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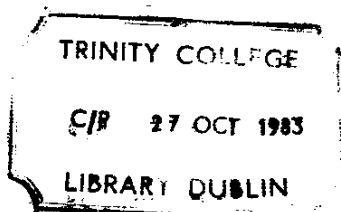
IRELAND IN THE EUROPEAN MONETARY SYSTEM
A PROGRESS REPORT ON FOUR YEARS OF MEMBERSHIP

Brendan M. Walsh

Working Paper No. 14

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Introduction *

The decision of the Irish Government to maintain the Irish pound in the narrow exchange rate band of the European Monetary System (E.M.S.) from its inception in March 1979 was one of the most important events in the economic history of the independent Irish state. The implications of abandoning the traditional sterling-link exchange rate policy were far from clear at the time, and are only gradually becoming apparent. After four years of membership of the EMS the longer term outlook for Irish exchange rate policy remains less certain than it was at any time before 1979.

This paper summarises the historical background to Ireland's entry into the EMS before examining the experience since 1979. It then examines how the first four years of membership have affected nominal and real exchange rates, inflation and interest rates. The role of domestic monetary and fiscal policies over this period is discussed. Finally, alternative exchange rate policy options are reviewed and some conclusions are drawn regarding Irish exchange rate policy.

Historical Background

The political integration of Ireland into the United Kingdom from 1800 to 1922 led to the suppression of the old Irish currency from 1826. Throughout the nineteenth century and until the establishment of an independent Irish state in 1922, there was little or no difference between Ireland and a county of England as far as monetary and currency arrangements were concerned. In the early days of Independence the established currency and banking arrangements were maintained. New Irish token coins were issued in 1926, and the note issue of the private Irish Banks was gradually replaced by an Irish Consolidated Note Issue, but there were mainly cosmetic and housekeeping exercises with no great significance for the underlying financial realities.

*I am grateful to J.P. Neary and Jim O'Leary for valuable suggestions and comments. Support from the Committee for Social Science Research in Ireland is acknowledged. The earlier sections of this paper draw on material contained in a previous publication [1].

A Commission on Banking, Currency and Credit was established in 1934 which reported in 1938. The Majority Report firmly rejected the radical schemes and proposals regarding the Irish currency that had been proposed by various witnesses. Instead, the benefits of maintaining the closest possible integration of the Irish currency with sterling were emphasised. In the 1930s these benefits were self-evident to all but the most Anglophobic. They derived from the high degree of integration between the Irish and British economies, especially the importance of Britain as a market for Irish exports and the interpenetration of the two banking systems. The creditworthiness of the Irish state was believed to depend on the 100 per cent backing of the Irish currency by sterling.

To maintain confidence in the financial management of the country, the Irish currency was fully backed by liquid sterling assets and convertible on demand in London. Foreign borrowing was not used for domestic development purposes, official reserves of foreign currencies were maintained at a high level, and Ireland remained a net creditor nation throughout its first half century of independence.

The main initiative that followed the publication of the Banking Commission's Reports was the establishment of the Central Bank of Ireland in 1942. Its powers were extended to those of a fully-fledged central bank by new legislation in 1971. During the first three decades of its existence its primary concern lay with influencing the direction of economic policy so as to maintain the sterling exchange standard of the Irish pound. Some doubts were voiced concerning the merits of this policy when sterling was devalued against the US dollar in 1949 and again when severely deflationary policies were put in place to redress the current account balance of payments deficits of the 1950s, but by and large the orthodoxy that had been enshrined in the Banking Commission's Majority Report remained unchallenged.

The main impetus to a serious discussion of the costs and benefits of the sterling link arose from the acceleration of inflation during the 1970s. It was quickly perceived that the benefits of the sterling link were seriously diminished by the slow growth of the British economy and above all by its apparently chronically high inflation. As early as 1973 the Governor of the Central Bank, while reaffirming the orthodox views of the advisability of maintaining the sterling link, wondered whether a revaluation against the British currency might not prove to be "a powerful anti-inflationary weapon".

These speculations at an official level were reinforced by a shift in academic opinion in Ireland towards the viewpoint that Ireland was an exemplar of the Small Open Economy model of inflation. Starting from the observation that over the post-war period, the Irish inflation rate showed no systematic deviation from that of the UK, most commentators felt that as long as we maintained the one-to-one sterling link, the Irish rate of inflation could be fully explained by the British rate. [3] According to this view, purchasing power parity (PPP) ensured the equality of Irish and British inflation under a fixed exchange rate between Ireland and Britain. It was a short step from this to the view that if we switched our exchange rate peg from sterling to the low inflation countries of the EEC, our inflation rate would rapidly converge to theirs. This point of view was voiced with increasing frequency during the period of very high inflation in Britain (1974-76).

These arguments might have remained only academic were it not for the developments in Europe that led to the formation of the European Monetary System (EMS) early in 1979. Ireland faced a crucial policy decision when it became clear that the United Kingdom was unlikely to participate in the EMS exchange rate mechanism, so that entry by Ireland into full membership of the System would entail a break

in the century-old sterling link. We accepted this consequence for reasons that were summarised as follows by the Governor of the Central Bank:

1. The inappropriateness of maintaining the sterling link indefinitely in view of the declining dependence of the Irish on the British economy.
2. The absence of a third option apart from the EMS and the sterling link.
3. The anticipated benefits in terms of reduced inflation as a consequence of switching the exchange rate peg to the hard-currency EMS area.
4. A commitment to a major European Community initiative and the committant support in the form of a significant "transfer of resources" from EC funds. [4]

In the Government White Paper on the EMS issued in December 1978 prominence was given to the belief that "the discipline involved in membership of a zone of monetary stability acts as a powerful aid in the fight against inflation". Of course the need to reinforce the price stabilising influences of the new currency regime with appropriate income, fiscal and monetary policies was widely recognised. To quote the Governor of the Central Bank once again:

For the first time since the establishment of the State, the effects of ill-advised domestic policies and actions will be seen quickly and obviously in the market's judgement of the Irish pound. [4]

In view of the high and rising level of public sector borrowing, which reached 15.5 per cent of GNP in 1978, the obvious implication was that joining EMS would entail a period of austerity as the necessary steps were taken to bring the public finances into order.

EMS Entry

Ireland joined the EMS and has participated in the narrow band exchange rate mechanism since its inception in March 1979. The United Kingdom government remained aloof from the exchange rate commitments of the System. By the end of March 1979 the strength of sterling relative to the EMS currencies faced the Irish authorities with the choice of seeking a realignment within the EMS or breaking the sterling link. The latter course was chosen, and for the first time in over 150 years a separate exchange rate was quoted for the Irish currency from the end of March 1979.

The most obvious effect of this train of events was an increase in the transactions costs of trade with the United Kingdom (which includes Northern Ireland). About half our foreign trade by value, and probably a higher proportion of the number of external transactions, involved foreign exchange dealings for the first time. The additional costs thus imposed on the Irish economy almost certainly absorbed all of the transfer of resources made to Ireland by the Community as a result of our entry to EMS, leaving no net resources to help overcome the structural problems that were the stated object of these grants.

