as described in detail in Table 1. ε is a random sampling error. It is important to note that while β_0 is often interpreted as an estimate of the "true" effect size adjusted for publication selection bias, this interpretation becomes more complex when we encounter heterogeneity in our studies and include various control variables in X_{ij}. In such cases, β_0 represents the estimated effect size when all the control variables in X_{ij} are set to zero, which serves as a baseline estimate. However, the true effect size may be influenced by which variables in X_{ij} are truly important in shaping it.

Unfortunately, a large body of the literature covered in this study does not provide standard errors, which are available only for 9% of all estimates. In this case, the inverse square root of the sample size is considered a feasible alternative for missing standard errors in the literature (Begg & Berlin, 1988; Chaikumbung et al., 2016; Johnston et al., 2019; Nemati & Penn, 2020; Penn & Hu, 2019; Stanley & Doucouliagos, 2012; Stanley & Rosenberger, 2009, p. 73), but it is less accurate and thus potentially misrepresents the underlying publication selection bias. Nevertheless, simulation studies such as Stanley and Rosenberger (2009) attribute this kind of 'n-estimator'

a higher potential to reduce publication selection bias than other estimation strategies. For our analysis, we estimate FAT-PET specifications using the inverse of the square root of the number of observations as an alternative for the standard error:

$$e_{ij} = \beta_0 + \beta_1 \frac{1}{\sqrt{n_{i,j}}} + \beta_2 X_{ij} + \varepsilon_{ij}, \tag{12}$$

and PEESE specifications with the inverse of the number of observations as an alternative for the variance.

While the FAT-PET specification is considered to be one of the least biased estimators, its estimated effects are still not unbiased (Stanley & Doucouliagos, 2012). We thus use the PEESE specification to provide a more precise estimate in cases where the FAT-PET specification finds an underlying "true" effect. Since the error term ε in these regressions is not expected to be i.i.d., we apply weighted least squares (WLS) in order to assign more weight to estimates with higher precision (Stanley & Doucouliagos, 2015). Coefficients are estimated with the number of observations as weights[18] and with robust standard errors clustered at the study level. Finally, we use the few available standard errors for a robustness check and non-linear tests in Section 5.4 below.

5 | RESULTS

This section presents the results of our meta-analysis, covering the literature that estimates the effects of changes in the functional income distribution on demand. We first present a histogram of the distribution of estimated effect sizes for both total demand and domestic demand, before investigating each one separately in more detail. This is because total demand is covered by both neo-Kaleckian and structuralist strands of the literature as discussed in Section 2, and we complement this with domestic demand, which is mainly relevant for the neo-Kaleckian strand.

Figure 4 shows a histogram of effect sizes estimated by the literature covered in this meta-analysis for both total demand and domestic demand. The two distributions form a slight bell shape, with the bulk of estimates clustering around the "true" value. This is to be expected when there is little publication selectivity in the literature (Stanley & Doucouliagos, 2012). Within one standard deviation, the effects range from 0.4 to −0.7 for total demand, and from 0.8 to −0.3 for domestic demand. The sample mean for all estimates of total demand is negative (−0.140), while it is positive for domestic demand (0.272) across all studies (see Table 1). For total demand, the distribution of effect sizes is somewhat left-skewed, with the right tail largely missing except for a single outlier estimating a large positive effect for Norway for the period between 1962 and 2011 (Oyvat et al., 2018).[19] This may indicate a paucity of reported total demand estimates finding wage-led demand regimes. The distribution of the effect sizes for domestic demand, in contrast, appears to be slightly right-skewed, suggesting a potential lack of estimates that find domestic demand to be profit-led.

5.1 | Total demand

A summary of the estimated effect sizes and their precision is shown in the funnel plot in Figure 5.[20] As expected, it shows that estimates with a higher precision are clustered, while less precise estimates are more dispersed (Stanley & Doucouliagos, 2012). As indicated by Figure 4,

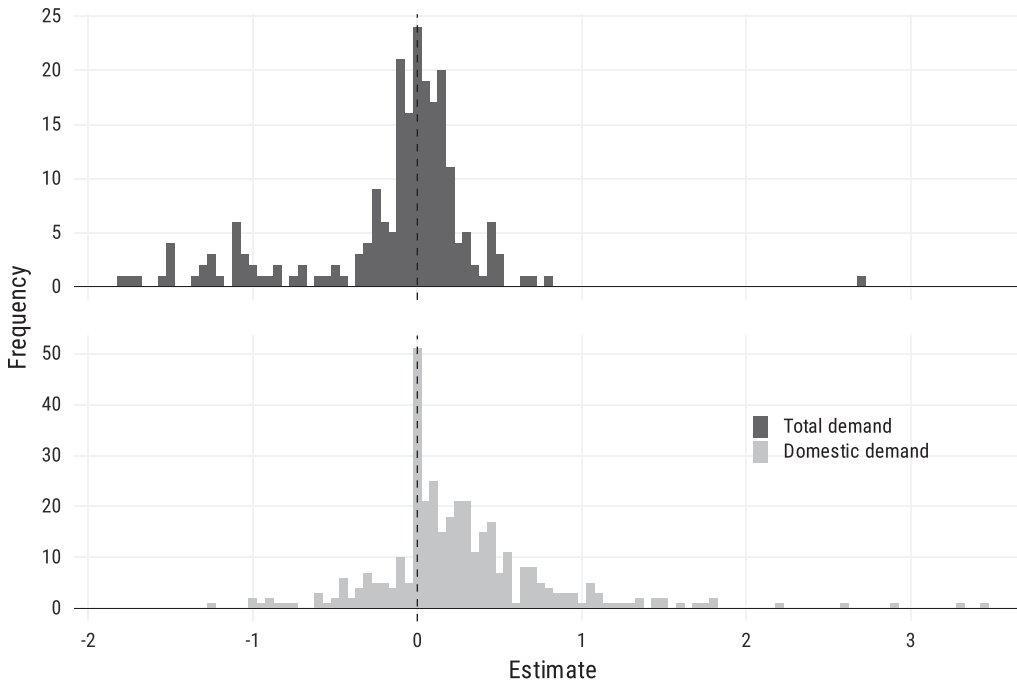

FIGURE 4 Histogram of estimates for total and domestic demand. *Note*: This graph shows the histogram of estimates, that is, the number of estimates finding a certain marginal effect from a one percentage point increase in the wage share on demand, for total demand (dark gray) and domestic demand (light gray). *Source*: own compilation.

the right-hand side tail of the distribution of effects of the functional distribution on total demand is thinly populated, although almost half of the estimates are (weakly) positive (102 of 218 estimates). In contrast, the data show a negative tail that is thicker than a random distribution around the "true" value would suggest. These estimates indicate that, on average, total demand growth is profit-led with a mean estimate of about −0.14, although the lack of symmetry in the funnel plot indicates possible publication selection bias in favor of profit-led results.

