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Reconsidering macroeconomic policy prescriptions with meta-analysis

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This paper investigates recent developments in meta-analysis, the tool to quantitatively synthesize research in a certain body of literature. After providing a brief overview on how to do a meta-analysis and discussing recent methodological advancements in the field, I review applied contributions to the field of macroeconomics. It turns out that meta-analyses have often questioned the conventional wisdom and established new consensuses in fiscal, monetary and labor market policies by uncovering substantial publication bias and unexpected determining factors in many bodies of literature – in particular those dominated by policy conclusions in the neoclassical tradition like minimum wages, financial regulation and the relative effects of tax and spending policies.

Keywords: Meta-analysis; macroeconomics; monetary policy; fiscal policy; labor market

JEL classification: E50, E60, J30

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I. Introduction

Modern macroeconomics, since its beginnings in the 1930s, has been a battlefield of competing schools of thought. Keynesians, Neoclassics, Ordoliberals, Austrians, Schumpeterians, Institutionalists, Marxists, Sraffians, New Classics, New Keynesians and Post Keynesians (to name a few) have discussed the role, workings and efficiency of monetary, fiscal and labor market policies for growth, business cycles, employment, interest and prices. Some of these paradigms have dominated the scientific discourse and policy advice over extended periods of time. The orthodoxy of recent history, the New-Neoclassical Synthesis emerged in the 1970s and has been more broadly questioned since the Great Recession. This orthodoxy informed much of the policies that have been described as the "Berlin-Washington Consensus" (Fitoussi and Saraceno 2013). From a macroeconomic perspective, this consensus featured tight fiscal and monetary policies (due to their supposed low effectiveness and inflationary tendency) as well as financial, trade and labor market deregulation (because of their supposed structural inefficiencies due to extensive policy interventions). While these policies generated the "Great Moderation" (Stock and Watson 2003) of low inflation and low business cycle volatility, under the surface they bred inequality, trade imbalances, private debt accumulation as well as subdued growth and labor market performance (Behringer and van Treeck 2021; Hein et al. 2017; Dosi et al. 2013). Heterodox approaches pointed to these problems and questioned the mechanisms and implications of the underlying New-Neoclassical Synthesis approach (Arestis and Sawyer 2006; Arestis 1996; Arestis and Sawyer 2004; Hein et al. 2008) (Lavoie and Godley 2006; Dullien 2012; Dosi and Virgillito 2021; Dosi and Roventini 2019; Haldane and Turrell 2019; Caverzasi and Russo 2018; Louçã et al. 2021; Turner 2010).

The hopes that data and econometric tools could settle these debates via unambiguous empirical evidence have been disappointed by dozens of studies on the same topic that often

cannot even agree on the sign, let alone the size of a specific parameter. The quest for the data generating process and the true underlying coefficient is complicated by variable and changing circumstances, data availability and quality, model uncertainty and identification, which are all particularly manifest in macroeconomics (Nakamura and Steinsson 2018). Feedback mechanisms are everywhere and blur the identification of exogenous variation (Sims 1980). Inclusion and aggregation of economic activities in national accounts is governed by path dependent conventions and uncertainties (DeRock 2021). Predominance of a certain paradigm governs, which methods and results are publishable in prestigious journals or not. This has been criticized not only by heterodox scholars (Dobusch and Kapeller 2012; Aistleitner et al. 2019) but also by well-established authors in the field (Blanchard 2018; Romer 2016; Wren-Lewis 2018; Heckman and Moktan 2020; Stiglitz 2018).

Besides such "upstream" issues, there are many degrees of freedom for the empirical researcher to choose and transform the dataset, to include or exclude variables and instruments, to select the regression form and technique, to evaluate and present specific test statistics, etc. Researcher flexibility, in combination with the pressure to produce statistically significant or theory-conformist results can lead to publication bias in the form of *p*-hacking or selective reporting (also known as the "file-drawer problem"). *p*-hacking refers to practices like data mining or covariate-selection that produce lower *p*-values in order to meet conventional significance standards like the 5% threshold (Brodeur et al. 2020). Selective reporting occurs when there is selection for statistical significance or when theory demand a certain directional effect. The effect on the research record can be especially strong when theory provides guidance for plausible vs implausible results or when the existing literature (both theoretical and empirical) is characterized by a low degree of theory competition (Doucouliagos and Stanley 2013).

Publication bias in these dimensions typically leads to an exaggeration in the reported effect sizes for a specific parameter and thus also for the average effect size of a literature. This will ill-inform policy makers about the quantitative consequences of their policies and thus the appropriate sizing of measures. The so-called "Paldam rule" suggests effect sizes in many literatures are exaggerated by about a factor of two (Doucouliagos et al. 2018).

