NBER WORKING PAPER SERIES

THE AFTERMATH OF THE 1992 ERM BREAKUP: WAS THERE A MACROECONOMIC FREE LUNCH?

Robert J. Gordon

Working Paper 6964
http://www.nber.org/papers/w6964

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 1999

This research is supported by the National Bureau of Economic Research and is part of the NBER research program in Economic Fluctuations and Growth and International Finance and Macroeconomics. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research. I am grateful to Barry Eichengreen for useful suggestions and help with the references, to Paul Krugman and Andy Rose for their helpful comments, and to Tomonori Ishikawa for compiling the data and producing the figures. The views expressed here are those of the author and do not reflect those of the National Bureau of Economic Research.

The Aftermath of the 1992 ERM Breakup:
Was There a Macroeconomic Free Lunch?
Robert J. Gordon
NBER Working Paper No. 6964
February 1999
JEL No. E3, F4

ABSTRACT

This paper examines the macroeconomic aftermath of the 1992 breakdown of the European Exchange Rate Mechanism (ERM). The economic performance of six "leaver" nations is compared with five "stayer" nations that maintained a roughly fixed parity with the Deutsche Mark. Recent writing about post-1992, which I call the "conventional wisdom," reports that a surprising miracle occurred — the leaver nations are alleged to have enjoyed a burst of real growth and a decline in unemployment, all without any evidence of extra inflation.

The results in this paper turn the conventional wisdom on its head. While the leaver nations experienced an acceleration of nominal GDP growth relative to the stayers, fully 80 percent of this spilled over into extra inflation, leaving only 20 percent remaining for extra real GDP growth. Virtually 100 percent of the nominal exchange rate depreciation passed through into higher import prices, and extra inflation would have been even more pronounced if it were not for quiescent wage rates, which the paper attributes to high unemployment. The absence of any significant stimulus to real output growth is attributed to fiscal tightening under pressure from the Maastricht criteria, which offset nearly all of the stimulus coming from the improved current account of the leaver nations.

Robert J. Gordon
Department of Economics
Northwestern University
Evanston IL 60208-2600
and NBER
rjg@nwu.edu

"The secret of empirical work is to define your hypothesis so that failure to find significant results can be interpreted as support." — attributed to Jeff Frankel by Paul Krugman (1996, p. 406).

I. Introduction

From 1992 to 1999: What Happened in Between?

Viewed from afar, the literature on European currency issues in the 1990s has a peculiar character. There is an abundance of papers on the context of the 1992 ERM breakdown — was it caused largely, partly, or not at all by the fundamentals, was it predictable, and if so why did market participants fail to predict it?[1] There is now an outpouring of attention to the imminent establishment of a single European currency — with much concern both about the broader issues of its sustainability and the narrower issues of the day-to-day transition to January 1, 1999.[2]

But what happened in between 1992 and 1999? There has been remarkably little systematic analysis of the macroeconomic aftermath of 1992. How has the macroeconomic performance of those nations which dropped out of the ERM (hereafter the "leavers") differed from those which stayed in (hereafter the "stayers")? One common impression is that an economic miracle occurred in which the leavers grew faster than the stayers, and in the starkest contrast, the United Kingdom achieved an unemployment rate little more than half that of France in 1997 despite having in 1992 an unemployment rate that was almost exactly the

1. Among the many interpretations of the 1992 ERM breakdown are Dornbusch *et. al.* (1995); Eichengreen and Hsieh (1995); Eichengreen and Wyplosz (1993); Eichengreen, Rose, and Wyplosz (1995); Krugman (1996); Obstfeld (1995); Rose and Svennson (1994); and Svennson (1993).

2. References include Kenen (1995); McKinnon (1997); Obstfeld (1997, 1998); Taylor (1995); von Hagen and Eichengreen (1996); and Wyplosz (1997).

same.[3] While faster growth might have been expected, so would faster inflation. Yet "surprisingly, the European experience failed to reveal almost any inflationary response to devaluation" (Dornbusch *et. al.*, 1995, p. 254). Similarly, "according to the evidence presented, depreciating countries also did better in decelerating inflation" (Pelagidis, 1997). Henceforth, based on these quotes, we will take the "free lunch" interpretation to represent the "conventional wisdom."

Did the leavers achieve the macroeconomic equivalent of a "free lunch," achieving faster growth and lower unemployment without extra inflation, and if so, how was this achieved? A finding that a free lunch occurred would have profound implications for two of the most debated issues in European macroeconomics. First, if the demand stimulus provided by devaluation boosted real growth without extra inflation, this would imply that high unemployment in Europe is not caused entirely by structural impediments but is at least in part a result of insufficient aggregate demand.[4] This finding would change the perception of the tradeoff faced by nations considering the abandonment of a fixed exchange rate. While normally a nation contemplating devaluation must weight the tradeoff between the benefit of faster growth against the cost of faster inflation, the discovery that there is no such cost would

---

3. In September-November 1997, the U.K. unemployment rate by the standardized ILO definition was 6.6 percent while that of France was 12.4 percent (*Economist*, January 24, 1998, p. 104). In 1992 the standardized unemployment rates were 10.1 and 10.3 percent, respectively (*OECD Economic Outlook*, June 1997, Annex Table 22).

4. In contrast, with the single exception of Finland, Nickell (1997, p. 72) treats the actual average rate of unemployment as an accurate estimate of the equilibrium rate (or NAIRU) and dismisses the contribution of inadequate aggregate demand: "Business cycle effects and autonomous demand shocks of various kinds should wash out if we take a long enough period — and our focus has been on 1983-1996, a 14-year stretch. . . . over the longer period, there is only one country where truly exceptional problems have distorted the long period average dramatically, namely Finland. . . . Without these exceptional events, there is no question that average unemployment would have been substantially lower over the relevant period and this lower number would more accurately reflect the equilibrium rate in Finland."

tilt the benefit-cost calculus toward devaluation.[5] Second, the ability of individual nations to achieve unambiguous improvements in economic performance by breaking away from the Bundesbank's tight policy regime raises doubts about the sanity of those countries which seem so eager to join the EMU and reinforces the view that the motivation for EMU must be entirely political, since it makes little economic sense.[6] The apparent benefits of exchange rate flexibility would appear to free policymakers from "the dire consequences of the policy responses required to defend the exchange [that] can bring a government's entire macroeconomic strategy tumbling down" (Eichengreen, Rose, Wyplosz, 1995, p. 251).

Beyond its implications for these great policy debates, the ERM aftermath raises perplexing problems for the more academic concerns of macroeconomists. Much of the literature on exchange rate pegging (e.g., Rebelo 1997) stresses its role as a signal of inflation credibility. It follows that devaluations in the 1992 mode must reveal inflation noncredibility. If the presence or absence of credibility plays an independent role in the determination of the inflation rate, as many have surmised from the role of the EMS in achieving inflation convergence during the 1981-90 period, then this creates two *a priori* reasons to predict an inflationary outcome after 1992, namely the noncredibility effect and the normal exchange-rate pass-through effect into the prices of exports, imports, import-competing goods, and ultimately labor costs.

---

5. The output-inflation tradeoff cited in the text is the normal view which "welcomes nominal exchange rate depreciations or devaluations because they improve competitiveness, but they are also feared because they may bring about inflation so dampening the initial competitive gains" (Alberola, Ayuso, and López-Salido, 1997, p. 1).

6. Feldstein (1997) provides a skeptical view of both the economic and political implications of EMU.

Goals and Plan of the Paper

This paper attempts to provide a comprehensive treatment of the macro aftermath of 1992.[7] Sufficient time has now elapsed to determine whether the nominal depreciations of 1992-93 achieved real depreciations that were permanent or were ephemeral, being gradually but steadily eroded — as many theories would suggest — by differentially faster inflation. And the elapsed time allows conclusions to be drawn on whether faster output growth was achieved, whether faster output growth was achieved primarily in the external sector or partially by more rapid growth in domestic demand, whether there was a surprising absence of extra inflation, and, if so, to what extent this surprise originates in an atypically low pass-through of the exchange rate into import prices, as contrasted with a low pass-through of import prices to labor costs.

The paper differs from most of the literature by treating the origins of the 1992 breakdown as a side issue rather than a central focus, and we bypass entirely the debate on the role of fundamentals versus pure speculation, and on single versus multiple equilibria.[8] The only important aspect of the runup to 1992 that concerns us is the fundamentals themselves, both because the response of inflation to devaluation depends in part on the degree of

---

7. There are many scattered citations of data on the 1992 aftermath in the articles cited above in footnote 1, but their primary focus is on the circumstances of the 1992 breakdown rather than the details of the aftermath. The most systematic analysis is that of Eichengreen, Rose, and Wyplosz (1995, esp. pp. 269-85), who provide charts showing the average behavior of a large number of variables before and after specified types of exchange rate depreciations, devaluations, and crises. However, the 1992 aftermath provides only a small number of observations in their large set of episodes extending from 1959 to 1993. A graphical view of several aspects of post-1992 performance is contained in Bergin and Moersch (1997). Post-1992 is one of the episodes studied in Borensztein and De Gregorio (1998).

8. The clearest presentation of the traditional theory based on fundamentals, as contrasted with "the new theory" emphasizing the independent role of speculators, and of the subtle variations between the two theories, is contained in Obstfeld (1996).

macroeconomic slack in the year or two directly preceding the devaluations, and because the differing experiences among the leaver nations may depend not only on differing policies pursued after 1992, but also on differing shocks and policy responses prior to 1992.

Our analysis compares macroeconomic outcomes in six "leaver" countries (Finland, Italy, Portugal, Spain, Sweden, and the U. K.) with five "stayer" countries (Austria, Belgium, France, Netherlands, and Switzerland).[9] In order to avoid being swamped with individual country statistics on a number of macro variables, primary attention is given to GDP-weighted "leaver" and "stayer" aggregates. However, these aggregates disguise diversity; just as Nickell's (1997) analysis of structural unemployment in Europe remarks on the diversity of experience within Europe, so our analysis uncovers a wide range of experience among the leavers, and to a lesser extent among the stayers.[10] For instance, we will find that the frequent comparison of the U. K. with France is misleading, as the U. K. is the only country in our group of 12 that had a lower unemployment rate in 1996 than in 1991.