Table 2 contains our regression results for total demand in the FAT-PET specification, adding our control sets sequentially in columns (1)–(6). It presents the coefficients of Equation (12) as well as (adjusted) R^2, and the number of observations. Note that β_0 can only be interpreted as the "true" effect in column (1), since it is sensitive to the choice of reference groups in the moderator variables in the multivariate analysis. The coefficient for the precision measure β_1 indicates the presence of publication selectivity.

Column (1) indicates the presence of a statistically significant publication selection bias for the total demand sample; correcting for this bias, the FAT-PET fails to detect a statistically significant underlying effect. The PEESE (see Table A.2 in the Appendix) confirms the FAT-PET's statistically significant bias in favour of profit-led results, but also suggests that the mean beyond bias is statistically significantly profit-led. Table A.2 also shows that the mean beyond bias (−0.037) is slightly less negative than the sample mean (−0.14), which indicates that the negative effect of a change in the wage share on total demand would be smaller without publication selectivity. Both the FAT-PET and the PEESE thus suggest profit-led bias present in the literature, and the

TABLE 2 Regression results for total demand (FAT-PET).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	−0.025	0.326***	0.152	0.026	−0.175	−0.355**
	(0.021)	(0.079)	(0.098)	(0.134)	(0.171)	(0.174)
$1/\sqrt{n}$	−0.675**	−1.669***	−2.994***	−3.588***	−3.308***	−2.868***
	(0.313)	(0.397)	(0.590)	(0.591)	(0.557)	(0.569)
Published		−0.326***	−0.269***	−0.187**	−0.231***	−0.211**
		(0.068)	(0.074)	(0.079)	(0.087)	(0.102)
Insignificant estimate		0.013	−0.042	−0.063	0.074	0.096
		(0.065)	(0.066)	(0.061)	(0.064)	(0.070)
Tackling endogeneity			0.152**	0.169**	0.071	0.071
			(0.059)	(0.072)	(0.086)	(0.109)
Simultaneous estimation			−0.042	0.002	−0.031	−0.072
			(0.086)	(0.095)	(0.105)	(0.101)
Mean marginal effect			0.263***	0.146***	0.093**	0.068*
			(0.073)	(0.052)	(0.043)	(0.039)
Quarterly data			0.185**	0.036	0.215*	−0.060
			(0.085)	(0.103)	(0.112)	(0.152)
Capacity utilization			−0.318**	−0.396***	−0.345**	−0.101
			(0.125)	(0.149)	(0.156)	(0.222)
Real wages			0.259**	0.029	0.264*	0.376**
			(0.106)	(0.125)	(0.150)	(0.188)
Early observation period				0.040	0.154*	0.131
				(0.088)	(0.090)	(0.092)
OECD country				0.358***	0.295***	0.355***
				(0.080)	(0.113)	(0.120)
Profits in I					0.081	0.155
					(0.089)	(0.096)
Interest rate in I					0.195**	0.336***
					(0.096)	(0.097)
Profits in X					0.072	0.202**
					(0.087)	(0.095)
Unit labor costs in X					−0.125	−0.207
					(0.107)	(0.131)
Exchange rate in X					0.284***	0.436***
					(0.082)	(0.101)
Government spending						−0.116
						(0.099)
Debt and credit						0.345*
						(0.206)

(Continues)

TABLE 2 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Personal inequality						−1.237***
						(0.397)
Wealth effects						0.251
						(0.180)
R^2	0.017	0.104	0.278	0.383	0.466	0.523
Adj. R^2	0.013	0.091	0.247	0.350	0.423	0.474
Num. obs.	218	218	218	218	218	218

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on total demand. Robust standard errors (in parentheses) are clustered at the study level.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

PEESE that correcting for publication selectivity would reduce the effect size compared to the mean found in the literature.

However, the difference of the true mean to the sample mean is economically very small. Furthermore, it should be born in mind that our precision measure, which is the square root of observations rather than inverse standard errors, likely leads to imprecise measurement. Although the estimation strategy applied here has been shown to reduce publication selection bias more

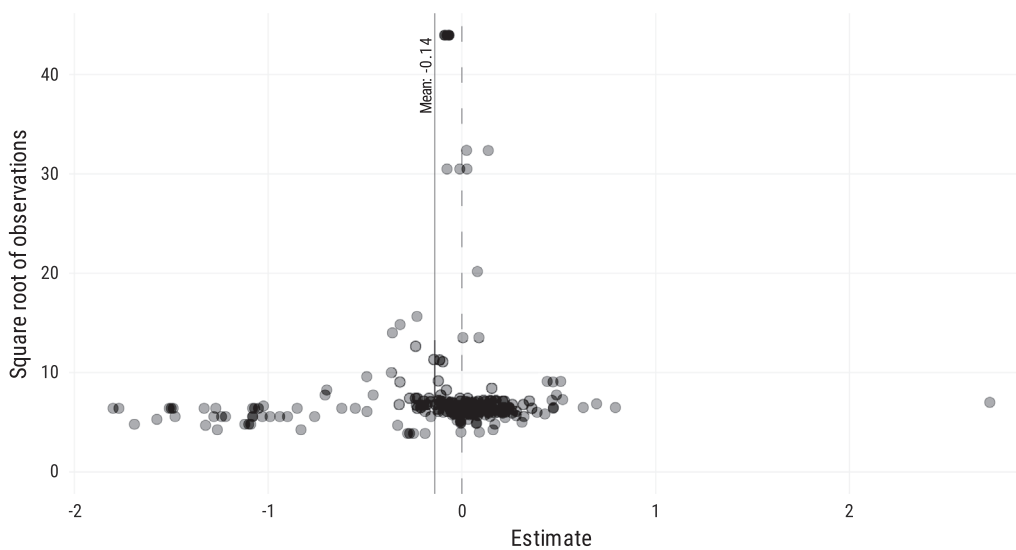

FIGURE 5 Funnel plot: Total demand. *Note*: This graph shows the estimates for the marginal effect of a 1 percentage point increase of the wage share on total demand against these estimates' precision, measured as the square root of observations. Close estimates appear darker due to overlapping and indicate a high density. *Source*: own compilation.

strongly and more precisely than alternative estimation strategies (Stanley & Rosenberger, 2009) we therefore interpret these findings with caution.

The estimated coefficients of Equation (11) are largely robust across our specifications. Published estimates are more profit-led in all specifications, including the full model. Regarding the estimation strategy, tackling endogeneity is associated with more wage-led estimates in specifications (3) and (4), while using a simultaneous estimation strategy is not statistically significantly linked to the estimated effect size.

This is in contrast to theoretical expectations and suggests that the choice to address the potential endogeneity between demand and the functional distribution is more important than the historically differentiated estimation strategy (additive vs. simultaneous). Reporting mean marginal effects, however, does predict more wage-led results. Using capacity utilization as the dependent variable instead of GDP is related to more profit-led results (significant in all but the full specification). Quarterly data and (less so) real wages are not consistently statistically significantly related to the estimated effects of the functional distribution on demand growth.