Meta-analysis is the quantitative synthesis of effect sizes from a specific literature. Meta-regression analysis seeks to explain the wide variation across studies stemming from variations in data, methods, and model uncertainties. These tools have also been adapted to detect and accommodate publication bias. Meta-analysists collect all of the available empirical evidence on a certain parameter in combination with study and data characteristics (Stanley and Doucouliagos 2012). They apply parametric and non-parametric weighting schemes to detect publication bias and approximate the underlying average effect size that would be seen in the absence of publication bias. Moreover, meta-regression analysis (MRA) tries to explain heterogeneity in study results via study and data characteristics, pointing to influential choices and assumptions that researchers make in a given literature (Havránek et al. 2020).

This article reviews selected meta-analyses in three central fields of macroeconomic policies: monetary, fiscal, and labor market policies. I show that meta-analyses have questioned established consensuses in many of these fields contributing to a more informed consensus in some of them. The pattern that emerges is that those bodies of literature where the New-Neoclassical Synthesis was particularly dominant, and theory-competition was low, are the ones where meta-analyses contested conventional views most clearly: the effects of minimum wages on employment, the stabilizing effects of inflation targeting by central banks, the growth effects of financial regulation and the relative strength of specific fiscal tax and spending policies to promote growth and business cycle stability. Minimum wage hikes are likely not detrimental to employment; the merits of inflation targeting for business cycle stabilisation are

likely overrated; financial regulation does not seem to curb macroeconomic performance; government spending, in particular on capital formation, tends to enhance growth better than tax cuts. The meta-analysis results in these (and other) areas are more in line with conclusions from those approaches that have been largely sidelined by the New-Neoclassical Synthesis such as those from the evolutionary and Post-Keynesian camp, but also post-crisis New Keynesian approaches (Dosi et al. 2010; Hein 2017; Dupraz et al. 2019; Rannenberg 2021).

Although still developing, meta-analysts have established a common core of methods and approaches (Havránek et al. 2020). By now, meta-analysis is widely accepted across economics and has been published in the most prestigious economic journals (Andrews and Kasy 2019; Havránek 2015; Ioannidis et al. 2017) Yet, several opportunities for further development and application remain. There are many macroeconomics topics that haven't been meta-analyzed, leaving plenty of room for promising new discoveries and subsequent publications.

The remainder of this article is structured as follows: the next section will give a brief overview on how to do a meta-analysis, pointing to common standards, some potential pitfalls and new developments in the field. In section 3, important applied meta-analyses in the fields of monetary, fiscal and labor market policies are reviewed in respective subsections. The final section concludes.

II. How Meta-Analysis Is Done

Applied meta-analysis typically involves the following steps:

1. Choose an interesting research question on a quantifiable parameter.
2. Define the effect size to be measured.
3. Define a search routine (keywords, databases).
4. Collect the available empirical studies according to the routine.
5. Getting familiar with the literature, its issues and discussions.

6. Collect the effect size, its standard error and/or the sample size plus further study characteristics in a systematic manner.
7. Double-check the meta dataset for errors and inconsistencies.
8. Meta-analyze the data including: descriptive statistics, publication bias tests, meta-regression analysis, robustness checks, model averaging techniques.

Some comments and details on this list are in order: after selecting the parameter to meta-analyze, one will find that a certain literature often contains non-standardized effect sizes. For example, some studies may report elasticities or semi-elasticities while others report multipliers. In dynamic regressions, effect sizes are sometimes reported as cumulative effects over several periods or period by period. Such differences in dimensions can often be standardized and thereby meaningfully compared analytically, but the exact procedures used to transform different reported outcomes to a common metric must be fully described for the sake of transparency and replicability.

When defining a research routine, it has become standard to report the chosen combination of keywords and the used databases (often google scholar is employed nowadays), inclusion criteria (e.g. publication year, language restrictions, a focus on journal publications, etc.) as well as the date when the search for studies was finished, in order to allow for replicability. After collecting studies in accordance with the research routine, meta-analysts often use "snowballing", i.e. searching for additional suitable papers in the references of collected studies. The snowballing process should be documented as well.

Having finished the collection of studies is the right time to get familiar with the literature, often by reading several seminal papers first. The seminal papers guide discussions and standard choices in the field and thus help in defining relevant study characteristics, such as: essential control variables, preferred models and which econometric methods are likely to affect the findings. Effect size estimates $\hat{\beta}_{ij}$ and their standard errors $\widehat{SE}_{ij}$ (where i represents the i-th

estimate from study j) are the primary columns of the meta dataset. These are followed by the set of relevant study characteristics, as exemplified in Table 1.

