The "New" EMS

by

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1. Introduction

In the past three years, the countries that belong to the Exchange Rate Mechanism of the European Monetary System (EMS) have experienced a very rapid process of financial integration. Most exchange controls -- in the form of constraints on portfolio investment and foreign trade financing, or dual exchange markets, where capital account transactions are kept isolated from current account transactions -- have been lifted, and the few remaining regulations are scheduled to be removed in the next few months.

While the process of financial integration was taking place, important changes have occurred in the mode of working of the EMS. The abolition of exchange controls has been accompanied by the transition to more fixed exchange rates. For three years now there have been no changes of the central parities -- a sharp difference from the previous eight years of operation of the EMS, when central parities used to be realigned once every year, at least. Early in the most recent period, strong speculative pressures against some "weaker" currencies, like the French franc and the lira were resisted obstinately, unlike in the past, and with success. On more than one occasion the offer by Germany of an across-the-board appreciation of its currency, often but vainly solicited in the past, was turned down: aversion to parity changes, once confined to the smaller (Northern) members of the system has now become common to all -- including the newcomer, Spain.

While these developments were occurring, the process of convergence of infra-EMS inflation rates seems to have come to an end: an inflation differential between Germany and "weaker" countries persists, though in different degrees. At the same time domestic demand has grown more rapidly in "higher-inflation" countries. Higher inflation and faster growth of domestic demand are reflected to some extent by changes in the current account position,

and more fully by changes in the infra-EMS trade balances.[1] These imbalances are projected to grow further in the near future.

This side of the European experience raises the question of what are the effects of financial integration and the committment to fix exchange rates on the speed and the output cost of a disinflation. Are the microeconomic benefits associated with free trade in financial assets going to come at the macroeconomic cost of growing infra-European imbalances?

The decision to fix exchange rates and liberalize capital movements before the convergence of inflation rates has been accomplished would normally be applauded by some and objected to by others. Both lots would however agree that it must cause hardships, in the shape of a contraction of output induced by real appreciation, and of capital outflows and loss of reserves resulting from repeated speculative attacks on the currency. The difference of views would only arise out of a different relative assessment of costs and benefits: the supporters believing that the disciplinary effects on inflation of the policy shift are sizeable, and valuing them more than the costs; the opponents being doubtful about those effects, and attributing a greater weight to the costs. Recent developments, however, seem to have faulted both, the supporters and the opponents. There have been no hardships; but there has been no disciplinary effect either.

In this paper we attempt to provide an explanation for these developments,

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[1] For an analysis of the effects of divergent growth rates of domestic demand on infra-EC trade balances see Bini Smaghi and Vona [1988]. Between 1984 and 1988 the overall current account position of the EC deteriorated by 0.3% of total GDP, while that of Germany improved by 2.4%. Germany's total trade surplus rose from 3.1% to 6.1% of GDP; the trad trade surplus with EC countries rose from 1.5% to 3.8%. The fall in the German trade surplus with the United States, after the peak of 1986, was more than offset by the rise in the surplus towards Europe.

based on the effects on expectations of the change in EMS regime. Section 2 discusses the facts: why are we talking of a "new" EMS ? In Section 3 we analyse the effect of the regime shift on inflation, and on the output cost of disinflation. We start describing the "old" EMS, which, at least in the more recent years, very much resembled a crawling-peg regime. We then analyse the adjustment process initiated by the authorities' decision to fix the nominal exchange rate. We consider first the case where the policy shift has no effect on expectations. Next we ask how credibility affects the adjustment. We show that the answer critically depends on the degree of financial integration -- and in particular on the ability of domestic residents to borrow in foreign currency.

Our conclusions on the consequences of the new EMS regime are mixed. The impact effect of financial integration and of a credible commitment to fixed exchange rates seem to jeopardize at first the attempts to disinflate. In the longer run, however, they may become important assets, which speed up the disinflation and dampen its output cost.

2. Some facts on the "new EMS"

2.1 The effects of financial integration: capital flows

Figure 1 shows differences in the growth rate of domestic demand. The faster growing group is led by Italy and Spain, the two EMS countries with a higher inflation; France is in the middle, while Germany and the Northern countries lag behind. Higher growth in the former countries has gone together with higher investment rates, especially in equipment.

Differences in growth rates are reflected in current account imbalances;

the latter, however, have not affected exchange rate stability. Current account deficits have been overfinanced by capital inflows. Exchange rate stability and financial integration have stimulated capital flows from lower inflation and lower growth areas into countries with higher inflation and faster growth of domestic demand. Monetary authorities in the latter countries have sterilized the increase in reserves, to prevent an undesired monetary expansion and a reduction in domestic interest rates. When full sterilization has proved difficult, they have attempted to discourage the inflows through administrative controls and/or have accepted some appreciation of the exchange rate. In short, the monetary targets set by the weaker countries in order to control domestic demand have overfulfilled the requirements set by the exchange rate objective.

Italy and Spain provide good examples of these developments. In Italy, following the last realignment in January 1984, the lira started to depreciate relative to the Deutschemark, as had happened after previous parity changes. To keep within the band the central bank raised the nominal interest rate differential vis-a'-vis Germany by 200 basis points. A large speculative attack was resisted in the summer, and a number of occasions in which a decision to realign would have been naturalwere not seized. Early in 1988, expectations shifted. Capital started to flow in notwithstanding a reduction in the interest rate differential vis-a'-vis Germany (figure 2.)

Table 1 provides a breakdown of capital inflows. It also shows that the increase in reserves has not been allowed to affect monetary targets: in spite of an anomalous public sector borrowing requirement, the Bank of Italy has become a net seller of Treasury paper. In the attempt to stem capital inflows, a 25% reserve requirement on foreign borrowing by domestic banks has been imposed. In the past 12 months the lira has been allowed to appreciate up to 3% with respect to the Deutschemark, while the Italian inflation rate remains 4

percentage points above the German rate. The monetary targets set by the Bank have been fully respected. Credit targets, instead, have been substantially exceeded: but this is part of the story we shall tell later.

Table 2 provides similar data for Spain. Even before joining the EMS, the Spanish authorities had made it clear that they were shunning from a weak currency option. Again, the size of capital inflows is impressive.

There are two differences with respect to Italy: the limited dimension of commercial banks' borrowing suggests that long term capital has been more important; sterilization has been less effective. Credit targets have been largely overshot, as in Italy.

