Dissecting the two-handed approach: 
Who’s the expert hand for what?

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Abstract: In this paper we address the question of the macroeconomic assignment problem of wage and demand policy that is implicit in the “two-handed approach”. It is central to an understanding of this problem to distinguish the two levels of policy instruments and policy makers. Unfortunately, but also illuminatingly, these two perspectives may well lead to opposing policy recommendations. Whereas demand policy is likely to be the instrument better suited to target output – and hence wage policy to target inflation – it is equally likely that demand and wage policy makers should not be entrusted with these targets.
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1. Introduction

The joint importance of demand and supply side policies for macroeconomic stability, growth and employment is hardly disputed among economists. In their authoritative analysis of the European unemployment problem, Blanchard et al. (1986) famously coined the term “two-handed approach” to express the proposition that demand and supply side policies must be used alongside each other in the fight against low growth and high unemployment in Europe. Whilst this principle is widely accepted as a general proposition, disagreements about the relative importance of the two hands (and the different fingers at each hand) in a specific situation remain. There appears to be no consensus at all, however, on the problem of assigning a particular policy instrument to a particular policy objective if a joint optimization of both instruments is unattainable.

In the policy arena, this unresolved issue is quite important since different interest groups and policy-makers keep blaming each other for failing to reach a desired macroeconomic outcome. This is true at least for European countries – and for Germany in particular – where labour union officials keep demanding more expansionary demand policies to improve the dismal labour market performance whereas monetary and fiscal policy makers almost instinctively reject these claims, pointing to their responsibility for price stability and sustainable public finances, respectively. The discussion is also rather vivid among academic economists. The Annual Reports of the German Council of Economic Advisors regularly contain majority and minority statements taking radically different positions on the assignment of policy responsibilities (see Sachverständigenrat 2002, 2003, 2004) as well as Horn/Logeay (2004).
In this paper, we address the policy assignment problem that was left unresolved by the original proponents of the two-handed approach. We will adopt a rather high level of abstraction, treating wage policy as representative for all supply-side measures and allowing for no more than one instrument of demand management. Also, we will consider only two macroeconomic target variables, unemployment and inflation. From Tinbergen’s (1952) pioneering analysis, we know that two independent and effective policy instruments are required for meeting two policy objectives. But the Tinbergen principle has nothing to say about which instrument to assign to which target variable. Mundell (1962) solved this problem with his famous “principle of effective market classification” which calls for the assignment of each instrument to the target variable on which it has a relatively larger effect. This amounts to an application of the Ricardian concept of comparative advantage to normative policy analysis.

Somewhat surprisingly, the comparative advantages of supply and demand policies in addressing inflation and employment targets have, to the best of our knowledge, not been systematically analysed in the literature before - at least not by evaluating the relative effects of alternative policy instruments on different target variables. To develop such an analysis, we proceed in three steps: In section 2, we review the economic policy debate on the proper tasks to be assigned to supply and demand side policies. We contrast the ruling orthodox policy assignment with an opposite heterodox view which we trace back to Keynes.

Next, we address the assignment problem theoretically. This can be done in two ways. From a purely technocratic perspective, one can consider given objectives and given instruments within a well-defined structural model which links the objectives with the instruments and apply the principle of effective market classification to the question at hand by looking at the relative impact of the two instruments. This is what Mundell (1962) has done with regard to the use of fiscal and monetary policy in an open-economy model. In section 3, we perform an analogous exercise with regard to the use of supply and demand policy in a prototype macro-model. A crucial shortcoming of the technocratic approach is its neglect of the incentives of policy-makers. In section 4, therefore, we move on to
a political economy approach which determines instrument settings endogenously, starting from the presumption that policy choices are made in a rational way by optimizing policy-makers. As far as macroeconomic policy is concerned, this type of analysis dates back to the seminal papers by Kydland/Prescott (1977) and Barro/Gordon (1983) who shifted the focus from the technical instrument-target relationship to the institutional setting in which policy-makers operate. We will argue that both perspectives must be taken into account when we think about macroeconomic policy. Section 5 concludes.

2. Orthodox and heterodox assignments for demand-side and supply-side policies

The orthodox assignment
In the design of the European Monetary Union, a key issue was how to handle the interaction between centralized European monetary policy and the many policy domains that remained in the hands of national policy-makers, in particular wage and employment policies and fiscal policy. The large potential for spill-over effects, both across national borders and across policy areas, led many politicians to call for sophisticated coordination mechanisms. As it turned out, however, the spill-over problem was not addressed by formal institutionalized coordination, but by the assignment of well-defined responsibilities to the various policy-making authorities: The European Central Bank has got a mandate to maintain price stability whereas national wage setting and supply-side policies such as labour market and social policies are supposed to take care of each country’s employment performance. This is what we call the orthodox policy assignment. The only significant effort to subject national policies to some type of a coordinated regime is the Stability and Growth Pact which was designed to enforce sustainable fiscal policies.

