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". As a novelty relative to the existing literature, we thereby distinguish the two levels of policy instruments and policy makers. Unfortunately, but also illuminatingly for the policy debate, 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 plausible that demand and wage *policy makers* should not be entrusted with these targets.

Key words: Wage Policy, Demand Policy, Assignment Problem, Two-Handed Approach

JEL codes: E10, E61

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Dissecting the Two-Handed Approach: Who's the Expert Hand For What?

By Jürgen Jerger* and Oliver Landmann**

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 labor union officials keep demanding more expansionary demand policies to improve the dismal labor 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, 2005) as well as Horn/Logeay (2004).

The contribution of this paper is the formal analysis of the policy assignment problem that was left unresolved by the original proponents of the two-handed

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approach. For our purpose, a rather high level of abstraction is sufficient. Thus, we treat wage policy as representative for all supply-side measures and allow 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 in case the two instruments are not under the control of one single policy-maker. 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 analyzed 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 assignment of supply and demand side policies to employment and inflation objectives. 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 by looking at the relative impact of the two instruments. This is what Mundell (1962) has done with regard to the assignment of fiscal and monetary policy to internal and external balance in an open-economy model. In section 3, we perform an analogous exercise with regard to the assignment of wage and demand policy to the objectives of full employment and price stability in a prototype demand-and-supply 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. In fact, emphasizing and exploring the different perspectives of policy instruments and policy-makers in the conduct of macroeconomic policy is the central and innovative contribution of this paper. 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 spillover effects, both across national borders and across policy areas, led many politicians to call for sophisticated coordination mechanisms. As it turned out, however, the spillover 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 labor 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 spillovers from other policy areas even though such spillovers 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 behavior 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 produces better outcomes if it is not played as a cooperative game, but as a non-cooperative game, with monetary policy unambiguously committed to the goal of 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. In turn, they can 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 labor market performance in the long run

[1] Issing (2002, p. 317, our translation).

[2] Issing (2002, p. 320).

(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 labor market or the nature of the wage-setting process. But the path of transition to a new, better equilibrium is crucially shaped by the behavior of the demand side.[3] 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.[4] 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 leveled 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, pp. 327-28)

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*,

[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.

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.“ (Blanchard et al. 1986, p. 118)

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 centered 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.

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.[6] 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

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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).

[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 the Great Depression.

assignment above. It was heterodox in Keynes's days, it was later widely accepted for a while in the heyday of Keynesianism, and it 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

In this section, we develop the simplest possible framework for discussing the relative roles of wage and demand policies at the macroeconomic level. Before turning to the model proper, we should perhaps clarify what we mean by a „wage policy". Whereas there is little ambiguity in talking about a demand policy (monetary or fiscal), it may appear more natural to view the determination of wages in a market economy as the outcome of a market process rather than a „policy". This would indeed be the appropriate perspective if the labor market were an ordinary market just as any other market. However, in most economies, especially in Europe, wages are negotiated by powerful organizations representing the interests of workers and employers. Of course, the specific structure of the bargaining process and the institutional setting within which such bargaining takes place, vary widely from country to country. But the obvious macroeconomic importance of the wage settlements gives the contracting parties the status of „big players" in the macroeconomic policy-making game, on a par with fiscal and monetary policy-makers and other governmental authorities. It is in this sense that we treat the wage level as a policy parameter and, accordingly, the wage setters as policy-makers.

The model that we use in this section to discuss the assignment of wage and demand policy to macroeconomic objectives is quite general in that it treats the policy parameter as exogenous variables. It thereby leaves room for many ways of specifying the behavior of policy makers. On the demand side, we could think of fiscal and monetary policy rules or reaction functions describing the management of aggregate demand. Equally, the determination of the wage level could be endogenized in a great number of ways. Wage setters could be forward looking agents forming expectations about the macro-economy, they could be conditioned by some kind of an incomes policy (as in Davidson 1991) or they could be involved in a strategic game with other policy-makers. This third possibility will in fact be pursued in the subsequent section. What is important at this point, though, is that whatever specific behavior of wage and demand policy is assumed, we need a general structure which allows to represent their joint impact on the price level, output and employment.