In accordance with our predictions based on the literature review, studies' choices regarding the geographical space and, to a lesser extent, the time horizon affect their findings. Most notably, estimates covering OECD countries are more likely to be wage-led, as suggested by theory.

Regarding studies' controls, including interest rates in the investment function and exchange rates and profits in the exports function is correlated with more wage-led findings. Finally, control variables for debt and credit (or, more generally, financialisation) are associated with more wage-led results, while personal inequality is connected to more profit-led results. The other control variables are insignificant.

Overall, the directions of the coefficients for the control variables are thus largely in line with the hypotheses that resulted from the literature review in Section 2. Interestingly, whether studies control for endogeneity seems to matter more for the direction of estimates than whether they use a simultaneous estimation strategy or not. Moreover, variables relating to space appear to affect the direction of results. For control variables used in the studies, we find interest rates in the investment functions, and profits and exchange rate variables used in export functions, as well as debt and credit, and personal inequality to help explain the heterogeneity in the results of studies.

5.2 | Domestic demand

Turning to the relationship between the functional distribution of income and domestic demand, Figure 6 shows the funnel plot of all effect sizes against their precision. As discussed in the literature review in Section 2, estimating domestic demand is theoretically meaningful mainly in the neo-Kaleckian additive approach; our literature is thus for the most part restricted to this subsample of studies. As Figure 6 shows, there is a positive correlation between the wage share and domestic demand in the majority of estimates; domestic demand is estimated to be wage-led in 71% of our sample of reported estimates. This conforms well with the consensus in previous literature reviews, as discussed in Section 2.

Moreover, the estimates with high precision confirm this positive correlation between the wage share and domestic demand. Finally, note that a single study (Stockhammer & Stehrer, 2011) with a large number of estimates stands out.[21]

Next, we estimate Equation (12) for domestic demand, for which Table 3 presents the results, again adding our vector of controls in a step-wise fashion in columns (1) to (6). Both the model fit and the explanatory power are substantially weaker for domestic demand, which may be due

TABLE 3 Regression results for domestic demand (FAT-PET).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	0.291***	0.349***	0.054	0.085	0.087	−0.018
	(0.068)	(0.119)	(0.153)	(0.133)	(0.132)	(0.170)
$1/\sqrt{n}$	0.006	−0.158	0.453	−0.255	−0.281	0.259
	(0.539)	(0.583)	(0.592)	(0.532)	(0.542)	(0.727)
Published		−0.073	−0.150*	−0.109	−0.105	−0.144**
		(0.089)	(0.086)	(0.085)	(0.079)	(0.067)
Insignificant estimate		0.055	0.019	0.016	0.017	0.015
		(0.072)	(0.079)	(0.081)	(0.081)	(0.085)
Tackling endogeneity			0.101	0.035	0.024	−0.014
			(0.063)	(0.068)	(0.071)	(0.092)
Simultaneous estimation			0.273	0.298	0.306	0.487
			(0.205)	(0.251)	(0.254)	(0.307)
Mean marginal effect			0.121*	0.048	0.053	0.054
			(0.064)	(0.065)	(0.073)	(0.063)
Quarterly data			0.159**	0.059	0.092	0.225**
			(0.064)	(0.070)	(0.079)	(0.098)
Capacity utilization			−0.524	−0.259	−0.342	−0.577
			(0.722)	(0.719)	(0.733)	(0.751)
Real wages			0.062	−0.050	−0.024	0.022
			(0.119)	(0.134)	(0.139)	(0.140)
Early observation period				0.164	0.175	0.298*
				(0.109)	(0.110)	(0.168)
OECD country				0.066	0.017	−0.103
				(0.105)	(0.126)	(0.155)
Profits in I					0.006	0.010
					(0.070)	(0.099)
Interest rate in I					0.068	0.186**
					(0.074)	(0.086)
Government spending						0.169*
						(0.097)
Debt and credit						0.364
						(0.223)
Personal inequality						−0.103
						(0.133)
Wealth effects						−0.139
						(0.096)

(Continues)

TABLE 3 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
R^2	0.000	0.003	0.028	0.032	0.033	0.038
Adj. R^2	−0.003	−0.006	0.003	0.002	−0.004	−0.010
Num. obs.	360	360	360	360	360	360

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on domestic demand. Robust standard errors (in parentheses) are clustered at the study level.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

to the lower number of studies (but not observations) and reduced heterogeneity in our observations compared to total demand. This, in turn, could relate to the fact that this literature is almost exclusively neo-Kaleckian.

We find some genuine underlying effect in column (1) of Table 3 for FAT-PET andTable A.3 for PEESE. The adjusted effect sizes of about 0.29 (FAT-PET) and 0.32 (PEESE) are higher than the sample mean of about 0.27, which confirms the funnel plot's finding that domestic demand is wage-led. However, in contrast to total demand, we cannot detect publication bias.

Concerning controls for the heterogeneity between studies, publication characteristics are not statistically significant except for published studies in specifications (3) and (6). The use of quarterly data and of mean marginal effects, as well as an early period of observation, appear

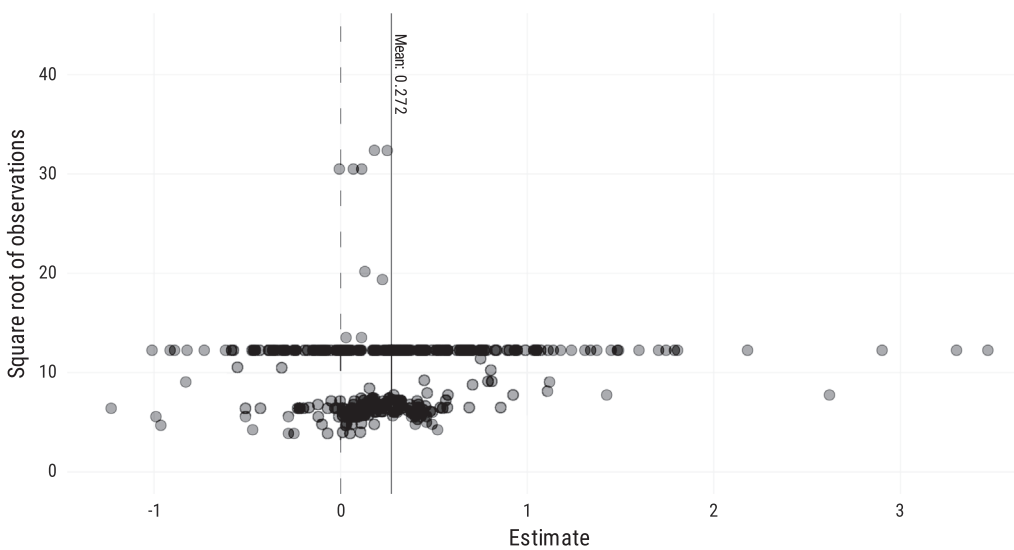

FIGURE 6 Funnel plot: Domestic demand. *Note*: This graph shows the estimates for the marginal effect of a 1 percentage point increase of the wage share on domestic demand against these estimates' precision, measured as the square root of observations. Close estimates appear darker due to overlapping and indicate a high density. *Source*: own compilation.

to be statistically significantly related to more wage-led reported estimates. Finally, including the interest rate in the investment function and controlling for government spending is statistically significantly associated with (more wage-led) reported estimates of our covariates capturing studies' controls. The PEESE specification in Table A.3 in the Appendix validates these results qualitatively.