Politically, this clear separation of responsibilities means that policy makers cannot excuse poor performance in their assigned policy areas with adverse spill-overs from other policy areas even though such spill-overs may render their task
more difficult. Of course, this institutional design allows for some measure of *implicit coordination*. The unconditional commitment of monetary policy to price stability, in particular, serves to condition the behaviour of wage setters who act in an autonomous decentralized way on the national level. As Issing (2002, p. 317) put it, national social partners „only act in their best own interest if they see to it that price stability and high employment are compatible.“¹ The implicit hypothesis underlying this position is that the game of macroeconomic stabilization and employment policy leads to better outcomes if it is not played as a cooperative game, but as a non-cooperative game, with monetary policy acting as a Stackelberg-leader committed to price stability. In this game, social partners are expected to set employment-friendly wages conditional on the framework of monetary stability provided by the central bank. Quite in line with the Stackelberg model, they can in turn expect to be rewarded by a more accommodating stance of monetary policy if they avoid wage increases that are in conflict with price stability.²

The theoretical foundation of this orthodox policy assignment is twofold. One premise is that responsibilities must be clearly defined and allocated if the policy parameters that matter for society’s basic macroeconomic objectives cannot be controlled by a single policy-maker who pursues a unified, coordinated strategy. The second premise is the natural rate hypothesis, i.e. the theoretical doctrine that demand-side policies cannot affect labour market performance in the long run (Friedman 1968). Although doubts about the validity of this doctrine have been expressed time and again (Solow 1986, Ball 1997, Akerlof/Dickens/Perry 2000), it has long become a central pillar of the mainstream theory taught by all standard textbooks of macroeconomics.

The heterodox assignment and the „two-handed approach“
Even if the natural rate hypothesis is accepted as a rough approximation, the orthodox policy assignment does not follow as unequivocally as it might appear at

first sight. To be sure, according to the natural rate hypothesis, sustainable employment gains can only be attained through supply-side reforms that improve the structure of the labour market or the nature of the wage-setting process. But the path of transition to a new, better equilibrium is crucially shaped by the behaviour of the demand side. In the absence of demand-side support, the burden of adjustment is placed entirely on the wage-price mechanism. The simplest way to make this point is by considering the well known quantity equation

\[ M \cdot V = P \cdot Y. \]

The quantity of money \( M \) times velocity \( V \) represents aggregate nominal demand for goods and services which must be equal to the product of the price level \( P \) and real output \( Y \). If successful supply-side policies succeed in raising the equilibrium level of \( Y \), actual \( Y \) can rise to this level only if either nominal demand \( MV \) expands or the general price level is adjusted downwards. As pointed out above, the orthodox policy assignment is not inconsistent with an active role of demand-side policies in accommodating supply-side reforms since the stabilization of \( P \) requires an elastic response of \( MV \) to any supply-side induced change in the equilibrium level of \( Y \). But the orthodoxy has been criticized repeatedly for ignoring or neglecting such an active role. A particularly poignant criticism was levelled in a widely noted „Manifesto on Unemployment in the European Union“ initiated by the late Franco Modigliani in 1998 and signed by a large number of prominent macroeconomists:

„This Manifesto challenges a pernicious orthodoxy that has gripped Europe’s policy makers. It is that demand and supply side policies must have different aims, that a limited number of supply side policies are to be devoted to fighting unemployment, and that demand management (and particularly monetary policy) is to be devoted solely to fighting inflation“ (Modigliani et al. 1998, S. 327f.).

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3 See the extensive analysis by Gordon (1996).
4 In an inflationary environment with continuously rising nominal demand, price level adjustment might be brought about by a temporary slowdown of inflation, which does not necessarily involve prices falling in absolute terms.
The Manifesto calls for a bundle of complementary supply-side and demand-side measures to combat European unemployment. It thereby takes up the recommendation of earlier analyses of the European unemployment problem by Olivier Blanchard, Rudiger Dornbusch, and Richard Layard (1986) whose essays, commissioned by the Brussels-based *Centre for European Policy Studies*, culminated in what soon became known as the „two-handed approach“ to growth and employment policy:

„Neither supply nor demand measures will by themselves create and sustain employment growth. This simple point forms the basis of our approach: structural changes on the supply side are required if employment growth is to be sustained, but a boost is needed to start the process. This boost must come from timely supply measures, sustained and validated by demand.”

The slogan of the „two-handed approach“ leaves no doubt that the polarized debate on the proper cure for unemployment, so typical for European politics, and German politics in particular, pitting proponents of structural reforms and wage moderation against proponents of demand stimulus, misses the point.