We note another remarkable similarity between the two countries. Twice this year the Bundesbank increased German interest rates. This move was promptly followed by other EMS members, but not by Italy and Spain the two countries with the higher inflation differential with respect to Germany.

The recent experience in Italy and Spain has a precedent. In Denmark, controls on capital inflows were abolished in the spring of 1983, when the authorities made a firm commitment to a stable parity. Figure 3 shows that a steep fall of the Danish interest rates was insufficient to prevent the large capital flows -- mainly (as in Italy) through foreign borrowing by commercial banks -- induced by the credibility of the government's commitment.

Table 1

Italy: The Current Account, Private Capital Flows and Central Bank Sterilization

	1988	1989 (January-October)
current account	-12,285	-17,958
private capital flows	+23,186	+24,895
of which:		
change in net foreign liabilities of comm. banks	+10,219	+10,739
change in C.B. reserves	+10,906	+17,676

	1987	1988	1988 (January-September)	1989 (January-September)
Change in Monetary base (bn. lire)	13,946	12,957	6,462	8,921
of which:				
- increase in reserves	6,756	10,947	5,225	19.062
- Treasury financing	8,820	2,295	3,442	-8,266
- other	-1,631	-667	-2,205	-1,875
M2 (% change)				
- target	6-9	6-9		
- outcome	8.3	7.7		
Credit to non-state sector				
-target	7.0	6-10		
-outcome	10.3	15.5		

Table 2

Spain: The Current Account, Private Capital Flows and Central Bank Sterilization

(billion of pesetas)

	1988	1989 (January-July)
current account	-348.9	-723.1
private capital flows	1,693.0	1,193.3
of which:		
change in net foreign liabilities of comm. banks	302.6	108.2
change in C.B. reserves	961.8	793.9

	1987	1988	1988	1989 (January-July)
Change in Monetary base (bn. lire)	747	224	733	1,826
of which:				
- increase in reserves	1,653	922	793	839
- Treasury financing	291	-40	-384	-62
- other	-1,197	-658	324	1,049
ALP (% change)				
- target	6.5-9.5	8-11		
- outcome	14.2	11.0		
Credit to non-state sector				
-target	...	12.5		
-outcome	14.5	16.4		

2.2 The effects of financial integration: exchange rate expectations

There were two common arguments in favor of capital controls in the EMS: (i) capital controls help to stabilize domestic interest rates; (ii) capital controls eliminate the possibility of speculative attacks against the reserves of the central bank.

With perfect capital mobility, whenever a discrete change in the exchange rate is expected, interest rate differentials widen sharply. In proximity of a devaluation, equilibrium interest rates on overnight assets can easily exceed 100 percent ! In general, expectations of exchange rate devaluations increase the volatility of short-term nominal interest rates to levels that are considered unacceptable by most central banks, though there is no widely agreed-upon welfare justification for the desirability of targeting nominal interest rates.[2]

Further, when a devaluation is expected, even a jump in domestic interest rates adequate to prevent the reallocation of international financial portfolios may not be sufficient to avoid a speculative attack on the reserves of the central bank. To escape the loss of purchasing power of the domestic money stock caused by a devaluation, holders of high powered money may be induced to sell the domestic currency to the central bank in exchange for foreign currency just before the devaluation, then buying it back after the devaluation. Speculative attacks on central banks' reserves thus can occur even when domestic interest rates are allowed to jump to equilibrate financial portfolios. This problem could be especially bothersome to central banks, since the magnitude of the expected devaluation does not affect the size of the speculative attack.

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[2] Many economists (see for example Barro [1988]) argue that nominal interest rate targeting seems a reasonable description of central banks' activities.

The reluctance of central banks to suffer large swings in their foreign exchange reserves is another argument for prohibiting the purchase of foreign exchange by domestic residents, for reasons that are not related to the the financing of international trade.

The likelihood of sharp increases in domestic interest rates and of speculative attacks is enhanced by the possibility that the expectation of a devaluation be self-fulfilling. A "confidence crisis" may force the central bank to devalue even if "fundamentals" are consistent with the exchange rate target. In such cases capital controls eliminate the possibility of multiple equilibria.

These arguments have been often used to suggest that the European Monetary System would not survive the abolition of exchange controls.

The process of financial integration that has taken place in the Community since 1985-86 has practically removed all controls on portfolio investment. The only remaining restrictions, in countries such as France and Italy, are on bank deposits -- residents are prevented from holding a checking account denominated in foreign currency. These restrictions are still effective at dampening the fluctuations in demand for high powered money that accompany expectations of exchange rate changes. Interest rates, on the contrary, already bear the full burden of adjusting to the portfolio shifts that may be induced by expectations of exchange rate changes.

The top panel of Table 3 compares the variability of onshore and offshore interest rates in France, Italy and West Germany before and after the liberalization. The offshore rate is the interest offered on Eurodeposits issued in London, and denominated in the three EMS currencies; onshore rates are offer rates in the domestic money market in Paris, Milan and Frankfurt. The Table reports figures for three sub-periods. During the first two periods

exchange controls in France and Italy isolated the domestic money market from the international financial market; the third period starts at the time of the abolition of exchange controls. In West Germany international financial transactions were unrestricted throughout the sample. We have split the sample referring to exchange controls into two, to account for the greater "turbulence" observed in the EMS up to the realignment of March 1983. Data are daily, and variability is defined as the standard error of the detrended time series of interest rates divided by the mean.

As expected, financial liberalization in France and Italy has eliminated that gap between onshore and offshore rates: the variability of the two series is now practically identical. This is in contrast to the early 1980s when exchange controls were effective at reducing the volatility of domestic interest rates relative to that of Eurorates.

However, contrary to what could have been expected, the gap has been closed, more than by an increase in the volatility of onshore rates, by a significant reduction in the volatility of offshore rates. This observation is consistent with three different hypotheses. First, interest rates worldwide may have become more stable. An alternative hypothesis points to the effects of exchange controls on the volume of Eurodeposits denominated in Lire and French francs: exchange controls increase transaction costs in the currencies that are subject to such controls, and thus limit the number of agents who actively trade for portfolio purposes in those currencies. The outcome is that offshore markets will be relatively thin, and in some cases "market thinness" may raise the volatility of asset prices. Finally, the reduction in the volatility of offshore rates may be an indication that exchange rate expectations have stabilized.