The First Four Years of Membership

Nominal Exchange Rates

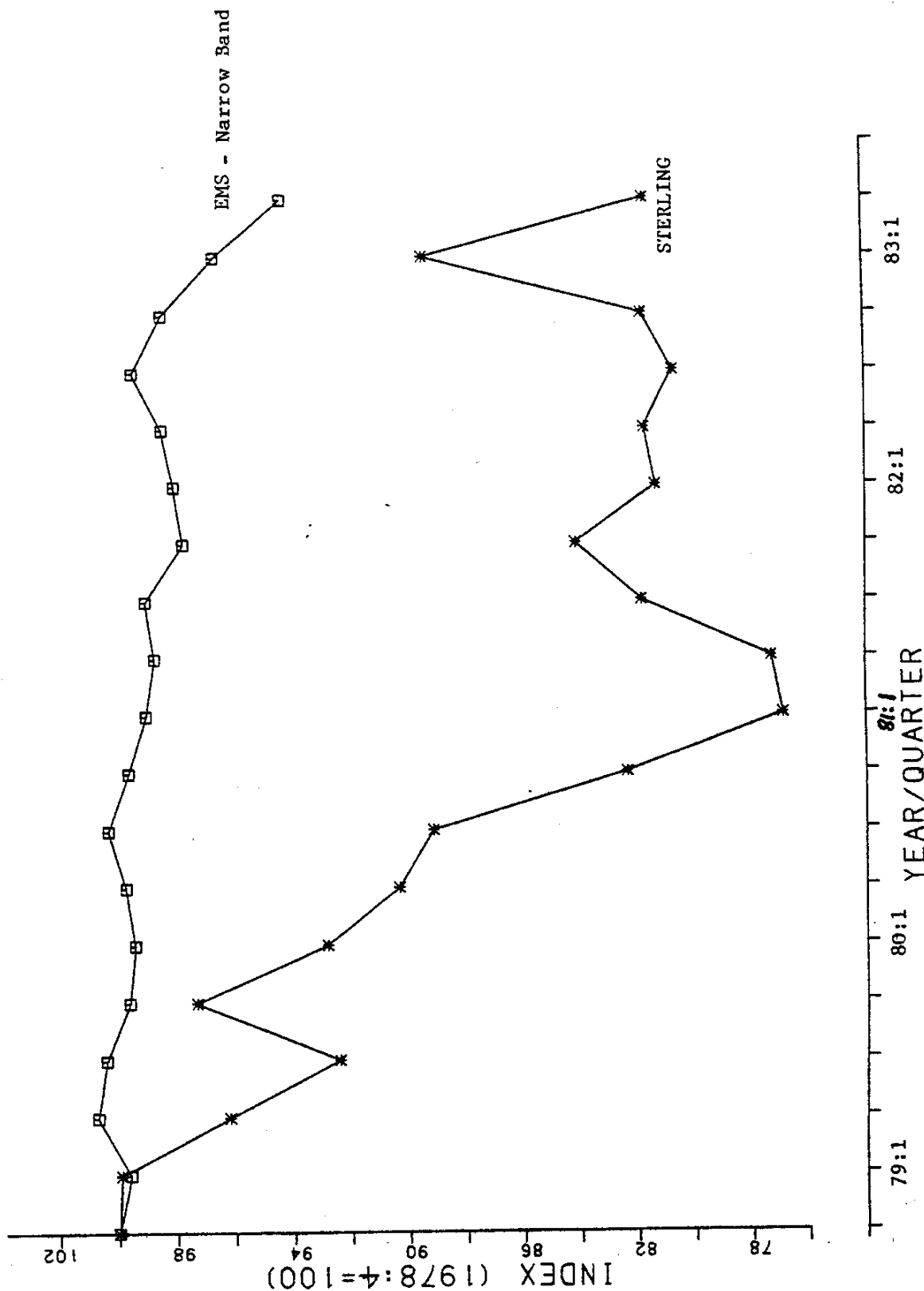
The first six realignments of EMS currencies involved Ireland only indirectly. On none of these occasions did we devalue or revalue the Irish pound relative to the ECU. The value of the Irish pound relative to other EMS currencies changed only because of movements in the value of these currencies at the realignments. Up until early 1983 it could be said that Ireland had indeed pursued a hard currency policy within the System: the value of the Irish pound had risen against all other currencies except the German Mark and the Dutch Guilder. Only at the March 1983 realignment was the value of the Irish currency reduced as a result of the first explicit devaluation decision taken by an Irish government. Despite the $3\frac{1}{2}$ per cent devaluation, the overall value of the Irish pound against a trade-weighted average of the narrow-band EMS currencies has remained very stable over the entire four year period since 1979 (chart 1)*

The relevance of this performance for the overall external value of the Irish pound is diminished by the continuing importance of the sterling area to the Irish economy. Contrary to expectations that were widespread at the time of our entry into EMS, the pattern of Irish trade has not altered radically since 1979, and Britain remains considerably more important as a source of imports and a destination for exports than the EMS countries, which after four years of quasi-fixed exchange

* The data on which the charts are based are contained in Appendix B.

All trade weights used in this study are bilateral.

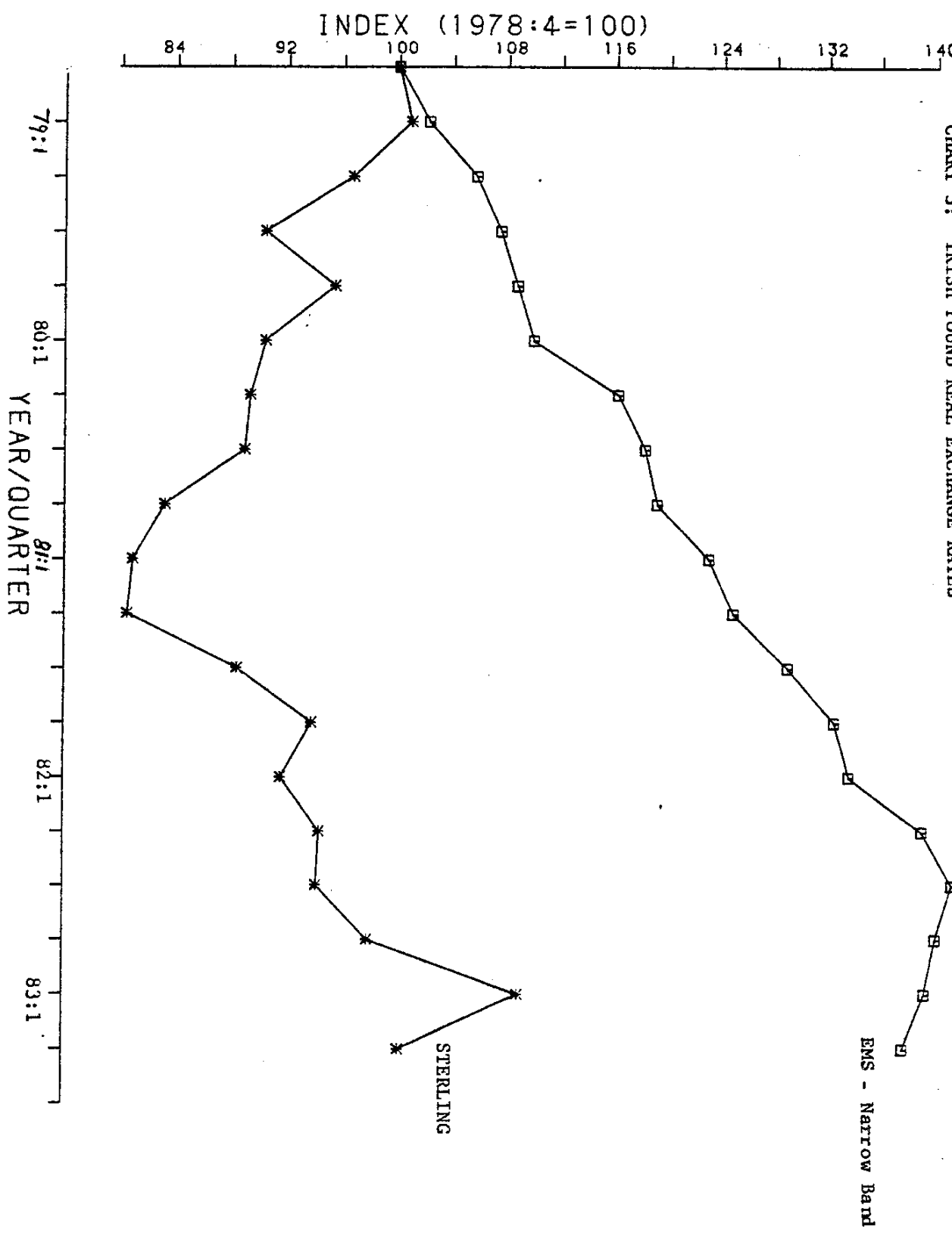
CHART 1. IRISH POUND EXCHANGE RATE (NOMINAL)



