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Is "Inflation First" Really "Rentiers First"? The Taylor Rule and Rentier Income in Industrialized Countries*

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ABSTRACT

The Taylor rule has returned as a significant policy guide amid increasingly overt political pressures for its official (and not just its implicit) adoption at the US Fed as inflation fears have come to dominate monetary policy actions both in the US and internationally in recent times. Our paper analyzes the effect of monetary policy on the functional distribution of income by reconstructing how the post-1970s "inflation first" policy commitments of central banks came to be crystallized in the Taylor rule. While there are differences among the various specifications of this "rule", the Taylor relation is merely an offshoot of what can be described generically as the family of

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Wicksellian reaction functions whose implications support rentier income over time. Because of the internal logic of the Taylor rule, this has led to different interpretations such as, for example, the more Keynesian Yellen rule, which depart from the strict sense of the Taylor rule. The paper also interprets the Taylor Rule in light of Wicksell's formulation and analyzes the potential consequence of the differences. In contrast to the strict Wicksell rule of "proportional" adjustment, our econometric findings suggest evidence that central banks adjust "over-proportionally" the benchmark money interest rate in the presence of changes in the inflation rate for the complete "inflation first" era since the 1970s until the COVID-19 crisis. They thereby strongly favored rentier incomes in their reaction functions, with the possible exception of the post-financial crisis period. To limit the pro-rentier consequences of such inflation-targeting regimes, it is important that policymakers mandate multiple objectives for central banks, as exemplified in the current US Fed's dual mandate.

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Introduction

This paper analyzes the effect of monetary policy on the functional distribution of income by critically reconstructing how the Taylor rule came to prominence during and after the 1970s. We develop our analysis using an explicitly Post-Keynesian framework (Seccareccia & Lavoie 2016, and Seccareccia & Matamoros 2022a, 2023). This approach differs from mainstream macroeconomic approaches in that it does not rely either on models featuring a single representative agent or arbitrarily selected sets of heterogenous agents who differ simply in terms of the incomes each receives. Our procedure, instead, is to take a leaf from Keynes' analyses in *A Tract on Monetary Reform* (1923) and then the *General Theory* (1936) and concentrate on how monetary policy reshapes the streams of incomes flowing to three distinctly different socioeconomic classes of wage earners, profit earners and interest-income earners (the latter constituting Keynes's "rentier class"). [1]

Our aim is to investigate the extent to which monetary policy has favored the income of one group, that of rentiers (i.e., the savers or net creditors within a community) relative to the incomes of the non-rentier groups (or net debtors). We focus on the period since the widespread adoption of "inflation first" monetary policy starting in the latter half of the 1970s. Over time this led to the operational acceptance, either implicit or explicit, of Taylor-rule policy frameworks by central banks in major industrial countries, particularly after the early-1990s. The central banks championed combatting inflation over all other possible goals, but they also became committed to and sought to practice almost surgical forms of inflation targeting (IT) within national economic space.

While this will not be addressed further in our analysis, we do wish also to recognize, however, that, throughout that whole era of this emerging "inflation first" policy framework within national economies, all this *tâtonnement* over an appropriate monetary policy for the period was occurring in the context of post-Bretton Woods international pressures whereby world trade and financial

[1] Interestingly, the Governor of the Bank of Italy, Ignazio Visco (2023), has referred to Keynes' class analysis in *A Tract on Monetary Reform* in the Governor's speech at the recent IARIW-Bank of Italy Conference to pinpoint that inflation and deflation both have "an effect in altering the distribution of wealth between different classes" (p. 1). Keynes (1923) believed that monetary policy focused, say, on combating inflation, impacts both the distribution of the flow of incomes across socioeconomic classes and the stock of wealth pertaining to each group. Our paper adopts Keynes' three-class methodology as a simplification, in a manner roughly analogous to the two-agent New Keynesian models that assume Hand-to-Mouth individuals and fully-insured individuals.

markets were becoming ever more liberalized and globalized. Therefore, quite parallel and complementary to the "inflation first" policy dominance, there was evolving a concomitant global trade and financial system. This emerging global system served as a *toile de fond* in spreading what was also a built-in deflationary bias on a world scale as it rested on what became the generally-accepted post-Bretton Woods export-led growth model (Seccareccia 2014). This globalized system only witnessed a substantial reversal (that is, a sort of unintended trend toward deglobalization) during the latter years of the COVID-19 crisis of 2021-2023 because crippling global supply chain problems triggered inflationary pressures not observed since the 1970s, and which were exacerbated by the war in Ukraine.

With this broad Keynesian social class perspective in mind, we look at the ongoing debates over the Taylor rule, which is usually presented in the context of the perennial conflicts over "rules versus discretion" in the conduct of monetary policy. By analyzing its operating instruments and response functions, we will show how the Taylor rule is consistent with prioritizing inflation-fighting over all other possible goals. As it is well known, because of a possible structural break in monetary policy implementation after the Great Financial Crisis (GFC) of 2007-2009 (see Seccareccia & Kahn 2019), the Taylor rule has returned as a significant policy concern, with increasingly overt political pressure for its official (and not just its implicit) adoption by the US Fed. For instance, Taylor (2011) himself began to promote his rule of officially legislating changes to the Fed's mandate by implementing his specific interest rate-operating rule. In more recent years, some Republican representatives have argued that the Fed has been given too much discretion in the pursuit of its current dual mandate *cum* its official 2 percent inflation target "add-on" since 2012. In its place, they suggest that the Fed should be guided strictly by the Taylor equation (for a summary of the recent political debates, see, among others, Davidson 2022). Indeed, Taylor (2023) himself continues to accuse the US Fed of being "behind the curve" in not following a sufficiently rule-based operating system, thereby allowing inflation greater latitude in 2021-2023, despite the fact that the Fed has for mandate also the goal of full employment.

Over the last decade, former Fed chairs have somewhat paid lip service to the Taylor rule as a broad perspective in conducting monetary policy but none have ever fully embraced it. For instance, Ben Bernanke, recognizing the comfort of focusing on the inflation targeting objective within the Taylor rule framework, has argued in favor of a "systematic" instead of "automatic"

monetary policy rule and has sought to tinker with its precise specification (see Bernanke 2015). Though also not officially adopting it, the response of former Fed chair, Janet Yellen (2016, fn. 8), who seemingly was seeking to deflect pressure coming from Taylorite politicians, did suggest a more traditional Keynesian interpretation of the Taylor rule by tilting the weights strongly in favor of the unemployment gap. The issues involved in such a debate have now acquired a new urgency as the problem of inflation has once again taken center stage within monetary policy circles.

To better frame this debate and explain what the actual issues at stake are which fundamentally concern income distribution, we have divided our paper into three major sections that try to cover broad history, theory, and evidence on the subject-matter. We begin with a study of the connection between rentier interests and the adoption of the Taylor rule as a general framework to meet specific inflation targets. In other words, what has been the political economy, with pressure coming particularly from the financial sector to combat inflation over all other possible goals, and to introduce and integrate the Taylor rule as a framework to conduct monetary policy within IT regimes? This section explains the historical and institutional context within which the adoption of the Taylor rule has taken place and shows, among other things, the extent to which it is primarily there to torpedo the central bank's dual mandate that we believe ought to remain critical to the workings of the US Federal Reserve.

This is followed by a more rigorous exposition of the theory behind the Taylor rule in relation to its potential consequences on the rentier income share. Some of the questions addressed are: Are there crucial differences between the Taylor rule and the Wicksell rule with regards to the implications on interest rate policy and on income distribution among socioeconomic groups? Since the Taylor rule is often confounded with the Wicksellian tradition, we wish to show that the Taylor rule is really a child of both the Wicksellian and monetarist traditions that are not altogether compatible. We also investigate to what extent the Taylor rule can be considered a real interest rate rule whose purpose is that of stabilizing rentier income while perhaps destabilizing incomes of non-rentier groups.

Finally, we address empirically whether monetary policy has benefitted rentiers compared to non-rentier groups during the era of the "inflation first" monetary policy that prevailed since the 1970s, which coincided with both the collapse of the Bretton Woods system and the first OPEC oil price shock. While the "inflation first" policy perspective has maintained a stranglehold over monetary

policy since the late 1970s, the official Taylor rule dominance began roughly three decades ago in the early-1990s and lasted until the GFC. Despite its decline as a policy rule following the GFC though, in some ways, it still very much dominates the debate over the conduct of monetary policy in major industrial countries. To analyze this, we undertake an econometric analysis of several major industrial countries over the whole era since the 1970s.

In Appendix I, we describe the stylized facts on the evolution of rentier income over the last half century since the collapse of the Bretton Woods system as pro-rentier/monetarist ideas took hold of macroeconomic policy in most Western countries. We observe and analyze both traditional measures of rentier income shares as well as heterodox measures such as variants of what have sometimes been described as "Pasinetti" index indicators. Because of the paucity of data and difficulties with the conventional national accounting measures, we compare variants of the Pasinetti index as suitable proxies for the evolution of the rentier share.

The Taylor Rule and All That: An Historical Perspective

The so-called Taylor rule was formally put forth as possible framework to conduct monetary policy only in the early 1990s (see, for instance, Taylor 1993). However, it brought together elements that emerged from discussions that followed the abandonment of the Keynesian priorities of high employment and growth during the high-inflation environment of the 1970s and early 1980s.

As it is well known, during that whole era of the 1970s, Western economies experienced a sharp rise in the inflation rate that reached double-digit levels and then was followed by a process of disinflation, that is, a transition period characterized by a lower inflation environment following the deep recession of 1981-1982. By the 1990s, through either explicit or implicit inflation targeting (IT), a new novel policy framework was formalized whose objective was to anchor inflationary expectations around a fixed 2 percent inflation target, thereby assuring a low long-term inflation era that essentially lasted until the COVID-19 pandemic. Conditioned by developments in macroeconomic theory connected with the rise of monetarism, there had emerged, therefore, a consensus among central bankers as to the underlying cause of the high inflation. While the proximate cause was recognized to be the series of OPEC oil price shocks, following the mainstream narrative, the ultimate culprit was supposedly the central bank pursuit of loose

monetary policy during the previous Keynesian era that pushed up real output above (and the unemployment rate below) its "natural" level, thereby creating inflationary instability in accordance with the Friedmanite interpretation of the traditional Phillips curve.

Given the generally-accepted diagnosis of the problem, this necessitated strong central bank actions to somehow slow the growth of the money supply by raising interest rates to historically high levels. This monetary tightness, resulting in very high interest rates, then provided the essential *coup de grâce* (the so-called Volcker shock) in slowing down economies and raising the rate of unemployment back to its natural level, thus slaying the inflation dragon. Much of this is the narrative that is still repeated in most mainstream macroeconomic textbooks, even though there has been significant research even at the US Fed and others that questions the accuracy of this explanation and points also to other contributing factors based on the decline of trade union density rates and growing trade liberalization during the post-1970s era that can partly explain the long-term decline of the inflation rate (see, for instance, Ratner and Sim 2022; Taylor and Barbosa 2021).

Despite this constantly repeated narrative on the necessity to fight inflation among central bankers, within the contested terrain of monetary policy neither business leaders nor organized labor, as separate political pressure groups, held as much hostility towards inflation as did the broad financial/rentier sector. Empirical evidence[2] suggests that the 1970s was a difficult decade for rentier income earners as double-digit inflation abruptly eroded rentier shares internationally, with real interest rates reaching negative levels not witnessed since the crisis era immediately following World War II, and, indeed, attaining even lower levels than the negative real interest-rates reached during the recent bout of inflation during the 2021-2023 pandemic period. As Smithin (1996) pointed out, the inflation experience of the 1970s left such a deep scar on rentier income that, in the contested terrain over income claims, we witnessed what he dubbed the "revenge of the rentiers", which brought to the macroeconomic policy scene what De Long (2000) referred to as the "political monetarism" of the late 1970s and early 1980s fixated on controlling the money supply.

[2] For a detailed analysis, see Appendix I.

As is well known, textbook monetarism rested on the presumed stability of the velocity function of money, but also on the ability of central banks to control base money, all in conformity with the quantity theory tradition. Given the incapacity by central banks to find such empirically stable relations, what were adopted internationally were often even more naïve and stripped-down operational versions of Friedmanite monetarism, resting on the "control" of monetary aggregates such as net unborrowed reserves at the US Fed, and M1 or M3 targeting (as in Canada and the UK respectively).