The arguments that speak against placing the burden of adjustment exclusively on the supply side and on the wage-price mechanism have been known for a long time. Most of them were enumerated by Keynes (1936) in his legendary analysis of wage flexibility in Chapter 19 of the *General Theory*. His reasoning was concerned both with the speed of adjustment and with the reliability of the transmission mechanism translating wage and price adjustments into changes of output and employment. These considerations, which centred on redistribution between debtors and creditors as well as on the real interest rate effects of deflation and disinflation, are as relevant today as they were then.5 Tobin (1975, 1980) has shown that the adjustment process of wages and prices, if unaided by supportive aggregate demand management, can easily fail to lead to the desired new equilibrium and can even be destabilizing.

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5 For a more detailed discussion of Keynes’s analysis of wage flexibility in the context of current policy debates, see Landmann (2001).
The conclusion which Keynes (1936, p. 267) derived from his analysis is well known. He warned against relying on wage and price adjustment to bring a market economy back to full employment: “The economic system cannot be made self-adjusting along these lines.” His preferred strategy for wage policy, therefore, was simply to keep the aggregate nominal wage level stable. In a stationary economy - which was the context Keynes had in mind -, a stable wage level translates into a stable price level. To get the same result in a growing economy, obviously the rate of trend productivity growth must be factored into nominal wage growth. From his judgment that the maintenance of full employment should not be entrusted to wage and price adjustments, he immediately arrived at his well-known conclusion that aggregate demand management policies should be used to keep output and employment on track.

Evidently, the assignment rule by which Keynes allocated responsibilities to wage policy and to demand policy is the reverse of what we have dubbed the orthodox assignment above. It was heterodox in Keynes’s days, was turned into the mainstream view for a while by the Keynesian revolution and has become heterodox again today. We turn next to an evaluation of the orthodox and heterodox assignments.

3. **Solving the assignment problem I: The technocratic view**

**The Model**

We now develop the simplest possible model that allows a discussion of the relative merits of wage and demand policies at the macroeconomic level. Not surprisingly, this is the standard textbook model of aggregate demand and aggregate supply. Note that the aggregate supply curve does not (as in most

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6 This recommendation must be seen, of course, against the backdrop of the dramatic wage deflation experienced by the United Kingdom during the 1920s and in the Great Depression.
textbook expositions) require the assumption of perfect competition on goods markets but may also be interpreted as describing optimal price setting decisions under imperfect competition. The following log-linear equations are the key elements of our model:

\begin{align*}
(1) \quad y &= \alpha \cdot n \quad \text{production function (} 0 < \alpha < 1) \\
(2) \quad p &= w + \frac{1-\alpha}{\alpha} y \quad \text{price setting ("AS- curve"')} \\
(3) \quad y &= \beta_1 m - \beta_2 p \quad \text{aggregate demand ("AD-curve"')} \\
(4) \quad u &= -n \quad \text{unemployment rate}
\end{align*}

All lower case Latin letters – except \( u \) – denote natural logarithms of the respective levels. Parameters are denoted by Greek letters and positive.

Eq. (1) links output \( y \) and employment \( n \). In this exposition, we ignore any shift parameters of the production function. The price setting equation (2) explains the price level \( p \) in terms of nominal wages \( w \) and output \( y \). Again, we ignore other supply side characteristics that may shift the price setting schedule such as the degree of competition on the market for goods and labour in the economy. Eq. (3) is the aggregate demand equation. Although the parameter "\( m \)" is named to evoke the connotation of "money", it should be broadly interpreted to encompass any policy instrument that is capable of influencing nominal demand. The possibility of \( \beta_1 \neq \beta_2 \) is introduced to allow for the possibility that changes in \( p \) do not only deflate the nominal policy variables but may work through other channels such as wealth effects as well. Eq. (4) simply translates employment into the unemployment rate. This approximation holds true for small unemployment rates and a labour force that is normalized to unity.

\footnote{This is called the price setting equation in the by now canonical model by Layard et al. (1991).}
Solving the model for \( u, p \) and the real wage \( w - p \), we get the following solution:

\[
\begin{bmatrix}
   u \\
   p \\
   w - p
\end{bmatrix} = \frac{1}{\Delta} \begin{bmatrix}
   -\beta_1 & \beta_2 \\
   (1 - \alpha)\beta_1 & \alpha \\
   - (1 - \alpha)\beta_1 & (1 - \alpha)\beta_2
\end{bmatrix} \begin{bmatrix}
   m \\
   w
\end{bmatrix},
\]

where \( \Delta = \alpha + (1 - \alpha)\beta_2 \).

A first important – albeit rather trivial – insight from (5) is the very foundation of the “two-handed approach”:

**Result 1:** (a) All endogenous variables – including the real wage – are jointly determined by both policy instruments. (b) The two policy instruments are jointly capable of reaching two targets, e.g. specific values for unemployment and inflation.

Two points follow immediately from this result: First, a “two-handed approach” is necessary (and in this simple model sufficient) to control the macroeconomic situation. Moreover, since both instruments affect both variables, outright coordination would be desirable in principle. Second, the frequently voiced recommendations for wage policy in terms of the real wage are ill-advised. The real wage is an endogenous variable that is jointly influenced by wage and demand policies – and is not available “for wishing” as Robert Solow (1986) has succinctly put it. The second part of Result 1 is simply a statement of the time-honoured Tinbergen (1952) rule.