The paper begins with a theoretical section, based in part on the IS-LM framework, that centers on role of German reunification as the essential precondition for the 1992 crisis. A shift in the Germany monetary-fiscal mix (in the same direction as that in the U. S. in 1981) raised interest rates and should have caused a DM appreciation. By adhering to a fixed DM parity in 1990-92, both leavers and stayers condemned themselves to depressed domestic and

---

9. Exchange rate afficionados may quibble with the choice of countries and the terminology. Norway was as much a leaver as Sweden and Finland and should have been included. Spain, Portugal, Ireland, and Denmark devalued in 1992-93 but maintained bands with the DM. The GDP weights that would be attributed to the omitted countries (Norway, Denmark, and Ireland) are so small that none of the conclusions is affected by the omissions.

10. ". . . labor markets in Europe exhibit enormous diversity; in fact, differences within Europe are much greater than are the difference between the European average and North America" (Nickell, 1997, p. 55).

foreign demand. Leavers then devalued and boosted external demand, in effect shifting the IS curve rightward, raising the level of real demand consistent with the German-determined interest rate. As long as the aggregate supply curve (or Phillips curve) is positively sloped, however, the boost in demand should have increased the leavers' inflation rate (or caused a smaller deceleration of inflation) than occurred among the stayers. This analysis suggests that any tendency for the leavers to experience the same inflation as the stayers (as suggested by the above-cited "conventional wisdom") would indeed be surprising.

The empirical analysis consists of three main sections. First, we study macroeconomic outcomes, using a mix of quarterly and annual data presented either in graphical or tabular form. Indexes of real growth indicate that, while the leavers had the expected boost to external demand, this did not spill over to more rapid growth in either domestic demand or real GDP as a whole. Almost all of the extra nominal GDP growth enjoyed by the leavers was chewed up by extra inflation, not just in import prices but in both the CPI and GDP deflator. Nominal unit labor costs increased at the same rate in the leavers and stayers, explaining why the much more rapid growth of import prices for the leavers translated into faster overall inflation. Up to this point the results contradict the "conventional wisdom" that the leavers obtained a macroeconomic free lunch.

The second part of the empirical analysis develops econometric estimates of pass-through equations for the individual countries and the leaver/stayer aggregates, comparing the estimated short-run and long-run coefficients with the pass-through literature to determine whether there was anything unusual about the pass-through process after 1992. Then the third part develops econometric estimates of equations explaining the rate of price and wage

inflation. Using both dummy variables and post-sample simulations for the post-1992 period, we ask whether there was anything unusual about the behavior of post-1992 inflation in the individual countries and the two sub-aggregates.

II. Theoretical Issues

In some theoretical frameworks, this paper could not be written, because the real exchange rate is not a policy instrument in any but the shortest run. Over the medium and long term, domestic inflation rises by exactly the same proportion as the exchange rate depreciation, thus causing an evaporation of the initial response of the real exchange rate to the depreciation in the nominal exchange rate. We begin with a brief review of the theoretical case supporting a policy role for the real exchange rate, and then proceed to the responses of real variables and the inflation rate that might have been expected following the 1992 devaluations.

Is the Real Exchange Rate a Policy Variable?

There is a traditional view holding that a domestic policymaker cannot control the real exchange rate, because a nominal exchange rate depreciation is quickly offset by domestic inflation, causing any ephemeral real exchange rate depreciation to vanish. Dornbusch (1995, pp. 247-250) describes two views, "monetarist" and "classical," both of which deny any policy role for the real exchange rate. In the better-articulated classical view, the real exchange rate is a market price, and any increase in the real exchange rate is a market response to a positive economic performance. "It is the reward for reform, stabilization, and doing good and right."

The view that a nominal exchange rate depreciation does not create a permanent real

exchange rate depreciation is based, of course, on the assumption that any nominal depreciation must, sooner or later, create a unit-elastic response in the domestic price level that leaves the real exchange rate unaffected. This is equivalent to the assumption that purchasing-power-parity must hold in the long run. In an influential review of exchange rate theory, Obstfeld (1995, pp. 121-39) supports the view that inflation rates explain most of the cross-country variation in dollar exchange rates, except for the continuing long-term appreciation of the Japanese yen, which he attributes to the Balassa-Samuelson theory that would attribute the yen appreciation to a continuing differential in the rates of productivity growth in traded versus nontraded goods. Obstfeld links the short-run correlation between nominal and real exchange rates to delays in adjustment which (citing Frankel-Rose 1995) have a half-life of around four years.

It is standard practice to build models in which PPP holds in the long run. One of the earliest papers on the ERM breakdown by Eichengreen and Wyplosz centers its analysis on a model (1993, pp. 83-84) in which the relationship between the nominal exchange rate and the domestic price level is described by a 45^{o} line, and in which the exchange rate and the price level both continue to adjust until they eliminate any gap between movements away from equilibrium among the domestic money supply, domestic price level, and nominal exchange rate. If macroeconomic adjustment in Europe were described by this model, by now in 1998 the effects of the 1992 devaluations on the real exchange rate should have nearly vanished, referring again to the Frankel-Rose (1995) result that the half-life of the adjustment process is four years.

Robert Mundell (1998) has provided an even stronger statement that the effect of

devaluations on the real exchange rate vanish within a short period of time:

> "To be sure, after a long period of price stability, devaluation, like a sudden burst of money acceleration, can have real effects due to rigidities and money illusion . . . . Provided wage rates are not indexed to prices, a *surprise* devaluation can be a temporary spur to the economy for the duration of existing wage contracts . . . . There is no free lunch, however. . . the crucial elements of money illusion and surprise are no longer present. Since the brekdown of the Bretton Woods arrangements, trade union leaders and investors have become fully aware of the link between currency depreciation and inflation, and have learned how to protect themselves against it. Wages now quickly adapt to inflation forecasts, leaving as a residue higher prices without any employment gains" (Mundell, 1998).

Mundell's confidence that wages are adjusted subsequent to the "duration of wage contracts" predicts that the real effects of a devaluation would vanish after one to three years.

The long-run validity of PPP requires both full pass-through of the exchange devaluation into import prices and then into wages. There is an entire separate literature on import price "pass-through" which appears (to this outsider) to be less than perfectly integrated with the conventional distinction between the short-run and long-run validity of PPP. The important survey by Menon (1995) establishes at least five reasons why a unit-elastic pass-through from the exchange rate to import prices may not occur. First, inelastic supply and/or demand may make pass-through incomplete. Second, a large literature suggests that imperfect substitutability between goods produced by different countries but sold in one

market can be an independent cause of violation of the law of one price. Third, the pervasiveness of intra-industry trade lends further support to the view that domestic and foreign manufactured goods are imperfect substitutes.[11] Fourth, changes in exchange rates of large economies like the U. S. can alter world prices, thus ensuring the co-existence of less than full pass-through with the preservation of the law of one price. Fifth, non-tariff barriers (NTBs) serve as a buffer to the response of import prices to the exchange rate: "The increase in the coverage of the NTBs as the dollar depreciated would hold up import prices. Then as the dollar depreciated from 1985, the premium on NTB-restricted imports would fall instead of import prices rising. Pass-through would imply a reduction of the premium on imports rather than rising prices" (Branson, 1989, p. 331).

The second step required for the validity of long-run PPP is the full adjustment of labor costs to the increase in the domestic price level contributed by the import-price pass-through.[12] Full adjustment of labor costs is not guaranteed except in the extreme case of fully indexed labor contracts, which have gradually disappeared since the era when the "scala mobile" dominated Italian industrial relations and less extreme versions rigidified wage adjustment in other countries. Numerous models of labor-market adjustment can accommodate the result that nominal labor costs increase less than one-to-one to an increase in consumer prices, i.e., that the real consumption wage is flexible. The absence of complete wage indexation and the existence of a labor supply curve that is less than infinitely elastic to

11. Citations to the previous literature are provided in Menon (1995, pp. 200-201).

12. The adjustment of mark-ups on import prices is taken into account in this two-step account while the adjustment of domestic markups is ignored.

changes in the real wage suffice to establish the possibility of a pass-through from import prices to domestic labor costs that is less than unit elastic.

German Reunification and its Aftermath

While the previous literature is ambiguous and inconsistent about the inevitability of a unit-elastic response of the domestic price level to an exchange-rate devaluation, it has established a firm consensus that the fundamental event that eventually caused the 1992 ERM breakup was the German reunification of 1989-90. In the well-chosen words of Branson (1993, p. 129), "the [fundamental] shocks started coming from the center!" It is helpful to use a simple textbook IS-LM model to establish the macroeconomic environment of 1992 and the direction in which we should have expected the main variables to move after the devaluation of the leavers.

Figure 1 arrays horizontally three IS-LM diagrams applying to, respectively, Germany, the stayers, and the leavers.[13] Germany in the left frame begins at point *A*, with initial output Y_0 and an initial interest rate r_0. Reunification shifts rightward the *IS* curve to position IS_1 as a result of the ensuing fiscal expansion and increase in investment opportunities. To repress the inflationary implications of the subsequent output boom, which would otherwise move the economy to point *B*, the Bundesbank tightens monetary policy, shifting the *LM* curve leftward to position LM_1, thus boosting the interest rate to r_1. As a result of the shift in the fiscal-monetary mix, the economy moves from point *A* to point *C*.