When central banks discovered that they could not actually control those money aggregates through direct quantity control of base money and also could not rely on stable money velocity without crashing the economy, as had occurred in the early 1980s, both policy makers and the mainstream economics profession slowly abandoned monetarism.[3] In its place, there gradually emerged a competing New Keynesian *cum* Neo-Wicksellian macroeconomics, particularly as central bankers cried out for some new policy anchoring during that decade, but without jeopardizing the "inflation first" priority to which, by then, virtually all central bankers were paying lip service. Indeed, throughout the 1980s, central bankers were in quest of a new approach once it had become a kind of secret of Polichinelle that monetary aggregates are essentially endogenous variables. The monetary authorities came to recognize that, because of *force majeure*, they can neither directly control base money (and its components) nor other monetary aggregates, such as M1 and M2, without causing significant macroeconomic havoc, as it had occurred during the monetarist experiment of the early 1980s.

A new neo-Wicksellian veneer of the reaction function slowly came to cover and eventually replace the tattered monetarist logic during the 1980s. Central banks were moving away from targeting money aggregates of the late 1970s/early 1980s with the emphasis now on new central bank instruments and indicators, such as the Monetary Conditions Index (MCI) as in Canada, in which interest rate considerations came to feature prominently (see Lavoie & Seccareccia 2013, pp. 71-72). Hence, already in the 1980s there was emerging the implicit or explicit formation of a

[3] This incapacity is best represented by a famous statement from Gerald Bouey, the then Governor of the Bank of Canada, who was quoted (in the Minutes of the Canadian House of Commons Standing Committee on Finance, Trade and Economic Affairs in March 1983) as saying that "We did not abandon M1, M1 abandoned us", thus pointing to endogeneity of these monetary aggregates that were being targeted during the monetarist era. This is quoted in Thiessen (2000, p. 13).

central bank interest rate-operating rule that could replace the previous monetarist logic. This was done while still maintaining inflation fighting at the very top of macroeconomic policy priorities and mandating central bankers with the single task of fighting inflation in accordance with the previous conventional "inflation first" monetarist credo.[4] This was strengthened institutionally with the adoption officially of IT policy the following decade.

Indeed, despite the fact that explicit/official IT policy began to be adopted in 1990 by New Zealand, followed by several industrialized and developing economies in the years ahead, Bernanke & Mishkin (1997) argue that many countries were implicitly implementing "inflation-focused" monetary policies years or even decades earlier. For instance, Germany and Switzerland started in the mid-1970s. The authors point to three main reasons to support the view that IT commenced long before the official adoption of inflation targets in several countries.

First, the need for a nominal anchor as "a way to reassuring the public that monetary policy would remain disciplined" (Bernanke & Mishkin 1997, p. 104), that is, a warranty that creditors' income would be given priority, particularly after the collapse of the Bretton Woods exchange-rate peg in the early-1970s and the subsequent period of negative real interest rates. Second, IT functioned as tool to lock in low inflation supposedly achieved through very tight monetary policies in the 1980s. And three, in the late-1970s there was a switch in mainstream macroeconomic theory positing that "there is no long-run tradeoff between output (or unemployment) and inflation, so that monetary policy affects only prices in the long-run" (Bernanke & Mishkin 1997, p. 104). Therefore, the long-run neutrality of money, the emergence of theoretical justifications of monetary policy rules due to the importance of "precommitment and credibility", as well as the acknowledgment within the mainstream that zero or low inflation is good for economic growth in the long run all now became widely accepted among central bankers.

Together with the increasingly widespread acceptance of the neo-Wicksellian logic, all of this quickly opened the door to the Taylor rule approach to monetary policy formulation. Since, as we shall see, the focus of the Taylor rule was to frame monetary policy decisions, by relying seemingly on the knowledge of just two key measurable variables and one real-interest rate estimated

[4] For instance, it is important to note, as Asso *et al*. (2007, p. 22) claim, that "except perhaps for the 1979-1983 period, the main instrument of Fed policy in the post-Accord period (1951-) has been a short-term interest rate, with the federal funds rate gaining increasing importance through the 1960s."

parameter, the stage was set for the popularity of this policy framework, especially within the newly-emerging IT monetary policy regimes beginning in the early 1990s. Despite the heroic attempt to try to reconcile the Taylor rule with monetarist causality (see Taylor 1999), as it has been emphasized elsewhere (see Seccareccia 1998) this new central bank framework and its attendant rule was in reality the direct lineal descendant of an old Wicksellian loanable-funds approach. Notwithstanding some limited popularity in the early twentieth century among theorists of central banking, particularly during the interwar era even before the Great Depression (cf. Jonung 1979, pp. 495-96), this Wicksellian theory never found much favor among macroeconomic policymakers until the 1980s and 1990s as fiscal policy became downgraded to running balanced budgets and monetary policy upgraded to becoming the exclusive instrument to achieve macroeconomic stabilization through direct interest-rate setting.

With the collapse and then subsequent abandonment of the now discredited monetarism, the conditions were in place for the widespread adoption of this broad hybrid Wicksellian policy framework represented in the Taylor rule. Abstracting from the obvious recognition, decision, and implementation lags in central bank interest-rate setting (thereby removing time subscripts in our equation below), the Taylor rule framework is normally described as resting on the familiar key elements found in the standard Taylor rule formula (Taylor 1993, p. 202):

$$i = \rho + \pi + \alpha(\pi - \pi^*) + \beta(q - q^*) \qquad [1]$$

where i is the nominal central bank benchmark rate of interest, ρ is a constant term, which in real terms $(i - \pi)$ when $(\pi - \pi^*) = (q - q^*) = 0$ was interpreted as some constant "natural" or "neutral" rate of interest; α and β are policy coefficients, π and q are the actual inflation rate and real output respectively with π^* being the target inflation and q^* some sustainable "full capacity" level of output compatible with a Friedmanite natural rate of unemployment (u^*). Indeed, given the presumed link between potential output and the natural rate of unemployment, especially since many traditional central bank estimates of "potential" output q^* are often directly calculated econometrically based on their estimates of the "natural" unemployment (that is, where their estimate of $q^* = f(\hat{u}^*)$), one could easily restate the output gap as an unemployment rate gap

$(u^* - u)$ and use it interchangeably as in equation [1'] below:

$$i = \rho + \pi + \alpha(\pi - \pi^*) + \delta(u^* - u) \qquad [1']$$

The policy appeal of this central bank reaction function represented by equation [1] (or its *alter ego* [1']) is important to highlight. Firstly, the policy framework fits unequivocally the pro-rentier "inflation first" priority that became politically anchored throughout the late 1970s and the 1980s era, since primacy was given to the inflation gap $(\pi - \pi^*)$, that is, the difference between the actual inflation rate (π) and the target inflation rate (π^*), with the latter becoming officially 2 percent in most IT regimes during the 1990s regardless of the precise weights of the coefficients for α and β, which Taylor had originally identified as 0.5 respectively. The reason why those weights may perhaps be of secondary consideration in the "inflation first" priority is because the second gap ($q - q^*$), (the so-called output gap) was never conceived as an independent argument to target by a central bank (as would a Keynesian policymaker) but only an information variable that the central bank can use to combat future inflation preemptively in setting its benchmark interest rate, i, as understood within the "New Consensus" models of that era. Hence, through its operational interest-rate instrument, i, both "gaps" in the Taylor reaction function have as ultimate focus the attainment of the central bank inflation target, whether it is the first (by responding to the current inflation vis-à-vis the target inflation) or the second term (which is communicating to the decision maker how preemptively to impact on future inflation based on some accelerationist reading of the traditional Friedmanite Phillips curve).

Of further importance, following former Vice-Chair of the US Fed Alan Blinder, the Taylor rule, as in equation [1'], with the unemployment gap, would be more in line, although still inconsistent, with the Fed's dual mandate of pursuing "maximum employment" and "stable prices", as he states:

> "The phrase "maximum employment" is conceptually awkward. In the presence of a price stability objective, it cannot possibly mean the largest number of jobs that the economy can generate. One reasonable interpretation would set u* equal to the natural rate of unemployment, the only unemployment rate consistent with stable inflation, and interpret the goal as stabilizing unemployment around its natural rate. […] my experience at the Federal Reserve led me to believe that many members of the Federal Open Market Committee (FOMC) interpret the "maximum employment" mandate in precisely this way." (Blinder 1997, p. 4)

The only reason to include the unemployment or output gap in a central bank's reaction function is to stabilize inflation in the short run consistent with a low and stable long-run inflation path. The concept of a unique natural unemployment rate (or NAIRU, that is, the non-accelerating inflation rate of unemployment) within the Phillips curve theory (where there is a short-run tradeoff between

inflation and unemployment) turns out to be critical to the conduct of monetary policy under an IT framework. Hence, according to Blinder (1997, p. 14), central bankers would have the NAIRU in mind when deciding the benchmark rate of interest.

Undoubtedly, this interpretation of the Taylor rule relies on the existence of the Phillips curve. That is why, if the Phillips curve does not hold, the unemployment/output gap serves no purpose at all in the Taylor formula and can be understood almost as a decoy to mislead a Keynesian economist more comfortable with the dual mandate who, instead, would see the minimization of the unemployment/output gap as a key objective to attain. Hence, it would ensue that the dual mandate interpretation of the Taylor equation is completely incompatible with an "inflation first" monetary policy, as Taylor (2012) himself explains:

> "The first step toward a more consistent policy would be to remove the dual mandate and bring the Fed's focus to a single goal. That goal should be price stability. […] The addition of the dual mandate to the Federal Reserve Act was based on the now-outmoded concept that was popular in the 1970s. Higher inflation, it was thought, would bring about lower unemployment. This notion has since been proved wrong empirically and theoretically." (Taylor 2012, p. 125)

As to the specific logic of the Taylor rule reaction function, it was to raise the benchmark nominal rate and, by implication, the real rate, $r = i - \pi$, whenever the actual inflation rate would be inching up above its target and whenever the unemployment rate would be below its "natural" level from which, as we have stated, these output gap measures were often directly or indirectly derived. This view of the Taylor rule is quite different from what is sometimes referred to as the Yellen rule that would take equation [1'] and engage in an unemployment gap-tilting exercise by placing a much higher weight on δ than α. The latter is done with the prospect of minimizing both gaps as within a genuine dual mandate case rather than one emphasized by Taylor above, whose sole mandate would be *de facto* to achieve present and future inflation rates consistent with an inflation target alone, as is the case for most IT regimes, where unemployment is not officially a concern in their mandates (see, for instance, Yellen (2016), and Nikolsko-Rzhevskyy, Papel & Prodan (2017)).[5]

[5] See Asso *et al*. (2007) for a historical interpretation of the Taylor rule where the different weights attached to the inflation gap (p) and the output gap (y) have reflected different policy priorities over time:
"The Great Depression created a constituency which tended to emphasize the importance of minimizing y (and hence tended to increase the weight attached to y). Inflation was accommodated, as a necessary cost of keeping debt servicing low (pre-1951), tolerated, or 'controlled away'. The Great Inflation and the costs associated with

Secondly, while central banks were no longer focusing on the evolution of monetary aggregates (which they could no more pretend to "control" after the early 1980s debacle), there was still a real sense of continuity with the broader monetarist baggage. This is not only because the pro-rentier priority of combating inflation above all else had remained intact (as previously discussed) but because the whole paraphernalia of the short-run versus the long-run Phillips curve remained largely unchanged albeit somewhat more superfluous within a neo-Wicksellian framework. Hence, by the 1990s, when mainstream macroeconomists came to adopt progressively the Wicksellian "natural" or "neutral" interest rate analytics (that is, without any necessary recourse to the Phillips curve reasoning), mainstream macroeconomists could continue to confound the two without recognizing the jump in logic from the Friedmanite labor market concept of the "natural" rate of unemployment to the Wicksellian two interest-rate dynamics generated by a disequilibrium in the capital markets arising from a gap between the money rate and the natural rate of interest. This quandary of mixing Wicksellian and monetarist logic arises because, within the Taylor rule reaction function, the real natural rate of interest (namely the estimated ρ term — the so-called natural rate — of the Taylor equation), would be the real policy rate of interest that was consistent with an equilibrium state in which both the inflation gap (π - π*) and the output gap (q - q*) are zero, that is, a state in which the actual unemployment rate has also reached its natural level.

Thirdly, and perhaps most importantly, even those who rejected the single-minded focus on fighting inflation, especially in the US where there had been a long hard battle during the 1960s and 1970s to adopt a dual mandate, the strong Keynesians who had promoted and favored the dual mandate were now somewhat drowned out and out-maneuvered politically because of the confusion arising from the Taylor rule framework. It was rather ironic that the very Keynesian historic amendment to the Federal Reserve Act, namely the Humphrey-Hawkins *Full Employment and Balanced Growth Act* was passed and adopted by the US Congress in 1978, which mandated the US Fed to achieve price stability (which could be interpreted as the first component of the Taylor equation) *and* full employment (which could be considered consistent with a particular monetarist interpretation of the second component of the Taylor equation).

