TRADE UNIONS' BEHAVIOUR AND MONETARY UNION

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Presented at the Annual Review Seminar, Research Department,
Central Bank of Barbados
July 27 - 30, 1999

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Working Paper
Mai 1999

Abstract

The aim of this paper is to analyse the relationship between trade unions' behaviour and the Central Bank's policy in a monetary union. Following Canzoneri, Henderson (1991), Jensen (1993) and Agiomirgianakis (1998) , we consider a world of two equal-sized countries which share the same currency but we exclude the hypothesis of international migration of labour force. Both labour markets are supposed to be controlled by trade unions whose behaviour depends indirectly upon the Central Bank's monetary policy. We show the differences between the two regimes : a cooperative and a non-cooperative equilibrium in which each union work independently. Concerning employment, we find that the cooperative situation is unambiguously better than the non cooperative one.

Résumé

L'objet de cet article est d'analyser les interactions entre le comportement syndical et la politique monétaire dans une union monétaire. A l'image des travaux de Canzonerie, Henderson (1991), Jensen (1993) et Agiomirgianakis (1998) , nous avons retenu un modèle à deux pays aux caractéristiques économiques identiques. Constitués en syndicats, les travailleurs des deux économies adaptent leur comportement salarial à la stratégie monétaire déterminée par l'unique Banque Centrale. Nous mettons en évidence les différences entre deux régimes : l'équilibre coopératif où les deux syndicats coopèrent et l'équilibre non-coopératif dans lequel les organisations de travailleurs agissent indépendamment les uns des autres. Nous montrons ainsi que la coopération syndicale est favorable à l'emploi.

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1 Introduction

The introduction of the single European currency is an unprecedented event in the economic history. This political choice, made by some European countries consisting in gathering into a monetary union, highlights various questions about the efficiency of this monetary framework. A national currency remains a powerful instrument which allows to pursuit an independent economic and budget policy. In a monetary union, monetary policy shocks are faced by all the member states, whatever their initial situation or their economic needs. In the Caribbean sea, the experience of the ECCB is an example where a central bank have to define a single strategy for various countries. *"Despite some similarities in the economies of OECS countries, their problems and requirements are differents, making the monetary and financial management of any one central bank somewhat complex" (Donna Danns(1997)).*

In Europe, economic agents attend the modification of their economic environment. The study of strategic interactions between agents is placed at the heart of a new problematic which is the starting point of our thought. In a national framework, it is frequent to oppose a policymaker, whose aim is to promote and maintain monetary stability, and a trade union, who tries to make workers' welfare as good as possible. This scheme disappears once we accept the idea that several countries can create a monetary union. In fact, in front of the single policymaker, there are as many trade unions as member states. These trade unions can coordinate their actions in order to be stronger or work independently. The cooperation between unions involves that they take incidences of their behaviour on other trade unions into account. The matter of cooperation had been studied for policymaker's behaviour. Rogoff (1985) showed that monetary coordination could be counterproductive and could strengthen the central bank's credibility problem vis-à-vis the private sector.

Our main objective is to measure the consequences of a cooperation between unions on general economic equilibrium. We will use methodological tools borrowed from the game-theoretic analysis. The model chosen is in line with Canzoneri and Henderson (1991) and is similar to Agiomirgianakis (1998) and Jensen (1993).

The paper is organised as follows. In section 2, we present the model. It schematises a two countries economy whose members share the same currency but it excludes the hypothesis of international migration of labour force. The conduct of monetary policy is committed to a single central bank. In section 3, the model is modified in order to describe the influences of the key variables, domestic and foreign nominal wages and money supply, on all the others variables. In section 4, the trade unions' behaviour and the central bank's choices are clarified. In each country, workers are gathered in a trade union which negotiate, at the beginning of each period, nominal wages taking into account inflation and unemployment. The central bank must manipulate the money supply, in order to control prices evolution and promote full employment. We conclude in section 5, comparing results obtained with and without cooperation between trade unions.