In the middle frame of Figure 1, the stayers find themselves faced with a demand

13. The use of the IS-LM model is suggested by Krugman (1996, p. 373). The first two situations in the two left frames of Figure 1 are identical to his diagram on p. 373, but the analysis in the right frame and the subsequent discussion of inflation adjustment and convergence extend his analysis.

contraction as higher interest rates push their economies northwest from point *A* to point *D*. Lacking the "*IS*-stimulus" that Germany experienced, the other stayers experience the normal negative response of aggregate expenditure to high interest rates. In the right frame the leavers initially duplicate the stayer experience, moving from point *A* to point *D*, and they move into recession just as do the stayers. However, the ensuing devaluation as the leavers depart from the ERM reduces the real exchange rate, boosts net exports, shifts the *IS* curve rightwards from IS_0 to IS_2 , and allows a monetary easing (shown by the rightward *LM* shift from LM_1 to LM_2) while still maintaining the same interest rate chosen by the Bundesbank, r_1 . As a result the leaver economies achieve a rightward movement from point *D* to point *E*. Whether or not the higher leaver output at Y_2 exceeds the initial output level Y_0 depends on the values of the parameters and the size of the devaluation.

As drawn Figure 1 appears to predict that the leaver countries will enjoy a higher level of real GDP than the stayers, and yet we will find below that this did not occur. The reason is extraneous to the analysis of devaluations but nevertheless empirically important, and this is the pressure of the Maastricht criteria in creating a fiscal tightening in the leaver countries that put downward pressure on domestic demand and real GDP. As shown in Tables 2 and 3 below, the structural budget deficit was reduced between 1992 and 1996 much more in the leaver countries than in the stayer group.

How does the inflation rate respond to the three output scenarios depicted in Figure 1? Both frames of Figure 2 incorporate the natural rate hypothesis and plot a textbook Phillips curve relating the inflation rate $(\eth_t)$ to the detrended level of output (Y_t). The vertical Phillips curve *(LP)* is a locus of points at which the inflation rate is constant $(\eth_t = \eth_{t-1})$, and the short-

run Phillips curve *(SP)* displays a positive relationship between the current inflation rate and the output level, holding constant last period's inflation rate $(\eth_{t-1})$. That is, the *SP* curve plots a positive relationship between the acceleration of inflation and the detrended output level. Inflation accelerates when output exceeds the natural level of output at *Y** and decelerates when output falls short of the natural level.

The situation of Germany and the stayers is depicted in the left frame of Figure 2. The economy's initial position is at point *A*, with steady inflation. The German shift in the fiscal-monetary mix maintains a constant output level at point *C* in Figure 1, which is also consistent with steady inflation at point *C* in Figure 2. The lower level of output reached by the stayers yields a prediction that inflation decelerates, as at point *D*. An immediate problem posed by this analysis is that the stayers could not maintain a fixed exchange rate with Germany if their inflation rates continually decelerated relative to Germany, as suggested by the lower inflation at point *D* in the left frame of Figure 2 as contrasted with point *C*. Some force must have operated to cause the inflation rate in the stayer countries to converge to that of Germany, and if the natural rate approach in Figure 2 is valid, this means that the output gaps in Germany and the stayers must have converged as well.

One scenario consistent with output and inflation convergence in Germany and the stayers is suggested in the left two frames of Figure 1. Since the reunification boom was temporary, eventually the *IS* curve for Germany in the left frame must have shifted back to the left, which we shall assume for simplicity is to the original position IS_0. Without any change in the real money supply, the Germany economy would have remained on LM_1. The economy would have moved to point *F*, with a lower interest rate and lower output than at point *C*. The

stayer countries would have enjoyed some relief from high interest rates, and their position would have shifted from point *D* to point *F* (the intermediate *LM* curve crossing the *IS* curve at point *F* is omitted for clarity). At this point Germany and the stayers have achieved output and inflation convergence. Point *F* in the left-hand frame of Figure 2 suggests that the inflation rate in both Germany and the stayer countries should have continued to decelerate.

The reversal of the *IS* stimulus in Germany and subsequent reduction in interest rates gives a secondary boost to output in the leaver countries, as shown by the movement from point E to point G in the right-hand frame of Figure 1 (again, the final *LM* position intersecting IS_2 is omitted for clarity). There is no particular reason for point *G* to represent a higher or lower output level than the initial point *A*, so point *G* is drawn in the right-hand frame of Figure 1 has having the same level of output as point *A*. As shown in the middle frame of Figure 2, there are two reasons for the leaver countries to have a higher inflation rate than Germany or the stayer countries. First, the increase in the relative price of imports caused by the exchange-rate depreciation has, at least temporarily, shifted the *SP* curve above its initial position.[14] Second, the higher output level (*E* higher than *D* and *G* higher than *F*) implies that the leaver countries are further northeast along any given *SP* curve than the stayer countries.

However, while the leaver countries necessarily should experience more inflation than in the stayer countries, there is no necessary reason why their inflation rates had to exceed

14. The vertical position of the *SP* curve depends not just on lagged inflation (ϑ_{t-1}) but also on any operative supply shocks. Increases in the real price of imports or of oil shift the *SP* curve upwards for a temporary period, and decreases shift the *SP* curve downward. For a more detailed analysis see Gordon (1998, pp. 248-58).

their initial situation at point *A*, since a sufficiently steep *SP* curve combined with a sufficiently deep recession could place point *E* vertically below point *A*, as in the right-hand frame of Figure 2. Whether point *G* lies above or below point *A* depends on whether the temporary upward shift in the *SP* curve caused by an increase in the relative price of imports has reversed itself by the time the economy moves rightward from point *E* to point *G*.

If *ceteris paribus* is operating, this analysis makes clear predictions about the post-1992 macroeconomic performance of the leaver countries compared to the stayers — output should be higher, but so also should be the inflation rate. But, at the same time, there is no presumption that the leavers should have higher output or inflation than the same countries experienced before the ERM breakup, e.g., in 1991-92. This analysis also provides a framework for examining the data in subsequent sections. It would truly be surprising if the leaver countries did not experience higher output than the stayer countries and even more surprising if they did not exhibit more rapid inflation than the stayers (the extra surprise residing in the extra boost of higher import prices to domestic inflation, over and above the contribution of higher output). If the data do indeed yield surprises relative to this analysis, two possible explanations might be that the analysis is wrong or that *ceteris* was not *paribus*, i.e., that the leavers (either individually or together) experienced different shocks than the stayers.

III. Leavers versus Stayers Before and After 1992

The empirical conclusions of this paper rely primarily on a quarterly data file covering the nominal and real exchange rate, nominal and real import price deflators, nominal and real GDP, the GDP deflator, nominal and real unit labor cost, the CPI, and the unemployment

rate. Leaver and stayer aggregates are formed, using GDP weights as described in the data appendix. The quarterly data series are supplemented by selected annual series on other variables. The behavior of ten of the quarterly data series, expressed as index numbers with 1991 equal to 100, is plotted in Figures 3-12 for the period 1987-96. We focus on the period after 1987 because that year is generally acknowledged to represent the beginning of the five-year period of exchange-rate stability within the EMS and is subsequent to the 1981-87 period during which inflation rates converged and numerous realignments occurred. Our discussion is divided into two parts, referring first to differences between the leavers and stayers in the run-up to the 1992 crisis, and then to differences in the evolution of economic performance after 1992. The post-1992 analysis is further divided into three sections corresponding to three main classes of macroeconomic variables..

Differences in Behavior, 1987-92

Did the leavers reveal themselves to be candidates for crisis in the years prior to 1992? Our theoretical discussion suggests that both leavers and stayers were pressured by German reunification to tighten monetary policy, which should have reduced output and raised the unemployment rate in a similar fashion in the two groups of countries. While numerous papers, especially Svennson (1993) and Rose-Svennson (1994) demonstrate that the 1992 crisis was not anticipated on the exchange markets in the previous months, a longer view covering five years prior to the crisis, instead of just a few months, reveals some systematic differences between the leavers and stayers.

Since the leavers and stayers remained aligned in the ERM during 1987-92, it is not surprising to find the nominal effective exchange rate for both groups of nations hovering

around 100 during that period, as in Figure 3. However this alignment did not extend to the real effective exchange rate, displayed in Figure 4. There we see that the real exchange rate for the leaver aggregate rose relative to the stayers by 20.6 percent between 1987:Q1 and 1992:Q2, surely enough to raise the possibility that some or all of the leaver currencies had become overvalued. Dornbusch (1995, p. 243) and Krugman (1996, pp. 370-2) also call attention to the possibility of overvaluation for some of the individual leavers. Figure 4 raises a question about timing. Most of the real appreciation in the leaver/stayer ratio (14 percent of the total 20.6 percent) had already occurred by the end of 1988, more than three years before the crisis, and only the remaining 6 percent occurred between 1989:Q1 and 1992:Q2.

This appearance of mild relative appreciation disguises substantial differences over this 13-quarter interval. Three of the leavers experienced significant real appreciations of about the same amount over this period, amounting to 8.0 percent for Italy, 9.2 percent for Spain, and 10.5 percent for Sweden. In contrast, the real appreciation for the U. K. was only 2.4 percent. Outliers with very different experiences were Portugal, with a real appreciation of 25.5 percent, and Finland, where a collapsing economy held inflation well below that in the other countries and resulted in a real depreciation of 10.1 percent over the same interval. In contrast, the stayers were much more homogeneous, with real appreciations of less than one percent in Austria, France, the Netherlands, and Switzerland, and of less than three percent in Belgium.

As shown in Figure 7, much of the real appreciation in the leaver countries can be traced to more rapid inflation during the entire period before the crisis. The GDP deflator

for the leaver aggregate rose by 40.0 percent from 1987:Q1 to 1992:Q2, more than double the 15.8 percent increase registered by the stayer aggregates.[15] The contrast with the stayer countries is sharper and more uniform than is the case for the real exchange rate. The cumulative price increase among four of the leavers clustered in the narrow range of 36.8 to 40.2 percent, with Portugal's 80.0 percent and Finland's 25.9 percent as the outliers. In contrast, the inflation rate in the stayer countries was uniformly lower; in Austria, Belgium, and France the cumulative price increase clustered within 2 percentage points of Germany's 17.5 percent, while the Netherlands registered 11.3 percent and Switzerland 22.0 percent. This stark difference in the inflation behavior of the leavers and stayers seems largely to have been overlooked in the previous literature. It appears to reflect a difference in the behavior of nominal unit labor costs (Figure 8), which increased cumulatively over the same period by 45.7 percent for the leavers and just 14.0 percent for the stayers and 18.5 percent for Germany.

