Cavallari, Lilia

Working Paper
Inflationary performance in a monetary union with large wage setters

ZEI working paper, No. B 11-2001

Provided in Cooperation with:
ZEI - Center for European Integration Studies, University of Bonn

Suggested Citation: Cavallari, Lilia (2001) : Inflationary performance in a monetary union with large wage setters, ZEI working paper, No. B 11-2001, ZEI, Bonn

This Version is available at:
http://hdl.handle.net/10419/39559

Terms of use:
Documents in EconStor may be saved and copied for your personal and scholarly purposes.
You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.
If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.
Lilia Cavallari

Inflationary Performance in a Monetary Union With Large Wage Setters
Inflationary performance in a monetary union with large wage setters

Lilia Cavallari
University of Rome "La Sapienza"

Abstract

Building on a micro-founded model of a two region-world economy in the tradition of the new open economy literature, this paper analyses the strategic interaction of large wage-setters and the central bank when switching from a regime of uncoordinated national monetary policies to a monetary union. The establishment of a monetary union is shown to favour wage restraint, provided the united central bank is not too conservative. Wage discipline may reduce equilibrium inflation in a monetary union relative to the one under uncoordinated national monetary policies when wage setting is centralised across member countries.

JEL codes: E5, F4

Keywords: monetary union, wage bargaining, inflationary bias

Correspondence: Lilia Cavallari, Dip. Economia Pubblica, Via Castro Laurenziano, 9, 00161 Rome, Italy. E-mail: cavallar@eco.uniroma3.it. I wish to thank participants in seminars at ZEI, University of Bonn, IEFS 2000 at City University of London and RES 2001 at Durham University for valuable suggestions. Financial support from Murst is gratefully acknowledged.
1 Introduction

This paper models a two-region world economy in the tradition of the new open economy macroeconomics, with the aim of investigating the macroeconomic consequences of the establishment of a monetary union when labour markets are unionised.

In the literature on international monetary policy games, the switch from uncoordinated national monetary policies to a monetary union is generally argued to lead to higher inflation. One reason why the formation of a monetary union is likely to raise inflation for a given level of employment is that the unified central bank’s incentive to boost employment is no longer restrained by the cost of the exchange rate depreciation that follows unilateral monetary expansions (Rogoff [1985a]). Higher inflation may then result as a consequence of rational agents anticipating the central bank’s attempt to create surprise inflation.

A further channel leading to higher inflation has been recently stressed in the literature on strategic wage setting. Basically, it is argued that wage setters may be induced to behave more aggressively in a monetary union as they perceive an increase in their wages to have a smaller impact on the union-wide inflation rate relative to the one on their country-specific inflation rate.\(^1\)

As the move to a monetary union alters the strategic environment faced by the central bank and the labour unions, the incentives of both actors should be explicitly accounted for when analysing the macroeconomic impact of such a monetary policy regime shift. In this paper, we accomplish this task in the simplest general-equilibrium setup, where regions have asymmetric technological as well as institutional labour market features, namely different degrees of monopoly power in the factor market and various levels of wage centralisation.

While moving to a monetary union unambiguously accrues the central bank’s temptation to inflate, this paper shows that such a monetary policy regime shift may either favour or inhibit wage discipline. Wage setters are found to behave less aggressively in the monetary union relative to a regime of uncoordinated monetary policies, provided the central bank is not too conservative.\(^1\)

\(^1\)This point has been stressed by Zervoyanni [1997], Grüner and Hefeker [1999], Cukierman and Lippi [2000] and Soskice and Iversen [1998], among others.
For an intuitive account of this result, consider the unions’ perception of the inflationary consequences of their wage claims in the two monetary policy regimes. Under non-cooperative national monetary policies, each union understands that the increase in its own wage raises domestic inflation to an extent that is larger the bigger the union and the lower the central bank’s inflation aversion. When switching to a monetary union, the weight of domestic wages in the union-wide inflation rate reduces. Labour unions, however, may nonetheless perceive higher inflationary repercussions of their wage hikes as they correctly anticipate the response of the unified central bank to wage pressure to be stronger than the one of national central banks for the same degree of conservativeness. This latter effect is higher the less conservative the central bank. As higher inflation awareness on the part of unions favours wage restraint, not too conservative a central bank may then turn out to induce a less aggressive wage behaviour in a monetary union relative to a regime of uncoordinated national monetary policies.

In contrast to Rogož [1985a], this paper further shows that international monetary policy cooperation may be effective in reducing wage inflation. In our setup, the union-wide inflation rate falls short of the one under uncoordinated national monetary policies when wage setting is internationally centralised and the unified central bank is not too conservative, namely when wage restraint is strong enough so as to compensate for the inflationary consequences of central bank’s behaviour.

Since the contributions by Velasco and Guzzo [1999] and Lippi [2000], it is well-known that monetary institutions, such as central bank’s conservativeness, may permanently affect the trade-off between inflation and unemployment through their effects on strategic wage setting. The results in this paper may be read as extending this insight to a particular monetary policy regime shift, by showing that the macroeconomic consequences of establishing a monetary union may depend in a non-linear way on central banking institutions.2

Strategic interactions between the unified central bank and wage setters as those analysed in this paper may be relevant in determining the inflationary performance in the EMU, as several European countries are characterised by intermediate to high centralisation in wage bargaining.3 The results in

---

2The significance of unionised wage setting for the optimal design of central banking institutions in a closed economy is analysed, among others, by Lawler [2000].

3Calmfors [2000] provides a comprehensive survey of nominal wage bargaining within EMU, which focuses on the impact of given bargaining institutions on real wages and
the paper stress the harmful consequences of establishing the anti-inflation credentials of the European Central Bank (ECB) through the standard Barro-Gordon way of reputation building. Our analysis suggests that appointing an ultra-conservative central banker at the ECB and imparting a "deflationary bias" in the conduct of the European monetary policy, besides the usual costs in terms of employment, may turn out to threaten the ECB's anti-inflationary credibility.4

This paper is closely related to a contribution by Cukierman and Lippi [2000]; which analyses the implications of the establishment of a monetary union for strategic wage behaviour. Three main distinguishing features characterise the approach proposed in this paper. Firstly, we explicitly derive demands for both labour and goods from profit and utility maximization, while Cukierman and Lippi adopt a partial equilibrium approach. Secondly, our framework encompasses trade across the countries in the monetary union. Finally, we make a first step towards a welfare-based analysis of the strategic interactions between central banks and wage setters by specifying preferences for unions and the central bank that are consistent with the behavioral analysis. Building on our micro-founded framework, we are able to show that the establishment of a monetary union may induce a more or less aggressive wage behaviour, thus increasing or decreasing area-wide inflation for a given level of employment, while only the former effect may appear in their model.