2 The model

We consider a world of two equal-sized, interdependent and symmetric countries with flexible wages and exchange rates. Each country is specialised in the production of a homogeneous product that is an imperfect substitute in consumption for imports. Unlike Jensen (1993), we exclude the existence of shocks or stochastic components. The model is summarised by the following equations where lower case letters denote logs, and unstarred (starred) variables denote domestic (foreign) values. We treat firms in each country as perfect competitors who simply employ labour up to the point where its marginal product equals the real product wage. Assuming Cobb-Douglas production functions and taking capital to be fixed, output in each country is given by equation :

$$y = vn$$
$$y^* = vn^*$$

The labour demand is, as expected, a decreasing function in the real product wage :

$$n = -(1-v)^{-1}(w-p)$$
$$n^* = -(1-v)^{-1}(w^*-p^*)$$

As national and foreign productions are imperfect substitutes, they are consumed in both countries, which implies that consumer price indices q and q^* depend on national and foreign product prices. We assume that national (foreign) consumers prefer national (foreign) goods, that is why if $1-\beta$ and β are respectively the proportion of national and foreign goods in a national agent's consumption, we consider that $0 < \beta < 0.5$. The relative price of foreign production measured in reference to the national production noted z, is simply the difference between the production prices:

$$z = p - p^*$$

Then we can derive the formulation of the CPI:

$$q = p + \beta z$$
$$q^* = p^* + \beta z$$

Real wages are increasing functions in nominal wages, w and w^*, and decreasing functions in CPI, q and q^*. They are given by:

$$w_c = w - q$$
$$w_c^* = w^* - q$$

International migration is assumed to be prevented by psychological barriers to migration. They can be the results of a difference in languages like in Europe,

the attachment to a country or physical difficulties to migrate. In the Caribbean sea, this point seems also to be a reality. *"The only missing link to the establishment of an economic union is free movement of labour. Countries should try to accelerate the CARICOM initiative for free movement of skills which would provide basis for the eventual free movement of labour"(Donna Danns (1997)).*

To complete the model, we introduce a relation which represents the condition of equilibrium in the unified money market. The equilibrium constraint is derived from the quantity theory equation $m = p + y$, where money supply is noted m. The price variable is a weighted average of p and p^*, it can be written $p_{aggregate} = \alpha p + (1-\alpha)\, p^*$. Aggregate production is the sum of both national and foreign productions $y_{aggregate} = y + y^*$.

$$m = [\alpha p + (1-\alpha)\, p^*] + [y + y^*]$$

We will choose from now up to the end $\alpha = 1 - \alpha = 0,5$.

Trade balances are given by:

$$TB = TB^* = \alpha z - \beta\,(y - y^*)$$

Trade balances are at the equilibrium if $y - y^* = \delta z$, where δ is a parameter higher than unity (Agiomirgianakis (1998), Zervoyianni (1997)):

$$y - y^* = \frac{\alpha}{\beta}\,(p - p^*) \equiv \delta\,(p - p^*) \quad \text{avec } \delta < 1$$

δ is assumed to be higher than unity because changes in money purchasing power has stronger effects on trade balance than changes in incomes.

3 Resolution of the model and main results

Key variables are nominal wages w et w^* and money supply m. After adequate substitutions, equations can be written as followed :

Domestic economy:

$$p = \frac{1-v}{1+v}m + \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) + \frac{v}{1+v}\,(w + w^*)$$
$$n = \frac{1}{1+v}m - \frac{1}{1-v}\left\{w - \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) - \frac{v}{1+v}\,(w + w^*)\right\}$$
$$y = \frac{v}{1+v}m - \frac{v}{1-v}\left\{w - \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) - \frac{v}{1+v}\,(w + w^*)\right\}$$
$$q = \frac{1-v}{1+v}m + \frac{v}{1+v}(w + w^*) + (1-2\beta)\frac{v}{2(v+\delta(1-v))}(w - w^*)$$
$$w_c = w - \frac{1-v}{1+v}m - \frac{v}{1+v}(w + w^*) - (1-2\beta)\frac{v}{2(v+\delta(1-v))}(w - w^*)$$

Foreign economy:

$$p^* = \frac{1-v}{1+v}m - \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) + \frac{v}{1+v}\,(w + w^*)$$
$$n^* = \frac{1}{1+v}m - \frac{1}{1-v}\left\{w^* + \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) - \frac{v}{1+v}\,(w + w^*)\right\}$$
$$y = \frac{v}{1+v}m - \frac{v}{1-v}\left\{w^* + \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) - \frac{v}{1+v}\,(w + w^*)\right\}$$
$$q^* = \frac{1-v}{1+v}m + \frac{v}{1+v}(w + w^*) - (1-2\beta)\frac{v}{2(v+\delta(1-v))}(w - w^*)$$
$$w_c^* = w^* - \frac{1-v}{1+v}m - \frac{v}{1+v}(w + w^*) + (1-2\beta)\frac{v}{2(v+\delta(1-v))}(w - w^*)$$