In contrast to the contrasting inflation performance of the two groups, there was virtually no difference in the two central measures of real performance, namely real GDP growth and the unemployment rate. The cumulative increase in real GDP from 1987:Q1 to 1992:Q2 was 12.0 percent for the leaver aggregate and a slightly greater 16.4 percent for the stayers. Over the same interval unemployment fell by 7.2 percent (not percentage points) for the leavers and rose by a trifling 1.3 percent for the stayers. This period spans the 1988-90 European boom, when unemployment fell by 29 percent through 1990:Q2 for the stayers and by 19 percent for the stayers and subsequently reversed course, rising by almost the same

15. Our data set also includes the CPI for the same countries and time period, but the time path of the CPI mimicks that of the GDP deflator almost exactly, so that no separate comments are made in the text about the CPI. Subsequent footnotes comment on CPI changes.

amount. The larger downward and upward swing in leaver unemployment was entirely accounted for by the U. K., where unemployment fell by almost half between early 1987 and mid-1990 and then reversed course, by mid-1992 reaching close to the initial level.

Some of the accounts of the "fundamentals" in 1992 stress the sharp increase in unemployment between mid-1990 and mid-1992, creating a presumption among speculators that policymakers would opt for easier monetary policy if they were not bound by the ERM peg. However, unemployment behavior does not differentiate the leavers from the stayers, which both found themselves in a situation like point D in Figure 1 above. Instead, what seems misleading about the theoretical analogy in Figure 1 is the depiction of Germany as having a higher relative level of output (in the left frame of Figure 1) than the stayers or the leavers (in the middle and the right frame). Germany's unemployment rate actually increased between 1990:Q4 and 1992:Q2 by 31.4 percent, more than the leavers' 23.6 percent or the stayers' nearly identical 24.2 percent.

While differences in real GDP growth and changes in unemployment did not differentiate the leavers from the stayers in the runup to 1992, a starkly different inflation performance clearly sets the leavers apart. Cumulative inflation during 1987-92 for every leaver but Finland was more than double the cumulative inflation registered by every stayer but Switzerland. Creeping overvaluation was sufficiently pervasive to suggest that a breakdown of ERM was inevitable at some point.

The Aftermath of 1992: Real Depreciation, Prices, and Labor Costs

We set our analysis of the post-1992 aftermath in the context of the "conventional wisdom" (based on the citations in the introduction) that what has been most surprising has

been the absence of inflation among the leavers, who are sometimes viewed as having gained a burst of growth at little or no cost. If this view were correct, it would raise the issue of how the leavers had managed to overturn the laws of economics, which predict a substantial pass-through of an exchange rate depreciation into import prices and subsequently into domestic inflation. It would also lead us to ask whether this "escape from inflation" had been uniformly enjoyed by all the leavers, or just some of them, and why.

Our tour of the data begins by returning to Figures 3 and 4, which exhibits the sharp nominal and real depreciation of the leavers which reached its maximum extent in 1995:Q2, at which point the real depreciation had reached 20.8 percent from 1992:Q2. Because the stayers experienced a real appreciation that reached almost 7 percent over the same 12-quarter interval, the leaver/stayer real exchange rate ratio dropped by a full 26.0 percent. After 1995:Q2 the real exchange rates of the leavers and stayers began a reversal which by 1997:Q2 had reduced the cumulative real depreciation of the leavers to 11.1 percent and of the leaver/stayer ratio to 12.5 percent. The changes for the nominal exchange rate are remarkably similar, a maximum nominal depreciation of 21.4 percent in 1995:Q2, a decline in the leaver/stayer ratio of 30.4 percent, and a partial reversal during 1995-97.

Does the post-1995 reversal of the initial real depreciation confirm the "monetarist" and "classical" views that price adjustment soon eliminates a real depreciation as the domestic price level adjusts with a unit elasticity to the nominal exchange rate depreciation? Only about 4 percentage points of the turnaround in the leaver/stayer real exchange rate ratio after 1995:Q2 can be attributed to excess inflation in the leaver countries compared to the stayers. The remainder can be attributed to a sharp nominal appreciation of the British pound, and to

a lesser extent the Italian lire, together with a substantial nominal depreciation of the mark and those currencies tied to the mark (real exchange rate changes from 1995:Q2 to 1997:Q2 were +19.6 percent for the U. K., +17.5 percent for Italy, +12.2 percent for the leaver aggregate, -8.5 percent for Germany, and -5.3 percent for the stayer aggregate). While a graphical display of data for each country would expand this paper beyond manageable size, Table 1 does provide, for each country in 1996:Q4, a set of index numbers (1991=100) for the values of each variable plotted in Figures 3-12.

Figures 5 and 6 display, respectively, the nominal and real import price deflators. Nominal import prices shot up in the leaver countries immediately following the ERM breakdown. The leaver-stayer ratio in Figure 5 increased by 15 percent in the first year ending in 1993:Q3, and the increase in this ratio peaked out at 29 percent in 1995:Q3, followed by a slow decrease to 25 percent in 1996:Q4. The equivalent changes for the leaver-stayer ratio computed from the real import deflators are 13.1, 22.7, and 15.4 percent.

Subsequently we shall examine the dynamic path of the pass-through ratio, that is, the percentage adjustment of the real import deflator expressed as a ratio to the real exchange rate change. To preview those results, the pass-through ratio indicates that between half and two-thirds of the exchange rate depreciation was passed through to import prices for the leaver country aggregate, but the ratio varies substantially across the leaver countries.

Clearly, the difference in the behavior of the nominal and real import deflators demonstrates that the conventional wisdom is wrong, and that the leaver countries did experience more rapid inflation than the stayers. As shown in Figure 7, the leavers experienced almost twice as much inflation as the stayers between mid-1992 and the end of

1996. Translated into compound annual inflation rates, the leaver aggregate rate over this 18-quarter interval was 3.45 percent and the stayer aggregate registered 1.75 percent.[16] The leaver aggregate disguises a substantial dispersion between the maximum annual rate of 4.29 percent for Portugal and the minimum annual rate of 1.11 percent for Finland. The stayers exhibit a much narrower dispersion, between a maximum annual rate of 2.67 percent for Austria and a minimum annual rate of 1.56 percent for Switzerland.[17]

When we turn to unit labor costs, however, we do find a surprise consistent with the thrust of the conventional wisdom. Although, as we have seen, the leavers had substantially more rapid growth in nominal unit labor costs prior to 1991, after that point the leaver-stayer ratio for nominal unit labor costs was absolutely flat, as shown in Figure 8. Thus none of the differentially more rapid inflation passed through into domestic labor costs. This finding conceals substantial variation within the group of leaver countries, just as there is variation in the inflation experience. Italy and the U. K. exhibit increases in unit labor costs that are almost exactly the same as in the leaver and stayer aggregates (which are roughly equal to each other). The more rapid growth in unit labor costs in Spain and Portugal are balanced by much slower growth in Finland and Sweden. In fact, nominal unit labor costs for Finland were actually lower in late 1996 than in 1991.

The combination of extra inflation among the leaver countries combined with no pass-through to unit labor costs implies that real unit labor costs (equivalent to an index of labor's

16. The equivalent figures for the CPI are 3.32 and 1.91 percent, respectively.

17. These data on the dispersion of inflation rates refer to the CPI, for which our data extend further in time for some small countries than for the GDP deflator.

income share) must have fallen. As shown in Figure 9, the leaver-stayer ratio of real unit labor costs dropped steadily after 1992 by a cumulative 7.5 percent. However, the leaver countries were not unique in displaying this evidence of real-wage flexibility, as the real unit-labor-cost index for Germany also declined over the same period (see Table 1).

The Aftermath of 1992: Output, External and Domestic Demand, and Unemployment

The absence of pass-through from import prices to nominal unit labor cost, made possible by the flexibility of real unit labor cost, provides the first surprising aspect of the 1992 aftermath. A second and doubtless greater surprise is contained in Figures 10 and 11 containing the index numbers (again with 1991=100) for nominal and real GDP. Here we find that *virtually all of the leaver-stayer excess of nominal GDP growth was chewed up by extra inflation, with almost nothing at all remaining for real GDP growth.* Real GDP growth was absolutely identical in the leavers and stayers not just on average over the 1992-96 period but in each individual year! As a result, the leaver-stayer ratio for real GDP was a rock-solid 100 percent for virtually the entire period after 1992, growing infintesimally from 98.9 percent in 1992:Q2 to 100.8 percent in 1996:Q4. Another way to state this surprising result is that the excess growth of nominal GDP in the leavers was divided 80-20, with 80 percent going into extra inflation and only 20 percent going into real GDP growth.[18]

How could the stimulus to the external sector coming from a substantial real depreciation fail to boost real GDP growth by more than a tiny fraction? Further insight is provided in Table 2, based on annual OECD data for each country, where the leaver and

18. The leaver-stayer ratios on a base of 1992:Q2 = 100 are 109.99 for nominal GDP, 107.95 for the GDP deflator, and 101.99 for real GDP. The ratio for the CPI is 106.56.

stayer aggregates are formed with the same weights as in the quarterly data base. In the top two lines we see the enormous burst of real export growth in the leavers, at more than double the rate of import growth over the four year period. However, real domestic demand growth in the leavers fell slightly short of that in the stayers, keeping the excess real GDP growth in the leavers at a mere 2 percent, or only 0.5 percent per year.[19] This table displays the extent to which the U. K. is an outlier among the leavers, with much faster domestic demand growth than its leaver colleagues. In Italy, Spain, and Sweden domestic demand growth was virtually zero. One possible link between the two surprises, those of flexible real unit labor costs and of stagnant domestic demand growth, is that falling real wages (adjusted for productivity) restrained the growth of domestic real consumption. Another cause of sluggish domestic demand growth is a concurrent fiscal tightening, as shown in Table 2, column (6), where the leaver aggregate reduced its structural deficit by 3.2 percent of GDP between 1992 and 1996, as compared with a reduction of just 1.4 percent for the stayer aggregate.