The paper is structured as follows. Section 2 provides a reduced-form representation of the two-country world economy. Section 3 describes the one-shot game between the central bank and the unions in the two monetary policy regimes. In section 4, the equilibrium outcomes under uncoordinated national monetary policies and a monetary union are compared in the case of uncoordinated national wage setting as well as under international wage centralisation. Section 5 concludes. In the Appendix, the model of a two-country world economy is laid out.

unemployment as well as on the likely effects of EMU on those institutions.

4This accords with the views expressed in Allsopp and Vines [1998] favouring the development of an appropriate reaction function rather than the establishment of a tough anti-inflationary reputation as the main task of the ECB. A similar conclusion is drawn by Bean [1998]:
2 The world economy

The world economy consists of two equally-sized regions, Home and Foreign. Home is inhabited by a continuum of agents $j \in (0, 1]$: Agents living in Foreign are indexed by $j \in (1, 2]$: As in Corsetti and Pesenti (2000), each country produces a single traded good out of differentiated labour units, $\lambda_j$, indexed in the interval $(0; 1)$. Home workers are organized in $n$ unions, Foreign workers in $n'$ unions of size $n^1$ and $n'^1$; respectively. Each union sets nominal wages on behalf of its members.

2.1 The reduced-form representation

In each country, two reduced-form equations are needed for studying the monetary policy game (a detailed description of the economy is provided in the Appendix). The first one is obtained by substituting aggregate demand for the domestic good (A8) and optimal price-setting (A10) into the demand for labour of type $i$ (A3) and taking logarithms

$$
\ln \lambda_j = \mu(w_i, w) + \frac{1}{4}
$$

where $w_i$ is the growth of the nominal wage of labour of type $i$, $w$ is the aggregate nominal wage growth, and $\frac{1}{4}$ is the inflation rate.5

The second reduced-form equation is derived by substituting labour demand (A3) and nominal aggregate profts into the individual budget constraint (A6). Since unions are assumed to take aggregate profts as given, this gives

$$
c_i = (1 - \mu)(w_i - w) + \frac{1}{4}
$$

where $c_i$ is (the log of) real consumption. The central bank does not take aggregate profts as given when choosing monetary policy and faces the following reduced-form budget constraint

$$
c_i = (1 - \mu)(w_i - w) + \frac{1}{4}
$$

5 By normalising the previous period nominal wage to unity, the current nominal wage can be expressed as

$$
W_i = 1 + w_i
$$

where $w_i$ is the percent increase in the nominal wage of worker $i$. In the text, the following approximations are used: $\log \left( \frac{W_i}{W_{i-1}} \right) = w_i - w$ and $\log \left( \frac{P}{W_i} \right) = \frac{1}{4} + w$
Three equations parallel to (1)-(3) hold for the foreign country.

2.2 Central bank’s preferences

In the regime of uncoordinated national monetary policies, the objective function of both the domestic and foreign central bank is designed so as to trade off the average utility of their respective population with the dislike of country-specific inflation

\[ - = 2 \sum_{j=1}^{n} U_j \delta_j i - \frac{\gamma}{2} \]

\[ - = 2 \sum_{j=1}^{n} U_j \delta_j a i - \frac{\gamma}{2} \]

(4)

where \( U \) is the utility function (A4). The parameter \( \gamma \) captures the weight of inflation relative to other policy targets and represents the central bank’s degree of “conservativeness” (Rogoff [1985b]).

The common central bank also cares about the average utility of the agents in the monetary union while she dislikes average inflation

\[ - U = 2 \sum_{j=1}^{n} U_j \delta_j j + \sum_{j=1}^{n} U_j \delta_j a i - \frac{\gamma_r}{2} \]

(5)

where \( \gamma_r = (\frac{\gamma}{4} + \frac{\gamma}{2}) \). In specifying the central bank’s preferences (4) and (5), we have assumed that monetary conservativeness does not vary, so as to focus on inflation targeting as the only difference across monetary policy regimes. While domestic and foreign central banks aim at controlling country-specific inflation, the unified central bank has an average inflation target. As will become apparent soon, this alters the central bank’s incentive to inflate as well as nominal wage setting.

2.3 Unions’ preferences

Each domestic and foreign union is interested in the average utility of its members

\( ^6\)The central bank in a monetary union could also target union-wide inflation. However, this would not be consistent with the way inflation targeting is actually practiced. The ECB’s inflation target, for example, is specified in terms of a harmonised consumption price index.
It is worth stressing that we abstract from unions’ inflation aversion, so as to focus on the monetary policy regime shift as the only incentive for wage restraint.\footnote{The macroeconomic impact of a monetary union when labour unions are inflation averse is analysed, among others, by Cukierman and Lippi [2000], Grüner and Hefeker [1999] and Soskice and Iversen [1998].}

3 Strategic monetary policy

This section describes the one-shot, two-stage game between national central banks and labour unions in a monetary union, $U$, and in a regime of uncoordinated monetary policies, $N$.

In the first stage, each national union sets the rate of growth of the nominal wage of its members in an uncoordinated way relative to both foreign and other national unions. After wages are set, the unified central bank picks the average inflation rate in the monetary union, while each national central bank chooses the country-specific inflation rate in the uncoordinated monetary policy regime. Finally, given real wages, firms choose employment and produce the traded goods. The game is solved by backward induction.