5.3 | Discussion

Summing up the results of our meta-regression analysis, we find mixed evidence for publication selection bias in the wage-led/profit-led literature, which investigates the effects of changes in the functional distribution on demand. Concretely, our data show publication selectivity for total demand in the direction of more profit-led published estimates, which we interpret with caution due to our precision measure. Taking publication bias into account may reduce the estimated effect, that is, it makes total demand less strongly profit-led or even statistically insignificant. Our results for domestic demand find that the primary literature estimates domestic demand to be wage-led, so that an increase in the wage share raises domestic demand. Here, publication bias is largely absent.

These findings can be used to estimate a "best practice" mean effect of the functional income distribution on demand by controlling for publication characteristics. Since our literature is differentiated into two strands, we also hold estimation methods constant which are feasible (if imperfect) proxies for differentiating between the neo-Kaleckian and the structuralist strand of the literature.[22] For total demand, the predicted effect is indistinguishable from zero with a confidence interval ranging from −0.193 to 0.738. For domestic demand, it yields an underlying effect of 0.433, which is statistically significantly different from zero as the confidence interval lies between 0.240 and 0.627.

Our results thus partially contradict existing literature reviews which focus on the number of studies (instead of the number of estimates as the MRA warrants) and find both total demand and domestic demand to be wage-led. We further contribute to the understanding of this literature by providing evidence that the primary literature contains some publication bias; however, it is, if anything, overestimating the profit-ledness of total demand. Finally, we show that the estimation strategy (especially controlling for endogeneity) and some control variables in the studies' estimation functions matter for the direction of the estimated results.

While these findings fit well with the individual studies surveyed in the literature review in Section 2, our results should be treated with some caution. First and foremost, two methodological issues prevented us from gaining a complete picture using meta-regression analysis: As discussed in Sections 3 and 4, a number of studies could not be coded, especially from the structuralist literature strand using simultaneous estimation strategies. Second, we use the square root of the number of observations as our measure of precision due to data availability. While this is considered an acceptable proxy by the literature (Johnston et al., 2019; Penn & Hu, 2019; Stanley & Rosenberger, 2009), being able to access the primary estimates' standard errors would very likely improve the accuracy of our estimates. Even though our 'n-estimator' is considered one of the most effective alternatives in reducing publication selection bias, it may be affected by biases (Stanley & Rosenberger, 2009). In addition, the number of observations restricts the level of detail at which we are able to investigate the wage-/profit-led literature. In particular, a larger number of estimates would allow a more thorough analysis of publication selection bias at the level of individual countries. Finally, if all studies suffer from the same misspecification, then a quantitative literature review such as this meta-analysis may not uncover this bias. For the empirical

literature under review here, this concerns for instance overhead labor (Cauvel, 2023; Lavoie, 2017), as discussed in Section 2.2.

5.4 | Robustness checks

Given these limitations, we check the robustness of our results, first, by exploiting the panel nature of our data using a linear mixed effects (multi-level) model, which is capable of capturing both within- and between-study level heterogeneity in effect sizes. As Table A.4 in the Appendix shows, our findings are qualitatively robust with regard to the direction of effect sizes: total demand does not show statistically significant effects and domestic demand is wage-led. In addition, the multi-level model confirms the profit-led publication bias in our literature. Roughly 44% of the total variation in effect sizes originates from between-study variation for total demand, and up to 7% for domestic demand. This implies that, conversely, 56% of the variation is due to within-study variation in total demand estimates, and more than 93% in domestic demand estimates, which fits well with our overall finding that the heterogeneity in effect sizes is for the larger part well captured within studies in the primary literature.

Second, a possible concern regarding our findings is the linear estimation method used in obtaining them. We therefore conduct robustness checks using non-linear methods, whose results are included in Table A.5 for total demand and in Table A6 for domestic demand. First, we use the "top 10%" approach in terms of precision (Stanley et al., 2010). This requires a sampling strategy in the case of domestic demand, since a single large study's estimates overlay the 10% cut-off and inflate the subsample. We thus bootstrap 1000 times from the inflated top 10% sample to obtain exactly 10% of the total sample (36 observations) and show the average and standard deviation of 1000 estimates based on the bootstrap sample. Second, we analyse the subsample of effect sizes where standard errors are available in the primary literature. Standard errors are provided only for 54 total demand estimates from four studies and account for roughly 9% of all and 25% of total demand estimates. We additionally use the "weighted average of the adequately powered" (WAAP) approach as introduced by Ioannidis et al. (2017). Encouragingly, our literature appears to be relatively high-powered, since 77% of our codable estimates are considered adequately powered using the conventional levels of 5% statistical significance and 80% power. Third, we calculate the bias-corrected mean effect based on the non-parametric test for publication selection by Andrews and Kasy (2019). This method computes conditional publication probabilities for conventional critical limits of the p-value of the estimates in the primary studies.

The results for total demand in Table A.5 show that the non-linear methods do not find a mean beyond bias that is significantly different from zero. For domestic demand, Table A.6 shows a positive mean beyond bias for the full sample and positive but insignificant coefficients for the reduced samples. These robustness checks are, however, severely hampered by the limited number of observations on which they are based; while they broadly support our main findings, they should not be regarded as definitive.

6 | CONCLUSION

This paper analyzes the rich empirical literature on the relationship between the functional distribution of income and aggregate demand, investigating whether decreasing wage shares increase or decrease demand, and thus characterizing growth regimes as "wage-led" or "profit-led". It reviews 33 empirical studies with 578 estimates for domestic and total demand covering up to 163

years and 59 countries and regions; to the best of our knowledge, it represents the most detailed and extensive quantitative data set for the wage-led/profit-led debate to date. After reviewing the literature, we conduct a meta-regression analysis to systematically assess the presence of publication selectivity, the presence of a genuine underlying effect, and to uncover the effects of moderator variables on estimated effect sizes. Given that the standard errors of the calculated marginal effects were not readily available for most estimates, we used the inverse square root of the number of observations as an acceptable proxy.