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the Great Disinflation created a constituency that sought to minimize p (and hence tended to increase the weight attached to p)." (pp. 6-7)

In the traditional Keynesian framework of the Humphrey-Hawkins Act, as understood by, say, Alan Blinder (1997), the monetary authority would be faced with the task of trying to minimize jointly the inflation gap and the output gap to achieve two goals — full employment and price stability — but with only one instrument, the central bank policy rate. As we have written elsewhere (see Lavoie & Seccareccia 2021, and Seccareccia & Matamoros 2022a), this is really what the art of central banking should be all about in trying to reconcile two or more separate objectives, as it was done within the Keynesian context of the early postwar period through both fiscal and monetary policy coordination. In countries such as the US, a series of Fed Chairs going back to Alan Greenspan were pressured and encouraged to experiment with higher weights on the unemployment argument as an independent objective in its reaction function. However, as discussed above, this is not the way the Taylor equation was framed and ought to be interpreted in this hybrid neo-Wicksellian universe. With the needed budgetary "neutrality" of the fiscal authorities constrained to running only government budget balances, the two principal components of the Taylor equation would be recognized by the monetary authorities as a mere information set whose ultimate objective is single-handedly to bring the central bank policy rate into line with the presumed natural rate, ρ, that would be consistent with achieving the 2 percent inflation target. It is as if the dual mandate had been completely subverted and flipped on its head and submerged within a Taylor-rule policy perspective.

This conflict over the adoption of the Taylor rule has continued unabated even in recent times since the equation has become a political instrument to pressure central bankers to stick to the "inflation first" commitment. The commitment, as we shall see, had changed somewhat after the GFC via "flexible" IT, as over this period other concerns assumed greater prominence, especially because of fears of deflation and secular stagnation. This is undoubtedly why, over the last year or more, as inflation fighting has now been reprioritized, central bankers are under enormous political pressure to get back to the orthodox neo-Wicksellian interpretation of the Taylor rule. For example, in response to the pressure coming from primarily Republican representatives at the US Senate, Fed Chair, Jerome Powell, was quoted as saying at the Senate hearings in June of 2022, that the Fed's policy rate was now moving up "much closer to where various forms of the Taylor rule are …" (quoted in Davidson (2022)) thereby suggesting that the Taylor formula is very much on their minds and being used as a political tool whose purpose is to suppress what many of us believe is the actual spirit of the US Fed's dual mandate resting on a Keynesian interpretation of it. Indeed,

not unlike the 1970s and 1980s, under political pressure, the Taylor rule has become a policy hot potato in recent years, especially in this inflationary crisis. Its adoption, or lack thereof, remains an argument used in a political blame game of why central bankers have not sufficiently prevented inflation from taking hold during the pandemic.[6]

The Taylor Rule versus the Wicksell Rule

As mentioned above, the Taylor rule reaction function has achieved a high level of acceptance, which in recent years may have even surpassed perhaps what was once the very popular Phillips curve, particularly because of the controversy about the latter's existence and flatness (see Seccareccia & Matamoros 2022b). This generic central bank reaction function together with the Phillips curve are both key relations. Together with a third, the familiar aggregate demand function or dynamic IS relation that is dependent on both the autonomous and the interest-elastic components of aggregate spending in relation to the real interest rate, they are still all foundational macro relations upon which established New Keynesian DSGE macroeconomic models are normally built. However, the question that one must first address is what is precisely the Taylor rule equation that some politicians wish to impose as an interest-rate operating rule on central banks? As was depicted in equation [1] above, the generic version is one in which there are two familiar components that the monetary authorities ought to be monitoring closely: the inflation gap and the output gap. Within the Taylor rule, the natural real rate ρ is merely the residual real policy rate $i - \pi$ when the inflation rate is at the desired/target level and output is at its "potential" level, such that:

$$i = \rho + \pi \qquad [2]$$

While ρ is an autonomous element totally independent of nominal values in the system, it can be argued that the desired nominal rate set by the central bank would have to be consistent with the value of the inflation target π^* (i.e., the usual 2 percent rate consensus among IT central bankers nowadays). However, the problem is which 2 percent exactly? For instance, is it the broad CPI

[6] As an aside, Asso *et al*. (2007, p. 26) found that the first mention of the Taylor rule at a FOMC meeting was in 1995 by Janet Yellen, who at the time argued to keep the federal funds rate at 5 percent, following the Taylor rule estimates, instead of raising it to 7 percent as the so-called "Greenbook" forecasts suggested.

inflation or “core” inflation? Is this inflation target a fixed numerical value, a flexible band, or a flexible “average inflation targeting” as, for example, the US Fed has now been pursuing since August 2020? And if it is an average, over which period is it a moving average? In reality, there are a good number of varieties of IT regimes both existing or hypothetical/potential ones that would offer different guidance for the monetary authorities and, more precisely, very different degrees of freedom in interest-rate setting. For example, in the study by Levrero (2023), he lists at least six such specifications of the Taylor rule reaction function studied by researchers since the 1990s, which describe a large family of such relations that even include a variable natural rate, ρ, as perhaps Wicksell himself believed. As we shall see, for Wickell (1898) the natural rate was not some fixed/constant term derived from some linear regression, but unobservable. This is discussed further below.

Moreover, over what period does a central bank apply the rule, especially when knowing that inflation and unemployment can only be known on a monthly basis while real GDP would be quarterly or annual, depending on the country? A good example is the “Taylor Rule Utility” calculator available at the Atlanta Fed (see: Federal Reserve Bank of Atlanta (2023)) with its autoregressive formula for the so-called Taylor calculation that is somewhat different from the original Taylor formula in Taylor (1993). At the time, Taylor was suggesting calculations of the inflation rates over four-quarters. Even these minor differences can lead to significant changes in real interest policy rates resulting from the application of the basic rule.

At the same time, the notion of a potential output from which the output gap is calculated is plagued with all sorts of both technical and methodological problems, since potential output is historically dependent on past values of real GDP that are themselves the outcome of past macroeconomic policies (see, among others, Costantini 2015, and Fontanari, Palumbo & Salvatori 2019). This is so particularly if the measure of potential output is indirectly derived from some estimate of either the Friedmanite natural rate of unemployment or the NAIRU. On a methodological level, these can themselves succumb to the same criticism as estimates of potential output. This makes the use of such a flawed guiding compass in the reaction function highly problematic because these measures of the *ex post* output gaps are internally generated by research departments at their own respective central banks where questions of methodology and transparency can become critical when observers are monitoring central bank decisions from the outside.

The use of the output gap in the Taylor reaction function is deeply problematic for yet another reason. Its inclusion in the standard Taylor rule rests on a key pillar of mainstream theory, namely the Phillips curve, which, as mentioned, has fallen into such disrepute in recent decades that even central bankers such as Janet Yellen and Jerome Powell have recognized it to be highly questionable because the curve has been deemed by many to be essentially flat empirically, at least for the usual relevant ranges of unemployment or output fluctuations (for a review, see Seccareccia & Matamoros 2022b). If the Phillips curve is flat or largely unresponsive to the output gap, as was stated earlier, it can hardly be used as predictor of the future inflation rate within a Taylor rule reaction function.

This issue of the questionable relevance of considering output gaps for inflation control within IT regimes brings us to the bigger question of the Wicksell rule versus the Taylor rule. Indeed, as is well known, the Taylor relation is a key pillar of the New Keynesian/Neo-Wicksellian macroeconomics (as, for instance, in Woodford, 2003). As discussed in Seccareccia (1998), at the superficial level, the Wicksell rule differentiates itself from the broad Taylor rule relation in at least three ways, making the Taylor relation a hybrid descendant of Knut Wicksell's theories from over a century ago. Firstly, Wicksell had made it very clear that what central banks are doing is setting the money rate of interest, i, in relation to price changes within a certain period and not some Fisherian real rate as in the Taylor rule reaction function. The real rate ρ is merely the outcome of the setting of the money rate in relation to the inflation rate, which the central bank can only know *ex post*. Secondly, Wicksell ignored the output gap or, at least, implicitly assumed that actual output was always tending towards potential output or full employment, thereby excluding the output gap from his reaction function; and, thirdly, for Wicksell (1898) it can be said that the achievement of price stability meant that $\pi^* = 0$ and not the usual 2 percent target of central banks nowadays. We wish to argue that both the setting of the money rate of interest and the exclusion of the output gap are important differences because they lead to a crucial modification in the stabilization of actual *ex post* real interest rates and thus in the evolution of rentier income over time.

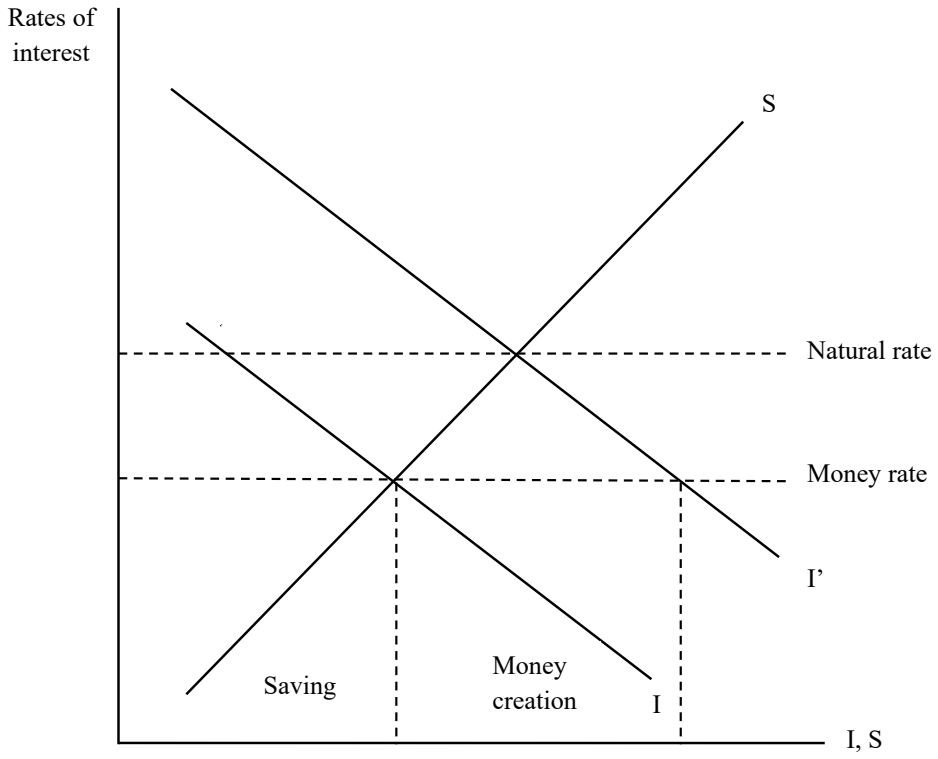
Before empirically exploring the possible implications of adopting these central bank rules from the historical evidence within "inflation first" policy regimes, let us explore more carefully these reaction functions which led to a massive transfer in favor of rentier income until the GFC. Since then, central bank fears of deflation materialized and become more concerned with issues about

both secular stagnation and the question of conducting interest-rate policy when one has reached the zero lower bound in the money interest rate. This is why central banks moved away from the strict IT regimes towards the so-called flexible IT, which became more consistent with a hybrid dual mandate regime. But let us first consider the implications of these theoretical approaches.

As is well known, Wicksell (1898) was acutely interested in central bank behavior theorized within the context of a "pure credit" economy in which the quantity theory relation could not apply, since the money supply was endogenous, but in which the outcome of his analysis would not be in fundamental opposition to the predictive outcome suggested by the quantity relation. To achieve this, he developed a theory of money supply growth and aggregate price formation based on a two-interest rate theory that was not very different from that of his modern disciples (see Woodford 2003). For Wicksell (1898, 1907), there were two broad classes of interest rates in an economy which, through their interaction with aggregate demand via the investment/saving process, impacted on the inflation rate. On one side, we have a set of rates of return emerging in the productive system proper arising *in natura* and determined by the real factors of "productivity and thrift", which, somehow in the aggregate, he defined as the "natural" rate of interest (*rho*) and which ought to be distinguished from the ρ term of the Taylor equation. Indeed, almost like did oracles in ancient times, the latter natural rate cannot be measured or known by central bankers except through its manifestation via the movement of prices. On the other hand, there was a group of interest rates determined within the monetary system and regulated by the reaction function of the central bank — which he coined the "money" rate of interest (i).