While the leavers display little benefit from faster real GDP growth in Figure 11, their real exchange-rate depreciations did yield a slightly better unemployment performance in Figure 12 than achieved by the stayers or by Germany. The data displayed in column (9) of Table 1 show that from 1991 to 1996:Q4 the unemployment rate in the leavers increased by 33 percent and in the leavers by 59 percent, so that the leaver-stayer unemployment ratio fell by 17 percent. However, these leaver-stayer aggregates are almost meaningless, as the variance of the unemployment changes is much greater across countries within the leaver and stayer

19. The cumulative excess real GDP growth of 2 percent in Table 2 is roughly the same as in the quarterly data displayed in Table 1, column (8), and in Figure 10.

groups than for the other variables in Table 1. Here we see that the relatively poor performance of the stayers is entirely due to the order-of-magnitude jump in Swiss unemployment, and that the other stayers experienced increases in unemployment that were roughly equal to the leaver aggregate or, in the case of Austria and the Netherlands, considerably lower. Similarly, the leaver aggregate disguises a huge difference between the U. K. which actually enjoyed a decline in unemployment, and the two Nordic countries, where the unemployment rate doubled in the case of Finland and almost tripled in the case of Sweden.

The Aftermath of 1992: Gaps and Deficits

A final array of data, based on OECD annual data, is presented in Table 3. Here we see three more aspects of pre-1992 economic performance in the leaver countries that might appear, at least in retrospect, to be auguries of the impending ERM breakdown. First, if we can believe the OECD output gap estimates (which are based on a simple detrending procedure rather than derived from inflation equations), there was considerably more excess demand in the leaver countries in 1989-90 than in the stayer countries. Second, the leavers had structural budget deficits in 1989-92 that were roughly twice as high as for the stayers. Third, the leavers on average had relatively large current account deficits throughout the period 1989-92.

The OECD output gap data show that the cumulative change in the output gap between 1991 and 1996 was roughly the same for the leavers and stayers, thus supporting our earlier conclusion that there was no payoff in extra real GDP from the 1992 depreciations. Further insight into the post-1992 adjustment is provided by the remaining sections of Table

3. While the leavers did achieve an improvement in the current account amounting to 3.9 percent of GDP between 1992 and 1996, the demand expansion provided by this external stimulus was largely cancelled out a percent of GDP reduction in the structural budget deficit. The concurrence of fiscal tightening with external expansion suggests that the 1992 aftermath is not a "clean experiment" of the effects of an exchange depreciation, and that the leaver economies would have experienced a more buoyant increase in output, and less of an increase in unemployment, if they had not been forced by their adherence to the Maastricht criteria to put their fiscal houses in order.

IV. The Pass-through from Exchange-rate Depreciation to Import Prices

As we have seen there is no support for the conventional wisdom that the leavers did not experience extra inflation. Nevertheless, it is interesting to compare the extent of pass-through of the exchange-rate devaluation into import prices with the main results in the vast previous literature on pass-through. The consensus for the U. S. that emerges from Hooper-Mann (1989) and previous studies is that the extent of pass-through is 20 percent in the short-run (defined as one quarter) and about 70 percent in the "long run" after about two years. A much broader range of estimates is summarized in Menon's (1995) survey, who finds that incomplete pass-through is "common and pervasive."

Several of the studies cited by Menon (1995, pp. 224-5) find systematic differences in the pass-through elasticities, although little agreement. Some studies find that the pass-through elasticity tends to vary inversely with the size of the country, while others find larger pass-throughs for the U. S., Germany, and Japan than for the smaller countries. For any given

country, results also vary. The long-run adjustment for the U. S. ranges from 49 to 91 percent, with a mean of 70 percent. The range of studies surveyed by Menon yield long-run ratios from 60 to more than 100 percent, although very few systematic studies have been carried out for the smaller countries.

Two methods can be used to measure the pass-through elasticity for the leaver countries. In evaluating the above-cited "conventional wisdom," we are interested in whether the measured pass-through elasticities for the leaver countries are systematically lower than in the previous literature and whether they are lower than in the stayer countries. One simple method of measuring the pass-through elasticity would be to take the percentage change in the nominal import deflator from 1992:Q2 and divide it by the percentage change in the nominal real effective exchange rate from the same date. However, this calculation would overstate the pass-through elasticity, since the numerator would combine the response of the import deflator to the exchange rate devaluation with general inflation that is shared alike by the leavers and the stayers. Stated another way, at a constant nominal exchange rate we would expect a steady increase in the nominal import deflator at the rate of inflation shared by the leavers and stayers. To correct for common inflation we compute a real import deflator, where the nominal import deflator in each country is deflated by the GDP deflator for the stayer aggregate.

The resulting elasticities can be plotted over time, as in Figure 13, where the elasticities are displayed for the leaver and stayer aggregate. The elasticities for the two groups of countries are fairly close together between mid-1995 and late 1996 in the range of -80 to -100 percent, higher than the ratios that emerge from most studies surveyed by Menon. As shown

in Figure 14, the individual leaver countries have ratios that cover a broader range, with Spain at the low end in most quarters and the U. K. at the high end.[20] An alternative measure of the pass-through elasticity can be obtained from a regression of import prices on exchange rate changes. Menon (1995, pp. 222-24) cites numerous problems in previous pass-through studies, including autocorrelation, spurious regressions, trended variables, and specification error. Many of these problems are avoided by specifying the pass-through relationship in terms of the import deflator expressed net of stayer inflation (thus eliminating common trends), by including changes in real oil prices as a determinant of changes in real import prices, and by eliminating serial correlation through the inclusion of the lagged dependent variable. Our preferred specification is:

$$(\mu-\pi)_t = \sum_{i=1}^{4} \alpha_i (\mu-\pi)_{t-i} + \sum_{i=0}^{4} \beta_i \eta_{t-i} + \sum_{i=0}^{4} \gamma_i \phi_{t-i} + \epsilon_t . \qquad \textbf{(1)}$$

In this formulation the rate of change of the real import price $(\mu-\delta)_t$ is regressed on four of its own lagged quarterly values, the current and four lagged rates of change of the real exchange rate (ς_t), and the current and four lagged rates of change of the real price of oil $(\ddot{o}_t)$.

Results for the leaver and stayer aggregates and the twelve countries are displayed in Table 4, with the estimates obtained over the 1973-96 sample period. The sum of coefficients on the change in the real exchange rate in column (2) represents a medium-term response, and column (5) gives the long-term response:

$$\acute{O}\hat{a}/(1-\acute{O}\acute{a}).$$

20. The exclusion of Finland and Portugal reflects their bizarre ratios ranging up to 400 percent.

The long-run responses lie in a narrower range than the short-run responses. For the leaver and stayer aggregates, Germany, and four of the individual leaver or stayer nations, the long-run response lies is in the relatively narrow range of -0.59 to -0.81, which seems roughly consistent with the previous literature and a bit lower than the elasticities plotted from the raw data in Figures 13 and 14.

As the final empirical exercise in this section, we can ask to what extent the nominal exchange devaluations of 1992 were transmitted to the real exchange rate, and whether the subsequent adjustment of domestic prices eliminated the real-exchange-rate response as the classical view and the Mundell quote (see pp. 9-10 above) would imply. Plotted in Figure 15 is the percentage of the nominal exchange rate change after 1992:Q2 that was transmitted to the real exchange rate. The Mundell approach would predict a percentage remaining above zero only for the duration of labor contracts, say one to three years. Yet the leaver ratio was as high as 75 percent in 1996:Q4, four years after most of the devaluations occurred, and the stayer ratio was at 60 percent (after an initial dip). The ratios for the individual leaver countries are show in Figure 16, and these equalled or exceeded 100 percent for Finland, Sweden, and the U. K. The explanation for the behavior of the ratio for Finland is straightforward — a virtual depression in the economy caused inflation after its 1991-93 depreciation to drop below the average for the stayer countries. Finland, by experiencing a reduction of inflation together with a nominal exchange rate depreciation, registered a real

depreciation that was greater than its nominal depreciation.[21]

V. Inflation and Labor-Cost Econometrics

The "Phillips curve" has become a generic term for any relationship between the *rate of change* of a nominal price or wage and the *level* of a real indicator of the intensity of demand in the economy, such as the unemployment rate. In the 1970s, the simple Phillips relation was amended by incorporating supply shocks and a zero long-run tradeoff. What emerged was an interpretation of the Phillips curve that I have called the "triangle" model of inflation — a label summarizing the dependence of the inflation rate on three basic determinants: inertia, demand, and supply.

For example, a general specification of this framework would be:

$$\eth_t = a(L)\eth_{t-1} + b(L)D_t + c(L)z_t + e_t . \qquad \textbf{(2)}$$

Lower-case letters designate first differences of logarithms, upper-case letters designate logarithms of levels, and L is a polynomial in the lag operator. The dependent variable $\eth_t$ is the inflation rate. Inertia is conveyed by the lagged rate of inflation $\eth_{t-1}$. D_t is an index of excess demand (normalized so that $D_t=0$ indicates the absence of excess demand), z_t is a vector of supply shock variables (normalized so that $z_t=0$ indicates an absence of supply shocks), and e_t is a serially uncorrelated error term.

Usually, equation (2) includes several lags of past inflation rates. If the sum of the

21. The base year in Figure 16 for the Finland calculation is taken as 1991:Q2 rather than 1992:Q2, the base year for all the other countries. Nominal exchange rate data for Portugal were not available from our data source.

coefficients on these lagged inflation values equals unity, then there is a "natural rate" of the demand variable (D^N_t) consistent with a constant rate of inflation. Subsequently we will supplement (2) by an alternative version that replaces the current and lagged price inflation variables with measures of wage inflation. Note that (2) is a reduced form that solves out wages, which requires strong assumptions about the absence of an independent role of wage changes that is not captured by the *D* and *z* variables in equation (2). Our empirical results presented below test for this restriction by allowing both lagged prices and wages to influence either price or wage inflation.