Note: In this and in subsequent Charts the exchange rate is measured as the price of a unit of Irish currency in terms of the relevant foreign currency. Thus a fall ^{note} in the exchange rate indicates a fall in the price of Irish currency in terms of the relevant foreign currency.

Inflation and Real Exchange Rates

The most surprising aspect of Ireland's first four years of membership of EMS is that it has proved possible to maintain a more or less fixed exchange rate with the narrow-band EMS currencies over a period when Irish inflation consistently exceeded their inflation by a very large margin. As we have noted, the virtual identity of Irish and British inflation during the period of the sterling link lent credence to what might be called a reverse PPP view of Irish inflation, with the causality running from exchange rates to inflation rates. This model proved a very poor guide to Ireland's experience following entry into EMS. In the initial period of membership, Ireland's inflation remained close to the high rate prevailing in Britain, despite the fall in the value of the Irish pound relative to sterling. In the more recent period, the fall in inflation in Britain has been much more rapid than in Ireland. The result has been a very pronounced real depreciation of the Irish pound relative to sterling, reaching 20 per cent by the first half of 1981, followed by an equally dramatic real appreciation during the period 1981-83. These developments are shown in Chart 3. (In this section "real" exchange rates refer to nominal exchange rates corrected for inflation differentials, with inflation measured in consumers' prices. The use of this measure of inflation is discussed below). The rate of inflation in the other narrow band EMS countries has been persistently higher than in Ireland, and very little of this inflation differential has been offset by the modest fall in the Irish nominal exchange rate against these countries. The result has been an uninterrupted rise in Ireland's real exchange rate relative to the narrow-band EMS until the end of 1982. Even after the devaluation within EMS in March 1983, the cumulative real appreciation of the Irish pound since the end of 1978 remained well over one third. These major movements in real exchange rates since 1979



Note: See Note to Chart 1.
Each real exchange rate equals the corresponding nominal rate multiplied

are a direct consequence of the break in the sterling link and the wide fluctuation in the sterling/EMS exchange rate since that date.

Despite the obvious failure of the Irish post-EMS experience to validate the expectations generated by what I have called the reverse PPP view of inflation, a recent Irish analysis [5] of the transmission of inflation under the pre- and post-EMS exchange rate arrangements has claimed some support in the Irish experience for the proposition of Frenkel and Mussa that

a country, particularly a small country, that fixes the exchange rate between its domestic money and some foreign currency will experience a domestic inflation rate and a domestic rate of monetary expansion that are strongly influenced by the monetary policy of that foreign country [6]

The evidence provided for this claim consists of monthly time series equations in which the Irish rate of inflation is regressed on the rate of increase in Irish wages, domestic monetary expansion, the rate of increase in the world price of Ireland's imports and exports, the rate of interest, and the exchange rate. For the pre-EMS experience (1972-79), it was not possible to reject the hypothesis that a given percentage increase in the UK money stock had a one-for-one long run effect on the Irish inflation rate. For the post-EMS period (1979-82) the results are much more tentative due to the limited number of observations, but the author concluded that the Irish pound-sterling exchange rate had a significant effect on the domestic inflation rate, implying that the Irish monetary authorities have tended to accommodate most of the inflationary pressure coming from this source. The role of monetary influences emanating from the narrow-band EMS on Irish inflation was not satisfactorily identified.

It is questionable whether these results can be said to lend support to the Frenkel-Mussa view that the choice of reserve currency "strongly influences" domestic inflation. In the reduced-form equation that forms the base of the study, the main explanatory burden is borne by the same variables in both the pre- and post-EMS periods. These are domestic wages, interest rates, monetary expansion, and world prices. While the role of the sterling exchange rate is significant in the post-EMS era, the role of EMS monetary policy on Irish inflation is far less clear-cut than was that of British monetary policy in the earlier period. Much further econometric research is needed to clarify the exact nature of the inflationary process in Ireland since joining the EMS. However, the clear failure of Irish and inflation rates to converge after four years of more or less fixed exchange rates casts serious doubt on the Frenkel-Mussa thesis concerning the role of a small open economy's reserve currency.

Interest Rates. As with inflation rates, entry into EMS was widely expected to reduce Ireland's interest rates to the much lower levels prevailing in the other narrow-band EMS countries. The outcome on this front has been equally disappointing. While Irish interest rates have tended to move up and down in line with movements in world rates, the differential between Ireland and, for example, Germany has remained fairly stable over the past four years. This differential could not have persisted if, as was hoped, Irish capital markets had become progressively integrated with German markets. The Irish government encouraged the private sector to borrow in other EMS countries by exempting such borrowing from the Central Bank's guidelines on domestic credit expansion, up to 1981, but Irish borrowers proved reluctant to seek funds abroad. Further encouragement was provided in the form of an exchange-rate guarantee, but even with the State shouldering this risk,

private firms have not sought credit on a large scale outside Ireland. The differential in interest rates between Ireland and, for example, Germany remains much greater than that between Ireland and the UK, and the forward foreign exchange discount of the Irish pound reflects this fact. Moreover, the correlation between Irish short and long-term interest rates in Ireland and those of Belgium, Germany and the Netherlands was lower in the period 1979-82 than it had been between 1976-79 (7). This demonstrates how little progress towards monetary integration was made during the early years of the EMS.

The Public Finances and the Balance of Payments

Entry into EMS was understood by the authorities cited earlier to imply a new discipline in the conduct of Irish economic policy. It was clearly expected that the level of public sector borrowing would decline sharply from the 15.5 per cent of GNP reached in 1978. In fact this did not occur. During the years of EMS membership borrowing has risen to 17, 18 and in 1981, 22 per cent of GNP. Severe budgetary measures were introduced in 1982, but these succeeded only in reducing borrowing to 20 per cent of GNP. Further deflationary measures (principally tax increases) will reduce the borrowing requirement to slightly less than 19 per cent of GNP in 1983.