Such a general structure is provided by an aggregate demand and supply framework as it can be found in many standard textbooks. The key elements of this framework are captured by the following four log-linear equations:

(1) $y = \alpha \cdot n$ Production Function ($0 < \alpha < 1$)

(2) $p = w + \frac{1-\alpha}{\alpha} y$ Price Setting („AS-Curve“)

(3) $y = \beta_1 m - \beta_2 p$ Aggregate Demand („AD-Curve“)

(4) $u = -n$ Unemployment Rate

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

The production function (1) links output *y* and employment *n*. In this exposition, we ignore any shift parameters of the function that might affect labor productivity. The aggregate supply curve (2), following from profit maximization, does not require the assumption of perfect competition on goods markets (as most textbook expositions do), but may as well be interpreted as reflecting optimal price setting decisions under imperfect competition.[7] The price level *p* should then be regarded as a mark-up on marginal cost. Taking into account the shape of the production function, we can thus write *p* as a function of the nominal wage level *w* and output *y*, again ignoring any further supply-side characteristics that might act as shift parameters such as the degree of competition on the goods market. The aggregate demand equation (3) condenses all exogenous factors affecting aggregate spending into one single parameter “*m*”. While this notation evokes the connotation of “money”, it can be more broadly interpreted to encompass other instruments of nominal demand management as well. With the possibility of $\beta_1 \neq \beta_2$, the specification is general enough to allow for changes in *p* to affect real aggregate demand not only as a deflator of nominal policy variables (such as the money supply), but through other channels as well. As a consequence, this parameterization does not impose any restrictions on the sensitivity of output and employment with respect to price level changes. As will become clear below, this issue is crucial for the solution of the assignment problem. The normalization (4), which simply translates employment into the unemployment rate, holds true for small unemployment rates and a labor force that is normalized to unity.[8]

In this model, the two exogenous variables *m* and *w* which we treat as policy parameters, determine *y*, *p*, *n* and *u*. By implication, the real wage (*w* – *p*) is also endogenous. We can solve for *u*, *p* and (*w* - *p)* as follows:[9]

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[7] This is called the price setting equation in the by now canonical model by Layard et al. (1991).

[8] Under this normalization, $n = \ln(1-u) \approx -u$.

[9] A closely related model and a suggestive diagrammatic exposition is presented by Fazzari et al. (1998).

$$(5) \qquad \begin{bmatrix} u \\ p \\ w-p \end{bmatrix} = \frac{1}{\Delta} \begin{bmatrix} -\beta_1 & \beta_2 \\ (1-\alpha)\beta_1 & \alpha \\ -(1-\alpha)\beta_1 & (1-\alpha)\beta_2 \end{bmatrix} \cdot \begin{bmatrix} m \\ w \end{bmatrix},$$

where $\Delta \equiv \alpha + (1-\alpha)\beta_2$.

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 the price level.

Two points follow immediately from this result: First, a "two-handed approach" is necessary (and in this simple model sufficient) to control both the unemployment rater and the price level. This is simply a statement of the time-honored Tinbergen (1952) rule. Moreover, since both instruments affect both target variables, outright coordination between wage and demand policy is 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.[10]

The Assignment Problem

If the control of the two instruments is allocated to different policy-makers and if outright coordination and collaboration between them is not feasible, it is important to determine which instrument is better suited to attain a certain target. Mundell (1962) taught us how to do this: "Policies should be paired with the objectives on which they have the most influence." That is, we must look at *relative* policy multipliers.[11] Since both instruments influence both targets, the

[10] A referee raised the question of the robustness of our results with respect to more sophisticated features such as forward looking behavior. The answer to this is that we will arrive at our conclusions in *any* model in which higher wages (expansionary demand policy) ceteris paribus lead to higher prices and higher (lower) unemployment. Thus, we settle for the most parsimonious specification with these features.