It is the interaction between these two sets of interest rates which, according to Wicksell, explained the dynamics of inflation. Hence, if investment (I) is a function of *rho*, while saving (S) [and thus consumption C] is a function of i, any positive/negative gap between *rho* and i, would give rise to a positive/negative difference between entrepreneurial investment and desired household saving. This gap is then filled via endogenous monetary creation/destruction which, at a fixed potential output level, would be inflationary/deflationary.

Figure 1: Wicksellian Investment-Saving Relation



To understand the mechanism described in Figure 1, let us begin at an initial equilibrium point where prices are stable given by the intersection between *I* and *S*, where *rho* = *i*. Now suppose that there is an exogenous technical change which pushes the natural rate, *rho*, upward and, with it, investment in relation to saving so that *rho* > *i* and *I'* > *S* as in Figure 1. Unless the central bank raises *i*, the net money creation between *I'* and *S* will ultimately bring about an increase in prices. This inflation will continue if the gap between *rho* and *i* persists, which is caused by unpredictable fluctuations in the natural rate.

To prevent price level instability, the central bank-determined money rate must continually be chasing the natural rate so that the gap between the two rates is eliminated — as, for instance, at the new higher intersection point between *I'* and *S* in Figure 1. Periods of inflationary/deflationary tendencies arise merely from the incapacity of central banks to act quickly in closing the gap between the two rates. Accordingly, it is the stickiness of the money rate due to the relative inertia in the actions of the monetary authorities that is the *causa causans* behind price-level fluctuations. Because of the natural rate's erratic behavior, would this mean that central banks would have to

use their resources to monitor the fluctuations in *rho*, as many are doing nowadays with their estimates of their "neutral" rates of interest? Wicksell (1898) himself did not think that it would be necessary or even possible to trace the movement of the natural rate. All that was needed was to observe the movement of the price level. As he points out:

> "This does not mean that the banks ought actually to ascertain the natural rate before fixing their own rates of interest. That would, of course, be impracticable, and would also be quite unnecessary. For the current level of commodity prices provides a reliable test of the agreement or diversion of the two rates. The procedure should rather be simply as follows: *So long as prices remain unaltered the banks' rate of interest is to remain unaltered. If prices rise, the rate of interest is to be raised; and if prices fall, the rate of interest is to be lowered; and the rate of interest is henceforth to be maintained at its new level until a further movement of prices calls for a further change in one direction or the other.*" (Emphasis in original; Wicksell 1898, p. 189).

While there may be some debate as to the precise bank reaction function to which Wicksell was subscribing, it has been argued elsewhere (see Seccareccia 1998, p. 186) that it could take the form of what we can describe as a nominal variant of the broad Taylor rule:

$$i = c + \alpha'(\pi - \pi^*) + \beta'(q - q^*) \qquad [3]$$

where c is a constant term not to be confused with the unknown natural rate *rho* in Wicksell. Instead, α' and β' are coefficients as previously discussed vis-à-vis the Taylor equation. However, since Wicksell had assumed that the target of monetary policy ought to be price stability, such that $\pi^* = 0$, and since he had assumed a fully-employed economy with actual output being at its potential level ($q = q^*$), then the equation above is reduced to a much simpler reaction function:

$$i = c + \alpha'(\pi) \qquad [4]$$

The properties of this Wicksellian reaction function are of some interest. When $\alpha' = 1$, this reaction function resembles a hybrid Fisher equation. However, unlike the Fisherian explanation, a stable real rate "*c*" is not the result of market forces compatible with inflation and output being at their steady-state desired levels (as we can perhaps interpret the constant real term ρ in the Taylor equation [1]) but rather it is merely the outcome of the policy decision of the central bank in seeking to stabilize the price level by raising the money rate in proportion to inflation, thereby stabilizing the benchmark real rate.

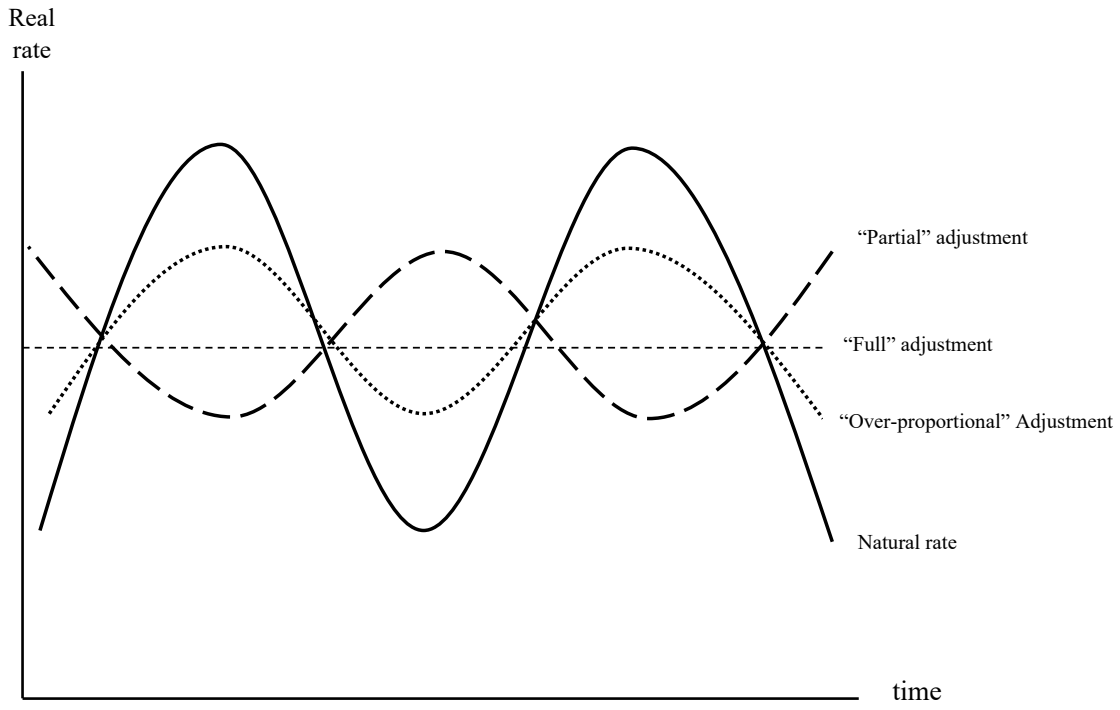
The value of α' could be greater or less than unity. Wicksell himself felt that the sluggishness in the behavior of the monetary authorities in adjusting the money rate to the inflation rate would suggest $\alpha' < 1$. The values of α' being greater or less than unity would merely indicate either an overzealous or a less committed central bank in combating inflation. It is important to notice, however, that the "natural rate" variable, *rho*, does not appear anywhere in the reaction function. Since Wicksell assumed that *rho* cannot itself be monitored, then what the central bank does in responding to changes in prices is presumably to bring the money rate closer to this unobservable natural rate. A central bank could only know that i is getting closer to *rho ex post* because it sees the rate of inflation/deflation slowing down and that $rho = i$ when the rate of inflation/deflation has come to a halt. As Wicksell (1898) had argued, it could only know that $rho = i$ from logical inference, that is, by monitoring the time path of inflation. Hence, while postulating the existence of a natural rate, the latter plays no direct role in the central bank setting of interest rate other than to assume that, when the rate of inflation, π, is zero, the money rate must be equal to the unknown natural rate.

Already in the 1930s, there had been numerous critics of this essentially dubious concept with a weak or doubtful empirical basis. As discussed elsewhere (Seccareccia 1998, pp. 185-86), critics such as Williams (1931), Sraffa (1932), Myrdal (1939) and even Hayek (1941) questioned both the theoretical and empirical validity of such an elusive will-o'-the-wisp concept because of the circular reasoning but also because, as post-Keynesian writers were to show subsequently, the whole notion of the natural rate succumbs to the Cambridge critique of capital (see Rogers 1989, pp. 27-38; and Levrero 2021, pp. 19-20). Despite the long series of criticism that have been voiced historically, this concept has resurfaced in full force in contemporary neo-Wicksellian literature on central banking, and the empirical implications of the above-mentioned Wicksellian reaction function are of some interest.

From the simple reaction function, we could infer that $(i - \alpha'\pi) = c$. With $\alpha' = 1$ (representing an instantaneous and equi-proportional adjustment of the money rate i to the rate of inflation π), fluctuations in the natural rate *rho* will be reflected in a complete *ex post* stability of the real rate, with $i - \pi$ equal to the constant c. On the other hand, with partial adjustment ($\alpha' < 1$) the real rate will be gravitating counter-cyclically around the value of c at the same time as the natural rate will be fluctuating because of, say, shocks to productivity growth. Such hypothetical time paths are

depicted in Figure 2 below for partial adjustment ($\alpha' < 1$), proportional or "full" adjustment ($\alpha' = 1$), and "over-proportional" adjustment ($\alpha' > 1$) of i to π.

Figure 2: Evolution of *Ex Post* Real Rate of Interest under the Wicksell Rule for Central Banks



Given the slow adjustment of the money rate (i) to changes in prices, Wicksell himself felt that the normal state was one where partial adjustment was the norm, thereby generating a negative (or countercyclical) statistical relation between real rates and the rate of inflation. However, even with partial adjustment of the money rate to changes in prices, the effect would still be to mitigate fluctuations in the real rate, when compared to some alternative monetary policy of, say, merely pegging the money rate. In the latter scenario, the *ex post* real rate would fluctuate more dramatically and in inverse proportion to the rate of inflation, as had occurred during the early post-World War II years, when money interest rates were pegged.

The original Wicksellian monetary policy regime just described is merely one among an array of different monetary policy regimes that one can find historically. The most celebrated, of course, is the Taylor rule response mechanism, which closely resembles the Wicksellian reaction function,

but with one important difference. As we had depicted earlier, in the generic form of the Taylor reaction function in equation [1] above, there is the obvious recognition that the economy may not be at its potential output. Hence, the central bank ought to take into consideration the output gap (q - q*) (or the unemployment gap, u-u*) not to act directly on the latter, as would a traditional Keynesian policy maker, but to react pre-emptively against forecasted future inflation on the basis of that output gap. The Taylor-type reaction function postulates that the central bank should target a real rate of interest, whose effect would then be to impact on interest-sensitive aggregate real expenditures in the New Keynesian aggregate demand function. Abstracting from changes in the output gap, it is quite clear in this case that, whenever π is inching upwards in relation to π*, the central bank ought to react to the excessive inflation by raising the real rate, which would be compatible with the "over-proportional" adjustment as understood within the above Wicksellian framework.

Hence, unlike the previous Wicksellian hypothesis that, depending on the value of *rho*, the real rate of interest could be constant or could move counter-cyclically or pro-cyclically, in implementing the Taylor reaction function the central bank must raise the real rate, i - π, whenever $\pi > \pi$*. As stated above, this would entail a uniquely pro-cyclical movement of the *ex post* real rate of interest (unless offset by a sharp rise in the output gap (q - q*)). This has clear empirical consequences that can easily be verified by simply analyzing if inflation and real rates are positively or negatively correlated in an economy in which the central bank is targeting an inflation rate.

Before discussing the empirical ramifications of these distinct central bank reaction functions and the possible inferences on the evolution of rentier income, let us better distinguish between *rho* in Wicksell and ρ in the Taylor rule equation. In particular, can ρ be equivalent to *rho* in the Wicksellian system? For Wicksell, the natural rate is both unobservable and has a value which, by its very nature, is related to long-term factors pertaining to "productivity and thrift", that is to say, to factors relating to technical change and intertemporal consumption/saving decisions. On the other hand, it cannot be a mere econometric outcome of the evolution of real rates over some given time horizon historically as originally interpreted by Taylor (1993) when the output gap is zero and inflation is on target, because such an estimated constant term ρ can itself be an outcome of past monetary policy of which it is supposed to be independent. Because of this conceptual

conundrum, researchers within this Taylor-type paradigm have tried all sorts of procedures especially in order to obtain a time varying ρ based on the presumed determinants of the natural rate. This research has taken different forms (for an extensive review see, for example, Giammarioli & Valla (2004), Hamalainen (2004) and Laubach & Williams (2015), but also Lavoie & Seccareccia (2019) and Levrero (2021)). In fact, almost a mini-industry has developed to estimate the natural rate, where numerous research departments within central banks internationally now continually grind out estimates of these so-called "neutral" rates of interest that would be compatible with zero inflation gaps and zero output gaps.