The data in Table 3 tend to reject the first two interpretations. If we

take the DM as the standard, we see that the change in the volatility of interest rates on DM deposits cannot fully explain the stabilization of Eurorates in lire and French francs: between 1983-87 and 1988-89 the variability of DM Eurorates falls by 50 percent, while that of Eurofrancs and Eurolire falls by 250 percent. The lower panel of Table 3 reports the average spread between bid and ask rates in each sub-sample. These spreads tend to widen in thin markets. If financial liberalization had rapidly deepened the Euromarket we should observe a fall in the average bid-ask spread. Although there is some evidence that bid-ask spreads have fallen in the Eurofranc market, spreads on deposits denominated in Italian lire have remained almost unchanged. The evidence thus suggests that the transition to greater freedom of capital movements and to growing integration of financial markets has stabilized exchange rate expectations; these in turn are reflected in the convergence of the variability of Italian and French interest rates to that of West German rates.

A change in the process that drives exchange rate expectations suggests a "change of regime". If, for example, agents in financial markets had associated the abolition of exchange controls with a shift in monetary policy, we would observe a change in the process driving expectations.

As we have seen above, financial liberalization has indeed been accompanied by a "regime change". It is as if the authorities had realized that once exchange controls are gone, realignments become virtually impossible, since the mere possibility of a realignment could stir up an unsustainable speculative attack. The commitment to fixed exchange rates then becomes the only alternative to abandoning the EMS and letting exchange rates float freely.

Table 3

Variability of onshore and offshore interest rates

(1-month deposits)

	Deutsche marks		French francs		Lire	
	offshore	onshore	offshore	onshore	offshore	onshore
12.11.10 - 31. 3.83	.141	.146	.482	.146	.262	.060
1. 4.83 - 31. 7.87	.093	.087	.132	.059	.126	.079
1. 4.88 - 21.10.89	.061	.056	.051	.046	.050	.032

Average Bid-Ask Spreads in the Euromarket

(1-month deposits)

	Deutsche marks	French francs	Lire
12.11.10 - 31. 3.83	.014	.033	.067
1. 4.83 - 31. 7.87	.026	.023	.047
1. 4.88 - 21.10.89	.021	.015	.048

Data are daily, and interest rates are per-annum. The measure of variability refers to bid rates. Variability is defined as the standard error of the detrended time series of interest rates divided by the mean. The average bid-ask spread is computed as $[i(ASK) - i(BID)]/[i(ASK) + i(BID)](0.5)$.
Source: Data Resources Inc., FACS Databank.

3. The "old" EMS

We now address the problems arising in the transition from the "old" EMS equilibrium to a new situation developing as a result of a policy shift in the weaker members of the system. To sharpen the comparison, we shall to some extent caricature the features of the old system. This does not apply to its broad characterization, which, as we have mentioned above, is one of frequent, and especially frequently expected, realignments. But it does apply to our description of the system as one in which realignments followed, or were expected to follow, a crawling peg pattern so as to keep the real exchange rate constant in presence of persisting inflation differentials. For our purposes, however, this caricature is not a misrepresentation, in spite of the fact that the disciplinary effects of the EMS in the past depended precisely on less than full accomodation of inflation differentials. When the differential, though still persisting, has already narrowed considerably, it may be expected that periodical small realignments will be tolerated, at home and abroad. We further use the assumption of constant real exchange rates for simplicity: what really matters is that parity changes did occur and were expected to occur.

The policy shift is signalled by the resolve of the authorities of the high-inflation country to stick to the existing central parity from now on, and to resist market pressures for a realignment. Over time, the authorities' commitment acquires credibility, and agents' expectations shift.

The transition from a crawling peg to fixed exchange rates is normally associated with a contraction of output due to a loss of competitiveness. We shall instead argue that, when we allow for freedom of capital movements and integration of financial markets, a commitment to the existing parity will initially produce an undesired expansionary stimulus to domestic demand: this effect is undesired, because it frustrates the effort to eliminate the inflation

differential via the contraction of total demand induced by the real appreciation.

Let us first consider equilibrium in the "old" EMS. Domestic absorption depends positively on income, on the real interest rate, and on the stance of domestic fiscal policy. The current account depends positively on the relative price of home goods, and negatively on the level of income.[3] Solving for income, total demand for home goods can be written as:

$$y_t = - \beta r_t + \alpha \lambda_t + \gamma f_t \qquad (1)$$

where y denotes the logarithm of domestic demand , $\lambda \equiv e+p^*-p$ the logarithm of the real exchange rate, r_t the level of the real interest rate relevant for domestic demand, and f_t is an index of fiscal stance.

Prices are predetermined: the rate of increase of prices between period t and period t+1 is a function of excess demand in period t and of past inflation:

$$p_{t+1} - p_t = [(1-\mu)/(1-\mu L)] (p_t - p_{t-1}) + \delta y_t \qquad (2)$$

where μ ($0 < \mu < 1$) is the parameter of the distributed lag function of past inflation and L is the lag operator. Equation (2) is consistent with wage contracts where wages for period t+1 are set in period t, based on current conditions in the labor market and on past inflation -- either because expectations follow an error-correction rule, or because of the presence of overlapping contracts. Equation (2) also assumes that firms passively set prices

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[3] In defining the current account we assume that foreign income is exogenous, and we neglect interest payments on net foreign assets.

based on current wages, and, more importantly, rules out any forward looking behaviour in the labour market. Our motivation for making this assumption is that we wish to concentrate on the effects on aggregate demand of a shift in exchange rate expectations: we thus overlook the effects of exchange rate expectations on the supply side of the economy.[4]

Domestic financial assets (denominated in the domestic currency) are imperfect substitutes for foreign financial assets, and capital flows depend on the uncovered interest rate differential.

Abroad prices are constant and the nominal, and real, rate of interest is fixed at i^*. In the initial equilibrium domestic output is at the full-employment level (normalized to zero), and the inflation rate is positive, but constant. The central bank lets the nominal exchange rate depreciate at a rate equal to the rate of inflation -- which is the crawling-peg assumption -- and keeps the domestic real rate of interest equal to i^*. $\lambda_t = \bar{\lambda} = 0$, and $f_t = \bar{f} = 0$ keep the goods market and the current account in equilibrium -- assuming for simplicity $i^* = 0$.[5] The initial equilibrium is depicted in figure 4, where we plot the real interest rate and the real exchange rate along the axes. The equilibrium at E is independent of the rate of inflation, as the nominal exchange rate depreciates with inflation, and the real interest rate is constant at i^*.