[11] In Mundell's (1962) original model, the interest rate and the fiscal policy stance are the two instruments available for achieving internal stability and external balance. As is well known, he concluded that fiscal policy should be assigned to internal stability and the interest rate to external balance „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".

optimal solution of the policy assignment problem involves a judgment on "plausible" parameter constellations. Formally, we must determine the sign of the expression $\left|\frac{du/dm}{du/dw}\right| - \left|\frac{dp/dm}{dp/dw}\right|$ which from eq. (5) is given by:

$$(6) \qquad \left|\frac{du/dm}{du/dw}\right| - \left|\frac{dp/dm}{dp/dw}\right| = \frac{\beta_1}{\beta_2} - \frac{(1-\alpha)\beta_1}{\alpha} = \frac{\beta_1}{\alpha}\left[\frac{\alpha}{\beta_2} - (1-\alpha)\right].$$

If the bracketed term is positive (negative), demand policy has a comparative advantage (disadvantage) in controlling unemployment whereas wage policy has a comparative advantage (disadvantage) in controlling the price level. Thus, for $\alpha/\beta_2 > 1-\alpha$, the heterodox assignment is efficient. The intuition of this condition is readily understood from fig. 1 which depicts the aggregate supply (AS) curve and the aggregate demand (AD) curve implied by equations (1) – (4) in *p*-*u*-space.

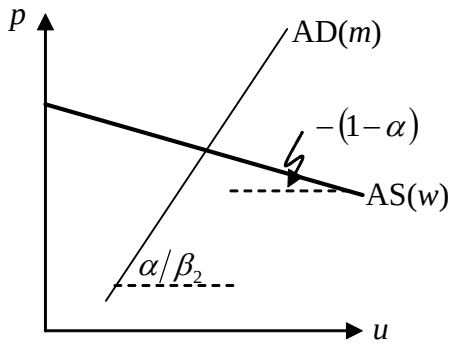

Figure 1: Equilibrium

The two terms in the crucial bracket in eq. (6) turn out to be the slopes of the two curves. If the AS-curve is relatively flat (as depicted), shifting this schedule by varying *w* will have a relatively 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, 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. Demand stimuli are well known to show up relatively quickly in quantities (output and employment) whereas cost stimuli such as wage hikes translate quickly into price hikes. Note that the slope of the AS curve must be evaluated for any given value of the nominal wage *w*. Therefore, models that argue for a steep or even vertical short-run AS curve on the basis of the flexible response of wages to demand stimuli do not bear on the issue at stake in the present context.

A rather voluminous literature has questioned the theoretical and empirical justification of assuming a finite slope for the AD curve at all. As mentioned above, almost all the arguments pondered by this literature date back to Chapter 19 of Keynes' *General Theory* (1936). The real balance effects that are behind the standard slope assumption for the AD curve may be weakened by countervailing forces such as the „Debt-Deflation" effect which was emphasized as early as 1933 (Fisher 1933).[12] Another old argument which has recently received a lot of attention relates to the destabilizing effects of deflationary expectations on the real economy, especially when interest rates are at or close to their zero floor. Strictly speaking, this is not a consideration bearing on the slope of the AD curve, but rather on its displacement through a deflation (or disinflation). To properly address this point would require a fully developed dynamic analysis as pioneered by Tobin (1975) and De Long/Summers (1986). This is clearly beyond the scope of the present paper. But since this expectations effect (sometimes termed the „Mundell effect") also runs counter to the textbook real balance effect, a defensible short-hand representation in our static framework would again amount to a rather steep if not vertical slope of the AD curve.[13]

Even if we do not go as far as to deny a negative price-level effect on real demand altogether, the above considerations strongly support

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 was also taken by the famous "Manifesto on the Unemployment Problem in the European Union" (Modigliani et al. 1998, p. 347f.) which denounced the exclusive focus of the European Central Bank (ECB) on price stability as highly inefficient and, therefore, inappropriate:

> "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 labor market. Given large-scale unemployment, they can affect prices

[12] For more recent treatments of the macroeconomic implications of redistribution between debtors and creditors, see Caskey/Fazzari (1987) and Tobin (1993). Redistribution between capital and labor income might reinforce the Debt-Deflation effect. Another concern about the empirical relevance of real balance effects stems from the possible endogeneity of money (see Dullien 2004 for a recent discussion).

[13] The extreme case of an aggregate demand schedule which is totally insensitive to changes of the price level is considered by Fazzari et al. (1998). In our set-up, this amounts to the assumption $\beta_2 = 0$. As becomes clear from eq. (5), this assumption would be sufficient to prevent wage policy from affecting unemployment, the real wage or, for that matter, any real variable of the system.