Table 1. An example of a meta dataset

Study #	Obs #	Effect size	Standard Error	Charact #1	Charact #2
1	1	$\hat{\beta}_{1,1}$	$\widehat{SE}_{1,1}$	a	x
1	2	$\hat{\beta}_{2,1}$	$\widehat{SE}_{2,1}$	b	y
2	1	$\hat{\beta}_{1,2}$	$\widehat{SE}_{1,2}$	b	z

Data collection is the most laborious part of meta-analysis. It is also a learning process, as the next study might include a relevant research approach that might not have been considered by the meta-analysts when defining relevant study characteristics to be coded. For example, after coding the effects and characteristics from the first 20 studies, studies 21-30 might make a clear case for including an important control variable, which has not been considered by the previous studies or which has been judged to be a side issue by the meta-analysts before. Table 1 will have to be appended by an additional column and the respective rows will have to be filled for all observations from study 1-20. After completion of the dataset, rigorous double checks (if possible by a four-eyes principle) should apply.

The final step is the exploration of the dataset, the actual meta (regression) analysis. This involves calculating descriptive statistics on the effect size and the collected study characteristics (which are often coded as dummy variables or categorical variables). The mean of all collected effect sizes would normally be the best guess of the true parameter in an ordinary literature review. However, meta-analysts have demonstrated that such an unweighted measure will very often be upward-biased due to selecting statistically significant or theory-conformist regression results and discarding non-significant, strange or non-conformist estimates.

Consider the case of theory-conformism via an innocent example: the elasticity of substitution between capital and labor in aggregate production functions is, by all relevant theories, confined to be non-negative. At the lower bound, a Leontief production function implies an elasticity of zero. The Cobb-Douglas case has an elasticity of one. CES or other even more flexible approaches would result in a parameter space of [0, ∞]. Thus, in an empirical investigation, negative estimates of the elasticity will likely be discarded as nonsensical by the econometrician, and plausibly so from an individual study perspective (Gechert et al. 2021a). However, a fallacy of composition applies: if the plausibility filter for all researchers is one-sided (as in this case), negative results will be discarded while large positive results will pass through. Consequently, the unweighted mean of the substitution elasticity appears larger and has a lower standard deviation than would be the case if all estimates would be treated without prejudice. To put that into perspective, the unweighted average of the more than 3,000 elasticity observations is 0.9, close to the Cobb-Douglas case, while controlling for publication bias and inferior specifications brings the best practice estimate down to 0.3, strongly statistically significantly different from Cobb-Douglas (Gechert et al. 2021a).[2]

A less innocent example of filtering is provided by the literature on the impact of minimum wages on employment: neoclassical labor-market theories predict a clearly negative impact of an increase in the minimum wage on employment and they dominated this field for a long time (even though alternative theories implying a zero or positive impact existed). This likely created pressure to discard non-conforming positive or zero estimates (Doucouliagos and Stanley 2009).

[2] This result strongly questions standard macroeconomic models based on a Cobb-Douglas production function, while it can accommodate models of directed technical change (Tavani and Zamparelli 2017), evolutionary modeling approaches (Dosi and Nelson 1994) or CES DSGE models (Cantore et al. 2015). The evidence in favor of the Cobb-Douglas production function has been called into doubt earlier by (Shaikh 1974) and more recently by (Felipe and McCombie 2020).

The other less innocent source of publication bias is *p*-hacking: econometricians search in the space of available regression specifications and data for low p-values – typically below established thresholds like the 5%-level. This should make their results look more interesting to a general audience or survive the peer-review process (Brodeur et al. 2020; Abadie 2020; Andrews and Kasy 2019).

Standard identification of publication bias usually derives from the fact that most econometric techniques assume the point estimate and its standard error to be independent from each other. This is equivalent to assuming that their ratio has a *t*-distribution. Independence of $\hat{\beta}_{ij}$ and $\widehat{SE}_{ij}$ also implies that a plot of point estimates (x-axis) vs precision (reciprocal of the standard error, y-axis) should be symmetric in the absence of publication bias. An example of such a "funnel plot" is given in the left panel of Figure 1, which is reproduced from a Monte Carlo simulation of estimates of the elasticity of substitution between capital and labor in Gechert et al. (2021a). However, publication bias will introduce a positive (negative) correlation between the point estimate and its standard error, if the "expected" effect size is positive (negative). When researchers or editors select publishable results based on statistical significance or theory compliance, the funnel of published estimates in a literature will appear asymmetric like the one in the right panel of Figure 1.