Our results support the findings of previous conventional literature reviews in concluding that the link between functional income distribution and demand does, indeed, exist. The effects of a change in the functional income distribution of one percentage point on aggregate demand in the empirical literature range between 0.8 and −0.3 within one standard deviation for domestic demand, and between 0.4 and −0.7 for total demand. The literature denotes a marginal effect size in the range of |0.5| as economically large (Onaran & Obst, 2016; Stockhammer et al., 2018); considering that the average GDP growth was roughly 2% in the OECD countries between 1991 and 2021, we consider the outer bounds of the effects found in the literature covered here to be economically significant. We show that the primary literature on average estimates total demand to be predominantly profit-led despite indications for missing wage-led estimates in the funnel plot across all countries. Domestic demand is found to be wage-led.

We further contribute to the literature by presenting mixed evidence of publication selection bias. While this may affect the size of the effect for total demand, it does not change the direction of the published estimates in the empirical literature covered by our data set. That is, if one were nonetheless to take publication selectivity into account, despite the uncertainty attached to our precision measure, this would imply that the effect of the functional distribution on total demand was less profit-led or statistically insignificant. Furthermore, we identify several moderator variables that help explain the variation in the empirical estimates, including publication characteristics, estimation strategies, and a number of control variables in the studies' estimation functions.

These findings contribute to the growth models literature: After Fordist accumulation regimes were superseded by finance-dominated accumulation regimes, the long-term fall in wage shares in many industrialized countries entailed challenges to stabilize aggregate demand. While some countries were able to increase their international competitiveness and pursue an export strategy, others compensated falling wage shares with a rise in private debt levels to maintain demand. This led to current account imbalances that contributed to financial and economic crises. The relationship between the functional distribution of income and aggregate demand is thus relevant for economic stabilization.

Finally, our findings point to several areas in which the literature would benefit from deeper analysis: Since we show that the estimated impacts of changes in the functional income distribution on aggregate demand are region-dependent, a more detailed analysis of demand regimes over space would be particularly relevant. At present, only a relatively small number of estimates for non-OECD countries is available and results for most African and former Soviet Union countries are largely missing. Second, most estimates cover the period after the 1960s and 1970s. Analyses of longer time spans are likely to yield additional insights into historically changing demand regimes and their contributing factors.

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CONFLICT OF INTEREST STATEMENT

The authors report there are no competing interests to declare.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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ENDNOTES

[1] Barrales-Ruiz et al. (2021) limit their focus to the profit-led side of the literature.

[2] A Fordist accumulation regime was characterized by in-house careers, on-the-job training, and employment stability, a political compromise implying shared productivity gains between workers and managers, and an active entrepreneurial state (Labrousse & Michel, 2017).

[3] For an extensive review of the basic model, see Lavoie (2014, pp. 361).

[4] A higher wage share still leads to an increase in consumption in the model.

[5] In another specification, where they decompose individual and collective government consumption as well as public investment, the effect of government consumption on private investment is ambiguous (positive for some countries, negative or insignificant for others), while public investment has a positive effect on private investment in most EU-15 countries.

[6] High private indebtedness, for example, could explain a disconnect between profits and investments since profits then need to be used for deleveraging.

[7] Balance sheet recessions refer to a situation where both households and businesses "are forced to repair their balance sheets by increasing savings or paying down debt. This act of deleveraging reduces aggregate demand and throws the economy into a very special type of recession" (Koo 2011, p. 19).

[8] This is due to a fluctuating composition of the work force between productive and overhead labor over the business cycle.

[9] These papers extend the standard neo-Kaleckian model by permitting capitalist managers to receive wage income and workers to save, own part of the capital stock, and hence receive a share of the profits. The deciding factor for the overall demand regime then becomes the prior distribution of income between wages and profits (instead of the difference in the propensity to consume between capitalists and workers).

[10] If a study was not (yet) published at that point, we used the latest available (working paper) version of the study for coding the estimates.

[11] We do not differentiate between different kinds of wage or profit share variables (e.g., adjusted or unadjusted wage shares) used within the studies.

[12] Whenever different amounts of observations were available, for example, for separate estimates for consumption, investment, and net exports, we use the smallest sample size for the domestic or total demand effect. Moreover, we assume annual data when it is unclear whether the data is quarterly or annual.

[13] See the Appendix for a list of included papers.

[14] For VAR estimations, we include cumulative effects after at least five periods to ensure comparability with single equation estimations.

[15] The data set is available in the online Appendix.

[16] Since the two estimates covering 155 years for the UK and 140 years for Germany as well as several other estimates covering a period of more than 80 years in Stockhammer et al. (2018) are outliers, we checked whether our results are robust to the exclusion of this study. Our findings are not affected by the change (see Tables A.9 and A.10 in the Appendix)

[17] MRAs repeatedly find that the 'true' underlying effect can be quite different from the 'conventional' effect found within the respective fields' primary literature estimates. For example, Hafner et al. (2017) find no statistically significant effect of an increase in the UK minimum wage on unemployment, even though the vast majority of 1451 estimates do. Similarly, Reckova and Irsova (2015) find an underlying effect of climate sensitivity between 1.4 and 2.3°C, even though the estimates from 16 studies range from 0.7 to 10.4°C – a far higher 'conventionally' assumed view than ultimately estimated by MRA.

[18] Since the optimal weight in FAT-PET and PEESE specifications is the inverse of the variance, the equivalent in our case is the sample size. All specifications are thus weighted with the number of observations.

[19] One estimate for Italy, again in Oyvat et al. (2018), was removed from our sample due to its very large effect size of 296.1.

[20] Recall that the measure of precision here is the square root of observations, which emphasizes studies with a large number of underlying observations. In our case, this concerns two studies: Kiefer and Rada (2015), which uses quarterly data for a period of 40 years and 13 OECD countries, and Hartwig (2014), which is based on 34 countries and an observation period of 41 years.

[21] A robustness check shows that the publication bias is qualitatively robust to its exclusion (see Tables A.7 (FAT-PET) and A.8 (PEESE) in the Appendix).

[22] Best practice estimates for total and domestic demand are based on estimation specification (6) in Tables 2 and 3 respectively, except for the dummies for simultaneous estimation, early observation period, and OECD country. As best practice, we suggest estimates that are published, do not contain insignificant effects for demand components, tackle endogeneity, calculate marginal effects at the mean over the total observation period, are based on quarterly data, use GDP rather than capacity utilization, use the wage share rather than real wages, and include all controls.

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APPENDIX

Papers included in MRA

[1] Allain, O. and N. Canry (2007). Distribution and Growth in France (1982-2006): A Cointegrated VAR Approach. Post-Print and Working Papers. Université Paris1 Panthéon-Sorbonne.

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Papers were excluded if they did not report marginal effects, the number of observations, or a way to calculate them.

TABLE A.1 Control variable definition.