> 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 general point is that it may become very costly to control the price level by demand policy instruments alone – and particularly so if the economy operates with idle capacities. 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

To demonstrate this point, we consider a simple description of the adjustment dynamics implied by orthodox and heterodox policy assignments. Denoting the (exogenous) target values of inflation and unemployment by p^* and u^*, we represent the two policy regimes by the following dynamic adjustment equations:

(7a) $\dot{m} = \omega_1 \left(p^* - p \right)$ (7b) $\dot{w} = \omega_2 \left(u^* - u \right)$

(8a) $\dot{m} = \eta_1 \left(u - u^* \right)$ (8b) $\dot{w} = \eta_2 \left(p^* - p \right)$,

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 assignments, 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

$$\begin{bmatrix} \dot{m} \\ \dot{w} \end{bmatrix} = \mathbf{J}_i \cdot \begin{bmatrix} m \\ w \end{bmatrix} + C_i, \qquad i = \eta, \omega \,.$$

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

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

$$(10) \qquad \mathbf{J}_{\eta} = \frac{1}{\Delta}\begin{bmatrix} -\beta_1\eta_1 & \beta_2\eta_1 \\ -(1-\alpha)\beta_1\eta_2 & -\alpha\eta_2 \end{bmatrix}.$$

It is straightforward to show that $\mathrm{tr}(\mathbf{J}_i) < 0$ and $|\mathbf{J}_i| > 0,\ i = \eta, \omega$. Hence, both systems are stable. However, depending on the parameter values, the movement back to equilibrium is cyclical or non-cyclical. Fig. 2 summarizes the dynamic behavior in the phase diagrams implied by the orthodox and heterodox assignments, respectively. The equilibrium loci represent the (*m*, *w*) configurations consistent with the target unemployment rate and the target price level, respectively, and hence with the stationarity of whatever instrument is assigned to the respective target. Obviously, the equations of the two equilibrium loci are identical for both assignment regimes.

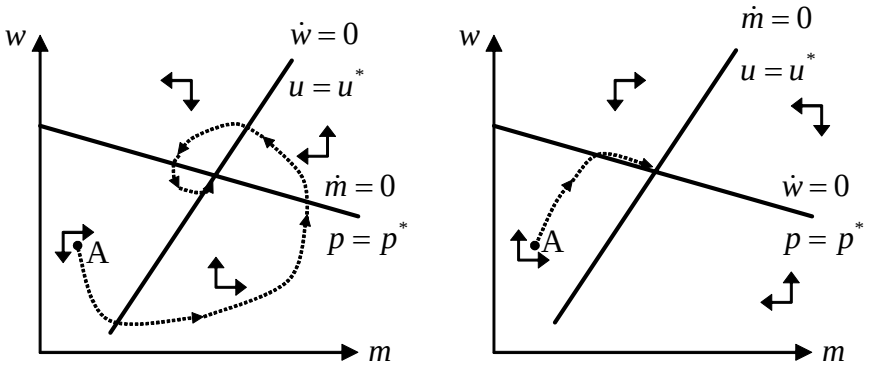

Figure 2: Dynamic Adjustment under Different Instrument Assignments

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.[14] Loosely speaking, the inefficient orthodox assignment displays a stronger propensity to produce cyclical oscillations, whereas under the efficient heterodox assignment, the system homes 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

[14] Stability hinges on the precise specification of the adjustment dynamics. In a discrete, cobweb-like specification of adjustment, the orthodox assignment can immediately be seen to be unstable whereas the heterodox assignment would be stable.

$u > u^*$) 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.[15] Evidently, both variables display a higher volatility under the inefficient orthodox policy assignment.