3.1 The central bank’s problem

In the regime of uncoordinated national monetary policies, the domestic central bank chooses the national inflation rate so as to maximize (4) subject to (1) and (3), which yields the reaction function

$$\alpha_i = n \sum_{j=1}^{Z_i} U_i d_j$$

$$\alpha_n = n \sum_{i=1}^{Z_i} U_i d_i$$

(6)

An equation similar to (7) describes the behaviour of the foreign central bank. The reaction functions of the domestic and foreign central banks are common.
knowledge for wage-setters, who can easily calculate the inflationary impact of an increase in their nominal wage growth

\[
\frac{\partial \bar{\pi}}{\partial w_j} = \frac{\cdot}{n^2} S^n 2 (0; 1)
\]

\[
\frac{\partial \bar{\pi}^\delta}{\partial w_j^\delta} = \frac{n}{n^2} S^n 2 (0; 1)
\]

(8)

In the monetary union, the unified central bank chooses the average inflation rate so as to maximize the utility of all agents in the union (5) subject to (1) and (3) and their foreign analogues. The central bank's optimal strategy is

\[
4 \sum_{i=1}^{1=2} \ln \left[ \frac{\partial \pi_j}{\partial w_j} \right] \ln \left[ \frac{\partial \pi_j^\delta}{\partial w_j^\delta} \right] \pi_j = 0
\]

(9)

Building on (9), domestic and foreign unions calculate the union-wide inflationary impact of their wage claims

\[
\frac{\partial \pi}{\partial w_j} = \frac{n^2}{n^2} S^n U
\]

\[
\frac{\partial \pi^\delta}{\partial w_j^\delta} = \frac{n^2}{n^2} S^n U
\]

(10)

Comparing (8) and (10), it appears that the monetary policy regime shift has two opposing effects on the way domestic and foreign unions perceive the inflationary consequences of their wage claims.

On one hand, the establishment of a monetary union decreases the perceived inflationary impact of national wage hikes, as unions are smaller relative to the whole population in the monetary union (this is captured by the first addend in brackets). A one percent increase in domestic wages, in fact, has an impact on the domestic aggregate price level and hence on domestic inflation equal to 1/2 percent, while this halves to 1/4 percent when the average inflation rate in the monetary union is considered.

On the other hand, switching from uncoordinated monetary policies to a monetary union accrues the central bank's temptation to inflate (as captured by the second addend in brackets). Under uncoordinated monetary policies, in fact, national central banks are refrained from generating surprise inflation
due to the exchange rate costs that follow unilateral monetary expansions, while these costs obviously disappear in the monetary union. This in turn may increase the unions' inflation awareness, as unions perceive the response of the common central bank to an increase in nominal wages to be stronger than the one of national central banks.

As will become apparent later, a high inflation awareness on the part of unions favours wage moderation as it leads each union to internalise the reduction in the real wage of other unions that follows the increase in its own wage. Whether the switch to a monetary union may discipline wage setters then crucially depends on which one of the two opposing effects discussed above prevails. It can be easily shown that the perceived inflationary consequences of an increase in domestic wages are higher in a monetary union relative to a regime of uncoordinated national monetary policies provided the unified central bank is not too conservative. Using (8) and (10) it is immediate to obtain

$$s_U - s_N > 0 \implies 2.$$  

(11)

### 3.2 The unions' problem

Under simultaneous bargaining, each national union sets the rate of growth of the nominal wage of its members so as to maximize (6) subject to (1), (2), the central bank's reaction function in the appropriate monetary policy regime, i.e. (7) or (9), and taking as given the nominal wages set by other unions at home and abroad. The optimal non-cooperative strategy of the domestic union $i$ is

$$\left(1 + s^r - \sigma^r\right) + \sigma^r \cdot \ln \left(\frac{W_i}{P_i}\right) = 0$$  

(12)

where $\sigma^r$ is the elasticity of labour demand to the nominal wage of union $i$ in the monetary policy regime $r = U; N$

$$\sigma^r = \frac{\mu}{\mu} \cdot \frac{\frac{d \ln \left(W_i^r\right)}{d \ln w_i}}{\frac{d \ln \left(W_i^r\right)}{d \ln w_i}} = \frac{1}{\frac{1}{\mu} + \frac{1}{n} s^r}$$  

(13)

---

*This is analogous to the "adverse competition" effect in Cukierman and Lippi [2000].*
An analogous equation describes the behaviour of the foreign union \( i \). A unitary increase in the nominal wage of union \( i \) has two contrasting effects on its members' utility. On one side, utility decreases since consumption reduces (this is captured by the term in brackets in (12)), while on the other side the increase in leisure raises utility. Each union’s optimal nominal wage is then set so as to balance these costs and benefits.

It is apparent in (12) that a high inflation awareness on the part of unions, a high \( s \), reduces the marginal utility of consumption while raising the marginal disutility of labour effort. As output is sub-optimally low due to monopolistic distortions, this will reduce unions' welfare and will thus discipline wage behaviour.

Drawing on the constant relation between increases in nominal and real relative wages, \( \frac{d\ln(W_i/P)}{\ln(W_i/P)} = 1 = 1 \cdot (1 - s') \), we can cast the first order condition (12) in terms of the real effects of the union's nominal wage, obtaining

\[
\ln \lambda_i = \frac{1}{1 - \lambda} - \frac{1}{r^i} \tag{14}
\]

where \( \lambda^r = (1 - s') \) is the elasticity of the demand for labour of type \( i \) to the real relative wage in regime \( r \).

Using (13) and (8) or (10) when appropriate, the elasticity of labour demand to the real wage in the two monetary regimes can be easily expressed in terms of the model's parameters

\[
\lambda^N = \frac{(1 + \mu_i)}{(n - 1) \cdot + n - (\mu_i \cdot 1) (n - 1) + 1}
\]

\[
\lambda^U = \frac{(4 + \mu_i)}{(n - 1) (2 - n) (\mu_i \cdot 1) (n - 1) + 1} \tag{15}
\]

4 Inflation under alternative monetary regimes

Under uncoordinated national monetary policies, the Home and Foreign inflation rates can be obtained by combining the respective unions' equilibrium strategies (12) in a symmetric equilibrium, \( \lambda^r = \lambda^i \), with the central bank's reaction function (7), which yields the area-wide average inflation rate.