Author(s)	Variable definition
Government spending	
Barbosa-Filho and Taylor (2006)	Government spending
Nikiforos and Foley (2014)	Government surplus/deficit as % of GDP
Wang (2009)	Total investment includes public investment
Feijo et al. (2015)	Public Investment (share of public capital formation in total capital formation; as dependent variable)
Molero and Simarro (2015)	Public investment in total investment (as dependent variable)
Obst et al. (2017)	Consumption: Social benefits, other current transfers; Investment: Government spending (individual, collective, investment)
Oyvat et al. (2018)	Government spending as share in GDP
Wealth effects	
Stockhammer and Wildauer (2015)	Consumption and investment: Real property prices (Stock price series)
Stockhammer et al. (2018)	Consumption and investment: Private Wealth
Onaran et al. (2011)	Consumption: Financial wealth, housing wealth
Debt and credit	
Alvarez et al. (2018)	Consumption: saving rate (SR) or household debt (HD); Investment: debt of non-financial corporations, total private debt of both non-financial corporations and households
Tamasauskiene et al. (2017)	Consumption: saving rate (SR) or household debt (HD); Investment: debt of non-financial corporations, total private debt of both non-financial corporations and households
Stockhammer and Wildauer (2015)	Consumption: credits to households, stock price series; Investment: credits to households, credits to businesses (stock price series)
Personal Inequality	
Stockhammer and Wildauer (2015)	Income share of richest 1 % or Gini index
Rolim (2019)	Income distribution between workers and supervisors/managers

TABLE A.2 Regression results for total demand (PEESE).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	-0.037**	0.289***	0.083	-0.110	-0.386**	-0.556***
	(0.017)	(0.070)	(0.097)	(0.131)	(0.168)	(0.164)
$1/n$	-4.181***	-9.118***	-13.612***	-13.945***	-11.644***	-10.349***
	(1.592)	(1.983)	(2.395)	(2.535)	(2.441)	(2.324)
Published		-0.329***	-0.256***	-0.159**	-0.176*	-0.159
		(0.067)	(0.073)	(0.079)	(0.090)	(0.106)
Insignificant estimate		0.014	-0.065	-0.091	0.060	0.088
		(0.063)	(0.067)	(0.064)	(0.065)	(0.072)
Tackling endogeneity			0.107*	0.156**	0.074	0.049
			(0.056)	(0.074)	(0.090)	(0.115)
Simultaneous estimation			-0.034	0.019	-0.026	-0.072
			(0.085)	(0.094)	(0.110)	(0.104)
Mean marginal effect			0.244***	0.139***	0.079*	0.059
			(0.065)	(0.052)	(0.046)	(0.041)
Quarterly data			0.179**	0.017	0.208*	-0.126
			(0.086)	(0.098)	(0.119)	(0.162)
Capacity utilization			-0.311**	-0.363**	-0.329*	-0.042
			(0.129)	(0.142)	(0.167)	(0.238)
Real wages			0.245**	0.032	0.271*	0.363*
			(0.106)	(0.118)	(0.158)	(0.200)
Early observation period				-0.044	0.062	0.042
				(0.081)	(0.084)	(0.085)
OECD country				0.362***	0.313***	0.372***
				(0.083)	(0.113)	(0.122)
Profits in I					0.095	0.185*
					(0.090)	(0.097)

(Continues)

TABLE A.2 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Interest rate in I					0.168*	0.358***
					(0.099)	(0.101)
Profits in X					0.122	0.255***
					(0.088)	(0.095)
Unit labor costs in X					-0.097	-0.170
					(0.112)	(0.134)
Exchange rate in X					0.280***	0.439***
					(0.083)	(0.104)
Government spending						-0.090
						(0.103)
Debt and credit						0.322
						(0.237)
Personal inequality						-1.413***
						(0.451)
Wealth effects						0.352*
						(0.194)
R^2	0.025	0.117	0.268	0.352	0.434	0.507
Adj. R^2	0.021	0.104	0.236	0.318	0.389	0.456
Num. obs.	218	218	218	218	218	218

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on total demand. Robust standard errors (in parentheses) are clustered at the study level.

*$p < 0.1$.

**$p < 0.05$.

***$p < 0.01$.

TABLE A.3 Regression results for domestic demand (PEESE).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	0.316***	0.407***	0.121	0.095	0.094	0.028
	(0.049)	(0.096)	(0.133)	(0.127)	(0.124)	(0.144)
$1/n$	-2.868	-3.987*	0.099	-2.006	-2.052	-0.115
	(2.132)	(2.246)	(2.303)	(1.985)	(2.039)	(2.658)
Published		-0.112	-0.171**	-0.114	-0.109	-0.152**
		(0.086)	(0.084)	(0.085)	(0.079)	(0.067)
Insignificant estimate		0.055	0.023	0.017	0.018	0.016
		(0.072)	(0.079)	(0.080)	(0.081)	(0.085)
Tackling endogeneity			0.086	0.029	0.020	-0.021
			(0.059)	(0.070)	(0.074)	(0.094)
Simultaneous estimation			0.220	0.284	0.292	0.456
			(0.197)	(0.245)	(0.249)	(0.296)
Mean marginal effect			0.129**	0.048	0.053	0.054
			(0.065)	(0.065)	(0.072)	(0.063)
Quarterly data			0.155**	0.050	0.084	0.208**
			(0.068)	(0.069)	(0.078)	(0.094)
Capacity utilization			-0.476	-0.242	-0.327	-0.528
			(0.719)	(0.715)	(0.728)	(0.741)
Real wages			0.080	-0.044	-0.017	0.022
			(0.118)	(0.136)	(0.140)	(0.141)
Early observation period				0.169	0.178	0.304*
				(0.112)	(0.113)	(0.176)
OECD country				0.063	0.014	-0.103
				(0.104)	(0.125)	(0.155)

(Continues)

TABLE A.3 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Profits in I					0.007	0.012
					(0.070)	(0.099)
Interest rate in I					0.067	0.183**
					(0.073)	(0.087)
Government spending						0.152*
						(0.089)
Debt and credit						0.348
						(0.217)
Personal inequality						-0.099
						(0.129)
Wealth effects						-0.140
						(0.097)
R^2	0.001	0.005	0.027	0.032	0.033	0.038
Adj. R^2	-0.001	-0.003	0.002	0.002	-0.003	-0.010
Num. obs.	360	360	360	360	360	360

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on domestic demand. Robust standard errors (in parentheses) are clustered at the study level.

*$p < 0.1$.

**$p < 0.05$.

***$p < 0.01$.

TABLE A.4 Linear mixed effects (multi-level) model.

	Total demand		Domestic demand	
	(1)	(2)	(3)	(4)
Constant	-0.089	0.217	0.234***	0.473***
	(0.066)	(0.135)	(0.052)	(0.123)
$1/\sqrt{n}$		-2.167***		-1.716**
		(0.838)		(0.845)
AIC	219.503	214.917	595.339	594.802
BIC	229.657	228.455	606.997	610.346
Num. estimates	218	218	360	360
Num. studies	30	30	26	26
Between-group var.	0.098	0.096	0.021	0.006
Within-group var.	0.125	0.121	0.291	0.295
ICC	0.438	0.441	0.068	0.02

Note: This table shows the results of a multi-level model in a FAT-PET specification. The Intraclass Correlation Coefficient (ICC) shows the ratio of between-group and within-group variance of effect sizes.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

TABLE A.5 Non-linear tests of publication bias for total demand.