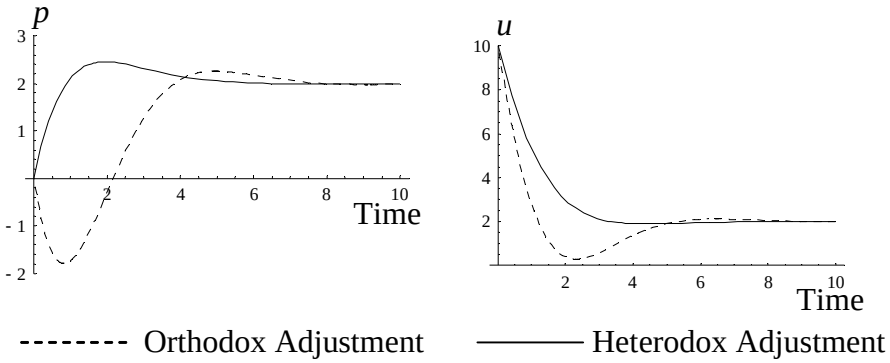

Figure 3: Orthodox and Heterodox Ways out of a Depression

One might wonder how the dynamics of adjustment would change in the special case $\beta_2 = 0$, discussed above, in which there is no feedback at all from the price level to real aggregate demand. It is tempting to conclude that in this case, the orthodox assignment, which relies on wage policy to affect output and employment via the price level, cannot possibly achieve full employment. After all, eq. (5), the solution to the static model, yields $du/dw = 0$ for $\beta_2 = 0$. Inspection of the Jacobi matrix J_ω in eq. (9) shows, however, that the orthodox assignment regime converges to $u = u^*$ and $p = p^*$ even in this case.[16] To be sure, the forces stabilizing the orthodox regime are weakened in this case and, by the same token, the efficiency advantage of the heterodox assignment is strengthened. Even in this extreme scenario, therefore, the choice between the two assignments is not a matter of feasibility or dynamic stability, but of efficiency.

[15] For the simulations shown in fig. 3, we assumed the following values:
$p^* = u^* = 2$; $\beta_i = \eta_i = \omega_i = 1$, $i = 1, 2$; $\alpha = 0.7$; $p(0) = 0$; $u(0) = 10$.

[16] With $\beta_2 = 0$, the $u = u^*$ locus becomes vertical in both panels of fig. 2. The stability conditions, however still hold: $\mathrm{tr}(\mathrm{J}_\omega)|_{\beta_2=0} = -(1-\alpha)\beta_1\omega_1/\alpha < 0$ and $\det(\mathrm{J}_\omega)|_{\beta_2=0} = \beta_1\omega_1\omega_2/\alpha > 0$.

Possible Problems of the Heterodox Policy Assignment

From the above analysis, the case for a heterodox policy assignment appears to be pretty strong. The almost "instinctive" reservation most economists would have against this policy recommendation would not stem from quibbles about relative parameter values. Rather, it comes from doubts about the practicability of the efficient assignment. Policy makers cannot necessarily be trusted to make proper use of their respective instruments. In particular, it seems somewhat quixotic to rely on wage setters to anchor the price level. Realistically, wage setters also attempt to pursue other targets such as income redistribution. If this is the case, however, it is no 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. It will turn out that this distinction between *policy instruments* and *policy makers* is of crucial importance for the normative question of how to solve the assignment problem. By looking at the incentives of policy makers, we adopt and generalize the perspective of Rogoff (1985), who looked into the question of optimal delegation of monetary policy. More specifically, since society may decide to delegate demand policy, it is interesting to ask how this delegation should look like if the actions of wage setters are simultaneously taken into account. In addition to the literature existing on this subject, we show 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.[17] If this is taken for granted, only the presence of supply

[17] 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).

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 labor 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. 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

$$(11) \qquad L_D = u^2 + \varepsilon \cdot p^2 ,$$

where both bliss levels are normalized to zero. ε 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 behavior *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. First, wage setters as part of the society may simply share the general desire for price stability of the society as a whole, although different groups may do so to a different degree.[18] Second, even in the absence of an "own" inflation motive, corporatistic structures may lead wage setters to take into account the effects of their decision on inflation (Cubitt 1995). Third, wage setters will care about inflation if e.g. unemployment benefits are fixed in nominal terms (see Berger et al. 2002).