\footnote{The overall effect of the increase in the nominal wage of union \( i \) on consumption is negative, since the effect of the increase in the real wage \( (1 - s) \) is smaller than the reduction in labor demand \( (\lambda) \).}
For the well-known reason discussed in Kydland and Prescott [1977] and Barro and Gordon [1983], equilibrium inflation is sub-optimally positive. Other than on central bank’s inflation aversion, $\gamma$, the economy’s inflationary bias depends on labour market features as synthesised in the elasticities $\gamma^N$ and $\gamma^\Delta N$. Using (15) it is easy to verify that equilibrium inflation is higher the less substitutable the different types of labour and the more decentralised the wage bargaining structure.\footnote{This accords with the analysis in Cubitt [1992] and Calmfors and Drifl [1988]:}

A similar procedure that combines (12) and (9) yields the equilibrium inflation rate in the monetary union

$$\eta^U = 2 - \frac{1}{U} \frac{1}{\gamma^U} + \frac{1}{\gamma^\Delta U}$$

(17)

Comparing the area-wide inflation rates in the two monetary regimes, (16) and (17), it appears that in the absence of strategic effects - i.e., when $\gamma^U = \gamma^N$ and $\gamma^\Delta U = \gamma^\Delta N$ - inflation under uncoordinated national monetary policies is unambiguously lower than the one in a monetary union. The reason is the stronger incentive for the common central bank to resort to surprise inflation relative to national central banks (Rogoff [1985]).\footnote{In our setup, the common central bank has an incentive to inflate four time higher than the one of national central banks. This depends on two factors that are at work also in a more general framework, namely the economy’s degree of openness and the type of inflation targeting. In our specification, trade openness is 1/2 under uncoordinated national monetary policies, while the monetary union is a closed economy. This accounts for the common central bank having twice an incentive to inflate relative to national central banks. By the same token, average versus country-specific inflation targeting amounts to a double temptation to inflate in our setting.}

This matches with the empirical regularity documented by Romer [1993] showing that more open economies have a better inflationary performance in a broad cross-section of countries.\footnote{See also Lane [1997] and Campillo and Miron [1997], among others. Cavallari [2001] investigates the link between inflation and openness when wage setters are large.}

When wage setters are large, however, the move to a monetary union also affects wage behaviour and hence inflation in a direction that is not clear a priori. As already discussed, the establishment of a monetary union may
favour wage restraint, provided the unified central bank is not too conservative. This in turn will reduce the economy’s inflationary bias for a given level of employment, by increasing the elasticities of labour demand in (17) relative to the ones in (16).

4.1 International wage coordination

In our setup, wage discipline under a monetary union, when it occurs, is not able to compensate for the increase in the union-wide inflationary bias due to central bank’s behaviour. This leads one to question under what circumstances would such a wage restraint effect be strong enough to reduce inflation. An obvious candidate is the case of international wage coordination, where wage discipline is at its best. As recently stressed in the literature on nominal wage bargaining, the switch to a monetary union is likely to alter the structure of wage setting across the member countries, although opinions diverge as to the directions of this change.\(^{13}\)

As an example of international wage coordination, consider a supranational union that sets domestic and foreign nominal wages so as to maximise the average utility of the population in the monetary union, which for simplicity is assumed to consist of two perfectly symmetric regions

\[
a = \sum_{j=0}^{1} U_{i,j}
\]

under (1), (2) and the unified central bank’s reaction function (9). This yields the optimal strategy

\[
\ln \gamma = \frac{\bar{A}}{1 - 1} \frac{1}{\gamma_W}
\]

where

\[
\gamma_W = 1 + \left(\frac{\mu_j 1}{s^W}\right)
\]

and the superscript \(W\) stands for wage centralisation. The supranational union uses (9) so as to compute the perceived inflationary impact of an

\(^{13}\)Calmfors [2000] argues in favour of less centralisation in wage setting as a result of monetary union, while Holden [1999] stresses the higher gains to wage centralisation in a monetary union.
increase in domestic and foreign wages,\textsuperscript{14}

\[ s^W = \frac{2}{[2^2 + \bar{\alpha}^2]} \]  

(21)

Following the same steps as before, we can easily derive equilibrium inflation under international wage coordination

\[ \pi^W = \frac{4}{\bar{\alpha} W} \]  

(22)

Comparing (16) and (22), it is easy to verify that, differently from national wage bargaining, inflation in the monetary union may fall short of the one under uncoordinated national monetary policies when wage setting is internationally centralised. We can further show that this holds true provided the central bank is not too conservative. Using (8) and (15) as well as (21) and (20) in, respectively, (16) and (22), we obtain

\[ \pi^N = r^N \cdot a^N - b^N - c \cdot 0 \]  

(23)

where \( a = (\mu + 1)^N = 2 \), \( b = 6 + (\mu - 1)(8n - 10) \), \( c = 8 - 2(\mu - 1)(n - 1) \) and \( \bar{\alpha}^N \) is the positive root of the equation in (23).

For an intuitive account of this result, consider that under wage centralisation the switch to a monetary union always disciplines wage behaviour, as the sovra-national union internalises the higher incentive to accommodate wage inflation of the common central bank relative to national central banks. The overall effect of the monetary policy regime shift on inflation then depends on whether wage restraint is strong enough so as to compensate for the higher central bank’s temptation to inflate. A less inflation averse central bank, by increasing the inflation awareness of the sovra-national union while not affecting the central bank’s incentive to inflate across monetary regimes, may induce a less aggressive wage behaviour and hence lower inflation in the monetary union.

\textsuperscript{14}As countries are symmetric, foreign and domestic wages are equal.
5 Conclusions

Building on a micro-founded model of a two-region world economy, this paper has analysed the behaviour of large wage-setters when switching from a regime of uncoordinated national monetary policies to a monetary union. Provided the unified central bank is not too conservative, we have shown that the switch from uncoordinated monetary policies to a monetary union may favour wage restraint. We have also shown that wage discipline may reduce equilibrium inflation in a monetary union relative to the one under uncoordinated national monetary policies if wage setting is centralised across the members of the monetary union.

6 Appendix

Home production function is

\[ Y = Z \sum_{i} W_i i^{\frac{\mu}{1 - \mu}} \]  

(A1)

where \( Y \) represents output of the domestic good and \( \mu > 1 \) captures the degree of substitutability among different labour types.