	(1)	(2)	(3)	(4)	(5)
	Full sample	**Top 10%**	**Std.err.**	**WAAP**	**Andrews/Kasy**
β_0 [mean beyond bias]	-0.025	-0.025	0.057	0.001	-0.010
	(0.021)	(0.031)	(0.275)	(0.007)	(0.014)
Sample mean	-0.140	-0.081	0.019	0.054	0.019
Observations	218	21	54	42	54
Studies	30	8	4	2	4

Note: This table shows various non-linear tests in a FAT-PET specification with a baseline scenario in column (1). In column (2), the sample is reduced to the top 10% of effect sizes with respect to precision. Column (3) shows the result for all effect sizes where standard errors are available in the primary literature. Column (4) presents the weighted average of the adequately powered (WAAP) introduced by Ioannidis et al. (2017). Column (5) refers to the bias-corrected mean effect based on the non-parametric test for publication selection by Andrews/Kasy (2019). Robust standard errors (in parentheses) are clustered at the study level.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

TABLE A.6 Non-linear tests of publication bias for domestic demand.

	(1) Full sample	(2) Top 10% Reduced	(3) Top 10% Bootstrapped
β_0 [mean beyond bias]	0.291***	0.154	0.002
	(0.068)	(0.097)	(0.076)
Sample mean	0.272	0.122	0.278
Observations	360	9	36
Studies	26	5	6

Note: This table shows various non-linear tests in a FAT-PET specification with a baseline scenario in column (1). In column (2), the sample is reduced to the top 10% of effect sizes with respect to precision. The sample is further reduced as the precision threshold value for the top 10% includes a study with a very large number of estimates that is excluded. Column (3) shows the average effect of 10% of the full sample based on 1,000 estimations from bootstrapping the inflated sample (with the standard deviation in parentheses). Robust standard errors (in parentheses) are clustered at the study level.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

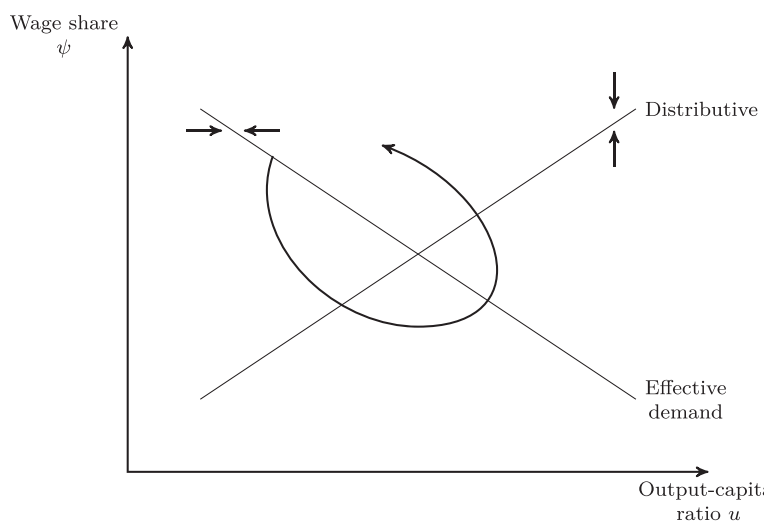

FIGURE A.1 Goodwin cycle (adapted from Barbosa-Filho and Taylor (2006)).

TABLE A7 Regression results for domestic demand (FAT-PET) excluding Stockhammer/Stehrer (2011).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	0.150***	0.318***	0.053	0.064	0.063	-0.030
	(0.048)	(0.103)	(0.161)	(0.140)	(0.137)	(0.163)
$1/\sqrt{n}$	0.424	-0.004	0.710	-0.052	-0.079	0.229
	(0.370)	(0.355)	(0.658)	(0.590)	(0.601)	(0.699)
Published		-0.203**	-0.158*	-0.113	-0.109	-0.145**
		(0.082)	(0.090)	(0.087)	(0.082)	(0.070)
Insignificant estimate		0.108**	-0.006	0.014	0.020	0.039
		(0.050)	(0.072)	(0.077)	(0.077)	(0.069)
Tackling endogeneity			0.095	0.050	0.043	0.003
			(0.063)	(0.073)	(0.078)	(0.095)
Simultaneous estimation			0.322	0.295	0.295	0.462
			(0.221)	(0.287)	(0.291)	(0.324)
Mean marginal effect			0.107*	0.047	0.052	0.054
			(0.064)	(0.067)	(0.075)	(0.065)
Quarterly data			0.004	-0.008	0.022	0.220
			(0.091)	(0.103)	(0.114)	(0.190)
Capacity utilization			-0.398	-0.226	-0.306	-0.567
			(0.731)	(0.736)	(0.756)	(0.788)
Real wages			0.042	-0.037	-0.006	0.045
			(0.123)	(0.144)	(0.148)	(0.131)
Early observation period				0.130	0.138	0.300*

(Continues)

TABLE A7 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
				(0.120)	(0.123)	(0.171)
OECD country				0.079	0.027	-0.102
				(0.117)	(0.137)	(0.160)
Profits in I					0.009	0.003
					(0.072)	(0.103)
Interest rate in I					0.073	0.182*
					(0.075)	(0.093)
Government spending						0.166*
						(0.095)
Debt and credit						0.382*
						(0.222)
Personal inequality						-0.104
						(0.200)
Wealth effects						-0.130
						(0.164)
R^2	0.006	0.068	0.155	0.185	0.190	0.238
Adj. R^2	-0.000	0.051	0.107	0.128	0.122	0.151
Num. obs.	168	168	168	168	168	168

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on domestic demand, excluding the observations from Stockhammer/Stehrer (2011). Robust standard errors (in parentheses) are clustered at the study level.

*$p < 0.1$.