Regardless of the supposed existence of this elusive driver of either ρ or *rho* that is seemingly behind central bank decisions to set interest rates, the questions that we would like to address are the following: What has been the actual evolution of these *ex post* real rates during this whole era since the 1970s and 1980s, when this "inflation first" policy perspective took hold and when central banks began to use, either implicitly or explicitly, the interest rate lever to combat inflation and stabilize the inflation rate at a desired level? Which pattern of behavior do they follow? Is it a Wicksell rule or a Taylor rule, and which of these behaviors are best compatible with the stylized facts on rentier income that are presented below in Appendix I? This will be the focus of the following section.

Evidence on Monetary Policy Rules for the Post-1973 Era

a) Reaction Function Specifications

The estimation of the central bank's reaction function depends on the assumptions pertaining to the relationships between the variables of interest. Specifically, although the production of reliable estimates of the policy parameters depends on the econometric technique and the data utilized, the regression specification would depend on the variables assumed either endogenous or exogenous in the reaction function, which is a theoretical inquiry. As previously referred to, traditionally estimations of the reaction function are framed within the New Keynesian framework, whose benchmark three-equation New Keynesian model is composed of the dynamic IS curve, the Phillips curve, and the Taylor rule (see Carvalho *et al*. 2021; Seccareccia & Matamoros 2023). In the basic New Keynesian model, the Taylor rule adopts the form:

$$i_t = \rho_t + \pi_t + \alpha(\pi_t - \pi_t^*) + \beta(q_t - q_t^*) + v_t \qquad [6]$$

which is analogous to equation [1] above but it includes an innovation (v_t) accounting for monetary policy shocks that are assumed exogenous i.e., nominal shocks that are independent of changes in current and past values of inflation and output — if they are short-lived. Following the standard approach, monetary policy shocks affect the nominal interest rate through unexpected changes in money demand that the central bank is only able to accommodate after some time, that is, money is ultimately an exogenous variable. Within this logic, presumably, the temporal imbalances of money supply and money demand would affect the money interest rate independently of interest rate policy. As Clarida *et al*. (1998) argue:

> "The specification also includes an exogenous random shock to the interest rate, v_t. Importantly, we assume that v_t is i.i.d. Several interpretations are possible. First, v_t could reflect a pure random component to policy, of the type stressed in the recent identified VAR literature on monetary policy. Second, it could arise because the central bank imperfectly forecasts idiosyncratic reserve demand and, for some reason, does not instantly supply reserves to offset the shock. Under this scenario, the interest rate jumps in response to unexpected movements in reserve demand that are orthogonal to movements in inflation and output." (Clarida *et al.* 1998, p. 1039)

In this New Keynesian framework, changes in the money interest rate are partly exogenous (because of the direct impact of monetary policy shocks) and partly endogenous (determined by the central bank's response to inflation and output deviations). The fact that monetary policy shocks are always nominal shocks, in the sense that they impact the money interest rate — and not the 'natural' real interest rate contained in the dynamic IS equation, implies that the central bank is effectively targeting the real interest rate (Taylor 1999).

Moreover, the so-called Taylor principle says that the slope coefficient of inflation should be greater than one ($1 + \alpha > 1$) to maintain a stable inflation path. Otherwise, if $\alpha < 0$, "the real interest rate would fall rather than rise when inflation rose. As a result, inflation could be highly volatile" (Taylor 1999, p. 326), since the central bank is persistently allowing the real rate of interest to fall as inflation goes up and this reinforces higher inflation expectations that are materialized.

The Taylor principle turns out to be critical in interpreting the Taylor rule as an "inflation first" policy, as Asso *et al*. (2007) argue:

> "[…] the "Taylor Principle" embedded in Taylor's Rule requires that the real federal funds rate be increased when inflation is above the inflation objective. In other words, the nominal funds rate should rise more than one-for-one with an increase in inflation above objective. This principle is also intuitive as a device for ensuring inflation remains anchored over time at its objective.
>
> The Taylor Rule appeared to satisfy the dual mandate. However, the Taylor Principle emerges by reorganizing Taylor's equation; and interpreting *y* as a harbinger of future inflationary pressures leads to single mandate inflation targeting." Asso *et al*. (2007, p. 22)

In contrast, the Wicksell rule takes a very different approach to monetary policy shocks that we think is more appropriate compared to the Taylor rule. First, it is based on an endogenous demand-led money framework in which the central bank can set the base money interest rate and money supply adjusts automatically to money demand. Second, there are no monetary policy shocks affecting the nominal interest rate alone; shocks are real in the sense of directly impacting the unobservable 'natural' interest rate. Real shocks do not impact the money interest rate exogenously as in the Taylor rule, they only impact the money rate endogenously through changes in the policy variables (e.g., inflation and output gaps). That is, the Wicksell rule implies that there cannot be exogenous changes in money rates that are unintended by the central bank.

In short, the Wicksell rule is a nominal interest rate rule that reacts to changes in the policy variables to stabilize the inflation rate. Conversely, the Taylor rule is a real interest rate rule that tries to accommodate monetary policy shocks to maintain a stable real interest rate. As such, the Wicksell rule is specified as equation [4] above, in which there is no innovation term (v_t).

The differences in specification of the Taylor and Wicksell rules as to being nominal or real rate rules and the treatment of the shocks have important implications for the calculation of estimates of the policy parameters in the reaction function. On the one hand, a Taylor rule specification must account for the endogeneity of the policy variables in the reaction function, or else the response parameters estimators, $\hat{\alpha}$ and $\hat{\beta}$, would be potentially biased. In particular, the direction of the bias of $\hat{\alpha}$ would depend on whether the Taylor principle holds (i.e., if $\alpha < 0$). As explained by Carvalho *et al*. (2021), assuming the Taylor principle holds, an OLS estimation would potentially yield a negative bias in $\hat{\alpha}$ (meaning $\hat{\alpha} < \alpha$) because the monetary policy shock always impacts the money

interest rate in opposite direction to the endogenous policy response in the Taylor rule (equation [6]). For instance, a negative shock on v_t (e.g., caused by a sudden increase in money demand) decreases i_t directly and raises π_t such that it induces the central bank to raise i_t as a policy response to higher inflation. Thus, an OLS estimation of $\hat{\alpha}$ would potentially portray the central bank as being less reactive to changes in inflation because it fails to disentangle the monetary policy shock from the endogenous policy response.

Nevertheless, Carvalho *et al*. (2021) argue that if shocks explain only a small fraction of the variance of the endogenous response variables, such as the inflation rate and output (or employment), then the OLS estimation bias would be 'economically irrelevant'. In other words, if the correlation between the error term and the regressors is small, the OLS bias would be also small, such that OLS estimation and instrumental variables (IV) estimation would produce very similar estimators. In fact, Carvalho *et al*. (2021) provide ample evidence through both simulations and regressions pointing out that the OLS bias is indeed small and of little practical importance. As a matter of fact, initially John Taylor (1999) estimated the reaction function of the US Fed for different historical periods using OLS and he obtained results that are very similar to subsequent estimations utilizing other methods (see Woodford 2003, p. 41).

In contrast, the estimation of the Wicksell rule by OLS would be unbiased because, in principle, there is no potential source of bias. The error term is assumed to be independent to the regressors, such that monetary policy shocks only impact the money interest rate through the endogenous response variables. An OLS estimation would suffice to provide reliable estimates of the policy parameters in the reaction function. The fact that the evidence shows that the shocks and the regressors are loosely correlated in the reaction function can be taken as possible evidence that shocks are "economically irrelevant". Importantly, adopting an endogenous and demand-led money framework, as we do here, would lead to unbiased OLS estimates, thereby making it unnecessary to use IV or other methods to disentangle endogenous from exogenous impacts on money interest rates. Nevertheless, we decided to show IV estimates as well to address potential concerns from economists adopting a New Keynesian monetary framework.

In what follows we estimate the Taylor and Wicksell rules by both OLS and IV to compare the different estimates for the average reaction function of nine industrialized countries for the post-Bretton Woods period 1973-2022 both in quarterly and annual data. The objective is to shed light

on the reaction function that central banks in major industrialized countries have been pursuing i.e., whether central banks have been following a real interest rate rule along the Taylor framework or a nominal interest rate rule of the Wicksell type. We also compute the reaction function of the post-GFC period, 2008-2022, to account for a potential regime switch in monetary policy after the crisis.

a) POLS and IV regressions

We stick to Carvalho *et al*. (2021) in defining a contemporaneous specification for the reaction function of the central bank, except that we replace the output gap with the unemployment rate because of the difficulty of obtaining output gap data for long historical periods going back to the 1970s for the nine countries in our sample, such that our specification for a quarterly frequency regression is as follows:[7]

$$i_t = c + \hat{\rho}_1 i_{t-1} + \hat{\rho}_2 i_{t-2} + \hat{\alpha}\pi_t + \hat{\beta}u_t + \varepsilon_t \qquad [7]$$

in which i is the short-term nominal interest rate, π is the CPI inflation rate, u is the unemployment rate, and the inflation and unemployment response parameters are computed as: $\alpha = \frac{\hat{\alpha}}{1-\rho}$ and $\beta = \frac{\hat{\beta}}{1-\rho}$, respectively, where $\rho = \hat{\rho}_1 + \hat{\rho}_2$. Again, we estimate equation [7] with two different models, a POLS and an IV (estimated through GMM) for the nine industrialized countries for the quarterly data period 1973q1-2022q4, since reaction functions are usually estimated in quarterly frequency (see Woodford 2003). For the Wicksell rule estimation, we estimate equation [7], which has the nominal interest rate as the dependent variable, whereas we just replace i for the real interest rate — the short-term nominal interest rate adjusted by CPI inflation — for the Taylor rule estimation. As usual for the IV, we use as instruments four lags of inflation, the unemployment rate, the gap between the long-term and the short-term interest rates, the energy CPI component, and lags three and four of the short-term nominal interest rate for the Wicksell rule estimation and the real interest rate (adjusted by CPI inflation) for the Taylor rule estimation.[8]

[7] This is not to mention the problem of calculating an *ex post* potential output measure to obtain an output gap, which would likely differ from the *ex ante* output gap that central bankers could have obtained to conduct interest rate policy.

[8] We included the energy CPI component as a proxy for a country-specific commodity price index, which is the one used in single-country estimations. A measure of money growth is also sometimes included as instrument, such as

Results for the Wicksell and Taylor rules' estimations are depicted in Table 1 for two periods: 1973q1-2022q4 and 2008q1-2022q4. The period starting in 1973q1 until 2022q4 covers data starting since the first oil price shock until the recent 2021-2022 inflationary surge.[9] However, we must clarify that the data for the complete nine industrialized countries is only available starting in the 1980s, since Japan data start in 2002q3, France in 1983q1, New Zealand in 1986q1 (while Japan data end in 2021q2). The second period covers series since the GFC because we are trying to shed light on a possible reweighting in the reaction function of central banks following the 2008 crisis that could have implied tilting the weights in favor of the unemployment variable and less weight on the inflation variable.

Columns (1) and (2) of Table 1 display results for the Wicksell rule regressions for the two mentioned periods. By observing column (1), the inflation response parameter (α) is significantly greater than unity for the period 1973q1-2022q4 in both POLS and IV estimations, suggesting that central banks have been adjusting money interest rates over-proportionally to changes in the inflation rate, on average. This over-proportional adjustment, to use previous Wicksellian terminology (meaning that the Taylor principle holds), is comparable to other findings for single-country estimations (see, for instance, Carvalho *et al*. 2021; Clarida *et al*. 1998; Woodford 2003). However, the size of the POLS downward bias in Table 1 is significantly larger than in Carvalho *et al*. (2021), implying that the estimation method could lead to substantially different implications, as we will show shortly. On the other hand, the unemployment rate response parameter (β) is not significant for both POLS and IV in this period, indicating that interest rate policy has not reacted as much to changes in the unemployment rate on average. This is consistent with the Wicksell rule formulation that monetary policy focuses solely on movements in the inflation rate and responding

M2 or M3, but here we omit it due to the lack of data of such measure for France, Germany, and Italy for the whole period.