The equations estimated in this paper use current and lagged values of the output gap as a proxy for the excess demand parameter D_t.[22] In turn the output gap is defined as the log ratio of actual to trend real GDP, with the Hodrick-Prescott filter used to detrend actual real GDP.[23] Inflation depends on both the level and change in the demand variable. The rate of change effect is automatically allowed to enter as long as the output gap variable is entered with more than one lag; in other words, if the gap variable is entered as, say, the current value and one lagged value, this contains precisely the same information as entering the current level and change from the previous period.

The third set of variables consists of the proxies for supply shocks. Here we use the

---

22. In my research on the United States (Gordon, 1997), I have found it possible to use the unemployment gap in equations like (2) and to estimate a time-varying NAIRU (natural rate of unemployment). This technique did not seem to be workable for Europe, presumably due to the sharp increase in the NAIRU in many countries. The alternative approach of using a detrended output series to create the output gap seems to work well and yield sensible results.

23. The smoothing parameter used in Hodrick-Prescott's original paper is 1600, and this results in a trend that is too "wavy" and responsive to the actual series. The output trends computed in this paper use a parameter of 10,000, which seems more consistent with the behavior of natural output in the United States as it is derived from inflation equations.

change in the real price of imports and the real price of oil, in both cases deflated by each country's GDP deflator. When the rate of change of the GDP deflator, the import deflator, and the price of oil are all identical, then the supply shock terms are zero and inflation depends only on its own lagged values and on the effect of the output gap.

Wage-Price Feedback

Thus far we have restricted the inflation process to rule out any feedback from wage changes to price changes. Yet we have seen in Figures 8 and 9 that one of the most remarkable aspects of the post-1992 performance of the leaver countries was the absence of any response of unit labor costs to the increase in import prices. The leaver-stayer ratio of nominal unit labor costs was flat at 100 percent on a 1991 base throughout 1992-96 (Figure 8), while the leaver-stayer ratio for real unit labor costs — the same as labor's income share — declined by about seven percent.

One direct indicator of the role of wages in the inflation process is provided by labor's share in national income. The change in labor's share (s_t) is by definition equal to the growth rate of the real wage $(w_t - \eth_t)$ minus the growth rate of labor's average product $(\grave{e}_t)$:

$$s_t = w_t - \grave{e}_t - \eth_t \qquad \textbf{(3)}$$

It can be shown (Franz-Gordon 1993) that changes in labor's share become a source of "cost push" that is on an equal footing with any other type of supply shock; an increase in labor's share pushes upward on the rate of inflation at any given level of the output gap.

A straightforward analogy of our basic inflation equation (2 above) is an equation explaining changes in wage rates (w_t) relative to productivity $(\grave{e}_t)$ by its own lagged values and

the same set of demand and supply variables that enter into the price equation.[24] The difference between the growth rate of wage rates and productivity is unit labor cost $(w\text{-}\dot{e})$.

$$(w\text{-}\dot{e})_t = g(L)(w\text{-}\dot{e})_{t-1} + b(L)D_t + c(L)z_t + e_t. \quad \textbf{(4)}$$

As originally suggested by Sims (1987) and discussed by Franz and Gordon (1993), the identification of a wage equation that is separate from the price equation is problematic. One approach would be to include different sets of demand and supply terms as explanatory variables in the wage equation from those included in the price equation. However, this is implausible *a priori*, since any variable relevant as a determinant of price change may also be relevant for participants in the wage-setting process, and vice-versa for prices. Another approach is to restrict the contemporaneous coefficient of wages on current prices or prices on current wages, but this is arbitrary as well.

In this paper we estimate (4) as a direct analogy to (2) by including the same explanatory variables (substituting lagged changes in unit labor cost for lagged inflation), based on the notion that the same variables are relevant for wage behavior that are relevant for price behavior. An alternative wage equation which leaves open the relative importance of wage-wage and price-wage feedback can be written as follows:

$$(w\text{-}\dot{e})_t = g(L)(w\text{-}\dot{e})_{t-1} + h(L)\eth_{t-1} + b(L)D_t + c(L)z_t + e_t. \quad \textbf{(5)}$$

24. It is preferable to express wage rates relative to the trend of productivity rather than to its actual levels, which tend exhibit procyclical fluctuations. It did not prove possible to obtain the data needed to carry out this decomposition for the purposes of this paper.

This equation (5) is identical to (4) except for the addition of the lagged price inflation terms. A simple method of estimating the relative importance of lagged wage and price inflation is to transform (5) by adding and subtracting $h(L)$ times the lagged trend unit labor cost terms:

$$(w-\dot{e})_t = [g(L)+h(L)](w-\dot{e})_{t-1} + h(L)(\dot{\theta}-w-\dot{e})_{t-1} + b(L)D_t + c(L)z_t + e_t . \quad \textbf{(6)}$$

The sum of the $g(L)$ and $h(L)$ coefficients can be constrained to sum to unity, which imposes the natural rate hypothesis, while the freely estimated sum of coefficients (Σh) indicates the weight on lagged prices in the determination of trend unit labor cost, while $1-\Sigma h$ indicates the weight to be applied to "wage-wage" feedback. A direct analogy to equation (6) can test for feedback from wages to overall inflation:

$$\dot{\theta}_t = [a(L)+g(L)]\dot{\theta}_{t-1} + g(L)(w-\dot{e}-\dot{\theta})_{t-1} + b(L)D_t + c(L)z_t + e_t . \quad \textbf{(7)}$$

Notice from (4) above that the second term in (7) is the change in labor's share, and the second term in (6) is minus the change in labor's share. In this framework, labor's share enters directly into the determination of both price and wage inflation if the sum of the coefficients on the labor's share terms is significant, in which case this variable plays a role analogous to the supply shock term z_t.

Estimation Results

Our main interest in estimating equations for price and wage inflation, using the specifications written down in (2), (4), (6), and (7), is to determine what was surprising about price and wage behavior in the leaver countries after 1992. After presenting estimates of the equations fitted to data for 1963-96, we shall assess the post-1992 "surprise" by two alternative

methods, first by entering a zero-one dummy variable for the period 1993:Q1-96:Q4, and second by computing dynamic simulations for 1993-96 based on an alternative version of the equation estimated for 1963-92.

The estimation results are presented in Table 5 for the leaver aggregate in the top section and the stayer aggregate in the bottom section. The rows in order correspond to the specifications written above as equations (2), (7), (4), and (6). The set of lagged inertia terms in column (1) is highly significant in all variants, with sums of coefficients almost exactly equal to the 1.0 implicit in the natural rate hypothesis. The labor's share change in column (2) is also highly significant (except in the wage equation for the stayer countries), indicating that the inflation rate in both the stayer and leaver countries incorporates a feedback from wage behavior with coefficients of 0.39 and 0.44 respectively. The output gap coefficients are all highly significant for the leaver countries and for the wage equations in the stayer countries, but not in the price equations in the stayer countries. Also, we note that the output gap effect on wages is considerably higher than for prices. The import price coefficients are, not surprisingly, larger and more significant in the price equations for the leaver countries but are not significant in the stayer countries. The oil price coefficients are uniformly insignificant.

Table 6 exhibits the two different ways of assessing the post-1992 surprise in price and wage behavior. Column (1) displays the coefficient on a dummy variable defined as zero for 1963-92 and unity for 1993-96. According to the pure price inertia approach (top line), the dummy variable was zero, so that inflation in the leaver countries was exactly on track. The positive coefficient of 0.81 in the next line indicates that price inflation was surprisingly high, taking into account the low rate of change of unit labor cost that should have fed back into

holding inflation down. The third line, the pure wage-inertia equation, indicates that despite its appearance of being low, wage inflation was actually surprisingly high. This unexpected result reflects the large coefficients on the output gap in the wage equations, and the fact that the output gap in the leaver countries was quite large, especially in 1992-94. The fourth line indicates that wage inflation was too low, taking account of feedback from price inflation.

For the stayer countries the dummy variable approach in column (1) indicates that inflation was on track not just in the first line (pure inflation inertia) but also in the second line (wage-to-price feedback). Both of the wage equations suggest that wage inflation was higher than predicted, a result that (as in the leaver countries) reflects large coefficients on the output gap and the sizeable output gap in the stayer countries in 1992-94.

The coefficients in column (2) represent an alternative test of post-1992 surprises. The equations are all re-estimated with a sample period ending in 1992:Q2, and the estimated coefficients are used to compute dynamic simulations for 1992:Q3-1996:Q4 in which the lagged dependent variable is computed and fed back endogenously rather than assumed to be exogenous. Again, as shown on the first line of each section of Table 6, the pure inertia version of the inflation equations fits very well, but all the other equations substantially underpredict the price and wage equation which occurred. For the second line in which wages are allowed to feedback into price inflation, the simulations indicate that inflation was higher than predicted, presumably because the slow rate of wage increase should have held down inflation more than occurred. The wage equations in the third and fourth lines, however, indicates that even though wage inflation seemed low, it was still higher than predicted in view of the substantial output gaps in both the leaver and stayer countries in 1992-94.

We emerge with a rather complex characterization of price and wage behavior after 1992. Given lagged inflation, the output gap, and the acceleration of import price inflation caused by the 1992-93 devaluations, inflation behaved just as would have been expected. But in view of the slow rate of wage growth and the decline in labor's share, inflation "should have" been slower. Wage growth itself looks modest in the leaver countries when compared with the stayers, but according to these equations should have been even slower in view of the large output gap coefficients estimated from historical data applied to the substantial output gaps that occurred.