A few interesting results are obtained. By combining, trade balances constraint and optimal labour demand, we can see clearly that the gap between national and foreign production prices is linked to the gap between wages. This result can be explained simply, if foreign wages are higher than domestic values, foreign labour demand and foreign production will be inferior to domestic values. This difference will create a foreign trade balance surplus and a domestic trade balance deficit. There are only two solutions to correct this imbalance, p diminishes and improves home country's competitiveness or p^* increases since foreign goods' supply is lower.

$$p^* - p = \frac{v}{v + \delta(1-v)}(w^* - w)$$

By integrating the money market constraint, we find :

$$p = \frac{1-v}{1+v}m + \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) + \frac{v}{1+v}\,(w + w^*)$$

$$p^* = \frac{1-v}{1+v}m - \frac{v}{2\,(v+\delta\,(1-v))}\,(w - w^*) + \frac{v}{1+v}\,(w + w^*)$$

What can be written :

$$p = \frac{1-v}{1+v}m + \frac{v}{1+v}\left(1 + \frac{1+v}{2\,(v+\delta\,(1-v))}\right)w + \frac{v}{1+v}\left(1 - \frac{1+v}{2\,(v+\delta\,(1-v))}\right)w^*$$

$$p^* = \frac{1-v}{1+v}m + \frac{v}{1+v}\left(1 - \frac{1+v}{2\,(v+\delta\,(1-v))}\right)w + \frac{v}{1+v}\left(1 + \frac{1+v}{2\,(v+\delta\,(1-v))}\right)w^*$$

These relations present separately the influences of w and w^* on the resolutions of p and p^*, when both money and commercial markets are cleared. In

what follows, we will focus our analysis only on the sensitiveness of the domestic production price to modifications in wages and money supply, the analysis of the foreign production price will follow by symmetry.

Every thing being equal, an increase in money supply unbalances money market. The clearing process needs a increase in p:

$$\frac{dp}{dm} > 0$$

The nominal domestic wage w and production price p are positively correlated. Two effects work, the first one is a monetary mechanism and the second one relies on the trade balance constraint. First, an increase in w create a drop in the production since labour cost is higher, monetary equilibrium will be reached only if prices go up. Second, an increase in w by lessening domestic production involves a trade balance surplus. It can be absorbed with a increase in production prices, which promotes a return to equilibrium:

$$\frac{dp}{dw} > 0$$

Total effect of w^* on p is the sum of two opposite effects; a positive one which work through the money market, it is identical to the effect of w on p ; a negative one which shows that an increase in w^*, lowers y^* and p. A trade balance deficit appears, and a decrease in p is necessary for improving the home country competitiveness. The total effect depends on the sign of $(2\delta - 1)$ which is always positive since $\delta > 1$.

$$\frac{dp}{dw^*} > 0$$

4 Trade Unions' behaviour and central banker's strategy

We consider that labour force in each country is organised in a single union. Each union decides nominal wages unilaterally and we assume that wages rates are set only at fixed intervals. Trade unions' behaviour is determined by the maximisation of a welfare function whose variables are employment and consumption wages. The utility function chosen is consistent with Zervoyianni (1996) and Jensen (1993) or Gylfason and Lindbeck (1986).

4.1 Situation without trade unions cooperation

For the domestic union, the function to maximise is given by:

$$\underset{w}{Max}\ U = -(n - n_0)^2 + bw$$
$$s.c. \frac{\partial w^*}{\partial w} = \frac{\partial m}{\partial w} = 0$$