Let \( W_i \) represent the Home nominal wage of worker \( i \). Then, \( W \), the price index for labour inputs, is defined as the minimal nominal cost of producing a unit of output

\[ W = Z \sum_{i} W_i i^{\frac{\mu}{1 - \mu}} \]  

(A2)

Cost minimization implies firms’ demand for labour of type \( i \) is

\[ q_i = \frac{W_i}{W} Y \]  

(A3)

Agents’ utility is given by

\[ U_i = \ln C_i + \frac{1}{2} (\ln q_i)^2 \]  

(A4)

where the real consumption index \( C \) aggregates consumption of the domestic good \( C_H \) and consumption of the foreign good \( C_F \)

\[ C = \frac{C_H}{C_F} \]  

(A5)
In this setup, economic size, as measured by the weight of Home goods in world consumption, coincides with population size.

While markets are complete domestically (everyone owns an equal share of all domestic firms), there is no international equity trade. As will become apparent later, this assumption is benign. Given the Cobb-Douglas preferences over domestic and foreign goods (A5) and the separability of individuals' utility functions, in fact, international equity trade would not affect equilibrium outcomes.

The budget constraint of the representative agent is

\[ P C_j = W_j + D_j \quad (A6) \]

where \( D_j \) are nominal aggregate profits.

Home and Foreign's current account, which are obtained by aggregating (A6) in the interval \((0; \frac{1}{2})\) and \([\frac{1}{2}; 1)\) respectively, are balanced when consumption is equalized across countries

\[ C = C^H = \bar{C} \quad (A7) \]

Then, aggregate demand for both the Home and the Foreign good is a linear function of world consumption, \( \bar{C} \)

\[ C_H = \frac{\mu P}{P_H} \bar{C} \quad (A8) \]

\[ C_F = \frac{\mu P}{P_F} \bar{C} \]

where \( P_H \) is the nominal price of the domestic good, \( P_F \) is the domestic-currency price of the foreign good after normalising the nominal exchange rate to one and \( P \) is the nominal price index defined as

\[ P = P_H^{\frac{1}{2}} P_F^{\frac{1}{2}} \quad (A9) \]

It is easy to verify that profit-maximizing firms will set the nominal price for the good they produce equal to the aggregate nominal wage

\[ P_H = W \quad (A10) \]

\[ P_F = W^\pi \]

A parallel representation exists for the Foreign economy.
References


[12] Holden S., [1999], "Monetary regimes and the coordination of wage setting", mimeo, University of Oslo


[16] Lippi F., [2000], "Revisiting the case for a populist central banker" forthcoming in the European Economic Review


[22] Zervoyanni A., [1997], "Monetary policy games and coalitions in a two-country model with unionized wage-setting", Oxford Economic Papers 49, 57-76
<table>
<thead>
<tr>
<th>Jahr</th>
<th>Thema</th>
<th>Autorinnen/Autoren</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Euro-Diplomatie durch gemeinsame „Wirtschaftsregierung“</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td>2007</td>
<td>Löhne und Steuern im Systemwettbewerb der Mitgliedstaaten der Europäischen Union</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td></td>
<td>Konsolidierung und Reform der Europäischen Union</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td></td>
<td>The Ratification of European Treaties - Legal and Constitutionial Basis of a European Referendum</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td>2006</td>
<td>Financial Frictions, Capital Reallocation, and Aggregate Fluctuations</td>
<td>Jürgen von Hagen, Haiping Zhang</td>
</tr>
<tr>
<td></td>
<td>Financial Openness and Macroeconomic Volatility</td>
<td>Jürgen von Hagen, Haiping Zhang</td>
</tr>
<tr>
<td></td>
<td>A Welfare Analysis of Capital Account Liberalization</td>
<td>Jürgen von Hagen, Haiping Zhang</td>
</tr>
<tr>
<td>2005</td>
<td>Das Kompetenz- und Entscheidungssystem des Vertrages von Rom im Wandel seiner Funktion und Verfassung</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td></td>
<td>Die Schutzklauseln der Beitrittsverträge</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td></td>
<td>Measuring Tax Burdens in Europe</td>
<td>Guntram B. Wolff</td>
</tr>
<tr>
<td></td>
<td>Remittances as Investment in the Absence of Altruism</td>
<td>Gabriel González-König</td>
</tr>
<tr>
<td></td>
<td>Economic Integration in a Multicone World?</td>
<td>Christian Volpe Martincus, Jennifer Pédussel Wu</td>
</tr>
<tr>
<td></td>
<td>Banking Sector (Under?)Development in Central and Eastern Europe</td>
<td>Jürgen von Hagen, Valeriya Dinger</td>
</tr>
<tr>
<td></td>
<td>Regulatory Standards Can Lead to Predation</td>
<td>Stefan Lutz</td>
</tr>
<tr>
<td></td>
<td>Währungs politik als Sozialpolitik</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td></td>
<td>Public Education in an Integrated Europe: Studying to Migrate and Teaching to Stay?</td>
<td>Panu Poutvaara</td>
</tr>
<tr>
<td></td>
<td>Voice of the Diaspora: An Analysis of Migrant Voting Behavior</td>
<td>Jan Fidrmuc, Orla Doyle</td>
</tr>
<tr>
<td></td>
<td>Macroeconomic Adjustment in the New EU Member States</td>
<td>Jürgen von Hagen, Iulia Traistaru</td>
</tr>
<tr>
<td>2004</td>
<td>The Effects of Transition and Political Instability On Foreign Direct Investment Inflows: Central Europe and the Balkans</td>
<td>Josef C. Brada, Ali M. Kutan, Tamer M. Yigit</td>
</tr>
<tr>
<td></td>
<td>The Choice of Exchange Rate Regimes in Developing Countries: A Mutlinominal Panel Analysis</td>
<td>Jürgen von Hagen, Jizhong Zhou</td>
</tr>
<tr>
<td></td>
<td>Fear of Floating and Fear of Pegging: An Empirical Analysis of De Facto Exchange Rate Regimes in Developing Countries</td>
<td>Jürgen von Hagen, Jizhong Zhou</td>
</tr>
<tr>
<td></td>
<td>Der Vollzug von Gemeinschaftsrecht über die Mitgliedstaaten und seine Rolle für die EU und den Beitrittsprozess</td>
<td>Martin Seidel</td>
</tr>
<tr>
<td></td>
<td>Deutschlands Wirtschaft, seine Schulden und die Unzulänglichkeiten der einheitlichen Geldpolitik im Eurosystem</td>
<td>Dieter Spethmann, Otto Steiger</td>
</tr>
<tr>
<td></td>
<td>Fiscal Crises in U.S. Cities: Structural and Non-structural Causes</td>
<td>Guntram B. Wolff</td>
</tr>
<tr>
<td></td>
<td>Firm Performance and Privatization in Ukraine</td>
<td>Galyna Grygorenko, Stefan Lutz</td>
</tr>
<tr>
<td></td>
<td>Analyzing Trade Opening in Ukraine: Effects of a Customs Union with the EU</td>
<td>Oksana Harbuzyuk, Stefan Lutz</td>
</tr>
<tr>
<td></td>
<td>Exchange Rate Risk and Convergence to the Euro</td>
<td>Lucjan T. Orlowski</td>
</tr>
<tr>
<td></td>
<td>The Endogeneity of Money and the Eurosystem</td>
<td>Otto Steiger</td>
</tr>
<tr>
<td></td>
<td>Which Lender of Last Resort for the Eurosystem?</td>
<td>Otto Steiger</td>
</tr>
<tr>
<td></td>
<td>The Effectiveness of Subsidies Revisited: Accounting for Wage and Employment Effects in Business R+D</td>
<td>Volker Reinthaler, Guntram B. Wolff</td>
</tr>
<tr>
<td></td>
<td>Money Market Pressure and the Determinants of Banking Crises</td>
<td>Jürgen von Hagen, Tai-kuang Ho</td>
</tr>
<tr>
<td></td>
<td>Die Stellung der Europäischen Zentralbank nach dem Verfassungsvertrag</td>
<td>Martin Seidel</td>
</tr>
</tbody>
</table>
B18-04 Transmission Channels of Business Cycles Synchronization in an Enlarged EMU
Iulia Traistaru