4. A change of regime with unchanged expectations

We now suppose that the authorities resolve to eliminate the inflation

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[4] Fischer (1988) addresses similar questions in a model where expectations affect both demand and supply.

[5] Note that internal and external equilibrium require an appropriate level both of the real excahnge rate and of fiscal policy.

differential with the foreign country and that, to do so, they decide to abandon the crawling peg regime which has, until then, validated that differential. With a stable nominal exchange rate, the real exchange rate will appreciate over time as long as inflation persists.

We are not concerned here with the effects of real appreciation on the sacrifice ratio -- or output cost -- of the disinflation.[6] We want to see how disinflation is brought about by real appreciation, and how this process is affected by a shift in exchange rate expectations.

Consider first a disinflation that takes place in the presence of a constant real rate of interest. The loss of competitiveness will cause a shift away from domestic goods, and hence a fall in total domestic demand -- as the current account worsens, while a constant real rate of interest keeps domestic absorption unchanged. As demand falls, the inflation rate declines, as shown by equation (2). The real appreciation will continue as long as a positive inflation differential persists, and will be followed by real depreciation when the differential turns negative to restore the initial level of competitiveness at a constant nominal exchange rate. The dynamic path of the economy from the old to the new steady state is described by:

$$\begin{vmatrix} p_{t+1} - p_t \\ \lambda_t \end{vmatrix} = \begin{vmatrix} 1 - \theta\alpha & (1-\mu)\theta\alpha \\ -1 & 1 \end{vmatrix} \begin{vmatrix} p_t - p_{t-1} \\ \lambda_{t-1} \end{vmatrix} \qquad (3)$$

The economy will converge to the new steady state provided:

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[6] The problem is discussed by Fischer (1988), who, unlike De Grauwe (1989), shows that the answer is ambiguous.

$$1 - \theta\alpha\mu < 1$$
$$4 - \theta\alpha(1+\mu) > 0 \qquad (4)$$
$$\theta\alpha(1-\mu) > 0$$

The first condition[7] requires $\mu\theta\alpha > 0$, and is satisfied for positive values of the three parameters. The third condition requires $\mu < 1$ and the second $\alpha < 4/[\theta(1-\mu)]$. Thus, for reasonable and plausible values of the parameters the process converges.

In the new steady state prices are constant, and the real exchange rate is back to equilibrium ($\bar{\lambda} = 0$.) With an unchanged real rate of interest, output will also have returned to equilibrium, as absorption has remained constant throughout the adjustment, and the current account is back to equilibrium. In the process, however, the country will have incurred a series of current account deficits. Whether and to what extent these deficits will be financed by private capital flows, or by a fall in official reserves, depends on what has happened to exchange rate expectations. If we assume $(e_{t+1} - e_t)^E = p_{t+1} - p_t$, official reserves have borne the entire burden.

5. The effects of a shift in expectations

The assumption that exchange rate expectations are unaffected by the regime shift appears unwarranted. Even if the authorities are not immediately and wholly credible in their resolve to maintain and defend the central parity, experience will teach agents to be less than certain about the regular

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[7] The conditions correspond to the requirement that the determinant of the state transition matrix be smaller than 1, the sum of 1 plus the trace plus the determinant be positive, and the sum of 1 plus the determinant minus the trace be also positive.

occurrence of parity realignments. To allow for this we assume that realignments are expected to occur with probability π, and that each realignment is expected to offset the current inflation differential:

$$(e_{t+1} - e_t)^E = \pi (p_{t+1} - p_t) \qquad 0 \leq \pi \leq 1 \qquad (5)$$

The probability assigned to a realignment, π, depends on the agents' perception of the policy followed by the authorities. This perception reflects past behaviour in exchange rate management: the regime the agents believe they are in is thus influenced by the number and the frequency of realignments which have occurred to date. When realignments occur at (more or less) regular intervals to prevent a real appreciation of the currency, as under the crawling peg-regime, we would have $\pi = 1$.

As a result of the policy change, however, no realignment occurs at the expected dates. "Expected dates" do not of course mean precise calendar dates: under the "old" regime, when the time for a parity change was ripe, the formal decision would be taken in connection with specific events -- like a meeting of the finance ministers, or the adoption of a policy package at home -- or would be taken in cold blood to anticipate market expectations. Now however the authorities signal their resolve to maintain the existing parity by foregoing occasions propitious to realignments and by resisting speculative pressures at times when the markets, on the basis of past experience, expect them. Over time the commitment to fixed (or less variable) central parities becomes gradually more credible, and the probability assigned to a realignments begins to fall.

If and when this happens, and if the domestic real interest rate is kept unchanged at the foreign level, the difference between the domestic nominal interest rate and the foreign rate plus the expected exchange rate depreciation,

$(1 - \pi)\ (p_{t+1} - p_t)$, will turn positive as π falls below 1. This will stimulate capital inflows which, depending on the degree of asset substitutability, may overfinance the current account deficit.

This, however, is not the only nor the most relevant effect of the change in expectations. Another, more relevant, effect becomes apparent once we take a closer look at what determines the real cost of borrowing, on which domestic absorption depends. The situation we consider is one of increasing, though not complete, freedom of capital movements and of growing integration of financial and credit markets. Both enable domestic residents to borrow not only in domestic currency, at the domestic interest rate, but also in foireign currency, at a cost which depends on the foreign interest rate and on the risk of depreciation of the domestic currency. The opportunity to borrow in the foreign currency, however, is not open to all agents in the economy. Small borrowers, typically households, have limited or no access to foreign credit, because of the small size of their loans relative to the fixed transaction costs involved in foreign borrowing, the market power of domestic banks, lack of information. Larger-size borrowers, typically firms, can instead turn to foreign credit and financial markets, if borrowing there costs less than borrowing at home.