The failure to control the level of borrowing was accompanied by an increasing reliance on Government foreign borrowing as a source of finance. This reached a peak in 1981 when public sector foreign borrowing amounted to 17.6 per cent of GNP. In 1983, this declined to less than 10 per cent of GNP. This level of borrowing has been adequate to finance the current account balance of payments deficit and the growing net outflow on the capital account, so that Irish official foreign exchange reserves have been maintained. The evolution of Irish external assets and liabilities is shown in Table 1. The rapid rise in the net liabilities of the Irish public sector to the rest of the world in the aftermath of EMS entry is crucial to understanding how it has proved possible for the country to maintain a more or less stable exchange rate within the system despite the persistence of a large differential between Irish and continental inflation rates.

An Overvalued Currency?

The material already presented on the behaviour of exchange rates reveals a progressive real appreciation against other narrow-band EMS currencies since 1979 and against sterling since mid-1981. The real depreciation against the US dollar since 1981 has been the only source of competitive gain for the Irish currency in recent years. This naturally raises the issue whether Irish entry into EMS, and the exchange rate policies pursued in the system, combined with the continuous high rate of domestic inflation, have lead to a significant overvaluation of the Irish currency.

TABLE 1 External Assets and Liabilities of the Irish Public Sector,
1978-83

IR£ billion (10⁹)

(end year)	1978	1979	1980	1981	1982	1983 (March)
Official External Reserves	1.3	1.0	1.3	1.5	1.6	1.2
External Liabilities:						
- Government	1.1	1.5	2.2	3.8	5.3	5.9
- Public Sector Companies (Net)	0.3	0.5	0.9	1.1	1.4	1.4
TOTAL	1.4	2.0	3.1	4.9	6.7	7.3
External Reserves —						
Liabilities	+0.1	-1.0	-1.9	-3.4	-5.1	-6.1

This issue can be assessed in part by reference to the data on real exchange rates presented above. These series used consumer prices to adjust nominal exchange rates. This was done partly because of the availability of up-to-date information on consumer prices, but also on the grounds that consumer prices are superior to unit labour costs as an indicator of the long-run trend in a country's competitiveness. The main support for this point of view derives from the tendency of unit labour costs for traded goods, measured in a common currency, to increase at a uniform rate in countries between which there are significant trading links. If in a small country such as Ireland wage increases tend to outpace those occurring in countries with which we trade, sooner or later an adjustment in the form of accelerated increases in labour productivity will take place. This can come about both through the demise of low productivity, labour intensive firms and through an acceleration of the productivity gains among surviving firms.

Evidence of the effect of the post-EMS exchange rate experience on Irish cost/price ratios is provided in charts 4 and 5. These display the behaviour of average hourly earnings in manufacturing industry and of output prices (net of tax) and the price/cost ratio. In the four years before entry into EMS there is no evidence of a trend in the price/cost ratio as the underlying growth rates of the two variables were very similar. Since entry into EMS, it appears that earnings have tended to accelerate relative to prices, with the result that the cost/price ratio has declined. At the end of 1982 this ratio was 17 per cent below its level at the time of entry into EMS. The actual level of labour costs to employers has risen more rapidly than is shown in these figures because employers' pay-roll taxes have been increased substantially in recent years. The rise in the real product wage reflects the inability of price-taking Irish employers producing tradeable goods to pass on domestic cost increases in excess of those experienced by their competitors in other countries. Of course, the degree to which high domestic cost increases can be recouped in higher output prices depends on exchange rate developments. The nominal exchange rate stability that has resulted from Irish policy within the EMS, and the relative stability of the Sterling/EMS rate since 1981, have led to a growing divergence between the rate of increase in domestic costs and in output prices in manufacturing. This development may be presumed to have played a significant part in the decline of employment in manufacturing from 221 thousand at the end of 1979 to 188 thousand in March 1983. Proportionally larger declines have been recorded in the older, more labour intensive sectors such as food processing, paper products, textiles and clothing. Some of the decline in these sectors has been offset by growth in newer sectors such as electronics and electrical engineering, where there is a continuing inflow of grant-aided overseas investment.