**The Assignment Problem**

If outright coordination and collaboration of the two policy areas is not feasible, it is important to know which instrument is better suited to attain a certain target. As Mundell (1962) put it: “Policies should be paired with the objectives on which they have the most influence.” As it is clear from (5), both instruments influence both targets. Hence, the optimal solution of the policy assignment problem boils
down to a judgment of “plausible” parameter constellations. Moreover, this property of the model also implies that one must compare relative effects.\(^8\)

Formally, we have to look at the expression \[ \frac{du}{dm} \left| \frac{dp}{dw} \right| \frac{dp}{dm} \left| \frac{du}{dw} \right| \], which from Eq. (5) is given by:

\[ \frac{du}{dw} \left| \frac{dp}{dm} \right| = \frac{\beta_1}{\beta_2} \left( 1 - \alpha \right) \beta_1 = \frac{\beta_1}{\alpha} \left( \frac{\alpha}{\beta_2} - (1 - \alpha) \right), \]

If the bracketed term is positive (negative), demand policy has a comparative advantage (disadvantage) to control unemployment relative to wage policy. Thus, for \( \alpha/\beta_2 > 1 - \alpha \), the heterodox assignment is efficient. The intuition of this condition is readily understood from fig. 1 that shows the AS curve and AD curve implied by equations. (1) – (4) in the \( p-u \)-space.

![Figure 1: Equilibrium](image)

If the AS-curve is relatively flat (as depicted), shifting this schedule by varying \( w \) will have a rather strong (weak) effect on \( p(u) \). By the same token, shifting the AD curve has a relatively strong (weak) impact on \( u(p) \) in this case. Conversely,

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\(^8\) The same is true in the model of Mundell (1962), where the interest rate and fiscal policy stance are the two instruments, internal stability and the balance of payments positions the two targets. As is well known, he made the case to use fiscal policy for internal stability and the interest rate for external stability “because the ratio of the effect of the rate of interest on internal stability to its effect on the balance of payments is less than the ratio of the effect of fiscal policy on internal stability to its effect on the balance of payments“.
if the AS-curve is steeper than the AD-curve, wage policy should be targeted at unemployment and demand policy at prices.

The relative slope of the two schedules is an empirical question, of course. The answer to this question will generally depend on the time horizon under consideration. Treating $w$ and $m$ as policy parameters only makes sense over a relatively short time span such as the duration of wage contracts. Here, the picture is very clear, however. Short run demand stimuli show up relatively quickly in quantities (output and employment), whereas cost stimuli such as wage hikes translate quickly into price hikes. This consideration strongly suggests

**Result 2:** The orthodox policy assignment violates the principle of effective market classification if the aggregate supply curve is flatter than the aggregate demand curve – which is empirically very plausible in the short run. The heterodox policy assignment is efficient in this case.

This position is shared by the famous “Manifesto on the Unemployment Problem in the European Union” (Modigliani et al. 1998, p. 347ff.). Here, the exclusive (and inefficient, as implied by Result 2) focus of the ECB on price stability is denounced as follows:

> “Realistically, [the ECB] has very limited control over the price level, at least in the short run. Indeed, its policy instruments ... do not directly affect prices when there is slack in the labour market. Given large-scale unemployment, they can affect prices only indirectly by affecting the rate of economic activity, and hence the rate of unemployment ... and thereby the growth of wages and finally prices. But unemployment is not a very potent instrument to control inflation when there is already plenty of slack while it has a major impact on society’s welfare.”

The argument clearly is that in the short run, and in the presence of idle capacities, it may be very costly to control the price level via demand policy instruments.

What are the consequences of an inefficient policy assignment? As we know from the analysis of Mundell (1962), a mistaken pairing of instruments and targets may
easily result in an unstable system. We will show that, at least for a standard specification of instrument adjustment, no such malign dynamics will occur in the context of our model. Macroeconomic performance nevertheless improves if policy-makers make proper use of their levers according to their respective comparative advantage.

**Dynamics**

We now turn to a simple description of the dynamics implied by orthodox and heterodox policy assignments. Denoting (exogenous) equilibrium values of inflation and unemployment by \( p^\ast \) and \( u^\ast \), we represent the two policy regimes by the following dynamic adjustment equations:

\[
(7a) \quad \dot{m} = \omega_1 (p^\ast - p) \\
(7b) \quad \dot{w} = \omega_2 (u^\ast - u) \\
(8a) \quad \dot{m} = \eta_1 (u - u^\ast) \\
(8b) \quad \dot{w} = \eta_2 (p^\ast - p),
\]

where \( \omega_i > 0 \) and \( \eta_i > 0, \ i=1,2 \) denote the adjustment coefficients. Clearly, eqs. (7) and (8) depict the orthodox and heterodox policy assignment, respectively.