[Figure 1 about here]

Besides visual inspection, there are more formal methods for detecting publication bias. A standard approach is the funnel asymmetry test (FAT) in combination with the precision effect test (PET). A FAT-PET involves a simple regression of the point estimates $\hat{\beta}_{ij}$ from a literature on a constant and its standard error $\widehat{SE}_{ij}$ as in equation (1):

$$\hat{\beta}_{ij} = \beta_0 + \theta\widehat{SE}_{ij} + u_{ij} \tag{1}$$

A statistically significant coefficient θ is consistent with publication bias (the FAT). The intercept β_0 gives an estimate of the true β in the absence of publication bias, i.e. the mean

beyond bias (or precision effect, PET) (Stanley 2005). A weighted least squares (WLS) version of equation (1) (with squared precision $1/\widehat{SE}_{ij}^2$ used as the weights) has been shown to be more efficient than simple OLS or random effects regression in simulations (Stanley and Doucouliagos 2017). Often panel fixed effects, clustering of standard errors or an instrumented approach (where the sample size of an estimate instruments the standard error) (Havránek 2015; Stanley 2005) are used as extensions of equation (1).

The approach of equation (1) can run into difficulties if publication selection results in a non-linear relation between the point estimate and the standard error. In particular, *p*-hacking will lead to missing estimates below and a clustering of estimates just above a conventional threshold of the *t*-statistic, which would be visible as a ray of observations in the β-SE space. Such forms of publication bias might be better detected by non-linear approaches like the ones by Andrews and Kasy (2019), Bom and Rachinger (2019), Furukawa (2019) or van Aert and van Assen (2018), among others.

Besides detecting and correcting for publication bias, a usual outcome of a meta-analysis is to explain heterogeneity in study results by relating them to certain study characteristics in a multiple meta regression model that extends equation (1) to include the study characteristics as moderator variables X_{ij}:

$$\hat{\beta}_{ij} = \tilde{\beta}_0 + \tilde{\theta}\widehat{SE}_{ij} + X_{ij}\Phi + v_{ij} \tag{2}$$

By this, meta regression analysis can give advice on important issues in a body of literature. For example, one might be interested in systematic differences of estimates that results from employing RCT vs DID methods (Brodeur et al. 2020); whether studies based on OECD country evidence show different effects from those that use non-OECD data (Gechert and Heimberger 2021); whether fiscal multipliers are on average larger in a recession than in an upturn (Gechert and Rannenberg 2018; Ferraresi et al. 2015); or one would want to know

whether authors that belong to a certain affiliation systematically report different results than the rest of the literature (Asatryan et al. 2020; Fabo et al. 2021).

The coding and inclusion of moderator variables entails its own issue of model uncertainty in meta-analysis. This is usually addressed by showing robustness of central results with different versions of matrix X_{ij}, general-to-specific methods or model averaging techniques (both frequentist and Bayesian model averaging has been employed in meta-analysis in economics (Havránek et al. 2017; Havránek et al. 2015; Gechert et al. 2021a; Stanley and Doucouliagos 2012).

Choosing best practices from some of the moderator variables (while fixing other moderators without a clear best choice at their sample average) can also give a more informed estimate of the underlying effect size $\tilde{\beta}_0$.

The available toolkits and practices of meta-analysis in economics have developed tremendously over the years. The *Journal of Economic Surveys* has published guidelines from the Meta-Analysis of Economics Research Network (MAER-Net) on how to do a proper meta-analysis (Stanley et al. 2013), (Havránek et al. 2020). There are also several textbooks that cover the methods of meta-analysis in great detail (Borenstein et al. 2021; Cooper 2017; Stanley and Doucouliagos 2012).

III. Meta-Analysis in Macroeconomics

Since macroeconomics is such a controversial field in theory and model as well as data uncertainty looms large in the empirics, meta-analysis is a particular powerful tool to synthesize the results from a certain body of literature. Likewise, if theory competition in a field is low because different schools of thought agree on a certain parameter or there is one dominant school that guides most of the empirical work, publication bias is likely more severe (Doucouliagos and Stanley 2013) and meta-analysis can help correcting for this bias. This

section will review meta studies from the main fields of macroeconomic policy, namely monetary, fiscal and labor market policies.