Thus for "households" the real cost of borrowing will be:

$$r^h = i - (p_{t+1} - p_t) \tag{6}$$

where i is the domestic nominal cost of borrowing, while for "firms" it will be:

$$r^f = \min \begin{cases} i - (p_{t+1} - p_t) \\ i^* + (e_{t+1} - e_t)^E - (p_{t+1} - p_t) \end{cases} \tag{6'}$$

Let "households"' borrowing represent a fraction (1-k) of total borrowing by domestic residents, while the fraction borrowed by "firms" is k.

Expenditure decisions depend on the real cost of borrowing. In view of the fact that some residents have access to foreign credit, the real cost of borrowing, which affects expenditure, is a weighted average of the real cost of borrowing in domestic and foreign currency:

$$r = k\, r^{f} + (1-k)\, r^{h} = (1-k)\,(i - (p_{t+1} - p_t)) + k\,[i^{*} + (e_{t+1} - e_t)^{E} - (p_{t+1} - p_t)] \qquad (7)$$

With exchange rate expectations as in (5)[8] and the domestic real interest rate at the foreign level:

$$r = i^{*} - k(1 - \pi)\,(p_{t+1} - p_t) \qquad (7')$$

In the "old" crawling peg regime, $\pi = 1$ and $r = i^{*}$, as can be easily verified. As π falls below unity, however, this "probability shock" causes a fall in r, in spite of the fact that the central bank pegs the domestic real interest rate. This means that, while real appreciation reduces the foreign component of total demand, the fall in the effective real borrowing rate provides an expansionary stimulus to domestic demand, which is not bargained for by the authorities and which seems to undo the disinflationary effects of real

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[8] Note that, as π does not exceed 1 (parity changes allowing a real depreciation are ruled out), and as long as the level of the real interest rate at home does not fall below the foreign level, the real cost of borrowing abroad will never exceed that of domestic borrowing.

appreciation. In terms of figure 4, while real appreciation moves the system to the left of the locus $y = 0$, as expected and desired by the authorities, the decline in r caused by the probability shock shifts it below the locus: which of the two effects will prevail cannot be said a priori. Even if we knew, we still would have no information on how the fall in π affects the disinflation process. We must therefore take a closer look at the dynamics of the system.

The transition matrix now becomes:

$$\begin{vmatrix} \dfrac{1 - \mu \bullet \beta k (1 - \pi) - \bullet \alpha}{1 - \bullet \beta k (1 - \pi)} & \dfrac{(1 - \mu) \bullet \alpha}{1 - \bullet \beta k (1 - \pi)} \\ - 1 & 1 \end{vmatrix} \qquad (8)$$

The first two stability conditions insuring that the dynamic path leads to a new steady state now become:

$$\alpha > [(1-\mu)/\mu] \, k \, \beta \, (1 - \pi) \qquad (9)$$

$$\alpha < [4/\bullet (1 + \mu)] - 2k\beta (1 - \pi) \qquad (9')$$

while the third of the conditions in (4) ($\mu < 1$) remains unchanged. We can safely assume that the second condition in (9) is satisfied, although it is more stringent than for $k(1 - \pi) = 0$. The first condition (which is derived from the requirement that the determinant be smaller than unity) has a clear economic interpretation: it is required that the effect on demand of a change in the real cost of borrowing, βk, be sufficiently small relative to the effect of a change in the real exchange rate. As $k(1 - \pi)$ rises, because the probability assigned to a realignment declines, and/or because the number of unconstrained borrowers

increases, the required value of α/β increases.

We must, however, be aware of a catch in the formal analysis of convergence in this case. The availability of foreign currency loans to unconstrained agents in the economy reduces the average cost of borrowing and stimulated domestic demand as long as the inflation rate is positive. At a zero inflation rate borrowing in domestic or foreign currency becomes a matter of indifference, because the real cost is i^* in both cases. As inflation becomes negative, however, the average real cost of borrowing cannot rise above i^*, as shown by (5') above. Foreign currency borrowing takes place as long as its cost is less than i^*: with negative inflation domestic borrowing becomes more convenient and will be 100% of total borrowing. Thus condition (9) is necessary only for positive inflation rates, while the less stringent condition $(\bullet \alpha \mu) > 0$ holds in the periods of negative inflation. True, if (9) holds it implies also $\bullet \alpha \mu > 0$, so that the ceiling set to the behaviour of r at $r = i^*$ should not jeopardize stability. However, the discontinuity implied by the fact that, as inflation turns negative, k falls to zero, makes a precise formal analysis of the whole dynamic process unmanageable.

More importantly, while it is relevant to establish that the process is stable, this, by itself, does not provide an answer to our earlier questions of how credibility and financial integration, as captured by positive values of $k(1 - \pi)$, affect the disinflation process initiated by foregoing parity changes. The formal analysis of stability only tells us that, if $k(1 - \pi) > 0$, the conditions on α/β are somewhat more stringent. We therefore do not even attempt a precise analysis of the dynamic process with switching parameters, and consider instead how the change in expectations affects the first phase of the disinflation, after the authorities have abandoned the crawling peg.

A turn of expectations (a fall of π below 1), caused by a growing perception

of, and an increasing confidence in, the shift in policy regime produces remarkable effects, which are greater the greater is the integration of financial markets.

At the early stages of the process, when the rate of inflation is still high and the real exchange rate not far yet from its equilibrium level, the expansionary effects of the fall in the cost of borrowing on domestic demand will always prevail on the initial contractionary effects of real appreciation. Following the policy shift, credibility results in a higher inflation rate than the authorities were expecting. It may even be the case that initially, as $k(1 - \pi)$ becomes positive, inflation rises above its previous level: this happens if $\alpha < \beta k (1 - \pi)$, which is compatible with $\alpha > \beta k (1 - \pi) (1 - \mu)/\mu$, the stability condition, if μ, the error correction term, is not too low. As time goes by, however, the contractionary effects are bound to prevail, as to higher inflation in one period there corresponds greater real appreciation in the following period. As inflation begins to fall, with $k(1 - \pi) > 0$ the process becomes cumulative, for the real borrowing rate begins to rise again, reaching, as we saw above, its initial level i^* at zero inflation. True, the expectations of a parity change may decline further, and recourse to foreign currency borrowing increase. Note, however, first that the possible rise of $k(1-\pi)$ is bounded by $\pi = 0$, $k = 1$, while the decline of λ finds a limit only when the inflation reaches zero; second, if the inflation rate is falling, the higher $k(1 - \pi)$, the faster the rise in r.