Foreign nominal wage and money supply are considered like exogenous. Trade unions have an employment target, full employment, and want simply to take advantage of the higher real wage possible. By assuming that they want to reach a special level of real wages $\tilde{w}$, the welfare function becomes the following one:

$$U = -(n - n_0)^2 + b(w_c - \tilde{w})$$

After resolution, we obtain the following Nash reaction functions

$$w = m + \frac{\theta}{\sigma}(m - w^*) - \frac{\tau}{\sigma}n_0 + \eta$$
$$w^* = m + \frac{\theta}{\sigma}(m - w) - \frac{\tau}{\sigma}n_0^* + \eta$$

with :

$$\sigma = \nu + 2\delta > 0 \qquad \eta = \frac{b\tau}{2\sigma^2}\left[(1 - v)\sigma + 2\beta v(1 + v)\right] > 0$$

$$\theta = v(1 - 2\delta) < 0 \qquad \tau = 2(1 + v)(v + \delta(1 - v)) > 0$$

Both nominal wages are negatively correlated to their respective labour supply. Moreover, w and w^* are positively linked, if a trade union asks and obtains more for its members, it will be imitated by the other union of workers. As expected, a period of ease money incites trade unions to ask for higher wages. Optimal nominal wages are given by:

$$w = m + \left(\frac{\theta\tau}{\sigma^2 - \theta^2}\right)(n_0^* - n_0) + \frac{b}{2}(1 + v)\left((1 - v) + 2\beta v\frac{1 + v}{\sigma}\right)$$

$$w^* = m + \left(\frac{\theta\tau}{\sigma^2 - \theta^2}\right)(n_0^* - n_0) + \frac{b}{2}(1 + v)\left((1 - v) + 2\beta v\frac{1 + v}{\sigma}\right)$$

4.2 Situation with trade unions cooperation

Inter-Union cooperation allows home and foreign wage setters to internalise externalities among them. A trade union knows that if it obtains a higher wage, *every things being equal*, it will cause a decrease in labour demand, a drop in the production and an monetary imbalance which needs an increase in prices. These evolutions will create an inflationary process in the foreign country. The foreign trade union will have to claim for higher wages too. Adapting to trade unions, cooperative behaviours attributed to policymakers by Canzoneri et Henderson (1991) or Rogoff (1985), the program to be maximised by both trade unions is the following one :

$$\underset{w,w^*}{Max}\ U+U^* = \left[-(n-n_0)^2+bw_c\right]+\left[-(n^*-n_0^*)^2+bw_c^*\right]$$
$$sc.\ \frac{\partial m}{\partial w} = \frac{\partial m}{\partial w^*} = 0$$

with $U = -(n-n_0)^2 + bw_c$ and $U^* = -(n^*-n_0^*)^2 + bw_c^*$

w et de w^* are determined simultaneously. Cooperative solutions are given by :

$$w = m - \frac{\tau}{(\sigma+\theta)^2}(\theta n_0 + \sigma n_0^*) - \frac{\tau(\sigma^2+\theta^2)}{(\sigma-\theta)(\sigma+\theta)^2}(n_0 - n_0^*) + \frac{b}{2}(1-v)(1+v)$$

$$w^* = m - \frac{\tau}{(\sigma+\theta)^2}(\theta n_0 + \sigma n_0^*) - \frac{\tau(\sigma^2+\theta^2)}{(\sigma-\theta)(\sigma+\theta)^2}(n_0 - n_0^*) + \frac{b}{2}(1-v)(1+v)$$

4.3 Central banker's strategy

Like Kydland and Prescott (1977) or Barro and Gordon (1983), the central banker maximises a general welfare function. Monetary policy is determined for both countries. Parameters taken into account to determine optimal monetary policy decisions must resume domestic and foreign economic situations. We use a simple welfare representation which is the sum of two national welfare functions. The program to maximise is the following one :

$$\underset{m}{Max}\ \Psi = V + V^* = \left[-(n-n_0)^2 - \lambda q^2\right] + \left[-(n^*-n_0^*)^2 - \lambda q^{*2}\right]$$
$$sc.\ \frac{\partial w}{\partial m} = \frac{\partial w^*}{\partial m} = 0$$

with $V = -(n-n_0)^2 - \lambda q^2$ and $V^* = -(n^*-n_0^*)^2 - \lambda q^{*2}$

The parameter λ represents the relative social importance assigned to inflation: a higher λ places a greater weight on inflation and a lesser weight to unemployment. Thus, for example, an unemployment-adverse society would be characterised by a low value of λ. The central bank's reaction function is given by:

$$m = \frac{1-2\lambda(1-v)v}{2+2\lambda(1-v)^2}(w+w^*) + \frac{1+v}{2+2\lambda(1-v)^2}(n_0+n_0^*)$$

If λ is zero, then the policy-maker wants to promote employment whatever the inflation costs, and money supply will be:

$$m = \frac{1}{2}(w+w^*) + \frac{1+v}{2}(n_0+n_0^*)$$

An increasing relation exists between money supply and nominal wages. That means in front of very active trade unions, central banker will choose an "*ease money*" strategy to avoid a boom of unemployment. Such a policy allows to maintain a good level of labour demand since the initial increase in nominal wages will involve an inflationary process.