**$p < 0.05$.

***$p < 0.01$.

TABLE A.8 Regression results for domestic demand (PEESE) excluding Stockhammer/Stehrer (2011).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	0.183***	0.342***	0.121	0.082	0.078	0.023
	(0.042)	(0.092)	(0.138)	(0.132)	(0.128)	(0.138)
$1/n$	0.583	-1.249	1.012	-1.497	-1.521	-0.714
	(1.695)	(1.593)	(2.593)	(2.171)	(2.219)	(2.432)
Published		-0.214***	-0.180**	-0.117	-0.113	-0.159**
		(0.081)	(0.087)	(0.086)	(0.080)	(0.070)
Insignificant estimate		0.110**	0.022	0.025	0.031	0.049
		(0.051)	(0.069)	(0.073)	(0.074)	(0.067)
Tackling endogeneity			0.087	0.042	0.035	-0.000
			(0.059)	(0.077)	(0.081)	(0.095)
Simultaneous estimation			0.238	0.266	0.269	0.423
			(0.208)	(0.277)	(0.280)	(0.308)
Mean marginal effect			0.119*	0.048	0.053	0.055
			(0.066)	(0.067)	(0.075)	(0.066)
Quarterly data			0.021	-0.001	0.029	0.235
			(0.089)	(0.108)	(0.118)	(0.191)
Capacity utilization			-0.347	-0.203	-0.287	-0.541
			(0.728)	(0.732)	(0.751)	(0.781)
Real wages			0.074	-0.030	0.002	0.051
			(0.119)	(0.145)	(0.148)	(0.132)
Early observation period				0.144	0.151	0.318*
				(0.127)	(0.130)	(0.186)

(Continues)

TABLE A.8 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
OECD country				0.076	0.024	-0.110
				(0.116)	(0.136)	(0.164)
Profits in I					0.009	0.004
					(0.072)	(0.102)
Interest rate in I					0.072	0.177*
					(0.074)	(0.090)
Government spending						0.141
						(0.085)
Debt and credit						0.365*
						(0.215)
Personal inequality						-0.067
						(0.198)
Wealth effects						-0.151
						(0.163)
R^2	0.000	0.070	0.147	0.187	0.192	0.238
Adj. R^2	-0.006	0.053	0.098	0.129	0.123	0.151
Num. obs.	168	168	168	168	168	168

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on domestic demand, excluding the observations from Stockhammer/Stehrer (2011). Robust standard errors (in parentheses) are clustered at the study level.

*$p < 0.1$.

**$p < 0.05$.

***$p < 0.01$.

TABLE A.9 Regression results for domestic demand (FAT-PET) excluding Stockhammer et al. (2018).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	0.295***	0.328***	0.032	0.096	0.128	-0.156
	(0.068)	(0.108)	(0.142)	(0.103)	(0.105)	(0.153)
$1/\sqrt{n}$	-0.063	-0.166	0.460	-0.332	-0.449	0.749
	(0.541)	(0.588)	(0.576)	(0.440)	(0.413)	(0.670)
Published		-0.052	-0.126*	-0.111*	-0.128*	-0.074
		(0.069)	(0.066)	(0.065)	(0.067)	(0.063)
Insignificant estimate		0.056	0.020	0.016	0.017	0.013
		(0.072)	(0.079)	(0.081)	(0.081)	(0.085)
Tackling endogeneity			0.099	0.031	0.014	-0.000
			(0.064)	(0.066)	(0.068)	(0.093)
Simultaneous estimation			0.271	0.292	0.300	0.512
			(0.205)	(0.251)	(0.255)	(0.311)
Mean marginal effect			0.117*	0.048	0.054	0.051
			(0.063)	(0.065)	(0.072)	(0.063)
Quarterly data			0.161**	0.057	0.092	0.242**
			(0.064)	(0.067)	(0.079)	(0.101)
Capacity utilization			-0.523	-0.246	-0.326	-0.627
			(0.723)	(0.716)	(0.732)	(0.752)
Real wages			0.062	-0.050	-0.021	0.008
			(0.119)	(0.134)	(0.139)	(0.141)
Early observation period				0.169	0.191*	0.258
				(0.105)	(0.104)	(0.161)

(Continues)

TABLE A.9 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
OECD country				0.066	-0.004	-0.025
				(0.105)	(0.121)	(0.140)
Profits in I					0.016	-0.024
					(0.066)	(0.100)
Interest rate in I					0.086	0.132
					(0.065)	(0.095)
Government spending						0.209**
						(0.092)
Debt and credit						0.350
						(0.228)
Personal inequality						0.065
						(0.128)
Wealth effects						-0.254***
						(0.075)
R^2	0.000	0.002	0.028	0.032	0.033	0.039
Adj. R^2	-0.003	-0.006	0.002	0.001	-0.004	-0.010
Num. obs.	350	350	350	350	350	350

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on domestic demand, excluding the observations from Stockhammer et al. (2018). Robust standard errors (in parentheses) are clustered at the study level.

*$p < 0.1$.

**$p < 0.05$.

***$p < 0.01$.

TABLE A.10 Regression results for domestic demand (PEESE) excluding Stockhammer et al. (2018).

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
Constant	0.317***	0.404***	0.105	0.108	0.134	-0.060
	(0.049)	(0.079)	(0.118)	(0.108)	(0.110)	(0.132)
$1/n$	-3.155	-4.148*	0.090	-2.400	-2.845*	1.420
	(2.117)	(2.238)	(2.166)	(1.529)	(1.489)	(2.292)
Published		-0.108*	-0.153**	-0.121*	-0.138**	-0.099
		(0.061)	(0.062)	(0.068)	(0.069)	(0.066)
Insignificant estimate		0.055	0.023	0.017	0.017	0.014
		(0.072)	(0.079)	(0.081)	(0.081)	(0.085)
Tackling endogeneity			0.085	0.025	0.010	-0.015
			(0.059)	(0.070)	(0.073)	(0.095)
Simultaneous estimation			0.218	0.278	0.288	0.470
			(0.196)	(0.245)	(0.249)	(0.299)
Mean marginal effect			0.127*	0.049	0.055	0.051
			(0.065)	(0.065)	(0.072)	(0.063)
Quarterly data			0.157**	0.047	0.083	0.222**
			(0.067)	(0.065)	(0.077)	(0.096)
Capacity utilization			-0.474	-0.230	-0.318	-0.551
			(0.719)	(0.713)	(0.728)	(0.741)
Real wages			0.081	-0.043	-0.012	0.007
			(0.117)	(0.136)	(0.140)	(0.142)
Early observation period				0.173	0.194*	0.277
				(0.110)	(0.110)	(0.174)

(Continues)

TABLE A.10 (Continued)

	(1) Pub. bias	(2) Pub. char.	(3) Est. strat.	(4) Time/Space	(5) Controls in I/X	(6) Oth. controls
OECD country				0.062	-0.013	-0.039
				(0.104)	(0.122)	(0.145)
Profits in I					0.021	-0.015
					(0.065)	(0.099)
Interest rate in I					0.090	0.140
					(0.066)	(0.096)
Government spending						0.180**
						(0.083)
Debt and credit						0.334
						(0.221)
Personal inequality						0.035
						(0.125)
Wealth effects						-0.234***
						(0.076)
R^2	0.002	0.005	0.027	0.033	0.033	0.039
Adj. R^2	-0.001	-0.004	0.002	0.001	-0.004	-0.010
Num. obs.	350	350	350	350	350	350

Note: This table shows the results of a weighted least squares regression for publication bias and the five sets of variables including publication characteristics, estimation strategy, meta-regression controls for time and space, and studies' controls in the investment and net export functions or other controls on domestic demand, excluding the observations from Stockhammer et al. (2018). Robust standard errors (in parentheses) are clustered at the study level.

*$p < 0.1$.

**$p < 0.05$.

***$p < 0.01$.