Even though the effects of a fall in the expectation of a parity change do not prevent the eventual decline in the inflation rate, the authorities may still be worried by the initial bulge of demand and inflation. If they take a short view, they see that the very purpose of their policy appears to be defeated by that policy's credibility. In any case, they have reason to ask

whether, owing to this, disinflation will be a more lenghty and more costly process than expected.

If fiscal policy is given, the authorities have two means at hand to prevent the expansionary effects analysed above. First, the domestic nominal interest rate can be raised so as to match the consequences of the decline in the expected depreciation. It can immediately be seen from (7) that this increase should be equal to the fall in expected depreciation, times the ratio of unconstrained to constrained borrowers. Second, they could let the currency appreciate within the fluctuation band provided by the EMS, especially in countries like Italy and Spain with relatively wider bands. Whereas an appreciation of the central parity implies a formal decision, which may be difficult to adopt while the current balance is deteriorating, a movement within the band only requires that the Central Bank abstain from inframarginal interventions. Suppose then the the Central Bank allows the currency to appreciate by, say, x percent. As the commitment is to defend the central parity, but not whatever departure from the central parity which may occur within the band, it will be expected that the appreciation above the parity will be reversed, and this will increase the cost of foreign borrowing. The choice may also be a mix between the two options: some rise in the domestic interest rate and some appreciation within the band will always allow to prevent the initial fall in r.

But do the authorities really have to worry ? Is it wise to raise the domestic interest rate and to allow a nominal appreciation in order to prevent the fall in the average cost of borrowing caused by the cheapening of foreign borrowing ? The answer is negative on both counts.

Somewhat paradoxically, it turns out that the initial fall in r and the resulting bulge in domestic demand make the disinflation process shorter and

less costly in terms of both output and current account deficits.

This is easily seen by solving for $p_{t+1} - p_t$:

$$p_{t+1}-p_t = [(1 - \bullet \beta\, k(1-\pi))]^{-1}\, [1-\mu \bullet \beta\, k(1-\pi) - \bullet \alpha]\, (p_t-p_{t-1}) - \bullet \alpha\, (1 - \mu)\, \lambda_{t-1} \qquad (10)$$

In the initial steady state, $\bar{\lambda} = 0$. Remembering that $\lambda_{t-1} = \lambda_t + (p_t - p_{t-1})$ and setting $(p_{t+1} - p_t) = 0$, we obtain:

$$\lambda_t = - \frac{1 - \mu \bullet \alpha - \mu \bullet \beta\, k\, (1 - \pi)}{(1 - \mu) \bullet \alpha}\, (p_t - p_{t-1}) \qquad (11)$$

Thus, when disinflation has been achieved, real appreciation will be smaller the higher $k\,(1 - \pi)$. Since:

$$\lambda_t = - \Sigma_1^t\, (p_s - p_{s-1}) = - (p_t - p_0) \qquad (12)$$

the other side of this conclusion is that cumulative inflation during the process of disinflation will be less, and the price index at the end of the disinflation will be lower, the greater credibility and integration. Disinflation must then be quicker, and its output costs lower, for higher values of $k(1 - \pi)$. Further, as the cumulated inflation and appreciation are lower, the cumulated current account deficit incurred in the process will be lower.

Figure 5 shows two examples obtained by simulating our model with two different sets of parameter values. In both cases inflation crosses the zero line before (and the cumulated output loss is smaller), the higher is $k(1 - \pi)$.

The intuition for this result is that credibility and financial integration,

by raising demand, and possibly accelerating inflation at the beginning of the process, shift the loss of competitiveness toward the early stages of the disinflation. This early loss of competitivess is carried on throughout the process and thus accelerates the convergence to zero inflation.

6. Conclusions

In this paper we have attempted to provide an interpretation of the developments which have occured as the EMS has evolved from a system of adjustable, and frequently adjusted, parities, where capital controls provided a shelter to weaker currencies, to one where this shelter is being removed while "an understanding that [exchange rate realignments] would be made only in exceptional circumstances" seems to have been reached, in advance of stage two of the Delors Report.[9] Our findings are at odds with the expected consequences of a shift to more fixed exchange rates when inflation differentials persist and there are no capital controls.

In section 2 we set forth some stylized facts, with particular reference to the experience of Spain and Italy. The change in exchange rate regime, far from inflicting hardships and imposing discipline has been accompanied by an expansionary stimulus to domestic demand. The resulting current account deficits have been overfinanced by capital inflows, while the removal of controls, contrary to what could be expected, has been followed by a reduction in the volatility of offshore rates. Our explanation of these facts is based on the effects of the change of expectations, induced by the shift in exchange rate policy, on the average cost of credit in a situation of growing integration of

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[9] Committee for the Study of Economic and Monetary Union, Report on Economic and Monetary Union in the European Community, April 1989, para. 57.

capital and credit markets.

As disinflation is the target of the policy change, the authorities may be worried by the unexpected and undesired expansion of domestic demand caused by the very credibility of their new stance. It is however our contention, and our counterintuitive finding, that credibility and financial integration, while causing difficulties in the short run, become important assets in the longer run. If the authorities keep steady, a growing credibility in their commitment, and increasing financial integration, speed up the process and reduce the output cost of disinflation.

This conclusion must however be qualified by at least three warnings. First, credibility and financial integration make the formal condition insuring the stability of the system more stringent than when the effects of both are neglected: if the sensitivity of aggregate demand to the average real cost of credit is too high with respect to the sensitivity to the real exchange rate, the outcome may be unstable.

Second, the process we have analyzed is not without costs. Quicker disinflation is bought at the price of greater current account deficits, and hence of greater foreign indebtedeness: what has been saved now may therefore have to be paid later.

Finally, any adverse shock may jeopardize the completion of the process. If the shock requires an adjustment of real wages, the market may anticipate an incentive to enforce this outcome through exchange rate depreciation, as nominal wage adjustment would be a difficult and lenghty process. Thus, under a shock, the credibility of the authorities' commitment to fixed exchange rates may quickly fade away: financial integration would then strengthen this adverse movement by lending more ammunitions to speculative attacks against the currency.

A "commitment technology" may help avoid this latter risk. A commitment to fixed parities which was the result of a broader institutional change, and not only the unilateral, and therefore more easily reversible, decision of one national authority would contribute to sustain the credibility of the system.