CHART 4: EARNINGS AND PRICES IN MANUFACTURING INDUSTRY

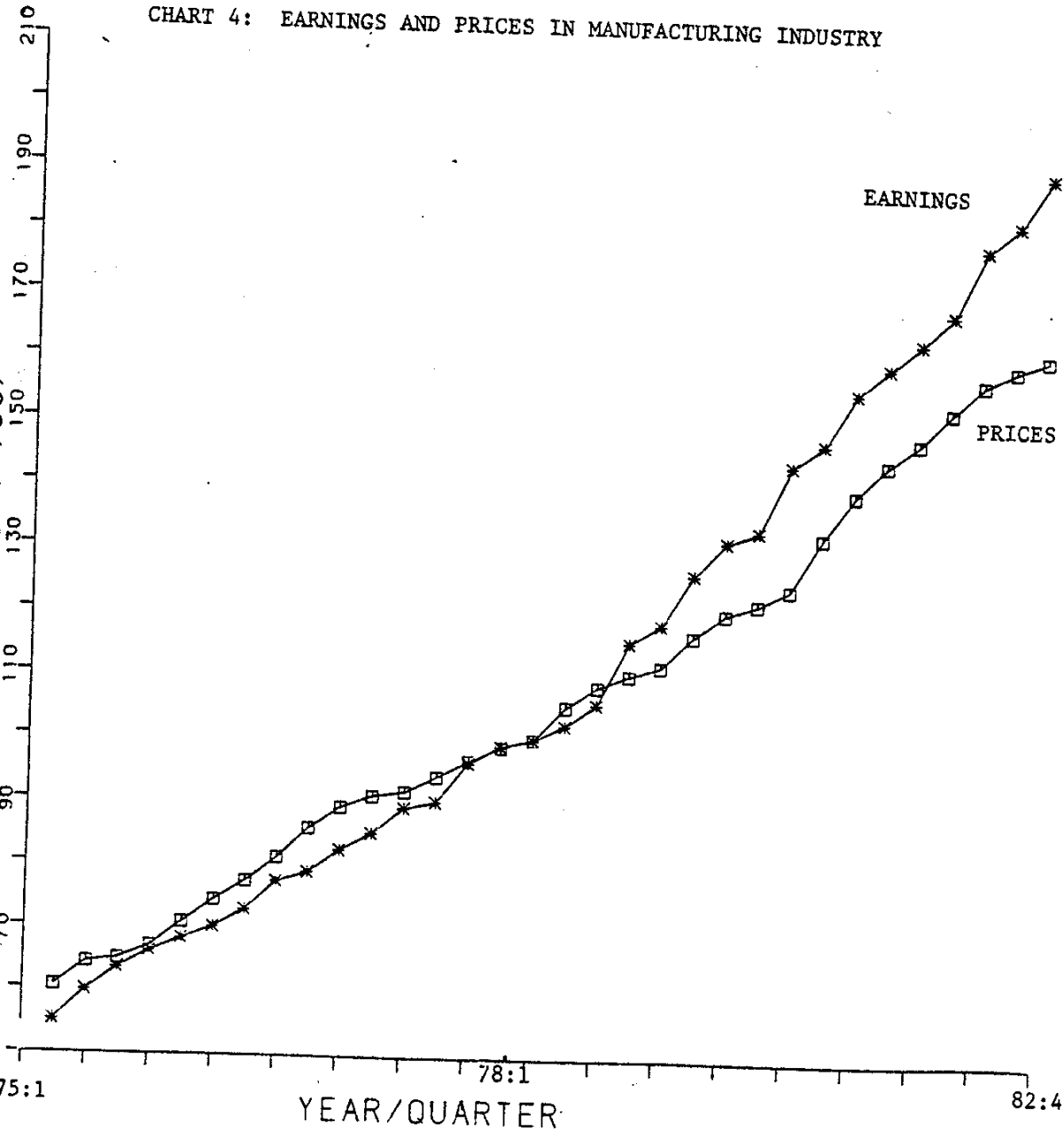
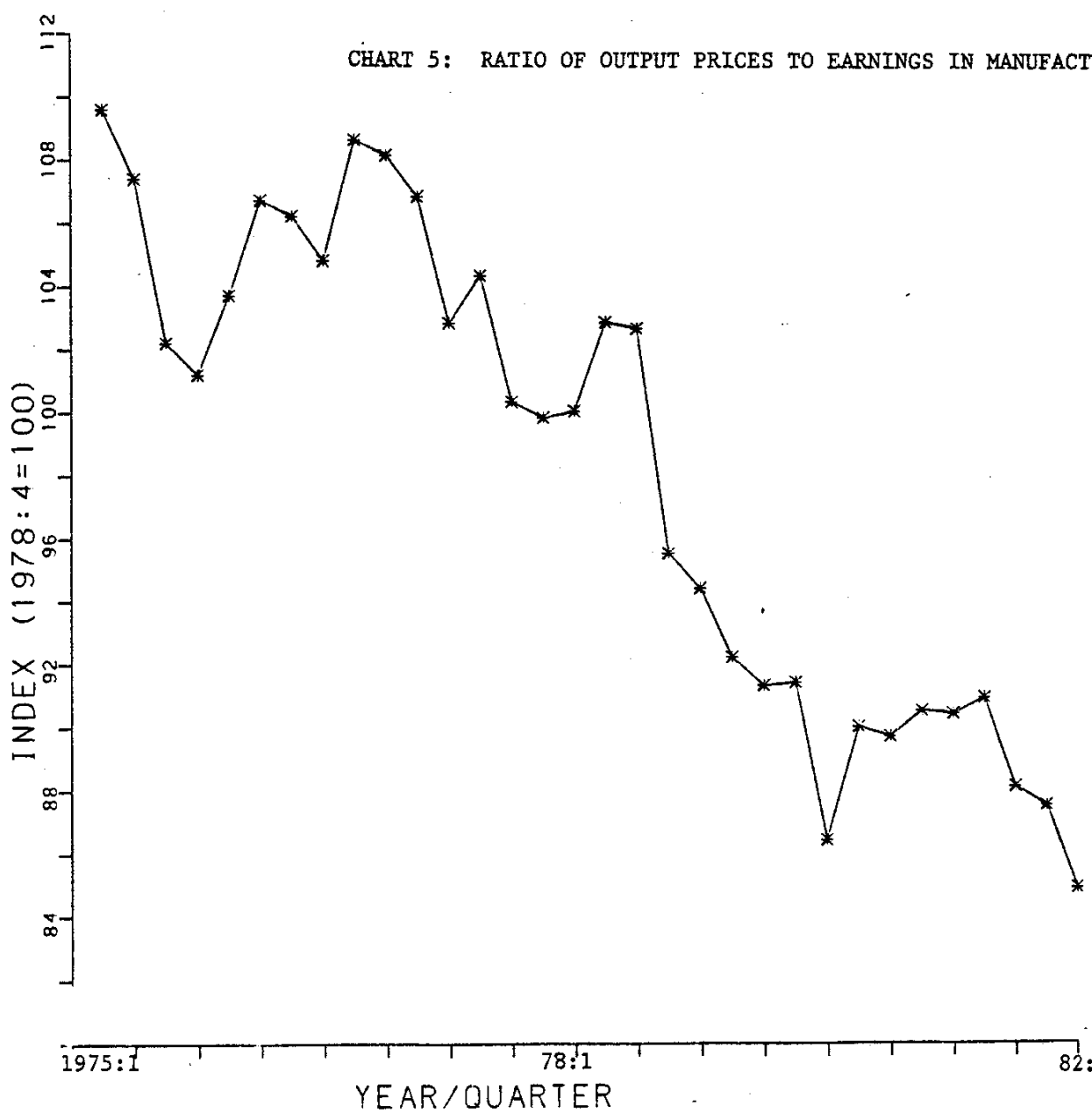


CHART 5: RATIO OF OUTPUT PRICES TO EARNINGS IN MANUFACT



The cost-price squeeze that is being experienced by Irish manufacturers has been felt much more acutely by the Irish agricultural sector. The stabilisation of the Irish pound within the EMS since 1979 has precluded continuing the devaluation of the Irish green pound which was an important source of price increases over the period 1974-78. Since 1979 the Irish agricultural sector has been constrained to price increases more or less in line with average EMS rates of inflation, while its domestically determined costs have continued to increase at a much faster rate. This has played an important role in the decline in living standards and the stagnation of real output since 1978.

In assessing the importance of Ireland's exchange rate for the economy's growth prospects it is informative to compare the present situation with 1976. At that time, the recent sharp decline in sterling, to which the Irish pound was still linked, placed the Irish trading sector in a strong competitive situation and enabled the country to participate fully in the international economic recovery. In 1983 the US dollar is the only currency against which the Irish currency has made significant competitive gains in recent years, and even the benefits of these have been diluted by our loss of competitiveness vis-a-vis third currencies. As a consequence the trading sectors of the economy are now much less favourably placed to participate in an international recovery than was the case in 1977-79.

Was there an Alternative?

It will be clear from the earlier sections of this paper that the evolution of events since Ireland joined the EMS has been very different from that expected and hoped for at the time of our decision to join. While the Irish pound/EMS narrow band exchange rate has remained very stable, the non-convergence of our inflation rate to those of the other members has given rise to a steady real appreciation of the Irish pound against these currencies. The absence of the UK from the exchange-rate mechanism has introduced a marked degree of instability in the Irish pound/sterling exchange rate. In the last two years the initial real depreciation of the Irish pound against sterling has been offset by a sharp real appreciation. On unchanged exchange rate policies, the outlook is for the overall real appreciation of the

Irish pound to continue. The implications for the cost/price ratios facing Irish industry and agriculture, and hence for output, employment and living standards, are gloomy.