The implied dynamics can be shown in terms of the instrument variables \( w \) and \( m \) or in terms of the target variables \( u \) and \( p \). We now derive the phase diagram for the former and give a simulation for the latter.

Plugging the solutions for \( p \) and \( u \) from eq. (5) into eqs. (7) and (8) yields two different interdependent first-order dynamic systems for the instruments of the form

\[
\begin{bmatrix}
\dot{m} \\
\dot{w}
\end{bmatrix} = \mathbf{J}_i \begin{bmatrix}
m \\
w
\end{bmatrix} + \mathbf{C}_i, \quad i = \eta, \omega.
\]

The Jacobi matrices \( \mathbf{J}_i, \ i = \eta, \omega \) are given by

\[
(9) \quad \mathbf{J}_\omega = \frac{1}{\Delta} \begin{bmatrix}
-(1-\alpha)\beta_1\omega_1 & -\alpha\omega_1 \\
\beta_1\omega_2 & -\beta_2\omega_2
\end{bmatrix}
\]

and

\[
(10) \quad \mathbf{J}_\eta = \frac{1}{\Delta} \begin{bmatrix}
-\beta_1\eta_1 & \beta_2\eta_1 \\
-(1-\alpha)\beta_1\eta_2 & -\alpha\eta_2
\end{bmatrix}.
\]
It is straightforward to show that $\text{tr}(J_i) < 0$ and $|J_i| > 0$, $i = \eta, \omega$. Hence, both systems are stable. Depending on the parameter values, the movement back to equilibrium is cyclical or non-cyclical. Fig. 2 summarizes the dynamic behaviour in the phase diagrams implied by the orthodox and heterodox assignments, respectively. The equilibrium loci represent the $(m, w)$ configurations consistent with the equilibrium unemployment and price level, respectively, and hence with the stationarity of whatever instrument is assigned to the respective target variable. Obviously, these equations are identical for both assignment regimes.

![Phase diagrams](image)

**Figure 2: Dynamic adjustment under different instrument assignments**

The relative slopes of the equilibrium loci reflect our assumption about the relative slopes of the AD curve and the AS curve in fig. 1 above. The logic of comparative advantage underlying the principle of effective market classification dictates that the $m$-instrument ($w$-instrument) should be directed towards the target variable represented by the steeper (flatter) equilibrium locus. As shown above, this amounts to the desirability of the heterodox assignment. Although the criterion of comparative advantage does not coincide with the stability condition for the dynamic system (as it did in Mundell’s model), the adjustment dynamics is nevertheless strongly affected by the assignment regime. 9 Loosely speaking, the

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9 Stability hinges on the precise specification of the adjustment dynamics. In a discrete, cobweb-like specification of the adjustment dynamics, the orthodox assignment can immediately be seen to be unstable, whereas the heterodox assignment would be stable.
inefficient orthodox assignment displays a stronger propensity to produce cyclical oscillations, whereas the efficient heterodox assignment makes the system home in on its equilibrium more directly. In fig. 2, this is illustrated by the quite different trajectories leading from a depressed situation A (with \( p > p^* \) and \( u > u^* \)) back to equilibrium. Under the orthodox assignment, wage policy first moves in the “wrong” direction (relative to its final destination) and thus produces unnecessary excess volatility both in the instruments and in the target variables. The consequences for \( u \) and \( p \) are visualized in the two panels of fig. 3. Differentiating (5) with respect to time and plugging in (7) or (8), respectively, yields two differential equation systems for \( p \) and \( u \). This system may be readily solved for any initial values.\(^{10}\)

![Graphs showing Orthodox and heterodox adjustment](image)

**Figure 3: Orthodox and heterodox ways out of a depression**

Both variables display a higher volatility under the inefficient orthodox policy assignment.

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\(^{10}\) For the simulations shown in fig. 3, we assumed the following values:

\[ p^* = u^* = 2; \quad \beta_i = \eta_i = \omega_i = 1, \quad i = 1, 2; \quad \alpha = 0.7; \quad p(0) = 0; \quad u(0) = 10. \]
Possible problems of the heterodox policy assignment

From the above analysis, the case for a heterodox policy assignment seems to be pretty strong. The almost “instinctive” reservation most economists would have against this policy recommendation would not stem from quibbles about the relative slopes of the AS- and AD-curves. Rather, it comes from the imputation that policy makers can not be trusted to make proper use of their respective instruments. In particular, it seems somewhat quixotic to rely on wage setters to control the price level. Realistically, wage setters also attempt to pursue other targets such as income redistribution. If this is the case, however, it is not longer reasonable to believe that demand policy makers will and should leave the control of the price level to wage setters. But this kind of consideration is clearly beyond the “technocratic” perspective of this section. Hence, the next section turns to the interdependent decision problems of policy-makers and thereby shifts the focus from the mere impact of the policy instruments to the incentives of those using them.