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

$$(12) \qquad L_W = (u - \bar{u})^2 + \phi \cdot p^2 .$$

$\phi = 0$ 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

[18] See van Lelyfeld (1999) for an empirical investigation into this.

completely decentralized since in this case, wage setters would not perceive an effect of their action on inflation and will act accordingly.[19]

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 modeling 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 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:

$$(13) \qquad m = \frac{\beta_2 - (1-\alpha)\alpha\varepsilon}{\beta_1\left(1+(1-\alpha)^2\varepsilon\right)} w \text{ and}$$

$$(14) \qquad w = \frac{\beta_1\left(\beta_2 - (1-\alpha)\alpha\phi\right)}{\beta_2^2 + \alpha^2\phi} m + \frac{\beta_2\left(\alpha + (1-\alpha)\beta_2\right)}{\beta_2^2 + \alpha^2\phi}\bar{u}\,.$$

Plugging these reaction functions into (5) leads to

$$(15) \qquad \begin{bmatrix} u \\ p \end{bmatrix} = \begin{bmatrix} (1-\alpha)\varepsilon \\ 1 \end{bmatrix} \frac{\beta_2 \cdot \bar{u}}{(1-\alpha)\beta_2\varepsilon + \alpha\phi}.$$ [20]

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 ($p = \bar{u}/(1-\alpha)\varepsilon > 0$). 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 ε with which demand policy pursues the inflation

[19] See Jerger (2002) on this point.

[20] We may note that in the extreme case of a vertical AD schedule (i.e. $\beta_2 = 0$), the macroeconomic equilibrium implied by (15) is given by $u = p = 0$, which is the social bliss point. The intuition for this is as follows. For a vertical AD schedule, demand policy does not perceive any trade-off between *p* and *u* and thus – for any given value of *w* – will set *m* such that the real target is reached.

objective and can be readily calculated by eliminating ε from the two equations in (15) as

$$(16) \qquad p = \frac{\beta_2}{\alpha\phi}\left(\bar{u} - u\right).$$

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 $\tilde{\varepsilon}$ leading to the macroeconomic outcome

$$(15') \qquad \begin{bmatrix} u \\ p \end{bmatrix} = \begin{bmatrix} (1-\alpha)\tilde{\varepsilon} \\ 1 \end{bmatrix} \frac{\beta_2 \bar{u}}{(1-\alpha)\beta_2\tilde{\varepsilon} + \alpha\phi}.$$

Optimal delegation then is the solution to the following problem:

$$(17) \qquad \min_{\tilde{\varepsilon}} L_D = \left(u(\tilde{\varepsilon})\right)^2 + \varepsilon \cdot \left(p(\tilde{\varepsilon})\right)^2,$$

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

$$(18) \qquad \tilde{\varepsilon}_{opt} = \frac{\beta_2 \varepsilon}{\alpha(1-\alpha)\phi}$$

and to

Result 3: If the interaction between demand and wage policy is modeled 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:

$$(15'') \qquad \begin{bmatrix} u \\ p \end{bmatrix} = \begin{bmatrix} \beta_2 \varepsilon \\ \alpha\phi \end{bmatrix} \frac{\beta_2 \bar{u}}{\varepsilon\beta_2^2 + \alpha^2\phi^2}.$$

Hence, optimal delegation (for $\phi > 0$) leads to a positive inflation rate, but also to an unemployment rate that is lower than what the wage setters intend ($u < \bar{u}$). Clearly, a higher value of ϕ 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.

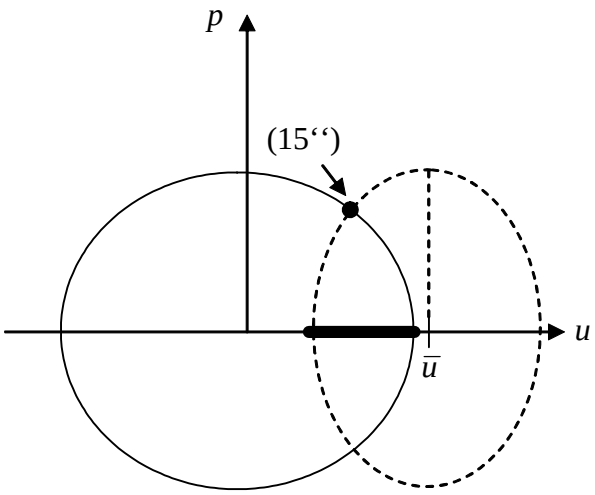

Figure 4: Cooperation between Demand and Wage Policy

This is shown in fig. 4 in which the utility levels of society and wage setters of the optimal solution (15’’) are depicted. 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 modeled 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). Using this and (5), gives *u* and *p* as functions of *w* only. With these, the objective function of wage setters becomes

$$(12') \qquad L_W = \left(\frac{(1-\alpha)\varepsilon}{1+(1-\alpha)^2\varepsilon} w - \overline{u} \right)^2 + \phi \left(\frac{1}{1+(1-\alpha)^2\varepsilon} w \right)^2 .$$

Note that the *u*(*w*) and *p*(*w*) functions used in (12’) do not depend on the parameters of the aggregate demand function (β_1 and β_2) since the optimal reaction of demand policy is anticipated by wage setters.