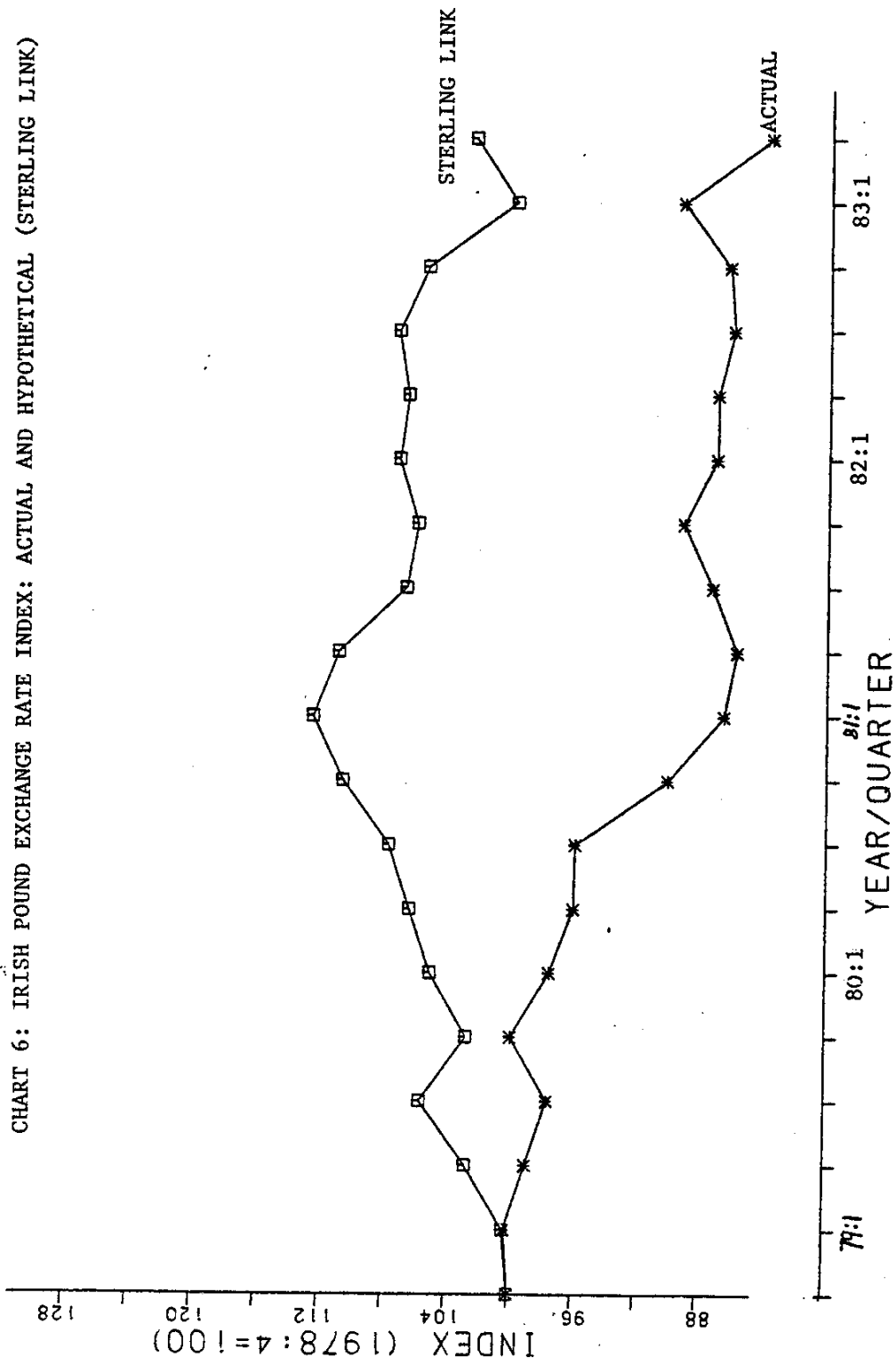
It is of interest to consider the alternative exchange rate policies that might have been pursued instead of strict adherence to the narrow-band EMS since 1979. While it is not possible within the confines of this paper to provide a counterfactual history of the Irish economy under different exchange rates, the broad implications of each alternative can be indicated.

The most likely alternative to EMS membership would have been a continuation of the link with sterling. The hypothetical value of the effective exchange rate of the Irish pound under the assumption that the one-to-one parity with sterling was maintained is shown in Chart 6. It may be seen that the strength of sterling relative to the EMS currencies would have led to considerably higher values of the Irish pound than were actually recorded, especially during 1981. What this would have entailed for the level of Irish competitiveness depends, of course, on what would have happened to our inflation rate under this arrangement. If PPP continued to hold with Britain as long as the sterling link were maintained, our inflation rate would have fallen much more rapidly than has actually been the case. Initially our currency would have been even more overvalued relative to the EMS currencies, but the impact of this would have been diminished by the maintenance of PPP with Britain.

As a third possibility, the exchange rate that would have reconciled actual inflation rates with PPP can be calculated.* While it is unrealistic to assume, as is done in this exercise, that inflation rates are independent of exchange rates, the results have heuristic value. The "warranted" exchange rate against sterling, in the light of actual inflation rates, is shown in Chart 7.

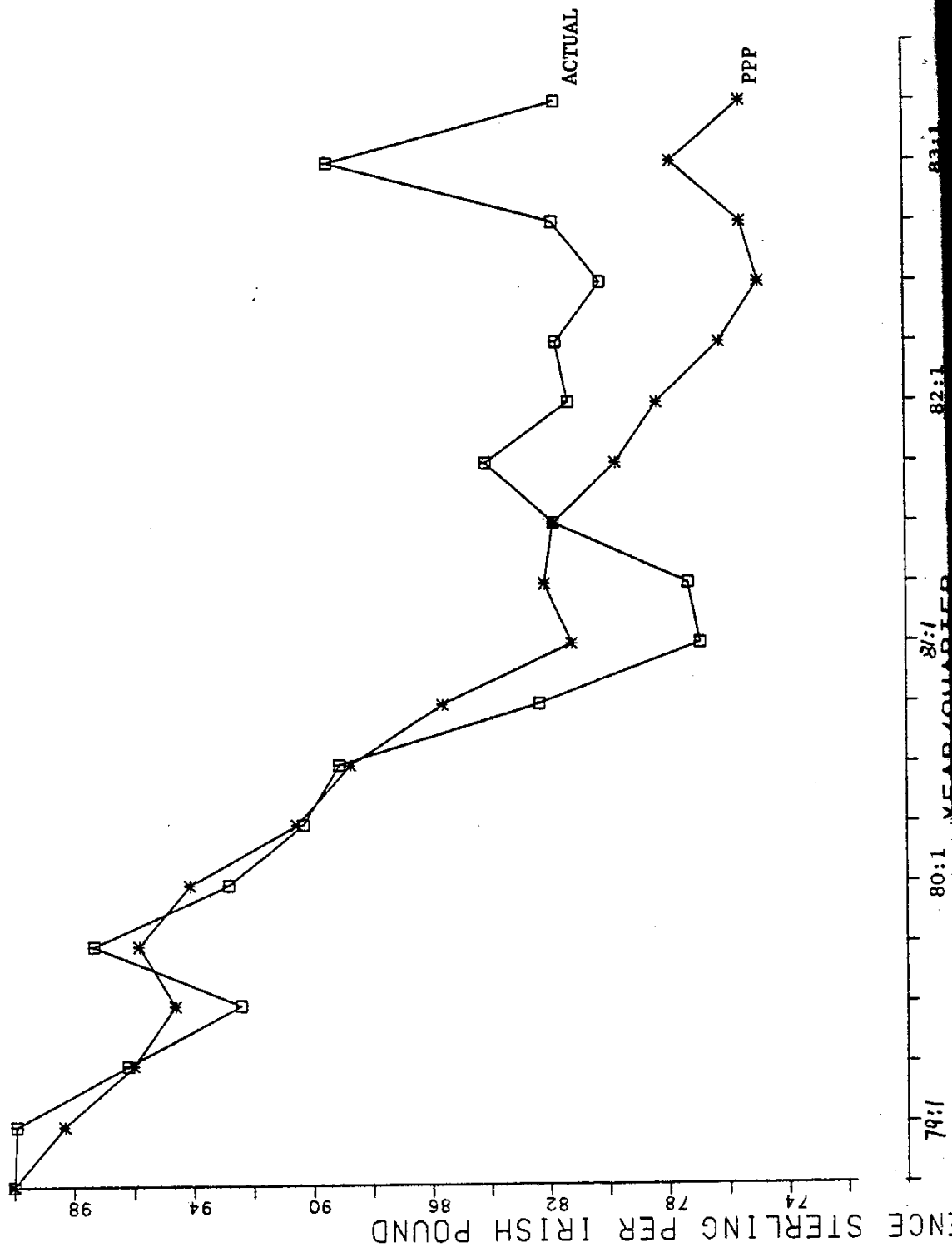
*The algebra is set out in Appendix A.