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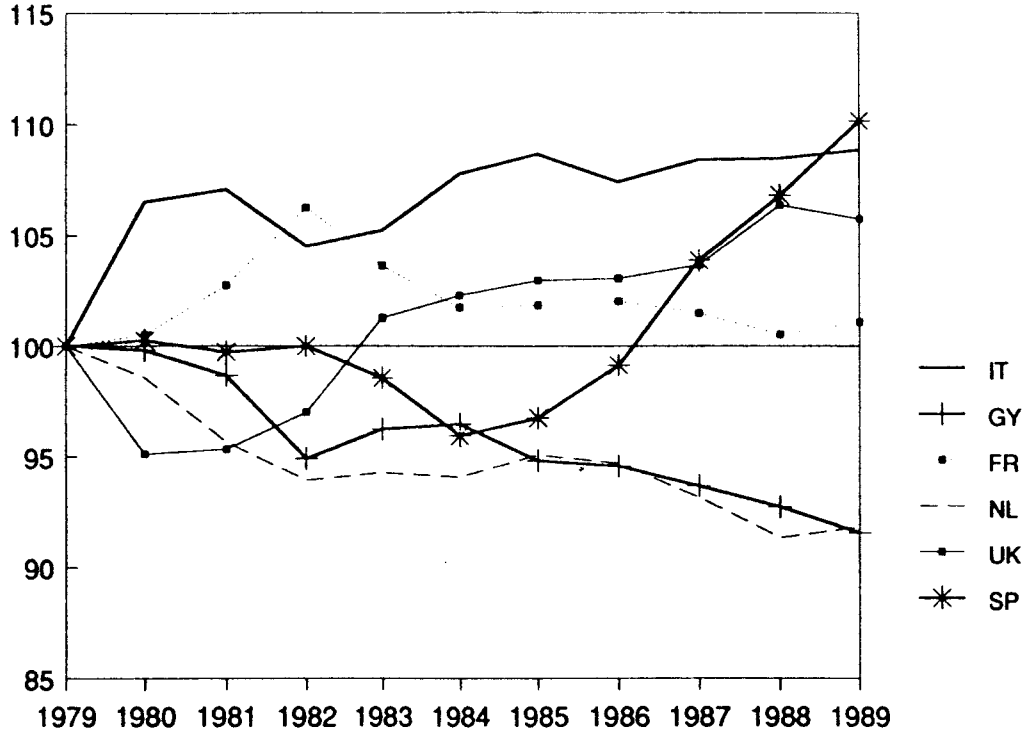
Figure 1

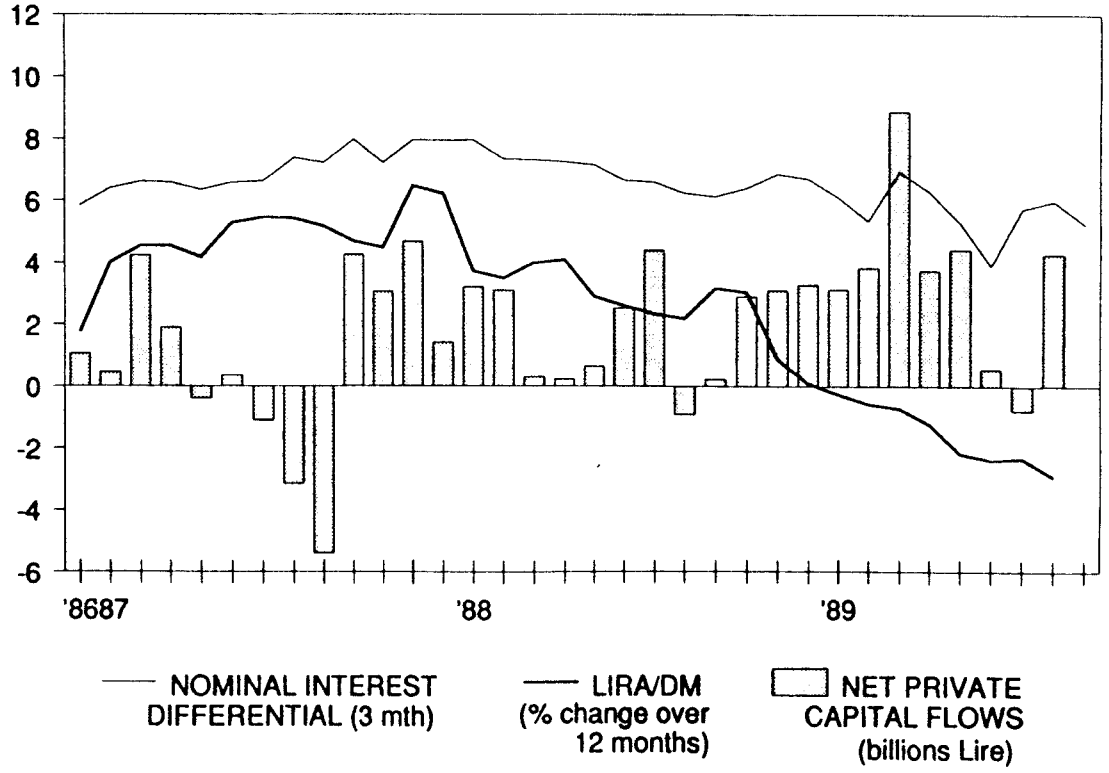
RELATIVE DOMESTIC DEMAND IN THE EMS
(1979 = 100)



SOURCE: OECD

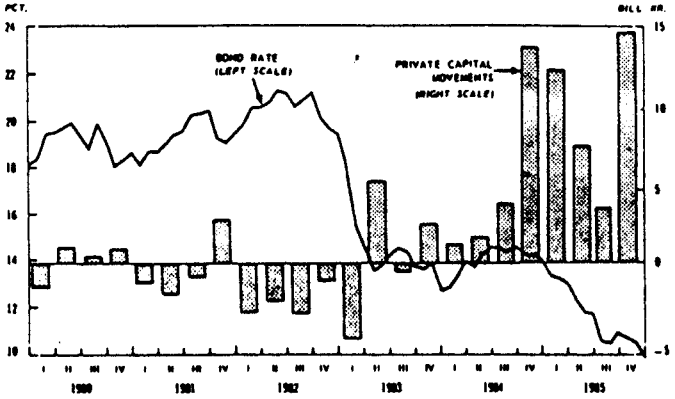
Figure 2

ITALY: THE EXCHANGE RATE, INTEREST RATES AND PRIVATE CAPITAL FLOWS 1987-89



EXCHANGE RATE STABILIZATION, INTEREST RATES AND PRIVATE CAPITAL FLOWS

DENMARK: 1982-83



Source: OECD, Economic Survey of Denmark, February 1986, p. 17.