Minimizing (12’) with respect to *w* leads to the wage equation

$$(19) \qquad w = \frac{(1-\alpha)\varepsilon\left(1+(1-\alpha)^2\varepsilon\right)}{(1-\alpha)^2\varepsilon^2+\phi}\bar{u},$$

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

$$(20) \qquad \begin{bmatrix} u \\ p \end{bmatrix} = \begin{bmatrix} (1-\alpha)\varepsilon \\ 1 \end{bmatrix} \frac{(1-\alpha)\varepsilon\bar{u}}{(1-\alpha)^2\varepsilon^2+\phi}$$

For $\phi = 0$, this solution is the same as in the Nash game, i.e. $u = \bar{u}$ and $p = \bar{u}/(1-\alpha)\varepsilon$. 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 ($\tilde{\varepsilon} = 0$) 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 modeled 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.[21]

Policy Implications

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. Thus,

[21] In a way, the result and its intuition is parallel to the result of the Nash game for $\beta_2 = 0$. In this case, demand policy was *not able* to influence *p*, which led to the social bliss point as explained in the footnote after eq. (15). Under optimal delegation in the Stackelberg game for $\phi > 0$, demand policy is *not willing* to do anything about *p*, which leads to the same macroeconomic outcome.

policy recommendations regarding the assignment of target variables to *policy makers* are not robust with respect to these features. The following table 1 summarizes the different sets of assumptions and the respective implications.

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

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 rather surprised to learn that their actions are primarily or even exclusively concerned with inflation.

Nevertheless, the assumption of inflation aversion of wage setters seems plausible. Van Lelyfeld (1999) 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. A „technocratic" analysis of instrument choice, which we have presented in section 3, casts considerable doubt on the suitability of the orthodox assignment which pairs monetary policy with price level targets and wage and supply-side policies with employment targets.

Developments in the European Monetary Union (EMU) in the early years of its existence suggest that the allocation of responsibilities for macroeconomic objectives is in fact a major unsolved problem of the Euro area. One remarkable feature of the early years of EMU is the rather persistent divergence of national inflation rates, partly in response to the differing cyclical positions of the individual countries (Angeloni/Ehrmann 2004). It is not clear that the Euro system is equipped with effective policy arrangements to deal with such a situation. With the ECB focusing on the aggregate inflation rate of the Euro area and national fiscal policies in many cases bound by the stability and growth pact, there is a real risk that no effective demand-side policy is in place to take care of output and employment on the national level. If national wage policies respond to unemployment, as they should according to the orthodox assignment, wages rise more rapidly where unemployment is low than they do where unemployment is high (relative to equilibrium rates). As a consequence, there is a tendency for national inflation rates to be driven away from the Euro average (which is targeted by the ECB), thereby adding to the persistence of inflation differentials. The diverging wage and price levels can add up to substantial real exchange rate changes within the currency area as the Euro area has in fact witnessed in 1999-2005. The resulting gains and losses in competitiveness are a major transmission channel by which wage policy feeds back to aggregate demand in an open economy. While such feedback mechanisms may eventually re-equilibrate relative output, employment and inflation rates, they are hardly a very effective device for preventing or rapidly curing major disturbances to the real economy.

Clearly, our paper cannot address this issue in detail. Capturing the full complexity of assigning responsibilities not only to different branches of macro-policy, but also to the different levels of governance (national vs. European) would require another paper. Any such analysis would have to be careful to take into account the incentives of policy-makers as well as their strategic interaction. Our simple models in section 4 made one thing clear: 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. Given these prerequisites, however, there is scope for beneficial cooperation between wage setters and demand policy makers.

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