CHART 6: IRISH POUND EXCHANGE RATE INDEX: ACTUAL AND HYPOTHETICAL (STERLING LINK)



Note: See Note to Chart 1.

CHART 7: IRISH POUND EXCHANGE RATE INDEX : ACTUAL AND HYPOTHETICAL (PPP)



During the first two years, 1979 and 1980, the divergences from the actual exchange rate are small. This reflects the fact that sterling began its substantial real appreciation just as the EMS was formed. To have avoided a real appreciation of the Irish pound would have required a depreciation against sterling very similar to that which actually resulted from our exchange rate policy within EMS up to 1981. During 1981, however, the actual fall in the value of the Irish pound against sterling went further than was required simply to preserve PPP, and our adherence to the EMS exchange rate commitment resulted in a real depreciation against sterling. This exacerbated, rather than moderated, inflationary pressures on the Irish economy. Between the end of 1981 and early 1983, however, the value of the Irish pound against sterling was higher than would have been warranted under PPP. The rise of sterling and the devaluation of the Irish pound in March 1983 closed more than half the gap that had emerged, but with a stable sterling exchange rate and a persistently higher rate of inflation in Ireland, it will widen again. During this period of overvaluation by the PPP criterion, while inflationary pressures have been moderated, the evidence suggests that domestic cost increases, attributable to labour costs and taxation, have been slow to respond, with a resultant cost/price squeeze that has adversely affected the growth of real output and employment.

The task of managing the Irish currency to achieve the hypothetical exchange *rate* outlined in Chart 7 would not have been easy. Outside EMS it would probably have been impossible. However, within EMS a 6 per cent band around the central exchange rate and recourse to more frequent realignments would have avoided the deviations from PPP that have actually occurred. While this strategy would not have overcome many of the difficulties attendant on EMS membership,

in particular that of nominal exchange rate variability, it would have resulted in a more stable real exchange rate and averted the recent serious decline in Irish competitiveness.

Conclusion

The four years of Irish membership of the EMS have brought new considerations to the forefront of Irish economic policy. The question of the appropriate value for the Irish exchange rate had not previously occupied an important place among the topics of concern to policy makers. The decision to adhere to the EMS narrow band at the original central rate through the first four years of the system's operation conveyed the impression that one automatic exchange rate rule (the sterling link) had been smoothly replaced by an equally automatic EMS rule. The tensions between the larger countries within the EMS, as well as aspects of Ireland's own experience in recent years have dispelled this impression. The continuing impact of the fluctuations in the sterling/EMS exchange rate on the nominal Irish pound exchange rate, in addition to the substantial real appreciation of the Irish pound against both sterling and the EMS currencies since 1981, leading to the devaluation of the currency at the March 1983 realignment, have brought home to us how far-reaching were the implications of breaking the sterling link in 1979. On the other hand, had this link been maintained, the Irish economy would have suffered at least as severely as has the UK the effects of a major real appreciation since 1979. Faced with these two unpalatable alternatives, the most appropriate course of action would seem to have been a more flexible approach that would have moderated the extent of the depreciation against sterling in 1981 and avoided the sharp appreciation early in 1983. While a more "active" exchange rate policy entails more scope for error, it seems unavoidable in view of the distortions and real costs that adherence to an inappropriate rule is likely to entail.

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APPENDIX A. AN EXCHANGE RATE THAT WOULD PRESERVE PPP

Let \dot{E}_{ij} = the rate of change of the ij^{th} exchange rate,
that is, the price of currency j in terms of i .*

\dot{P}_i = the rate of price inflation in country i .

w_i = the weight of currency i in Ireland's trade.

$i, j = 1, \dots, 10$ (Ireland's main trading partners).

The objective is to maintain a bilateral exchange rate, E_{ij} ,
so that $\dot{P}_I = \sum_{i=1}^n w_i (\dot{P}_i + \dot{E}_{Ii})$, where the I subscript refers
to Ireland.

This can be rewritten

$$\dot{P}_I = \sum_{i=1}^n w_i (\dot{P}_i + \dot{E}_{Ij} + \dot{E}_{ji})$$

Expressed in terms of the instrument exchange rate, E_{Ij} , this
becomes

$$\dot{E}_{Ij} = \dot{P}_I - \sum_{i=1}^n w_i (\dot{P}_i + \dot{E}_{ji})$$

Taking the Irish pound/sterling exchange rate as E_{Ij} these
calculations yield the hypothetical exchange rate shown in Chart 7.

*In all the exchange rates shown in Charts in this paper the
inverse of E_{ij} as defined here was used for ease of exposition.

APPENDIX B.DATA

	A	B	C	D	E	F	G	H	I
1978:4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.
1979:1	100.3	99.9	99.6	100.9	102.2	100.4	102.3	105.2	100.9
2	99.0	96.2	100.7	96.7	105.7	102.8	105.7	108.4	96.7
3	97.7	92.4	100.4	90.4	107.5	105.7	115.5	110.3	90.4
4	100.0	97.3	99.6	95.4	108.7	102.8	118.4	111.8	95.9
1980:1	97.6	92.8	99.4	90.4	109.9	105.1	126.4	116.6	90.4
2	96.1	90.3	99.7	89.3	116.2	106.4	131.6	120.2	89.3
3	96.0	89.1	100.3	88.9	118.2	107.7	133.3	121.8	88.9
4	90.1	82.3	99.6	83.2	119.1	110.6	143.7	124.2	83.2
1981:1	86.5	76.9	99.0	80.9	123.0	112.5	147.1	132.4	80.9
2	85.7	77.3	98.7	80.5	124.8	110.9	155.2	139.2	80.5
3	87.3	81.8	99.0	88.4	128.9	106.7	159.2	144.0	88.4
4	89.2	84.1	97.7	93.8	132.4	106.0	163.2	147.5	93.8
1982:1	87.1	81.3	98.0	91.6	133.5	107.2	167.8	152.5	91.6
2	87.1	81.7	98.4	94.4	139.0	106.7	178.2	157.0	94.4
3	86.1	80.7	99.4	94.2	141.2	107.3	182.1	159.3	94.2
4	86.4	81.8	98.4	97.9	140.0	105.5	189.7	161.1	97.9
1983:1	89.4	89.4	96.6	108.9	139.2	100.0	n.a.	n.a.	108.9
2	83.8	81.7	94.3	100.2	137.6	102.6	n.a.	n.a.	100.2

continued/.....