5 Comparison between cooperative and non cooperative regimes

In this final section, we assume that $n_0 = n_0^* = \tilde{n}$. Economic values in a cooperative regime are followed by coop, while economic values in a non cooperative regime are followed by ncoop. Using adequate substitutions, following results are obtained.

$$w_{coop} = w_{coop}^* = m - (1+v)\tilde{n} + \frac{b}{2}(1+v)(1-v)$$
$$w_{ncoop} = w_{ncoop}^* = m - (1+v)\tilde{n} + \frac{b}{2}(1+v)\left[(1-v) + \frac{2\beta v(1+v)}{\sigma}\right]$$

Trade unions' desires are lesser in a cooperative regime than in a non cooperative one:

$$w_{coop} < w_{ncopp} \text{ and } w_{coop}^* < w_{ncoop}^*$$

Money supplies are given by:

$$m_{copp} = 2v\tilde{n} + \frac{b(1-2\lambda v(1-v))}{2\lambda}$$

$$m_{ncopp} = 2v\tilde{n} + \frac{b(1-2\lambda v(1-v))}{2\lambda}\left[1 + \frac{2\beta v(1+v)}{\sigma(1-v)}\right]$$

It is less easy to deduce a hierarchy between these two money supplies, in fact:

$$m_{copp} > m_{ncopp} \quad \text{if} \quad 1-2\lambda(1-v)v < 0$$

and

$$m_{copp} < m_{ncopp} \quad \text{if} \quad 1-2\lambda(1-v)v > 0$$

Trade union cooperation which leads to a wage moderation is not a sufficient condition to ensure a more flexible monetary policy. It is the case only if the

central banker is very strict, as it seems to be in EMU, for values of λ superior to $1/2\,(2v(1-v))$.

Other economic variables also differ from a regime to the other. Production prices are higher in a non cooperative situation:

$$p_{coop} < p_{ncoop}$$

Labour demand is more important when unions cooperate:

$$n_{copp} > n_{ncopp}$$

Like both national products directly depend on labour demand, it appears clearly that incomes are better when trade unions work together.

$$y_{copp} > y_{ncopp}$$

An important element arises from these preceding lines. It is demonstrated that labour demand is stronger when trade unions decide to cooperate. Coordination between trade unions make nominal wages and production prices lesser. The passage from a non cooperative regime to a cooperative situation involves a drop in real wages which is good for employment. In fact, relative variation in nominal wages is higher than relative variation in production prices.

At last, consumer price indices and real wages reach lower levels in a cooperative situation

$$q_{copp} < q_{ncopp}$$

$$w_{copp} < w_{ncopp}$$

It seems to be in trade unions' interest to join their endeavours and to coordinate their strategies. These results are consistent whatever central banker's behaviour. There are identical to Zervoyianni (1997), which shows that in a monetary union, cooperation between trade unions is better.

6 Conclusion

It has been showed that cooperation between trade unions, by fixing nominal wages and inflation at lower levels than in a non cooperative regime, improves employment and activity. These results are identical to Akhand (1992) who demonstrates that in a national framework trade unions coordination solves partially the inflationary bias problem. This suggests that european and caribbean organisations of trade unions should be strongly encouraged, even by their respective central banker.

Implications for monetary policy are very clear. A central banker will get worse economic results if it decides to fight against inflation without seeking for a coordination of trade unions' strategies. The central banker has to improve cooperation among trade unions since "*Ease money and cooperation*" is preferable to "*tight money and non cooperation*".

At last, promote cooperation between trade unions can be a response to high unemployment rates observed in the monetary union of the OECS countries and in the quasi-union of European economies before 1999, respectively compared with larger Caribbean countries and with The United States (Demertzis and Hallet (1996)).

Our model is relatively simple but keeps its general feature. Nevertheless, among various ones, two ideas must be considered now, the hypothesis that countries are identical like in Jensen (1994) must be removed and the ability for workers to migrate must be considered like in Agiomirgianakis (1998).

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