B17-04 Foreign Exchange Regime, the Real Exchange Rate and Current Account Sustainability: The Case of Turkey
Sübidey Togan, Hasan Ersel

Harry P. Bowen, Jennifer Pédussel Wu

B15-04 Do Economic Integration and Fiscal Competition Help to Explain Local Patterns?
Christian Volpe Martincus

B14-04 Euro Adoption and Maastricht Criteria: Rules or Discretion?
Jiri Jonas

B13-04 The Role of Electoral and Party Systems in the Development of Fiscal Institutions in the Central and Eastern European Countries
Sami Yläoutinen

B12-04 Measuring and Explaining Levels of Regional Economic Integration
Jennifer Pédussel Wu

B11-04 Economic Integration and Location of Manufacturing Activities: Evidence from MERCOSUR
Pablo Sanguinetti, Iulia Traistaru, Christian Volpe Martincus

B10-04 Economic Integration and Industry Location in Transition Countries
Laura Resmini

Ayse Y. Evrensel, Ali M. Kutan

B08-04 European Integration, Productivity Growth and Real Convergence
Taner M. Yigit, Ali M. Kutan

B07-04 The Contribution of Income, Social Capital, and Institutions to Human Well-being in Africa
Mina Baliamoune-Lutz, Stefan H. Lutz

B06-04 Rural Urban Inequality in Africa: A Panel Study of the Effects of Trade Liberalization and Financial Deepening
Mina Baliamoune-Lutz, Stefan H. Lutz

B05-04 Money Rules for the Eurozone Candidate Countries
Lucjan T. Orlowski

B04-04 Who is in Favor of Enlargement? Determinants of Support for EU Membership in the Candidate Countries’ Referenda
Orla Doyle, Jan Fidrmuc

B03-04 Over- and Underbidding in Central Bank Open Market Operations Conducted as Fixed Rate Tender
Ulrich Bindseil

B02-04 Total Factor Productivity and Economic Freedom Implications for EU Enlargement
Ronald L. Moomaw, Euy Seok Yang

B01-04 Die neuen Schutzklauseln der Artikel 38 und 39 des Beitrittsvertrages: Schutz der alten Mitgliedstaaten vor Störungen durch die neuen Mitgliedstaaten
Martin Seidel

2003

B29-03 Macroeconomic Implications of Low Inflation in the Euro Area
Jürgen von Hagen, Boris Hofmann

B28-03 The Effects of Transition and Political Instability on Foreign Direct Investment: Central Europe and the Balkans
Josef C. Brada, Ali M. Kutan, Taner M. Yigit

B27-03 The Performance of the Euribor Futures Market: Efficiency and the Impact of ECB Policy Announcements (Electronic Version of International Finance)
Kerstin Bernoth, Juergen von Hagen

B26-03 Sovereign Risk Premia in the European Government Bond Market (überarbeitete Version zum Herunterladen)
Kerstin Bernoth, Juergen von Hagen, Ludger Schalknecht

B25-03 How Flexible are Wages in EU Accession Countries?
Anna Iara, Iulia Traistaru

B24-03 Monetary Policy Reaction Functions: ECB versus Bundesbank
Bernd Hayo, Boris Hofmann

B23-03 Economic Integration and Manufacturing Concentration Patterns: Evidence from MERCOSUR
Iulia Traistaru, Christian Volpe Martincus

B22-03 Reformzwänge innerhalb der EU angesichts der Osterweiterung
Martin Seidel

B21-03 Reputation Flows: Contractual Disputes and the Channels for Inter-Firm Communication
William Pyle

B20-03 Urban Primacy, Gigantism, and International Trade: Evidence from Asia and the Americas
Ronald L. Moomaw, Mohammed A. Alwosabi

B19-03 An Empirical Analysis of Competing Explanations of Urban Primacy Evidence from Asia and the Americas
Ronald L. Moomaw, Mohammed A. Alwosabi
The Effects of Regional and Industry-Wide FDI Spillovers on Export of Ukrainian Firms

Determinants of Inter-Regional Migration in the Baltic States

South-East Europe: Economic Performance, Perspectives, and Policy Challenges

Employed and Unemployed Search: The Marginal Willingness to Pay for Attributes in Lithuania, the US and the Netherlands

FCIs and Economic Activity: Some International Evidence

The IS Curve and the Transmission of Monetary Policy: Is there a Puzzle?