Data Appendix (continued)

		G	H
1975:	1	55.1	60.4
	2	59.7	64.1
	3	63.3	64.7
	4	66.0	66.8
1976:	1	68.1	70.6
	2	70.0	74.2
	3	72.8	77.3
	4	77.4	81.1
1977:	1	78.9	85.7
	2	82.3	89.0
	3	85.0	90.8
	4	89.0	91.5
1978:	1	90.0	93.9
	2	96.2	96.5
	3	98.9	98.7
	4	100.0	100.0

- A Effective Exchange Rate Index, Irish Pound
- B Sterling/ Irish Pound Exchange Rate (nominal)
- C EMS/Irish Pound Exchange Rate (nominal)
- D Sterling/Irish Pound Exchange Rate (real)
- E EMS/Irish Pound Exchange Rate (real)
- F Hypothetical (Sterling Link) Effective Exchange Rate Index

All data are quarterly averages

Real Exchange Rates calculated by Deflating Nominal Rates by the Ratio of Consumer Price Indices

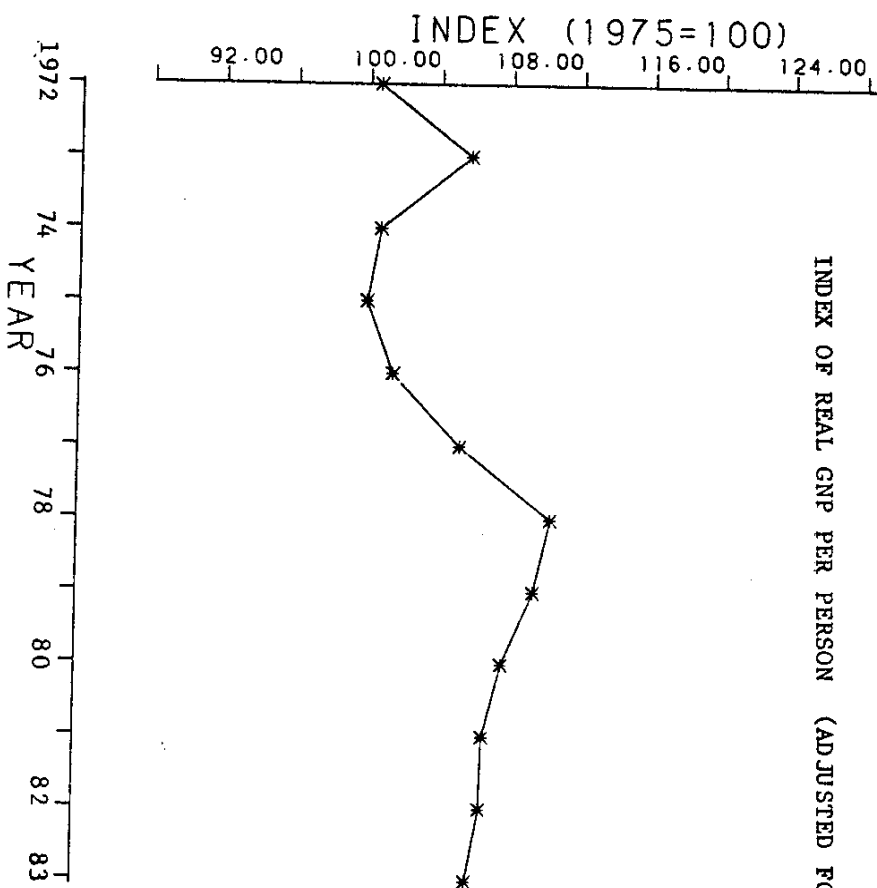
- G Average Hourly Earnings in Manufacturing Industry
- H Output Price Index (net of taxes) for Manufacturing Industry
- I Exchange Rate that would have Preserved PPP given actual inflation rates.

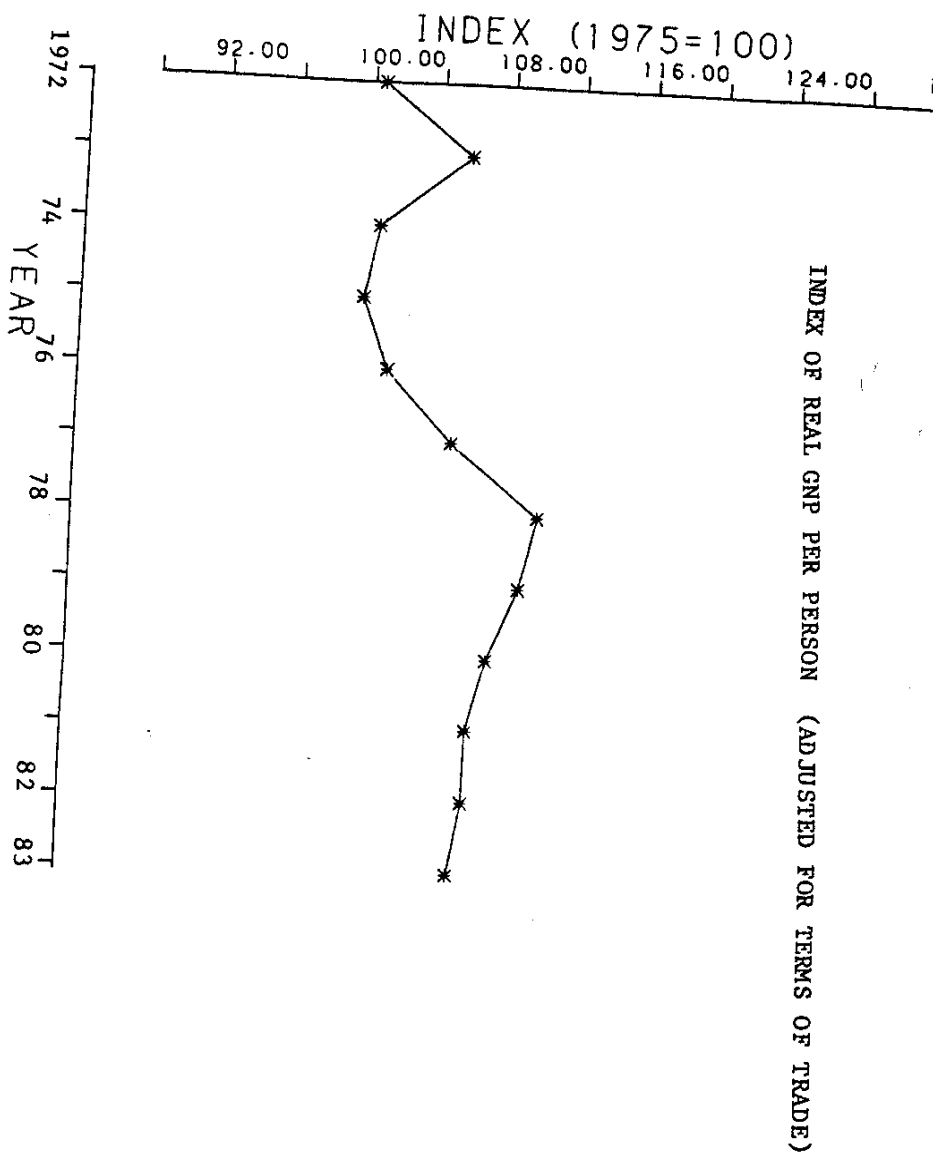
SOURCES: A to F: Exchange Rate and Price Data from Central Bank of Ireland and International Monetary Fund

G and H: Earnings and Prices Data from Irish Statistical Bulletin

I See text and Appendix A.

INDEX OF REAL GNP PER PERSON (ADJUSTED FOR TERMS OF TRADE)





INDEX OF REAL GNP PER PERSON (ADJUSTED FOR TERMS OF TRADE)