4. Solving the assignment problem II: The political economy view

In this section, the assignment problem will be solved taking into account the incentives of policy makers to use their respective instruments for their particular aims. Hence, in contrast to the technocratic view of the last section, this analysis is conducted from a political economy point of view.

As it is well known at least since the seminal paper by Rogoff (1985), under this perspective normative questions of policy design are still relevant. More specifically, since society may decide to delegate demand policy, it is interesting to ask how this delegation should look like if the action of wage setters are simultaneously taken into account. Moreover, we will ask how the result under optimal delegation will differ from what could be achieved if full cooperation between the macroeconomic players were feasible.
In the by now traditional monetary policy literature following the contributions by Kydland/Prescott (1977) and Barro/Gordon (1983), the main result is the desirability of the concentration of monetary policy on price stability. This would turn the result of the preceding section of this paper on its head. It is important, however, to recognize that this result stems from the assumption of the futility of monetary policy (or demand management) to influence anything beyond the price level in the longer run.11 If this is taken for granted, only the presence of supply shocks may justify looking at real variables for monetary policy (see Rogoff 1985, Lohmann 1992).

The long-run irrelevance of aggregate demand management was questioned in models of the interaction between demand management and wage setting since Gylfason/Lindbeck (1994). More recently, two papers by Guzzo/Velasco (1999) and Cukierman/Lippi (1999) also showed that this interaction may lead to important non-neutralities and a reconsideration of the proper division of labour between the two policy entities.

In this section, we use the already established framework of eqs. (1) – (4) as the basic description of the economy. We further simplify notation by setting $\beta_1 = \beta_2 = 1$ which yields

\[
(5') \quad \begin{bmatrix} u \\ p \end{bmatrix} = \begin{bmatrix} -1 \\ (1-\alpha) \end{bmatrix} \begin{bmatrix} m \\ w \end{bmatrix}.
\]

The policy makers are assumed to set their instruments such that their respective objectives functions are maximized.

Demand policy is assumed to minimize the social objective function that is quadratic in the deviations of “bliss” levels of unemployment and inflation

\[
(11) \quad L_D = u^2 + \varepsilon \cdot p^2,
\]

11 There is also a rather extended literature arguing that and why this may simply be not the case. For a recent contribution to this literature see Graham/Snower (2002).
where both bliss levels are normalized to zero. $\varepsilon$ is a measure of the relative importance of both target variables.

Wage setting takes place in a rather complex environment between employers and employees and/or their respective representatives. For the purpose of this paper, all relevant characteristics of this environment – ranging from the impact of minimum wage legislation to efficiency wage considerations – are condensed in an “employment target” of wage setters of $\bar{u} > 0$. This does not literally mean that wage setters ceteris paribus object to full employment. Their individual objectives (above all: distributional concerns), however, imply a behaviour as if they would aim for this employment target that is different from that of society as a whole. Traditionally, the literature on wage setting neglects a possible interest of wage setters in inflation. However, there is a number of reasons why they also care about this. E.g. Cubitt (1995) argues that corporatism will lead wage setters to take into account the effects of their decision on inflation. The same is true if unemployment benefits are fixed in nominal terms (see Berger et al. 2001).

Hence, the objective function of the wage setters may be summarized as follows:

\[
L_w = (u - \bar{u})^2 + \phi \cdot p^2.
\]

$\phi = 0$ captures the case of an exclusive interest on “real” variables on the part of wage setters. One should note that $\phi > 0$ only makes sense if wage setting is not completely decentralized since in this case, wage setters would not perceive an effect of their action on inflation and will act accordingly.\(^{12}\)

The interaction between demand policy and wage policy can be depicted by two plausible, but distinct timing-structures. First, one may assume that wages and the instrument of demand policy are set simultaneously and hence apply the Nash solution concept. This modelling choice may be interpreted as capturing the situation of repeated sequential moves of both players. Second, and alternatively, one may put wage setters into the position of a Stackelberg leader and thus give

\(^{12}\) See Jerger (2002) on this point.
demand policy the possibility to react to “predetermined” wages. Since both scenarios end up with possibly very different implications, we look at each in turn.

**Wage and demand policy I: Playing Nash**

Knowing the description of the economy (5'), and taking the action of the respective counterpart as given, the two policy makers will set $m$ and $w$ such that the loss functions (11) and (12) are minimized. This leads to the following reaction functions:

\[(13) \quad m = \frac{1 - (1 - \alpha) \alpha \varepsilon}{1 + (1 - \alpha) \varepsilon} w \quad \text{and} \quad \]

\[(14) \quad w = \frac{1 - (1 - \alpha) \alpha \phi}{1 + \alpha^2 \phi} m + \frac{1}{1 + \alpha^2 \phi} \bar{u}. \]

Plugging these reaction functions into (5') leads to

\[(15) \quad \begin{bmatrix} u \\ p \end{bmatrix} = \begin{bmatrix} (1 - \alpha) \epsilon \\ 1 \end{bmatrix} \frac{\bar{u}}{(1 - \alpha) \epsilon + \alpha \phi}. \]