What Makes Regions in Eastern Europe Catching Up? The Role of Foreign Investment, Human Resources, and Geography

Die Weisungs- und Herrschaftsmacht der Europäischen Zentralbank im europäischen System der Zentralbanken - eine rechtliche Analyse

Foreign Direct Investment and Perceptions of Vulnerability to Foreign Exchange Crises: Evidence from Transition Economies

The European Central Bank and the Eurosystem: An Analysis of the Missing Central Monetary Institution in European Monetary Union

The Determination of Capital Controls: Which Role Do Exchange Rate Regimes Play?

Nach Nizza und Stockholm: Stand des Binnenmarktes und Prioritäten für die Zukunft

Fiscal Discipline and Growth in Euroland. Experiences with the Stability and Growth Pact

Reconsidering the Evidence: Are Eurozone Business Cycles Converging?

Do Ukrainian Firms Benefit from FDI?

Europäische Steuerkoordination und die Schweiz

Commuting in the Baltic States: Patterns, Determinants, and Gains

Die Wirtschafts- und Währungsunion im rechtlichen und politischen Gefüge der Europäischen Union

An Adverse Selection Model of Optimal Unemployment Assurance

Trade Agreements as Self-protection

Growth and Business Cycles with Imperfect Credit Markets

Inequality, Politics and Economic Growth

Poverty Traps and Growth in a Model of Endogenous Time Preference

Monetary Convergence and Risk Premiums in the EU Candidate Countries

Trade Policy: Institutional Vs. Economic Factors

The Effects of Quotas on Vertical Intra-industry Trade

Legal Aspects of European Economic and Monetary Union

Der Staat als Lender of Last Resort - oder: Die Achillesverse des Eurosystems

Nominal and Real Stochastic Convergence Within the Transition Economies and to the European Union: Evidence from Panel Data

The Impact of News, Oil Prices, and International Spillovers on Russian Financial Markets
B19-02  East Germany: Transition with Unification, Experiments and Experiences
Jürgen von Hagen, Rolf R. Strauch, Guntram B. Wolff

B18-02  Regional Specialization and Employment Dynamics in Transition Countries
Iulia Traistaru, Guntram B. Wolff

B17-02  Specialization and Growth Patterns in Border Regions of Accession Countries
Laura Resmini

B16-02  Regional Specialization and Concentration of Industrial Activity in Accession Countries
Iulia Traistaru, Peter Nijkamp, Simonetta Longhi

B15-02  Does Broad Money Matter for Interest Rate Policy?
Matthias Brückner, Andreas Schaber

B14-02  The Long and Short of It: Global Liberalization, Poverty and Inequality
Christian E. Weller, Adam Hersch

B13-02  De Facto and Official Exchange Rate Regimes in Transition Economies
Jürgen von Hagen, Jizhong Zhou

B12-02  Argentina: The Anatomy of A Crisis
Jiri Jonas

B11-02  The Eurosystem and the Art of Central Banking
Gunnar Heinsohn, Otto Steiger

Martin Seidel

B09-02  Monetary Policy in the Euro Area - Lessons from the First Years
Volker Clausen, Bernd Hayo

B08-02  Has the Link Between the Spot and Forward Exchange Rates Broken Down? Evidence From Rolling Cointegration Tests
Ali M. Kutan, Su Zhou

B07-02  Perspectives der Erweiterung der Europäischen Union
Martin Seidel

B06-02  Is There Asymmetry in Forward Exchange Rate Bias? Multi-Country Evidence
Su Zhou, Ali M. Kutan

B05-02  Real and Monetary Convergence Within the European Union and Between the European Union and Candidate Countries: A Rolling Cointegration Approach
Josef C. Brada, Ali M. Kutan, Su Zhou

B04-02  Asymmetric Monetary Policy Effects in EMU
Volker Clausen, Bernd Hayo

B03-02  The Choice of Exchange Rate Regimes: An Empirical Analysis for Transition Economies
Jürgen von Hagen, Jizhong Zhou

B02-02  The Euro System and the Federal Reserve System Compared: Facts and Challenges
Karlheinz Ruckriegel, Franz Seitz

B01-02  Does Inflation Targeting Matter?
Manfred J. M. Neumann, Jürgen von Hagen

2001

B29-01  Is Kazakhstan Vulnerable to the Dutch Disease?
Karlygash Kuralbayeva, Ali M. Kutan, Michael L. Wyzan

B28-01  Political Economy of the Nice Treaty: Rebalancing the EU Council. The Future of European Agricultural Policies
Deutsch-Französisches Wirtschaftspolitisches Forum

B27-01  Investor Panic, IMF Actions, and Emerging Stock Market Returns and Volatility: A Panel Investigation
Bernd Hayo, Ali M. Kutan

B26-01  Regional Effects of Terrorism on Tourism: Evidence from Three Mediterranean Countries
Konstantinos Drakos, Ali M. Kutan

B25-01  Monetary Convergence of the EU Candidates to the Euro: A Theoretical Framework and Policy Implications
Lucjan T. Orlowski

B24-01  Disintegration and Trade
Jarko and Jan Fidrmuc

B23-01  Migration and Adjustment to Shocks in Transition Economies
Jan Fidrmuc

B22-01  Strategic Delegation and International Capital Taxation
Matthias Brückner

B21-01  Balkan and Mediterranean Candidates for European Union Membership: The Convergence of Their Monetary Policy With That of the European Central Bank
Josef C. Brada, Ali M. Kutan

B20-01  An Empirical Inquiry of the Efficiency of Intergovernmental Transfers for Water Projects Based on the WRDA Data
Anna Rubinchik-Pessach