[9] We must clarify why the tables' output is different from the earlier version's tables of this paper presented originally at the IARIW-Bank of Italy conference, even though the regression specification is the same in both, which is based on equation [7]. The reason for this is twofold. First, this paper presents a more accurate calculation of the policy response parameters according to the reaction function estimated by Carvalho *et al*. (2021). Second, despite the fact that we are adopting a non-mainstream approach to monetary policy where central banks can set the benchmark money interest rate and where the money supply is demand-led (i.e., there is no room for temporal imbalances in money supply and demand that lead to exogenous changes in money rates), and following a couple of concerns raised by New Keynesian colleagues as to accounting for these exogenous changes in our estimations, we decided to present not only POLS estimates — as we did in the earlier version of this paper — but also IV estimates that try to control for a supposed innovation exogenously affecting money rates.

accordingly — although it is also in line with the Taylor rule view that the output gap only matters so long as it provides a guidance for future inflation.

Table 1. POLS and IV Estimates of the Reaction Function by Central Banks, Nine Countries

	Wicksell rule (money interest rate)		Taylor rule (real interest rate)	
Periods	1973q1-2022q4	2008q1-2022q4	1973q1-2022q4	2008q1-2022q4
	(1)	(2)	(3)	(4)
	POLS estimates			
α	1.2 ***	0.75 ***	-0.15	-1.02 ***
	(0.261)	(0.149)	(0.436)	(0.188)
β	-0.16	-0.12 ***	0.35	-0.15 **
	(0.148)	(0.049)	(0.254)	(0.066)
ρ	0.94 ***	0.9 ***	0.95 ***	0.85 ***
	(0.009)	(.015)	(0.011)	(0.021)
N	1,417	534	1,417	534
R^2	0.97	0.96	0.9	0.9
	IV estimates			
α	1.54 ***	1.3 ***	1.6 ***	1.78
	(0.324)	(0.293)	(0.536)	(2.178)
β	-0.06	-0.08 *	0.02	0.1
	(0.161)	(0.051)	(0.218)	(0.361)
ρ	0.95 ***	0.94 ***	0.95 ***	0.96 ***
	(0.008)	(0.011)	(0.011)	(0.024)
N	1,363	534	1,363	534
R^2	0.96	0.96	0.89	0.87

Note: The table reports estimates of equation [7] by POLS and IV. The set of instruments includes four lags of CPI inflation, the unemployment rate, the gap between long- and short-term interest rates, energy CPI inflation, and lags three and four of short-term nominal interest rates for the Wicksell rule or real short-term interest rates for the Taylor rule. Statistical significance at the 90/95/99 % confidence level indicated with */**/***, respectively. Robust standard errors are reported in parentheses.

Column (2) suggests a reweighting of the inflation and unemployment response coefficients for the period 2008q1-2022q4. Not only is the α value significantly lower for both the POLS and the IV estimates, but the β value is also now negative and significant, implying that increases in the unemployment rate are associated with reductions in the money interest rate. Therefore, following the GFC, central banks have reduced their response to changes in the inflation rate while they have significantly increased their response to changes in the unemployment rate. This is compatible with the argument that, due to the fears of deflation and secular stagnation after the GFC, central

banks in major industrialized countries have adopted a more Keynesian-type interest rate policy that was formalized in flexible IT regimes.

Columns (3) and (4) show estimates of the Taylor reaction function, that is, where the real short-term interest rate is the dependent variable, for the same two periods. Column (3) displays mixed results since the α value is greater than unity and significant for the IV estimation, whereas it is not significant in POLS estimates. Thus, these results are, to some extent, consistent with central banks adjusting over-proportionally the money interest rate to keep or increase the real interest rate in the presence of changes in the inflation rate. The β is again not statistically significant for this longer period. Column (4), however, shows that α and β are negative and significant in the POLS estimation for the post-GFC period, in line with a significant reweighting of the reaction function. This points to both a regime switch toward a partial adjustment of interest rates to changes in the inflation rate and a greater importance of changes in the unemployment rate for interest rate policy. Nevertheless, the IV estimates do not corroborate the POLS findings and instead portray no significant coefficients of α and β during this period.

Overall, we think that the Wicksell and Taylor rules estimations do not contradict each other in the sense that they both show what seems to be an over-compensating behavior of interest rate policy toward changes in the inflation rate, on average, during the whole period of 1973q1-2022q4, also implying, in a sense, that the Taylor principle is dominant for the entire period. On the other hand, there is also evidence pointing to a significant change in central bank behavior after the GFC, thus suggesting a reweighting of the policy parameters toward a more Keynesian-type reaction function that tries to balance for both changes in the inflation and the unemployment rates. This reweighting in the policy response parameters, however, did not mean that central banks changed to a partial-adjustment or that they consistently violated the Taylor principle. It, instead, just implied less over-compensation in interest rate policy and a greater weight to changes in the unemployment rate. Therefore, our findings would be unfavorable to the claims of some influential economists — such as Bordo and Levy (2023), and Carstens (2023) — arguing that the policy of "too low for too long" interest rates and the systematic violation of the Taylor principle that prevailed in the several years prior to the COVID-19 inflationary surge, are part of the structural causes of high and sustained inflation and financial instability in the post-pandemic world.

Finally, the reader would probably notice that the IV regressions for the 1973q1-2022q4 period display less observations compared to the POLS regressions. The reason is that some instruments are missing observations at the beginning of the period for some countries (that is also why for the second period *N* is equal in POLS and IV regressions). Interest-rate data were extracted from the Monthly Monetary and Financial Statistics (MEI); unemployment rates were pulled out from the Key Economic Indicators (KEI) database, where unemployment rates are harmonized to be comparable among countries; and the series of consumer price index (CPI) were extracted from KEI database as well, that is, all databases found on the OECD Statistics website (OECD.Stat). As a sort of robustness check to assess our findings in Table 1, we present the same regressions as before but using annual data that, in principle, would filter very short-term variations and reduce noise in the estimations.

Hence, Table 2 presents results for the same regressions as in Table 1 but using annual data for the nine industrialized countries for the two different periods. Since we use annual data, the estimation of equation [7] only includes one lag of the interest rate as regressor, and the IV estimation includes only two lags of the instrument set (and lag two of interest rates). The results are, in general, consistent with the findings using quarterly data. On the one hand, Wicksell rule estimates for the period 1973-2022 display an α greater than unity for both POLS and IV regressions (column 1), whereas β is not statistically significant. This points to a central bank behavior that, on average, follows an "inflation first" strategy aligned with an over-proportional adjustment of interest rate changes for the whole period of study. On the other hand, for the post-GFC period (column 2), the Wicksell rule estimates suggest a significant change in behavior by central banks, where the inflation response parameter weighs less in the reaction function, and, at the same time, the unemployment rate response parameter seems to assume some role in the POLS regression, whereby increases in the unemployment rate are associated with a reduction in the money interest rate.

As to the Taylor rule estimation for the period 1973-2022 (column 3), the POLS regression depicts no significant policy parameters, α and β, while the IV regression indicates that the inflation response parameter is significant and greater than unity. This aligns with the results in Table 1, but this time the β parameter (α) is positive and significant at the 90 percent confidence level. Furthermore, for the post-GFC period (2008-2022), column 4 also suggests a change in central

bank behavior, on average, for the POLS and IV regressions, whereby increases in the inflation rate are associated with significant reductions in real interest rates. In other words, during this 2008-2022 period, central banks displayed what Wicksell described as partial adjustment in interest rates, implying money interest rates failing to catch up with increases in inflation that were reflected in declining real rates.

Table 2. POLS and IV Estimates of the Reaction Function by Central Banks, Nine Countries

	Wicksell rule (nominal interest rate)		Taylor rule (real interest rate)	
Periods	1973-2022	2008-2022	1973-2022	2008-2022
	(1)	(2)	(3)	(4)
	POLS estimates			
α	1.37 ***	0.69 ***	0.05	-1.88 ***
	(0.539)	(0.182)	(0.362)	(0.407)
β	-0.19	-0.2 ***	0.27	-0.16
	(0.162)	(0.064)	(0.366)	(0.103)
ρ	0.78 ***	0.66 ***	0.9 ***	0.69
	(0.026)	(.067)	(0.039)	(0.061)
N	361	131	361	131
R^2	0.9	0.77	0.74	0.76
	IV estimates			
α	1.52 ***	0.018	1.55 ***	-1.03 ***
	(0.278)	(0.35)	(0.539)	(0.267)
β	-0.1	-0.09	0.56 *	0.01
	(0.231)	(0.074)	(0.31)	(0.111)
ρ	0.84 ***	0.74 ***	0.86 ***	0.68 ***
	(0.034)	(0.06)	(0.038)	(0.058)
N	341	131	341	131
R^2	0.89	0.7	0.68	0.71

Note: The table reports estimates of equation [7] by OLS and IV. The set of instruments includes two lags of CPI inflation, unemployment rate, the gap between long- and short-term interest rates, energy CPI inflation, and lag two of short-term nominal interest rates for the Wicksell rule or real short-term interest rates for the Taylor rule. Statistical significance at the 90/95/99 % confidence level is indicated with */**/***, respectively. Robust standard errors are reported in parentheses.

Broadly speaking, Tables 1 and 2 display consistent results both across periods and regression methods. On the one hand, both POLS and IV estimates suggest that during the whole period of 1973-2022, on average, the over-adjustment of interest rate policy seems to prevail, in which the inflation response coefficient α has been greater than unity (also achieving the Taylor principle of $1 < \alpha$). At the same time, the non-significant β implies that concerns about the unemployment rate

do not appear relevant in the reaction function of central banks during this sub-period. Both features in the estimated reaction function suggest the dominance of an "inflation first" strategy during this five-decades period on average. On the other hand, there is also some evidence that central banks tilted, so to speak, the weights of their policy response parameters to give less importance to changes in the inflation rate and greater importance to changes in the unemployment rate after the GFC. Only in some cases did this reweighting imply a complete switch from over-proportional to partial adjustment in interest rate policy (i.e., a $\alpha < 1$) and a negative and significant β. Instead, the post-GFC reweighting in the response policy parameters suggests a step towards a more balanced approach in treating changes in the inflation and unemployment rates in line with a more Keynesian dual mandate approach that treats inflation and unemployment policy parameters as separate objectives to be attained.[10]

Conversely, a New Keynesian perspective would interpret the post-GFC reweighting in monetary policy parameters as asymmetrical because the unemployment response coefficient is only useful as an indicator of future inflation and not as an independent policy objective. For instance, Bordo and Levy (2023) concur with us that there was a significant change in central bank behavior at the turn of the twenty-first century (reinforced after the GFC) but their interpretation is totally different. For example, when referring to the recent Fed behavior, Bordo and Levy (2023) argue:

> "The Greenspan-led Fed's concerns about deflation and its perception that the risks of deflation and the stagnation that would result were a far bigger concern than the risks of high inflation, became influential. This new asymmetric view of risks around inflation resulted in the Fed's delayed exit from its 2001–2 countercyclical easing that proved costly for economic performance and financial stability. This asymmetric concern re-emerged as a dominant theme in the decade following the GFC.

[10] See Anderl and Caporale (2023) for a comparison between constant- and time-varying estimated policy parameters in several industrialized countries. Even though they estimate a forward-looking reaction function using the output gap applying HP filtering — such that it is not quite comparable to our estimations, and it might be subject to some of the critiques raised here — the authors found similar results when estimating fixed policy parameters, in which central banks responded less aggressively towards inflation deviations after the GFC. However, their time-varying estimations suggest instead that monetary policy has become, on average, "more averse to inflation and more responsive to the output gap over time." (Anderl and Caporale 2023, p. 28)

> […] "The new strategic framework institutionalized the Fed's asymmetries, including prioritization of its enhanced maximum employment mandate and flexible average inflation targeting that favored inflation above 2%." (Bordo and Levy 2023, pp. 170-171)

Finally, a couple of annotations must be added. Here again, the number of observations in the IV regressions for the period 1973-2022 are less than in POLS because there are some missing data on the instrument set at the beginning of the period for some countries. Also, data on unemployment rates start in 1982 for France, 1991 for Germany, 1983 for Italy. New Zealand and United Kingdom are missing the 2022 observation. Data on short-term interest rates begin in 2003 in Japan, 1974 in New Zealand, and 1986 in the United Kingdom. As a result, although the regression involves the period 1973-2022, in fact only Canada, New Zealand and the United States have data starting in 1973-74. Data for France, Italy and the United Kingdom begin in the 1980s, and Germany and Japan afterwards. This is to highlight that the period 1973-2022, in practice, involves data from the 1980s onwards for the nine industrialized countries, and there might be a consensus that "inflation first" strategies dominated in the 1980s.