For $\phi = 0$, (15) yields the traditional result of an unemployment rate that is completely governed by the objectives of wage setters ($u = \bar{u}$) and an inefficiently high inflation rate ($p = \bar{u} / (1 - \alpha) \epsilon > 0$). In this case, it is clearly desirable from a welfare point of view to delegate monetary policy to an “ultra-conservative” institution that is exclusively occupied with reaching price stability. In general, however, (15) implies a trade-off between $p$ and $u$ in equilibrium. This trade-off is governed by the relative weight $\epsilon$ with which demand policy pursues the inflation objective and can be readily calculated by eliminating $\epsilon$ from the two equations in (5') as

\[(16) \quad p = (\alpha \phi)^{-1} (\bar{u} - u). \]
This trade-off also modifies the optimal delegation which now will be to an institution that is less than ultra-conservative. Suppose that society entrusts demand policy to an agent that acts with an inflation weight of $\varepsilon$. Then, this leads to the macroeconomic outcome

\[
\begin{pmatrix}
u \\ p\end{pmatrix} = \begin{pmatrix}(1-\alpha)\varepsilon \\ 1\end{pmatrix} \frac{\overline{u}}{(1-\alpha)\varepsilon + \alpha \phi}.
\]

Optimal delegation then is the solution to the following problem:

\[
\min_{\varepsilon} L_D = \left(u(\varepsilon)\right)^2 + \varepsilon \cdot \left(p(\varepsilon)\right)^2,
\]

observing \((15')\). This leads to the following optimal value of $\varepsilon$:

\[
\varepsilon_{opt} = \frac{\varepsilon}{\alpha(1-\alpha)\phi}
\]

and to

**Result 3:** If the interaction between demand and wage policy is modelled as the solution to a Nash game, optimal delegation will depend on the inflation aversion of wage setters. More specifically, the more wage setters care about inflation, the less conservative optimal demand policy will be.

Plugging \((18)\) into \((15')\) gives the macroeconomic outcome under optimal delegation:

\[
\begin{pmatrix}
u \\ p\end{pmatrix} = \begin{pmatrix}\varepsilon \\ \alpha \phi \varepsilon + \alpha \phi \overline{u}\end{pmatrix} \frac{\overline{u}}{\alpha \phi \varepsilon + \alpha \phi \overline{u}}.
\]

Hence, optimal delegation (for $\phi > 0$) will lead to a positive inflation rate, but also to an unemployment rate that is lower than what the wage setters intend ($u < \overline{u}$). Clearly, a higher value of $\phi$ will improve the macroeconomic outcome since it basically means that the conflict between society and wage setters is mitigated. In the extreme case of $\phi \to \infty$, the macroeconomic bliss point of $p = u = 0$ would be attainable. In this sense, the heterodox assignment would turn out as optimal at the level of political agents as well as on the level of instruments.
In the (plausible) case of $\phi < \infty$, (15’’) immediately suggests a Pareto-improving cooperation between the two policy areas. This is shown in fig. 4.

Fig. 4 depicts the utility levels of society and wage setters in the optimal solution (15’’) of the non-cooperative game. Indifference loci of society (solid line) and wage setters (dashed line) are given as ellipses around the respective bliss points. Smaller ellipses are associated with higher utility levels. Thus, all points within the lens that is formed by the two indifference loci Pareto-dominate the solution (15’’). At $p = 0$, there is a “contract curve” that shows all Pareto-optimal combinations of $p$ and $u$ that may be reached from (15’’). This establishes our

**Result 4:** If the interaction between demand and wage policy is modelled as the solution to a Nash game and wage setters display some degree of inflation aversion, there is a well-defined potential for mutual beneficial cooperation between the two policy areas. Cooperation completely eliminates any inflation bias, whereas the consequences for unemployment are ambiguous.
Wage and demand policy II: Playing Stackelberg

If wage setters act as Stackelberg leaders with respect to demand policy, they will take into account the optimal reaction (conditional on \( w \)) of demand policy which is given by the reaction function (13). Hence, the objective function of wage setters becomes

\[
L_w = \left( \frac{(1-\alpha)e - w - \bar{w}}{1+(1-\alpha)^2e} \right)^2 + \phi \left( \frac{1}{1+(1-\alpha)^2e} w \right)^2.
\]

Minimizing with respect to \( w \) leads to the wage equation

\[
w = \frac{(1-\alpha)e(1+(1-\alpha)^2e)}{(1-\alpha)e^2 + \phi} \bar{w},
\]

and together with (13) and (5’) to the following macroeconomic outcome:

\[
\begin{bmatrix}
u \\ p
\end{bmatrix} = \begin{bmatrix}
(1-\alpha)e \\
1
\end{bmatrix} \frac{(1-\alpha)e\bar{u}}{(1-\alpha)e^2 + \phi}
\]

For \( \phi = 0 \), this solution is the same as in the Nash game, i.e. \( u = \bar{u} \) and \( p = \bar{u}/(1-\alpha)e \). Thus, the policy recommendation of installing an ultra-conservative demand policy (Rogoff 1985) is still valid – at least in the absence of supply shocks. This constitutes

**Result 5:** If wage setters do not care about inflation, it is socially optimal to entrust demand policy exclusively with the control of the price level regardless of the timing assumption in the strategic game between wage and demand policy.