VI. Conclusions

The point of departure for this paper was the "conventional wisdom" that the countries that had devalued their currencies and departed from the ERM in 1992-93 (the "leavers") had achieved an enviable combination of more rapid output growth, and a more rapid decline in unemployment, with little if any extra inflation, as contrasted with the "stayer" countries that had maintained their currencies pegged to the Deutsche Mark. The favorite example of the practitioners of the conventional wisdom is the contrast between the U. K. and France. With a standardized unemployment rate roughly the same as France in 1991, the U. K. managed to cut its unemployment rate to half of the French level by mid-1997, presumably in large part due to the policy freedom afforded by the 1992 ERM breakup.

This paper is the first to provide a systematic analysis of the macro aftermath of 1992. Instead of presenting scattered data on individual countries, it constructs quarterly time series for six leaver and five stayer nations, as well as for Germany, covering the main macroeco-

nomic variables of interest. To focus on the main differences between the leavers and stayers it aggregates its indexes into "leaver aggregates" and "stayer aggregates," and these reveal numerous surprises that overturn much of the conventional wisdom.

A preliminary to the theoretical analysis is a review of reasons why the real exchange rate can be a policy variable. There are many "slips between cup and lip" between the initial nominal exchange-rate devaluation and the ultimate adjustment of the domestic price level, and this accounts for the fact that changes in real exchange rates are highly correlated with changes in nominal exchange rates over a longer time horizon than the five years that have elapsed since the 1992 ERM breakup. The main filters that prevent the nominal exchange rate from altering the domestic price level with a unitary elasticity are the partial pass-through of exchange rate changes to import prices, and the subsequent partial adjustment of domestic labor costs to changes in import prices.

The paper frames its analysis with a simple exposition of textbook IS-LM and Phillips-curve diagrams. These focus the origin of the 1992 crisis on the German reunification, which can be interpreted as a shift to easy fiscal and tight monetary policy, raising European interest rates and forcing both the stayers and leavers to accept a reduction in output and an increase in unemployment. The leavers that chose (or were forced) to devalue were pushed in a direction that is quite unambiguous, according to this standard theory. Real demand and output should have accelerated relative to the stayers, due to the stimulus coming from the external sector that should have spilled over to domestic demand. As long as there is any short-run tradeoff between output and inflation, some fraction of the extra nominal demand created by the devaluations should have been dissipated in extra inflation, leaving only a partial

fraction remaining for real growth and a decline in unemployment.

The empirical analysis of the paper begins by reviewing differences between the leaver and stayer nations during the five years prior to the 1992 ERM breakup. In contrast to the previous literature, which tends to cite only scattered evidence that individual nations may have developed overvalued currencies during the pre-1992 period, our technique of aggregating the economic indicators for the leavers and the stayers reveals a stark and unambiguous contrast between the economic performance of the two groups. Our leaver/stayer ratios reveal a steady upward creep in the real exchange rate and a continuous excess of inflation, together with more vigorous output booms and excess demand in 1988-90, larger fiscal deficits, and larger current-account deficits. This evidence confirms those who attribute the 1992 breakup to the fundamentals, since the fundamentals were out of line to a more extreme extent that has heretofore been recognized.

The main analysis of the paper concerns the aftermath of the 1992 breakup. Simply stated, the results of this paper flip the conventional wisdom is almost completely on its head. When we compare the actual performance of the leavers as compared to the stayers, far from having no extra inflation, the leavers had almost double the inflation rate of the stayers from 1992 to 1996. Exactly 80 percent of the extra nominal GDP growth enjoyed by the leavers was chewed up by extra inflation, leaving only 20 percent to spill over to real GDP. While external demand stimulated the leaver economies, as expected, domestic demand actually grew more slowly than in the stayer economies. The paper attributes slow domestic demand growth in the leaver countries to two factors, the flexibility of real wages that caused nominal labor costs to rise at a slower rate than domestic inflation, and the quite extraneous and unrelated

pressure of the Maastricht criteria that caused the external demand stimulus to be almost entirely cancelled by a fiscal tightening.

The role of the Maastricht-imposed fiscal convergence needs special emphasis. The coincidence of the 1992 ERM breakdown and the almost-simultaneous Maastricht fiscal criteria must ultimately qualify our ability to generalize from the post-1992 experience of the leaver countries. Several of these, particularly Italy, were forced to impose a draconian fiscal tightening at the same time that their exchange rate devaluation provided an external stimulus. In this sense our conclusion that there was virtually no stimulus to real GDP is not a clean reading on the effects of devaluation, but rather on the combined effects of devaluation and fiscal tightening. This paper, then, provides a nice complement to Alesina's recent (1998) conclusion that it is possible to achieve a fiscal tightening without a demand contraction, since some of the countries in Alesina's sample were enjoying an external stimulus that offset much of the contractionary effect of the Maastricht tightening.

Much discussion of the 1992 aftermath begins with a contrast between the buoyant economic performance of the U. K. and the sluggish performance of France. Yet the U. K. was only one of the leavers and in many ways was the most atypical. It alone (of the 12 economies studied here) enjoyed a decline in unemployment from 1991 to 1996. It had a greater 1992-96 increase in domestic demand than any of the other leavers, and (with Finland) the greatest increase in real GDP over the same period. Yet if we are interested in generalizing about the results of sharp nominal devaluations, surely the experience of all six leavers matters more than the extreme case of the U. K. And here the results were much less scintillating — real domestic demand actually declined over 1992-96 in Italy and Sweden and barely grew in

Spain. Far from being nonexistent, extra inflation was almost explosive in Italy, Portugal, and Spain. In fact, if we omit the sick case of the stayers (Switzerland) and the star of the leavers (U. K.), there was no excess growth of real GDP in the remaining leavers as contrasted to the remaining stayers.

Contrary to my expectations when beginning this research project, the post-1992 outcome seems to ratify old verities in international macroeconomics more than it validates any new "free lunch" counterrevolution. Of course, no macroeconomic era provides a clean controlled experiment. There are special stories for each of the leavers. The U. K. appears to have an unusually flexible labor market that yields a high extent of adjustment of the unemployment rate to minor real GDP deviations, not just in the 1994-97 boom but also in the previous 1988-90 boom and subsequent recession. Finland and Sweden are well known (Dornbusch 1995, pp. 233-7; Andersen, 1997; Lindbeck, 1997) to have experienced an extreme overexpansion and asset inflation in the late 1980s that had to crash, sooner or later, and this adjustment for Finland was greatly amplified by the evaporation of Finland-USSR trade. Spain and Portugal are both strange economies which obey few of the rules of macro and labor economics and which contribute many of the outlier relationships uncovered in this study.

REFERENCES

ALBEROLA, ENRIQUE, AYUSO, JUAN, AND LÓPEZ-SALIDO, J. DAVID (1997). "When May Peseta Depreciations Fuel Inflation?" Banco de España working paper 9719.

ALESINA, ALBERTO, PEROTTI, ROBERTO, AND TAVARES, JOSÉ (1998). "The Political Economy of Fiscal Adjustments," *Brookings Papers on Economic Activity*, vol. 29, no. 1, forthcoming.

ANDERSEN, PALLE (1997). "Macroeconomic Developments in the Nordic Countries," in *Monetary Policy in the Nordic Countries: Experiences since 1992*. Basle, Bank of International Settlements, Policy Papers No. 2.

BERGIN, PAUL, AND MOERSCH, MATHIAS (1997). "EMU and Outsiders: Fixed versus Flexible Exchange Rates," in Paul J. J. Welfens, ed., *European Monetary Union: Transition, International Impact, and Policy Options* (Springer Verlag), pp. 71-130.

BORENSZTEIN, EDUARDO AND DE GREGORIO, JOSÉ (1998). "Devaluations and Inflation after Currency Crises," draft manuscript, February.

BRANSON, WILLIAM H. (1989). "Discussion" of Hooper-Mann (1989), pp. 330-33.

_____ (1993). "Discussion" of Eichengreen-Wyplosz (1993), pp. 125-29.

CLARIDA, RICHARD, GALÍ, JORDI, AND GERTLER, MARK (1997). "Monetary Policy Rules in Practice: Some International Evidence," CEPR discussion paper no. 1750, November.

DORNBUSCH, RUDIGER, GOLDFAJN, ILAN, AND VALDÉS, RODRIGO O. (1995). "Currency Crises and Collapses," *Brookings Papers on Economic Activity*, vol. 16, no. 2, pp. 219-70.

EICHENGREEN, BARRY AND HSIEH, CHANG-TAI (1995). "Sterling in Decline Again: The 1931 and 1992 Crises Compared," in Richard Tilly and Paul J. J. Welfens, eds, *European Economic Integration as a Challenge to Industry and Government* (Springer Verlag), pp. 355-92.

EICHENGREEN, BARRY, AND WYPLOSZ, CHARLES (1993). "The Unstable EMS," *Brookings Papers on Economic Activity*, vol. 24, no. 1, pp. 51-124.

_____, ROSE, ANDREW K., AND WYPLOSZ, CHARLES (1995). "Exchange Market Mayhem: the Antecedents and Aftermath of Speculative Attacks," *Economic Policy*, no. 21 (October), pp. 251-296.

FELDSTEIN, MARTIN (1997). "EMU and International Conflict," *Foreign Affairs*, vol. 76, no. 6

(November/December), pp. 60-73.

FRANKEL, JEFFREY A., AND ROSE, ANDREW K. (1995). "A Panel Project on Purchasing Power Parity: Mean Reversion within and between Countries," CEPR discussion paper 1128 (February).

FRANZ, WOLFGANG, AND GORDON, ROBERT J. (1993) "Wage and Price Dynamics in Germany and America: Differences and Common Themes," *European Economic Review*, vol. 37 (May), pp. 719-54.

GORDON, ROBERT J. (1997) "The Time-Varying NAIRU and its Implications for Economic Policy," *Journal of Economic Perspectives*, vol. 11 (February), pp. 11-32.

_____ (1998). *Macroeconomics*, seventh edition. Reading MA: Addison-Wesley.

HOOPER, PETER, AND MANN, CATHERINE L. (1989). "Exchange Rate Pass-through in the 1980s: the Case of U.S. Imports of Manufactures," *Brookings Papers on Economic Activity*, vol. 20, no. 1, pp. 297-337.