Concluding Remarks

We began with an initial question derived directly from the title as to whether "inflation first" is synonymous with "rentier first" monetary policy, and we believe that both the theory and the evidenced-based arguments put forth would allow us to respond affirmatively. Our regression analysis provides evidence that central banks in major industrialized countries have been pursuing an over-proportional adjustment in interest rate policy, at least before the GFC, where money interest rates have been over-adjusted to more than offset changes in the inflation rate, reflecting an overzealous behavior towards price inflation patterns and, at the same time, little or no concern whatsoever over changes in unemployment rates.

Now, despite this behavior of prioritizing inflation deviations that is compatible with both the Wicksell and Taylor rules, the apparent complete abandonment of unemployment or output considerations is more consistent with a Wicksellian single-goal framework. Seemingly, from the empirical evidence, what central banks were implementing was a simpler Wicksell rule that, as it had slowly been put in place after the monetarist fiasco of the early 1980s, led to historically high,

positive, sustained, and more stable real rates that eventually slowly declined to combat the decelerating inflation until after the GFC when central banks were redefining their priorities.

For this reason, we feel that the strict adoption of the Taylor rule incorporates an implicit class bias in favor of "unearned" income earners or rentiers that is unacceptable for a modern society seeking great equity and social inclusion, especially in light of its effect on the wage share historically (as we have argued elsewhere, see Seccareccia & Matamoros 2023). Admittedly, particularly in regards to a dual mandate, what has been occurring since the GFC in some industrialized countries is that a variant of the Taylor rule — due to its inclusion of an output and employment objective as in the so-called Yellen rule — can open the door to be interpreted in a Keynesian framework where not only the two variables (inflation and unemployment) can be construed as independent targets to pursue, but where fiscal policy can be coordinated with monetary policy ultimately to tackle two goals with two instruments. Lastly, we do recognize that some ideas raised in this paper are not developed in depth given either the lack of space or the absence of data. For instance, there is an important line of research on the evolution of rentier income that should be further explored, particularly considering the structural transformation of the rentier groups following the 1980s crisis where households became the "new" debtors and the nonfinancial business sector become net lenders and money managers within an increasingly financialized macro-economy. Also, despite its methodological difficulties, it would be interesting to come up with more concrete estimates of the impact of "inflation first" monetary policy on the transfer of income and wealth to rentiers. These and other issues are left for future research.

Appendix I: Some Stylized Facts on the Rentier Income Share

This Appendix tries to present some of the trends in the functional distribution of income along Keynesian lines, with a focus on rentier income, since the dominance of an "inflation first" monetary policy in major industrialized countries. We show data on the conventional rentier income share using national accounting measures, but we also present data on alternative measures of rentier income. While direct calculations of the rentier income share could be more in line with the original rentier concept by Keynes (1923, 1936), for instance, measured as the share of net interest payments from businesses and government out of GDP, these measures have serious issues of limited data availability among countries. Therefore, it becomes critical to present alternative rentier income measures that can be used for several countries and for much longer periods.

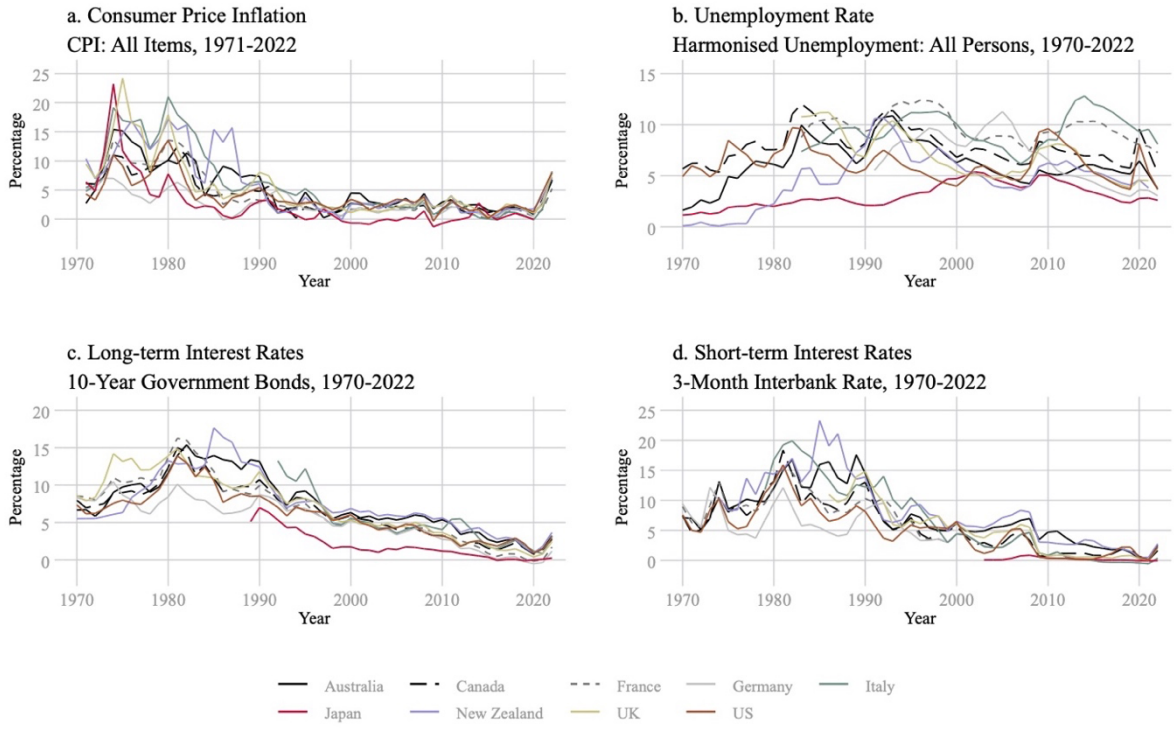
However, before exploring carefully rentier income measures and their trends, we would first like to show the evolution of a few macroeconomic variables that are crucial for the understanding of monetary policy over time (and which were used in the econometric section above). For starters, panel (a) in Figure 3 shows CPI inflation for nine industrialized countries — the G7 plus Australia and New Zealand — for the period 1971-2022 (Japan is missing 2021 and 2022 observations of inflation). Broadly speaking, inflation was relatively high before the mid-1990s and it remained low and stable afterwards (generally below 5 percent) until 2021, when it accelerated and surpassed 5 percent of annual inflation. Thus, we observe at least two types of inflation regimes: a high-inflation regime in the 1970s, 1980s, and after the COVID-19 crisis in 2020; and a low-inflation regime from the 1990s until the COVID-19 crisis (for a detailed analysis of the most recent COVID-19 inflation, cf. Ferguson and Storm, 2023).

Panel (b) displays the annual unemployment rate for the same nine countries for the period 1970-2022. There is no clear general pattern across countries. However, it seems that unemployment rates were relatively low but increasing in the 1970s. Then, higher unemployment rates are observed from the 1980s onwards, when unemployment rates frequently rose above 10 percent, whereas unemployment rates below 5 percent were very rare. We do not observe a simple negative relationship between inflation and unemployment rates as predicted by the Phillips curve. On the contrary, except for the inflationary surge in 2021-2022 that was accompanied by declining unemployment rates, the broad pattern would suggest a positive correlation between inflation and unemployment rates that contradicts any notion of the traditional Phillips curve. Moreover, we can

trace a decline in unemployment rates after the GFC that coincides with very low and flat inflation rates for the period 2010-2019. Yet, some unemployment data are missing, particularly for the 1970s: the series start in 1982 for France; in 1991 for Germany; in 1983 for Italy and the UK, and the 2022 observation is missing for New Zealand and the UK.

Panels (c) and (d) show the behavior of long- and short-term interest rates, respectively. Long-term interest rates refer to interest rates for 10-year government bonds, whereas short-term interest rates refer to three-month interbank rates or comparable three-month instruments. Both short- and long-term interest rates depict a very similar evolution. There is a clear pattern in both short- and long-term interest rates that mimics, with some lag, the evolution of CPI inflation. Interest rates were relatively low in the early-1970s and then they increased in the late-1970s, after the oil price shocks and the inflationary surge. Moreover, interest rates very slowly decreased from their peak in the 1980s, but only after the GFC of 2008-09 interest rates reached levels below 5 percent, whereas inflation rates were systematically below 5 percent since the 1990s. Given this similar but lagged evolution between interest rates and inflation, we would expect as well at least two regimes of inflation-adjusted interest rates that can potentially shape rentier income trends: a low-interest regime in the 1970s and after the GFC; and a high-interest regime in the decades in-between (i.e., the 1980s to the 2000s). As to data availability, long-term rates start in 1992 for Italy and in 1989 for Japan. Regarding short-term rates, data begin in 1979 for Italy, in 2003 for Japan, in 1974 for New Zealand, and in 1986 for the UK.

Figure 3. Evolution of Selected Macroeconomic Variables, Nine Countries, Annual Observations



Source: Monthly Monetary and Financial Statistics (MEI), OECD.Stat

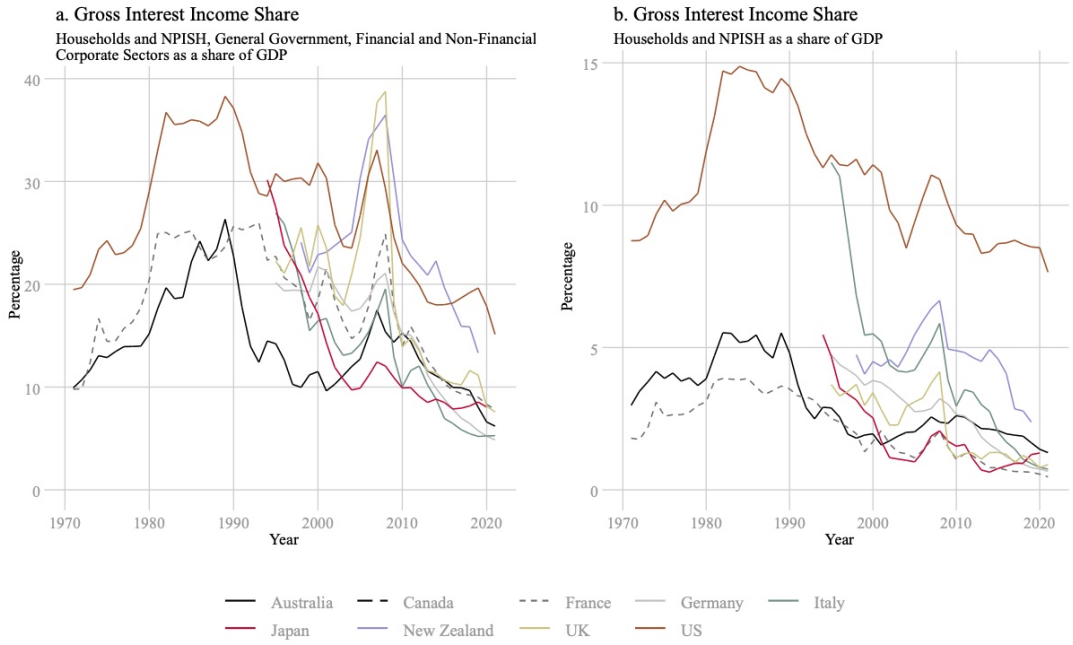
Considering the definition by Keynes of the rentier as the person who would be deriving income chiefly out of interest income payments, the rentier income share could be specified in various forms if we look at the institutional sectors in the 2008 System of National Accounts (SNA), which is the current methodology used in the construction of the OECD Statistics (United Nations 2009, Ch. 4). In it, table 14A specifies four institutional sectors abstracting from the rest of the world sector (ROW), such that we get the following identity as to interest payments/receipts:

$$R_h + R_f + R_c + R_g = P_h + P_f + P_c + P_g \qquad [2]$$

where R stands for interest receipts and P for interest payments from the different institutional sectors according to the subscripts of households (h), financial corporations (f), non-financial corporations (c), and general government (g). Hence, as a first approximation of rentier income share, Figure 4 depicts gross interest income as a share of GDP in two different forms. In panel (a), the left-hand side of the above identity is portrayed for the nine industrialized countries as a

share of GDP from 1971 to 2021, although only Australia, Canada and the United States begin in 1971. The gross interest income share for the four institutional sectors shows a significant increase in the 1980s and early 2000s, whereas it stays relatively low in the 1970s and decreases quickly after the GFC. Panel (b) displays the gross interest income share solely for the household sector — formally, the sector is households and non-profit institutions serving households (NPISH), and it shows a similar evolution as panel (a) although at a much lower level, except for the jump in the GFC which is more modest. Nevertheless, broadly speaking, we do observe a significant rise in interest income accompanying the Volcker shocks in the 1980s and then a gradual decline afterwards, as expected once interest rates started to fall along with inflation rates, and then this decline is interrupted as we neared the GFC.