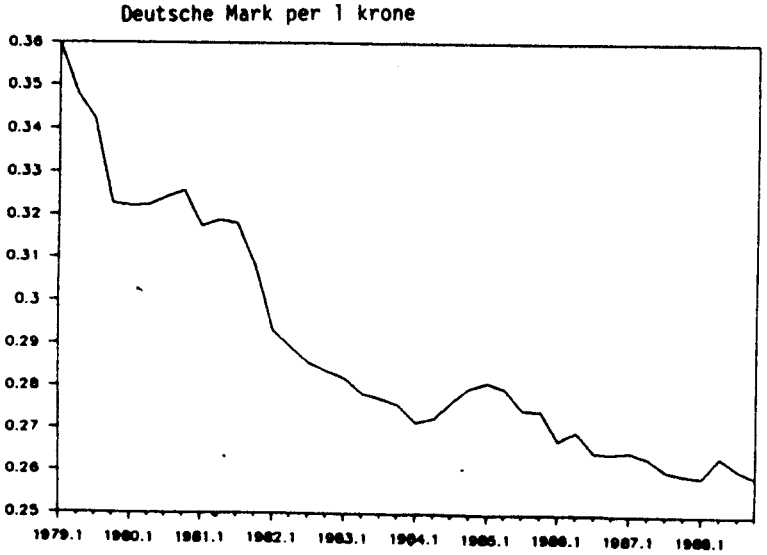


Figure 3

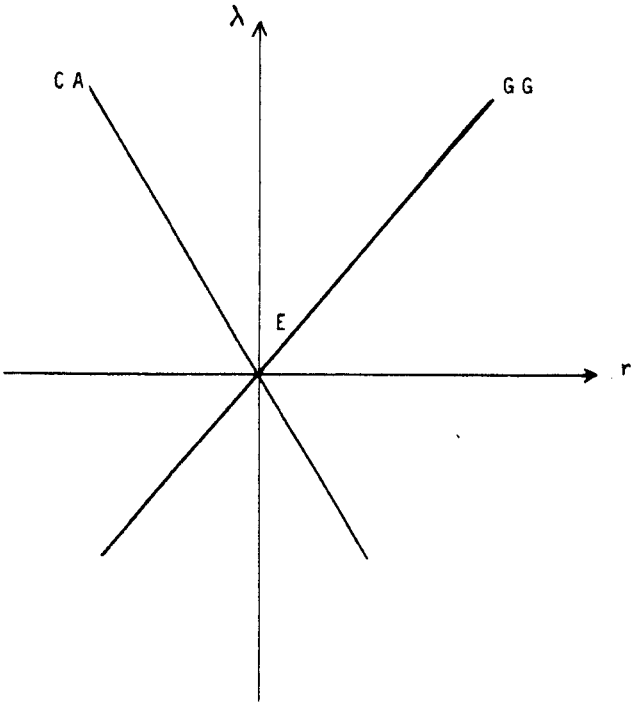
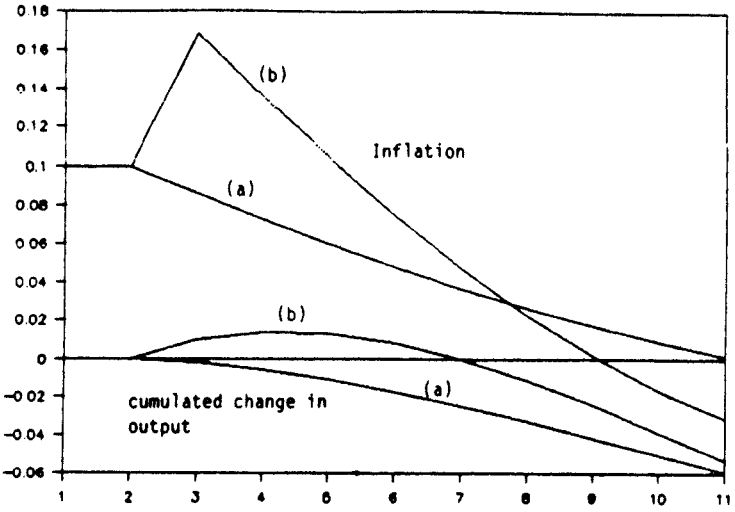


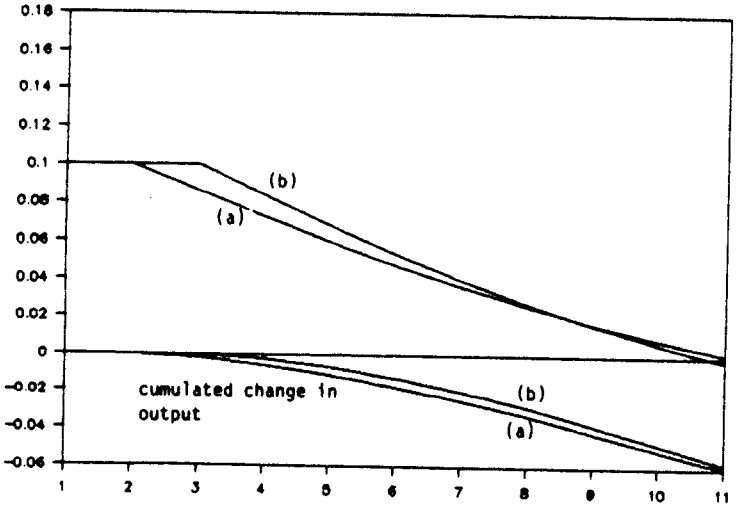
Figure 4



parameter values:

$\alpha = .2$
$\beta = .7$
$\mu = .9$
$\gamma = .7$

(b) $k(1-\pi) = 1$
(a) $k(1-\pi) = 0$



parameter values:

$\alpha = .2$
$\beta = .2$
$\mu = .9$
$\gamma = .7$

(b) $k(1-\pi) = 1$
(a) $k(1-\pi) = 0$

Figure 5