1. Fiscal Policy

When it comes to fiscal policy from a macroeconomic perspective, one of the main parameters to be analyzed is the fiscal multiplier, i.e. the short-term impact of expansionary and contractionary tax and spending policies on output. The interest in this topic has hugely increased during and after the financial crisis, which marked a reincarnation of traditional Keynesian discretionary fiscal policies that have long been considered inferior to structural reforms, monetary policy or automatic stabilizers. Likewise, the discussion of the effects of austerity in the Euro Area (and other parts of the world) was guided by the size of the fiscal multiplier. Policy prescriptions for Southern European countries were guided by the idea of expansionary austerity, i.e. negative spending multipliers, while critiques of this view pointed to particularly high multipliers during downturns (Gechert et al. 2016; Gechert and Rannenberg 2016; Gechert et al. 2019; Ferraresi et al. 2015; Ahn et al. 2017; Stockhammer et al. 2019).

After several conventional literature reviews (Parker 2011; Ramey 2011; Spilimbergo et al. 2009; Hebous 2011; Mineshima et al. 2014), Gechert (2015) provided the first meta-analysis in this field, comparing the relative efficiency of spending and tax changes in stimulating the economy. The meta-analysis is based on over 100 studies providing more than 1,000 multiplier estimates, both from purely empirical and from model-based estimates. Interestingly, spending multipliers are on average about 1, significantly larger than tax multipliers (0.7), and particularly so for public investment spending (1.5). New Classical RBC models and New-Keynesian DSGE models of earlier generations produce multipliers that are significantly lower than the average purely empirical estimates, while traditional large-scale macroeconometric models overstate multiplier effects. In particular, spending multipliers are larger than the New-Neoclassical consensus that prevailed prior to the financial crisis. In accordance with this

conclusion, there are some tentative signs of a negative publication bias, which would lead to a higher multiplier in the absence of publication selection, yet this depends on the specification of the meta-regression. The absence of a strong publication bias might be explained by the fact that the parameter space for fiscal multipliers, spanned by competing theories, is wide and includes both negative (New Classical) and strongly positive (traditional Keynesian) effects. The extension by Gechert and Rannenberg (2018), which focuses on purely empirical estimates and non-linear multiplier effects depending on the business cycle regime, largely confirms the earlier findings, but adds the notion that spending multipliers are particularly large in recessions, while tax cuts on average exhibit smaller effects that do not increase during a recession.[3]

Other meta-analysis of fiscal policy in macroeconomics have focused more on long-term issues of growth and debt sustainability. Nijkamp and Poot (2004) provide an early assessment of the long-run growth effects of fiscal policies, comparing government consumption, investment, military spending, education and taxation from 93 primary studies. Essentially, the meta-study challenges the conventional view that government consumption, military spending and tax hikes are clearly detrimental to growth as the average results are not robustly statistically significantly negative in this respect. Education and infrastructure spending, however, turn out to be clearly favorable to long-term growth. Nevertheless, it should be noted that the study by Nijkamp and Poot (2004) is rather special in its methodological approach and does not comply with the methods that have been established for meta-analyses today (Havránek et al. 2020). Nijkamp and Poot (2004) argue that more specific meta-analyses on the single policies should be undertaken to give more clear-cut results.

[3] In particular, transfer multipliers are larger than tax multipliers. This is consistent with recent advances in heterogeneous agent New Keynesian models that feature higher marginal propensities to consume of liquidity constrained households (Kaplan and Violante 2014), a feature that has long been entailed in Post-Keynesian models (Stockhammer and Onaran 2013). Gechert et al. (2021b) show this feature consistently for macro and micro data from Germany. Furceri et al. (2021) point out that pandemics require persistent government support of low incomes in order to prevent inequality that typically follows after pandemic-induced austerity.

The meta-study by Bom and Ligthart (2014) focuses on the productivity of public capital, covering 68 studies with almost 600 estimates of the output elasticity of public capital. While the study does not confirm the large estimates of the early study by Aschauer (1989) and also detects some positive publication bias in the literature, it still measures a sizeable and statistically significant average effect of public capital on output, which leads them to conclude that public capital is in short supply in OECD countries and could be extended with a social benefit. Given the current low interest rate environment, this conclusion should be even more valid today.

Alptekin and Levine (2012) review 32 primary studies on the effects of military spending on growth. The study concludes that, as opposed to conventional wisdom, defense spending is not detrimental to growth in low-income countries and is even positively associated with growth in high-income countries.

Alinaghi and Reed (2021) consider the effects of various tax measures on growth via a meta-study based on almost 1,000 estimates. They establish the notion that a fair comparison of these measures from different studies should take into account the budget constraint, and therefore combine the estimates in groups of tax-spending-deficit combinations that would conventionally be expected to have a positive or negative impact on growth overall. Indeed, the expected signs hold in their analysis such that for example VAT cuts financed by cuts to productive spending will have a negative impact on growth.