Figure 4. Evolution of Gross Interest Income Shares, Selected Countries, 1971-2021, Annual Observations



NPISH: Non-Profit Institutions Serving Households
Source: Tables 1 & 14A, System of National Accounts (SNA), OECD.Stat

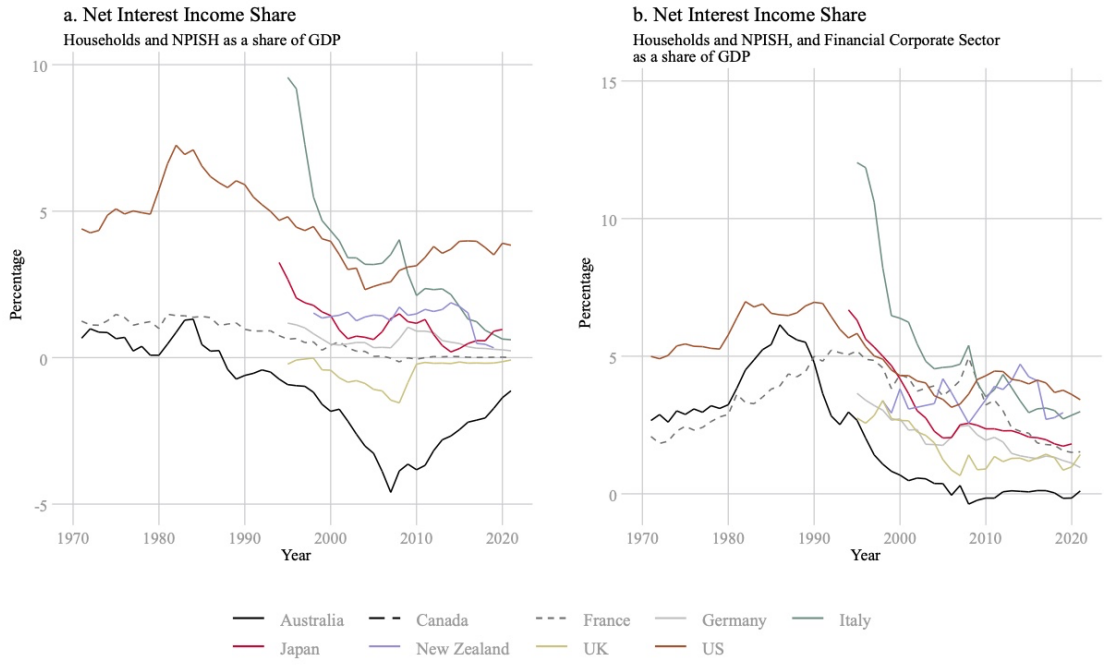
Equation (2) can also be rearranged to portray net interest income as a share of GDP, as in Figure 5 below. Panel (a) depicts the net interest income share for households and NPISH from 1971 to

2021 for the nine selected industrialized countries. In general, for the three countries with available data, the evolution of the rentier shares reaches a peak in the 1980s and then starts to fall gradually until the GFC, where it jumps and then stabilizes at a very low level after the crisis. However, panel (a) shows a peculiar behavior for Australia and the United Kingdom, where the interest share turns negative for a significant period. Düenhaupt (2012) found negative net interest shares for households in the United States in the mid-2000s as we find for Australia and the United Kingdom. She argues that it "can readily be attributed as due to the rising (over) indebtedness of private households in the US, i.e., interest payments to the rest of the world." (Düenhaupt 2012, p. 479)

Indeed, equation (2) above is omitting the ROW net interest payments, such that rising indebtedness to foreign financial institutions could be reflected in negative net interest income shares as in Australia and the United Kingdom for the household sector in Figure 5 panel (a). Furthermore, side-by-side with this "financial liberalization" process where households are increasingly indebted to foreign financial institutions, there was a dramatic structural change in the incidence of indebtedness too, as households in all countries went from being net lenders to net borrowers throughout this era of growing financialization.[11] That would probably also explain some of the decline in the net interest income share accruing to households vis-à-vis financial corporations as we can observe in panel (b) portraying the evolution of net interest income shares from households and financial corporations together. Panel (b) depicts plainly a net interest share evolution that mimics the behavior of gross interest shares and interest rates, namely, an increase in interest shares that peak in the 1980s and then a steady fall afterwards reaching very low and stable levels after the GFC. However, it is easy to observe that interest income data before the 1990s are only available for a few countries and, although the countries depict common trends in general, there are important differences in levels across them.

[11] Kearns, Major & Norman (2020) study the rise in household indebtedness in Australia going back to the 1980s. They underscore the fact that household indebtedness grew more rapidly compared to other industrialized countries due to a larger contribution of financial liberalization, a higher share of dwellings owned per person (where almost all the housing stock is owned by households, so that housing debt is virtually fully owed by the household sector), higher real incomes, and lower real interest rates. As to the importance and implication of this growing financialization as non-financial corporations were becoming net lenders as economies shifted to a regime of Minskian "money manager capitalism", see Seccareccia (2022).

Figure 5. Evolution of Net Interest Income Shares, Selected Countries, 1971-2021, Annual Observations



NPISH: Non-Profit Institutions Serving Households
Source: Tables 1 & 14A, System of National Accounts (SNA), OECD.Stat

The limited availability of data to calculate rentier income shares might be a compelling reason to look for an alternative measure of rentier income that could be used for longer periods and a greater number of countries. This is one of the reasons why one of us (see Seccareccia (1988) and Lavoie & Seccareccia (1988)) came up with a simple measure that would be later called the Pasinetti Index (PI) since it is inspired by the concept of the "fair", "just" or "natural" rate of interest put forward by Luigi Pasinetti to refer to the interest rate that stabilizes income distribution between rentier and non-rentier income over time. This rate of interest must be equal to the sum of the rate of inflation and the rate of productivity growth, and it is analogous to why average real wages growing commensurate with average labor productivity would ensure a stability in the share of labor income vis-à-vis non labor income. Accordingly, this measure of the PI is nothing but the gap between the inflation-adjusted interest rate (or the real interest rate) and the rate of growth of average labor productivity. A PI close to zero would mean a roughly constant distribution between the rentier and non-rentier groups in the economy. A steady positive PI implies an income and

wealth redistribution towards rentier groups, while a negative PI reveals a redistribution towards non-rentier groups.

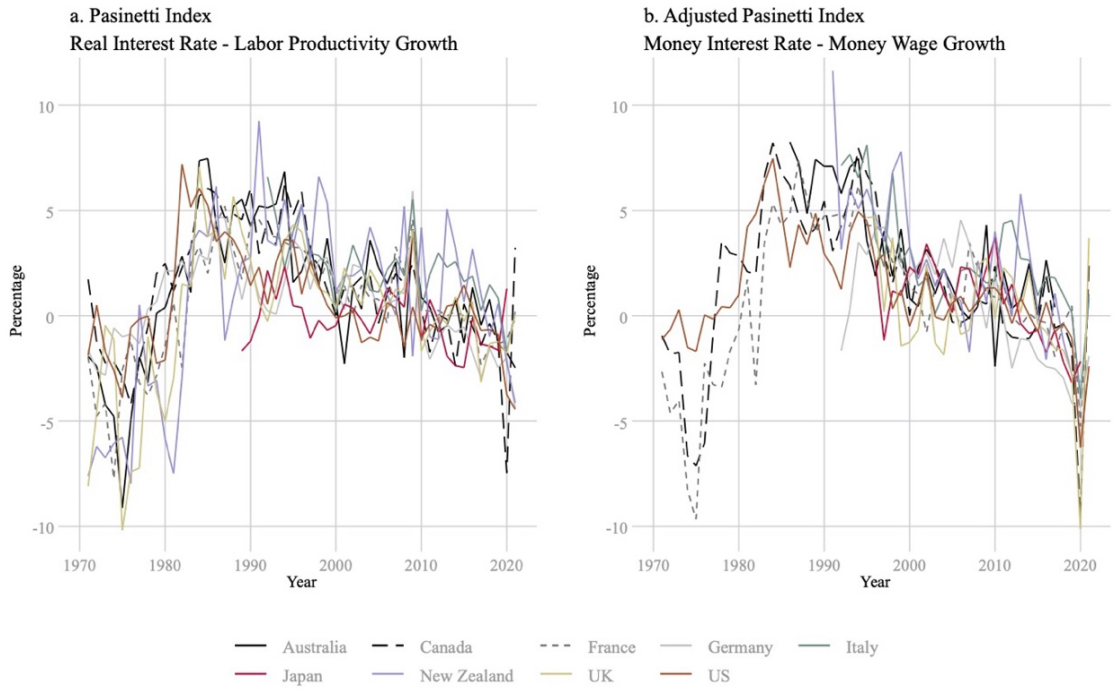
Figure 6 panel (a) portrays the evolution of the PI for the period 1971-2021 for the same nine industrialized countries. The real interest rates are computed with long-term interest rates adjusted to CPI inflation to be more in line with the original definition of the rentier by Keynes. Also, labor productivity is measured as real GDP per hour worked. We again observe at least two different regimes in the evolution of PI: a low-PI regime of zero or negative PI values prevailing in the 1970s and after the GFC; and a high-PI regime with positive PI values starting in the 1980s and all the way until the GFC. However, we can also distinguish within the high-PI regime a period of very high PI values in the 1980s and 1990s, and a period of still significantly positive but lower PI values in the early 2000s.

As discussed in detail in Lavoie & Seccareccia (2019), we have also looked at the case that is much closer to the original preoccupation by Luigi Pasinetti, which was to ensure that rentier wealth would be preserved over time in terms of labor time, and which tied the real rate of interest to the growth rate of real wages in the economy. Despite some data limitations, panel (b) of Figure 6 depicts an adjusted PI that is computed by replacing labor productivity with real hourly labor compensation. This adjustment was proposed and discussed in Lavoie and Seccareccia (2019), which attempted to measure the evolution of rentier income and wealth in labor time based on the original concern raised by Pasinetti (1981). Regardless of the series, both PI measures follow a very similar evolution so that we can also distinguish the low- and high-PI regimes. The adjusted PI remains stuck in negative values during the 1970s and after the GFC, and positive and high values during the 1980s and 1990s. Nevertheless, data are more limited for the adjusted PI: data begin in 1986 and end in 2017 for Australia; they start in Germany and Italy in 1992, in 1996 in Japan (and 2021 is missing), in 1991 in New Zealand, and in 1995 in the UK.

Lastly, by comparing the PI with the interest income shares (Figures 4, 5 and 6), we do identify a similar evolution of the different indicators when data are available. For instance, the Pearson correlation between the gross interest income share in Figure 4 panel (a) and the PI is 0.4, which is significant at the 1 percent confidence level; and the correlation with the adjusted PI is 0.37 and significant at 1 percent level as well. In addition, the correlation of the net interest income share in Figure 5 panel (a) with the PI and the adjusted PI (Figure 6) are 0.36 and 0.4 respectively, which

are significant at the 1 percent level. We argue that this correlation is sufficiently high to consider the PI as a relevant proxy for the rentier income share. As a result, based on the stylized facts and rentier income measures, we can safely say that there was a significant income redistribution towards the rentier groups during the 1980s all the way to the GFC. This era coincides with the implementation of a staunch "inflation first" monetary policy that would be contributing to a "rentier first" redistribution. Conversely, the 1970s decade is characterized by a redistribution towards the non-rentier groups, thereby depicting significant negative PI values and low interest income shares (where data are available). Similarly, the post-GFC era depicts a modest redistribution process towards the non-rentier groups reflected in flat or slightly declining interest income shares, as well as PI values very close to the neutral zero line.

Figure 6. Evolution of Pasinetti Indexes, Nine Selected Countries, 1971-2021, Annual Observations



Source: Key Economic Indicators (KEI) & Productivity and ULC - Annual, OECD.Stat

Appendix II

Table A. Descriptive Statistics, Pool of Selected Countries

Variable	Short-term interest rate	CPI inflation	Unemployment rate
		Annual Data: 1973-2022	
Mean	5.6	4.3	6.7
Standard Deviation	4.8	4.4	2.7
Min	-0.5	-1.3	0.1
Max	23.3	24.2	12.8
Observations	400	448	400
		Quarterly Data: 1973q1-2022q4	
Mean	5.6	4.3	6.8
Standard Deviation	4.9	4.5	2.6
Min	-0.5	-2.2	1.1
Max	25.7	26.5	13.3
Observations	1599	1785	1552

Note: Countries are Australia, Canada, France, Germany, Japan, Italy, New Zealand, United Kingdom, United States

Source: OECD.Stat

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