B19-01  Detrending and the Money-Output Link: International Evidence
R.W. Hafer, Ali M. Kutan
B18-01  Monetary Policy in Unknown Territory. The European Central Bank in the Early Years  Jürgen von Hagen, Matthias Brückner
B17-01  Executive Authority, the Personal Vote, and Budget Discipline in Latin American and Carribean Countries  Mark Hallerberg, Patrick Marier
B16-01  Sources of Inflation and Output Fluctuations in Poland and Hungary: Implications for Full Membership in the European Union  Selahattin Dibooglu, Ali M. Kutan
B15-01  Programs Without Alternative: Public Pensions in the OECD  Christian E. Weller
B14-01  Formal Fiscal Restraints and Budget Processes As Solutions to a Deficit and Spending Bias in Public Finances - U.S. Experience and Possible Lessons for EMU  Rolf R. Strauch, Jürgen von Hagen
B13-01  German Public Finances: Recent Experiences and Future Challenges  Jürgen von Hagen, Rolf R. Strauch
B12-01  The Impact of Eastern Enlargement On EU-Labour Markets. Pensions Reform Between Economic and Political Problems  Deutsch-Französisches Wirtschaftspolitisches Forum
B11-01  Inflationary Performance in a Monetary Union With Large Wage Setters  Lilia Cavallar
B09-01  Democracy in Transition Economies: Grease or Sand in the Wheels of Growth?  Jan Fidrmuc
B08-01  The Functioning of Economic Policy Coordination  Jürgen von Hagen, Susanne Mundschien
B07-01  The Convergence of Monetary Policy Between Candidate Countries and the European Union  Josef C. Brada, Ali M. Kutan
B06-01  Opposites Attract: The Case of Greek and Turkish Financial Markets  Konstantinos Drakos, Ali M. Kutan
B05-01  Trade Rules and Global Governance: A Long Term Agenda. The Future of Banking.  Deutsch-Französisches Wirtschaftspolitisches Forum
B04-01  The Determination of Unemployment Benefits  Rafael di Tella, Robert J. MacCulloch
B03-01  Preferences Over Inflation and Unemployment: Evidence from Surveys of Happiness  Michele Fratianni, Jürgen von Hagen
B02-01  The Konstanz Seminar on Monetary Theory and Policy at Thirty  Etienne Farvaque, Gael Lagadec
B01-01  Divided Boards: Partisanship Through Delegated Monetary Policy  Etienne Farvaque, Gael Lagadec

2000
B20-00  Breakin-up a Nation, From the Inside  Etienne Farvaque
B19-00  Income Dynamics and Stability in the Transition Process, general Reflections applied to the Czech Republic  Jens Hölscher
B18-00  Budget Processes: Theory and Experimental Evidence  Karl-Martin Ehrhart, Roy Gardner, Jürgen von Hagen, Claudia Keser, Martin Seidel
B17-00  Rückführung der Landwirtschaftspolitik in die Verantwortung der Mitgliedsstaaten? - Rechts- und Verfassungsfragen des Gemeinschaftsrechts  Christa Randzio-Plath, Tomasso Padoa-Schioppa
B16-00  The European Central Bank: Independence and Accountability  Jürgen von Hagen, Ralf Hepp
B15-00  Regional Risk Sharing and Redistribution in the German Federation  Selahattin Dibooglu, Ali M. Kutan
B14-00  Sources of Real Exchange Rate Fluctuations in Transition Economies: The Case of Poland and Hungary  Nauro F. Campos
B13-00  Back to the Future: The Growth Prospects of Transition Economies Reconsidered
| B12-00 | Rechtsetzung und Rechtsangleichung als Folge der Einheitlichen Europäischen Währung | Martin Seidel |
| B11-00 | A Dynamic Approach to Inflation Targeting in Transition Economies | Lucjan T. Orlowski |
| B10-00 | The Importance of Domestic Political Institutions: Why and How Belgium Qualified for EMU | Marc Hallerberg |
| B09-00 | Rational Institutions Yield Hysteresis | Rafael Di Tella, Robert MacCulloch |
| B08-00 | The Effectiveness of Self-Protection Policies for Safeguarding Emerging Market Economies from Crises | Kenneth Kletzer |
| B07-00 | Financial Supervision and Policy Coordination in The EMU | Deutsch-Französisches Wirtschaftspolitisches Forum |
| B06-00 | The Demand for Money in Austria | Bernd Hayo |
| B05-00 | Liberalization, Democracy and Economic Performance during Transition | Jan Fidrmuc |
| B04-00 | A New Political Culture in The EU - Democratic Accountability of the ECB | Christa Randzio-Plath |
| B03-00 | Integration, Disintegration and Trade in Europe: Evolution of Trade Relations during the 1990's | Jarko Fidrmuc, Jan Fidrmuc |
| B02-00 | Inflation Bias and Productivity Shocks in Transition Economies: The Case of the Czech Republic | Josef C. Barda, Arthur E. King, Ali M. Kutan |
| B01-00 | Monetary Union and Fiscal Federalism | Kenneth Kletzer, Jürgen von Hagen |

1999

| B25-99 | Micro and Macro Determinants of Public Support for Market Reforms in Eastern Europe | Bernd Hayo |
| B23-99 | Informal Family Insurance and the Design of the Welfare State | Rafael Di Tella, Robert MacCulloch |
| B22-99 | Partisan Social Happiness | Rafael Di Tella, Robert MacCulloch |
| B20-99 | Subnational Government Bailouts in Germany | Helmut Seitz |
| B19-99 | The Evolution of Monetary Policy in Transition Economies | Ali M. Kutan, Josef C. Brada |
| B18-99 | Why are Eastern Europe’s Banks not failing when everybody else’s are? | Christian E. Weller, Bernard Morzuch |
| B17-99 | Stability of Monetary Unions: Lessons from the Break-Up of Czechoslovakia | Jan Fidrmuc, Julius Horvath and Jarko Fidrmuc |
| B16-99 | Multinational Banks and Development Finance | Christian E.Weller and Mark J. Scher |
| B14-99 | Industry Effects of Monetary Policy in Germany | Bernd Hayo and Birgit Uhlenbrock |
| B13-99 | Financial Fragility or What Went Right and What Could Go Wrong in Central European Banking? | Christian E. Weller and Jürgen von Hagen |
| B12-99 | Size Distortions of Tests of the Null Hypothesis of Stationarity: Evidence and Implications for Applied Work | Mehmet Caner and Lutz Kilian |
| B11-99 | Financial Supervision and Policy Coordination in the EMU | Deutsch-Französisches Wirtschaftspolitisches Forum |
| B10-99 | Financial Liberalization, Multinational Banks and Credit Supply: The Case of Poland | Christian Weller |
| B09-99 | Monetary Policy, Parameter Uncertainty and Optimal Learning | Volker Wieland |
| B08-99 | The Connection between more Multinational Banks and less Real Credit in Transition Economies | Christian Weller |