In a recent meta-analysis, Gechert and Heimberger (2021) focus on the literature on corporate tax cuts on growth. While in some modelling approaches, revenues from corporate taxes could be employed for productive spending or tax cuts in more efficient areas, the main notion in the growth literature is that corporate taxes hamper domestic investment and FDI. However, Gechert and Heimberger (2021) show that the unweighted average from empirical studies points to a moderate positive effect of corporate tax cuts on growth, substantially smaller than

the preferred estimate from the seminal study by Lee and Gordon (2005). Moreover, when they control for publication bias in several forms, they cannot reject the null hypothesis of a zero-growth effect of corporate tax cuts. As an additional notable result, consistent with the meta-studies mentioned above, using higher corporate taxes to finance productive public spending could entail a positive net effect on growth.

The relation of tax and deficit financing of public spending is a classic question in macroeconomics, spelled out quite radically in the Ricardian equivalence theorem (RET). The RET argues that a public budget deficit would not change aggregate demand as it would be offset by increasing private savings. Thus, financing public spending either via lump-sum taxes or government bonds would be equivalent (Barro 1974). Stanley (1998) makes an early attempt to meta-analyze the related empirical literature on the RET. This literature is special in so far as many studies are designed such that a non-rejection of the null hypothesis is counted in favor of the RET. Low statistical power thus contributes to confirmation of RET. Nevertheless, Stanley (1998) strongly rejects the RET based on the 28 studies that where available at this time.

A final and related topic to be considered in macro fiscal policies is the impact of public debt on growth, which has been examined most prominently by Reinhart and Rogoff (2010). The alleged threshold of a debt-to-GDP ratio of 90%, above which growth would be much lower has strongly influenced public policy debates during the turn to austerity after the financial crisis in the Euro Area. Later on, Herndon et al. (2014) identified substantial errors in the data and analysis of Reinhart and Rogoff (2010) and other scholars questioned the one-way causal interpretation of an intertwined relation, yet the performative effect of the study prevailed. Just recently, Heimberger (2021a) conducted a meta-analysis on the relation, exploiting 48 primary studies with 826 estimates. While the unweighted average suggests that higher public debt ratios are related to moderately weaker GDP growth, correcting for severe publication bias nullifies

the underlying effect with the possibility of even a positive relation. Moreover, studies that account for the obvious endogeneity of public debt to changes in economic growth point to less detrimental effects of public debt on growth.

2. Monetary Policy

Surely, the most researched issue in macroeconomics is monetary policy. While there is a rather strong and long-established consensus in macroeconomic theory that monetary policy can influence the business cycle and inflation rates in the directions as given by the Taylor Rule, the size and the dynamics of the effects are subject to heated debates and the empirical evidence is much less conclusive. The zero-lower bound that constrained conventional monetary policy around the world since the financial crisis has opened up new issues.

Despite the importance and interest in the topic, to the best of my knowledge, there is no highly ranked peer-reviewed publication on the size of the impact of conventional monetary policy on prices and output. De Grauwe and Costa Storti (2004) provide a rough assessment by reviewing 43 primary studies, but they do not apply rigorous meta-analysis methods and also cannot establish any strong conclusions.

Rusnák et al. (2013) consider a specific issue in the monetary policy literature, the famous "price puzzle". They report that about half of the estimates in their meta-dataset (covering 70 studies and more than 1,000 estimates) show an initial rise in prices after a hike in the policy rate. This has been explained in the literature by econometric misspecifications or has been adopted as a feature in some modelling approaches. Interestingly, Rusnák et al. (2013) show that there is some publication bias against the price puzzle, which would imply that there are even more unpublished findings of a price puzzle in the file drawer. However, establishing a best-practice average estimate based on superior identification schemes and inclusion of important control variables largely solves the prize puzzle.

Havránek and Rusnak (2013) examine the length of the transmission lag via a meta-analysis of 198 estimates from 67 published VAR studies. They show that the average transmission mechanism is slower than expected by policy makers and calibrated in applied macroeconomic models. Against conventional wisdom, the transmission lag is longer in more advanced economies, which can largely be attributed to higher financial development providing stronger buffers against surprise shocks in monetary policy.

Balima et al. (2020) consider a substantial subfield of the literature that compares the performance of competing central bank strategies, in particular that of inflation targeting. With over 8,000 point estimates from 113 studies, they conducted one of the largest meta-datasets so far. Their most important finding is that the favorable effects of inflation targeting on inflation and output volatility as well as levels are strongly exaggerated by publication bias. Nevertheless, they find that there remains a genuine, but subdued favorable effect of inflation targeting on output and inflation levels. However, the preference of the New-Neoclassical Synthesis for inflation targeting and for the preference of monetary policy over fiscal policy in stabilizing business cycles is questioned by these findings.