If \( \phi > 0 \), this result changes drastically, however. As it is immediately clear from an inspection of (20), an ultra-populist demand policy (\( \tilde{e} = 0 \)) would lead to the social bliss values of \( p = u = 0 \). Hence, we have

**Result 6:** If the interaction between demand and wage policy is modelled as the solution to a Stackelberg game and wage setters display some degree of inflation aversion, it is socially optimal to entrust demand policy exclusively with the
control of the unemployment rate. Clearly, this does not leave any further potential for Pareto-improving cooperation.

Although this result may be surprising, the intuition behind it is quite simple. If demand policy can move after wage setting and is known not to care about inflation at all, it can and will see to full employment. Anticipating this, wage setters will – albeit cantankerously – take over responsibility for $p$, simply since there is nothing they can do about $u$. This implies a justification for a heterodox assignment of the policy objectives to the respective policy makers. Note, that the optimality of this assignment does not rest on any assumptions concerning relative slopes of AS- and AD-curves.

**Policy implications**

Unfortunately, the analysis in this section leads to vastly differing policy conclusions depending on how exactly the strategic interaction of the two policy makers is specified and whether or not wage setters display some degree of inflation aversion. The following table 1 summarizes the different sets of assumptions and the respective implications.

<table>
<thead>
<tr>
<th>$\phi$</th>
<th>Nash</th>
<th>Stackelberg</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\phi = 0$</td>
<td>Optimal delegation implies orthodox assignment and leads to $p = 0$ und $u = \bar{u}$, which does not leave any room for Pareto-improving cooperation.</td>
<td></td>
</tr>
<tr>
<td>$\phi &gt; 0$</td>
<td>Optimal delegation implies „mixed assignment“ and leads to $p &gt; 0$ and $u &lt; \bar{u}$. Under Pareto-improving cooperation $p = 0$ is feasible.</td>
<td>Optimal delegation implies heterodox assignment and leads to $p = u = 0$ from which no further Pareto-improvements are possible.</td>
</tr>
</tbody>
</table>

*Table 1: Solving the assignment problem at the institutional level*
In view of the differences spelled out in table 1, one needs to take a stand on the “appropriate” scenario. This is a rather difficult task since all models are stylized versions of reality, of course. The following considerations might be useful in “picking” the correct set of conclusions:

The scenario of our Result 6 that leads to the recommendation of the heterodox policy assignment at the level of policy makers displays some features that are empirically very implausible. More specifically, for a certain range of parameters, it implies that a more conservative stance of demand policy will lead to higher inflation. Empirical studies by and inspired by Alesina/Summers (1993), however, showed that inflation declines with more conservative central bankers in office. Although these studies focused on monetary policy alone and suffer from measurement problems, it seems far-fetched to expect the exact opposite from a more comprehensive look at the data. This conclusion is also consistent with the self-perception of the political agents – e.g. wage setters would be surprised to learn that their action are primarily or even exclusively about inflation.

Nevertheless, the assumption of inflation aversion of wage setters seems plausible. Van Lelyfeld (199) showed that workers are less inflation averse than the rest of society, but not indifferent to inflation. Also, in many countries (at least in Europe), wage bargains are sufficiently centralized for this channel to operate. Thus, a “mixed assignment” seems to be the best advice for the institutional level. The more responsibility wage setters feel – and exercise – for inflation, the more it is desirable that demand management looks beyond the control of inflation.

5. Conclusions

In this paper we addressed the question of the macroeconomic assignment of wage and demand policy that was left unanswered by the original concept of a “two-handed approach”. It is central to an understanding of this problem to distinguish the two levels of policy instruments and policy makers. Unfortunately, but also illuminatingly, these two perspectives may well lead to opposing policy
recommendations. Although demand policy is technically better suited to target output, and hence wage policy to target inflation, than vice versa, it would be dangerous to conclude that demand and wage policy should be entrusted with these targets because policy-makers cannot be expected to follow the plot of the technocratic analysis. This theoretical result underlines both the desirability and the difficulty of coordinating these policies. Such coordination is or was attempted throughout Europe in different forms of national (and also regional) “employment pacts”. At the EU level, the “Cologne process” is intended to accomplish this coordination function. Our analysis makes it clear that the key to the success of any such coordination attempt is the willingness of policy makers to take into account policy goals for which they did not traditionally feel responsible. More specifically, wage setters must accept a degree of responsibility for price stability if demand management is to play an active role in controlling output and employment.
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