With respect to the newly established field of unconventional monetary policies, two meta-analyses have been conducted so far. Papadamou et al. (2019) collects estimates from 16 published studies but does not come to a clear conclusion, except that the effects of Quantitative Easing (QE) on prices and output seem to be muted in European countries. Fabo et al. (2021) focus on the impact of author affiliations on the reported effect size of QE measures. Interestingly, central bank researchers tend to report stronger effects of QE than academic papers, both regarding output and inflation. They also point to more favorable career opportunities of central bankers whose research shows larger QE effects, discussing a likely incentive channel. An interesting exception are papers from German Bundesbank authors, an institution that has been an outspoken critique of QE policies in the Euro Area.

As a final issue in this subsection, I point to some relevant meta-analysis in the field of macroprudential policies. Ehrenbergerova et al. (2021) evaluate the effect of interest rate policies on house prices from a sample of 1,447 estimates and find the mean effect to be exaggerated by publication bias, but stronger for countries with more developed housing markets. Bumann et al. (2013), based on 441 estimates out of 60 studies only find a weak relation between financial liberalization and growth and that a higher level of financial development weakens the effect even further. Finally, Fidrmuc and Lind (2020) assess the impact of financial regulation, like the Basel III agreements, on growth. The 48 studies they review only point to a moderate negative impact of stricter regulation on growth.

3. Labor Market Policy

There is probably no better example of the power of empirical evidence to break up a theoretical hegemony than the employment effects of minimum wages. The consensus of neoclassical labor market theory that minimum wages would increase unemployment was strong before the seminal DID study by Card and Krueger (1994) that found no negative or even a slightly positive effect of a higher minimum wage on employment. Less well known, but an important supportive piece of evidence was the accompanying meta-study on time-series evidence by Card and Krueger (1995). This second study pointed to substantial publication bias in favor of negative employment effects of minimum wages in the existing literature. The study by Card and Krueger (1995) featured some methodological shortcomings and only looked at a small dataset. More recent and more sophisticated meta-analyses covering more than 1,000 estimates of minimum wage's effect on employment from many dozens of studies (Doucouliagos and Stanley 2009; Linde Leonard et al. 2014; Chletsos and Giotis 2015; Wolfson and Belman 2019) all confirmed the original conclusions. There is substantial publication selection in favor of negative employment effects, which disappear when correcting for publication bias. A zero effect cannot be ruled out. The robustness of this evidence had a strong

impact on labor market policies in many countries, which are now much more supportive of binding statutory minimum wages. As analyzed recently by Dustmann et al. (2022), the 2015 introduction of a general minimum wage in Germany came without negative employment effects, but lowered income inequality.

In fact, if there is notable monopsony power in labor markets, minimum wages might increase employment. When employers command wage-setting powers, the elasticity of labor supply to firm wages is low and market wages can be suppressed. The meta-analysis by Sokolova and Sorensen (2021) reviews the literature on monopsony power via more than 1,000 estimates from 53 primary studies. In general, Sokolova and Sorensen (2021) show an upward publication bias in favor of large positive labor supply elasticities as negative and insignificant findings are discarded. The low remaining elasticity suggests strong monopsony power and wage markdown. The dichotomy of direct and indirect approaches to estimating the labor supply elasticity also gives quite different results where direct estimates on average report a decisively lower labor supply elasticity, even when controlling for other confounders.

Complementing the monopsony model of the labor market is the efficiency wage hypothesis (EWH). EWH suggests that a wage premium may be used to attract and retain a more competent pool of workers. Perhaps, higher wages serve as a 'gift-exchange,' which increases worker loyalty and hence their productivity. With efficiency wages, minimum wages rises can increase employment, and a meta-analysis of EWH strongly confirms it (Krassoi Peach and Stanley 2009). These meta-analyses of monopsony and the efficiency wage hypothesis further corroborate the frequent finding of an absence of a minimum-wage effect on employment.

All of these empirical findings suggest that labor market institutions may limit employers from exerting their full wage-setting power. One such institution is employment protection legislation that varies substantially across countries and over time. Heimberger (2021b) surveys the macroeconomic literature that relates indexes of employment protection to unemployment.

While the conventional view of neoclassical labor market theory would predict a positive impact of employment protection on unemployment, the meta-evidence from more than 75 studies, providing almost 900 estimates cannot reject a zero effect after correcting for publication bias.[4] Together, these meta-analyses constitute a resounding empirical rejection of the neoclassical theory of labor markets.

When it comes to promoting new employment, established measures in many countries can be subsumed under the heading of active labor market policies (ALMP). There is a tremendous body of literature investigating the efficiency of such measures like training programs, direct public employment, wage subsidies and search assistance. This literature has been synthesized in several meta-analyses (Kluve 2010; Card et al. 2010; Card et al. 2018). According to these surveys, training programs and search assistance are more effective in comparison to public works. However, the evidence stems from micro data and thus, by definition, excludes macroeconomic multiplier effects from public works. Dosi et al. (2019) show in a macroeconomic framework based on heterogeneous agents that macroeconomic stabilization has stronger effects than ALMP. Interestingly, the meta-studies in the field of ALMP do not reveal publication bias. Card et al. (2018) speculate (in line with Doucouliagos and Stanley 2013) that the literature is less plagued by theory monopolism. With no expected sign of the effect, little incentive to selectively report results remain.

IV. Conclusions

This article has reviewed several notable contributions of meta-analysis in macroeconomics and macroeconomic policies. Where there are competing paradigms, high stakes, and a lot of model and data uncertainty, meta-analysis offers many potential valuable insights. Most importantly, meta-analysis often offers structure, coherence and consensus to an otherwise

[4] Dosi et al. (2018) confirm these findings in an agent-based model where structural reforms, reducing workers' bargaining power and compressing wages, actually increase unemployment and inequality.

inconclusive, highly conflicting, set of empirical studies. Also, it often uncovers and mitigates publication bias even in the most severe cases of selective reporting where there is low theory competition. By this, meta-analyses have questioned established consensuses and conventional wisdoms in many bodies of literature. They have even established new consensuses and influenced policy debates. The most prominent example is the minimum wage literature where meta-analyses have discarded the prevailing perception that minimum wage hikes would produce strong unemployment. However, meta-analyses have also shown that inflation targeting is much less effective than proclaimed by its proponents; that financial deregulation is unlikely to lead to strong growth effects and that fiscal multipliers of government spending are much larger than previously thought. These and other findings are contrasting the conclusions of the New-Neoclassical Synthesis that dominated the macroeconomic discourse up to the Great Recession.

Conducting meta-analyses requires diligence and endurance, but it also provides great opportunities to make scientific contributions that often have practical policy impacts.

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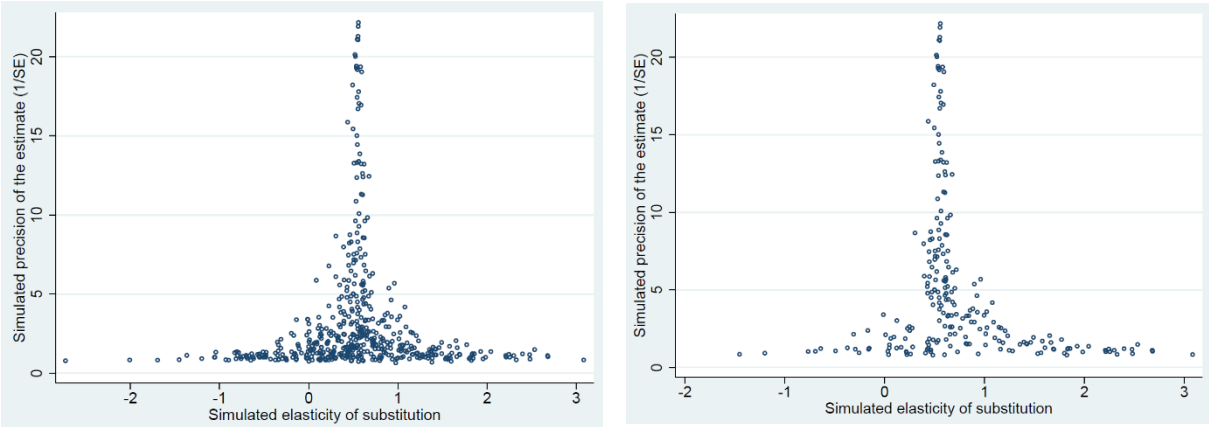
Figure 1. Examples of symmetric and asymmetric funnel plots



Note: These figures are reproduced from Gechert et al. (2021a). They show scatter plots ("funnel plots") of point estimates of the elasticity of substitution between capital and labor and the reciprocal of their respective standard errors from a Monte Carlo simulation replicating the estimate of Antras (2004), adding noise to his dataset. The left panel shows all 500 draws and produces a symmetric funnel. The right panel simulates the process of publication bias by filtering out 80% of estimates that are either not statistically significant at the 5% threshold or non-conforming with economic theory (with a negative elasticity of substitution), thus resulting in a typical asymmetric funnel.