ISARD, PETER (1995). *Exchange Rate Economics.* Cambridge UK: Cambridge University Press.

KENEN, PETER B. (1995). *Economic and Monetary Union in Europe: Moving beyond Maastricht.* Cambridge UK: Cambridge University Press.

KRUGMAN, PAUL R. (1979). "A Model of Balance-of-Payments Crises," *Journal of Money, Credit, and Banking*, vol. 11 ( ), pp. 311-25.

_____ (1996). "Are Currency Crises Self-Fulfilling?" *NBER Macroeconomics Annual 1996*, vol. 11, pp. 345-78.

_____ AND BALDWIN, RICHARD E. (1987). "The Persistence of the U. S. Trade Deficit," *Brookings Papers on Economic Activity*, vol. 18, no. 1, pp. 1-43.

LINDBECK, ASSAR (1997). "The Swedish Experiment," *Journal of Economic Literature*, vol. 35 (September), pp. 1273-1319.

MCKINNON, RONALD I. (1997). "EMU as a Device for Collective Fiscal Retrenchment," *American Economic Review Papers and Proceedings*, vol. 87, no. 2 (May), pp. 717-25.

MENON, JAYANT (1995). "Exchange Rate Pass-through," *Journal of Economic Surveys*, vol. 9, no. 2, pp. 197-231.

MUNDELL, ROBERT (1998). "The Case for the Euro — I", *Wall Street Journal*, March 24, p. A22.

NICKELL, STEPHEN (1997). "Unemployment and Labor Market Rigidities: Europe versus North America," *Journal of Economic Perspectives*, vol. 11, no. 3 (Summer), pp. 55-74.

OBSTFELD, MAURICE (1995). "International Currency Experience: New Lessons and Lessons Relearned," *Brookings Papers on Economic Activity*, vol. 26, no. 1, pp. 119-96.

_____ (1996). "Comment" on Krugman (1996), pp. 393-403.

_____ (1997). "Europe's Gamble," *Brookings Papers on Economic Activity*, vol. 28, no. 2, pp. 241-300.

_____ (1998). "A Strategy for Launching the Euro," *European Economic Review*, forthcoming.

_____ AND ROGOFF, KENNETH (1995). "The Mirage of Fixed Exchange Rates," *Journal of Economic Perspectives*, vol. 9, no. 4 (Fall), pp. 73-96.

PELAGIDIS, THEODORE (1997). "Divergent Real Economies in Europe," *Economy and Society*, vol. 26, no. 4 (November), pp. 546-59.

REBELO, SERGIO (1997). "What Happens When Countries Peg Their Exchange Rates? (The Real Side of Monetary Reforms)," NBER working paper 6168, September.

ROSE, ANDREW K., AND SVENSSON, LARS E. O. (1994). "European Exchange Rate Credibility before the Fall," *European Economic Review*, vol. 38, no. 6 (June), pp. 1185-1216.

SVENSSON, LARS E. O. (1993). "Assessing Target Zone Credibility: Mean Reversion and Devaluation Expectations in the ERM, 1979-1992," *European Economic Review*, vol. 37, no. 4 (May), pp. 763-93.

TAYLOR, CHRISTOPHER (1995). *EMU 2000? Prospects for European Monetary Union.* London: Royal Institute of International Affairs.

VON HAGEN, JÜRGEN, AND EICHENGREEN, BARRY (1996). "Federalism, Fiscal Constraints, and European Monetary Union," *American Economic Review Papers and Proceedings*, vol. 86, no. 2 (May), pp. 134-8.

WYPLOSZ, CHARLES (1997). "EMU: Why and How It Might Happen," *Journal of Economic Perspectives*, vol. 11, no. 4 (Fall), pp. 3-22.

Data Appendix

Annual Variables: Sources are indicated in notes to individual tables.

Quarterly Variables: Data on particular variables were obtained as follows.

Nominal oil price in dollars, Federal Reserve of St. Louis Economic Data Base ("FRED").

Real effective exchange rate and bilateral dollar exchange rates (used to create the nominal price of oil in local currency) from the International Financial Statistics CD-ROM dated December, 1997. Nominal effective exchange rates come from the same source dated February, 1998.

All other variables were obtained from Douglas Laxton of the IMF.

All leaver and stayer aggregates were created using 1991 PPP GDP weights from *OECD Economic Outlook*, June 1997, p. A2. Quarterly national accounts variables were missing for the year 1996 for Portugal, Austria, and Belgium. Leaver and Stayer Aggregates were extended from 1995 to 1996 by ratio-linking in 1995:Q4 the aggregates respectively including and excluding these three countries.

Table 1

Values of Selected Variables in 1996:Q4, 1991 = 100, For Leaver and Stayer Aggregates and Each Country

	Nominal Exchange Rate (1)	Real Exchange Rate (2)	Nominal Import Deflator (3)	Real Import Deflator (4)	GDP Deflator (5)	Nominal Unit Labor Cost[a] (6)	Real Unit Labor Cost[a] (7)	Nominal GDP (8)	Real GDP (9)	Unemployment Rate (10)
Leavers	83.6	88.7	123.0	100.7	122.3	109.4	92.2	137.1	108.1	132.8
Stayers	108.6	104.4	98.5	89.2	110.4	108.8	99.5	118.4	107.2	159.1
Leavers/Stayers	77.0	85.1	124.9	112.9	110.8	100.5	92.8	111.6	100.8	83.4
Germany	107.8	109.7	99.3	85.9	115.6	110.8	96.2	125.2	108.3	159.7
Leavers:										
Finland	88.1	82.2	119.9	111.9	107.2	99.6	92.0	117.8	109.9	207.3
Italy	78.2	86.3	130.2	103.0	126.3	108.9	89.7	133.0	105.3	139.5
Portugal	NA	108.8	109.1[a]	82.5[a]	132.1[a]	NA	NA	139.7[a]	105.8[a]	173.6
Spain	80.0	87.1	123.0	97.0	126.7	114.8	92.9	136.6	107.8	139.2
Sweden	89.5	87.4	114.4	103.6	110.4	103.5	92.8	116.5	105.6	281.5
United Kingdom	90.1	90.8	118.7	101.2	117.2	107.5	94.7	130.9	111.7	87.4
Stayers:										
Austria	105.5	106.6	102.6[a]	90.1[a]	113.8[a]	112.0	98.4	121.9[a]	107.1[a]	120.4
Belgium	106.3	103.2	96.1[a]	85.7[a]	112.1[a]	109.3	97.6	117.7[a]	105.0[a]	134.5
France	109.6	103.9	98.6	90.0	109.6	108.9	100.2	117.1	106.9	139.3
Netherlands	106.8	105.4	99.5	90.4	110.0	106.6	98.4	124.0	112.7	115.8
Switzerland	109.6	104.8	92.6	84.1	110.0	108.8	99.0	109.1	99.2	468.1

Source: See Data Appendix

Note: a. Value shown is for 1995:Q4 due to early truncation of this series in the source data.

Table 2

External and Domestic Demand, and Real GDP, Cumulative Percentage Increase, 1992-96

	Real Exports (1)	Real Imports (2)	Real Exports/ Real Imports (3)	Real Domestic Demand (4)	Real GDP (5)	1992-96 Change in Structural Deficit (6)
Leavers	36.9	17.2	16.8	3.2	7.3	+3.2
Stayers	17.4	14.2	2.9	4.4	5.3	+1.4
Leavers - Stayers	19.5	3.0	13.9	-1.2	2.0	+1.8
Germany	14.1	10.8	3.0	4.4	5.2	+1.2
Leavers:						
Finland	48.5	27.0	16.9	3.7	11.5	+0.2
Italy	34.4	6.3	26.4	-0.6	4.6	+5.9
Portugal	34.5	25.8	6.9	5.5	6.0	+1.7
Spain	51.1	23.5	22.3	1.3	6.0	+1.8
Sweden	45.9	26.0	15.8	-0.5	5.8	+4.5
United Kingdom	29.8	22.2	6.2	8.7	10.9	+1.3
Stayers:						
Austria	13.5	19.9	-5.4	9.5	6.4	-1.2
Belgium	21.7	20.6	0.9	2.9	4.2	+5.6
France	17.5	10.9	5.9	3.4	5.1	+0.9
Netherlands	20.4	18.8	1.3	8.0	9.3	+2.2
Switzerland	10.8	16.9	-5.2	2.5	-0.4	NA

Source: *OECD Economic Outlook*, June 1997, Annex Tables A8, A9, A10, A31.

Table 3

Gaps and Deficits, Percent of GDP, 1989-96

	1989	1990	1991	1992	1993	1994	1995	1996
Output Gap								
Leavers	3.9	3.3	1.1	-0.1	-2.7	-1.9	-1.3	-1.7
Stayers	0.9	2.0	1.3	0.5	-1.5	-0.6	-1.0	-1.2
Germany	0.0	2.1	2.7	2.7	-0.9	-0.6	-0.9	-1.4
Structural Budget Surplus								
Leavers	-5.4	-6.7	-6.4	-7.4	-7.1	-6.8	-5.6	-4.2
Stayers	-3.1	-3.4	-3.1	-4.0	-3.7	-4.1	-3.7	-2.5
Germany	0.1	-3.1	-4.3	-4.3	-3.0	-2.1	-3.1	-3.1
Current Account Surplus								
Leavers	-2.7	-2.7	-2.1	-2.3	-0.4	0.2	1.0	1.6
Stayers	0.6	0.2	0.4	0.9	1.8	1.7	1.9	2.1
Germany	4.8	3.3	-1.1	-1.0	-0.7	-1.0	-1.0	-0.6

Source: *OECD Economic Outlook*, June 1997, Annex Tables 11, 31, and 51, respectively.

Table 4

Pass-Through Regressions Explaining Change in Real Import Price, 1973:Q1 - 1996:Q4

	Sum of Coefficients and Significance of Sum				Long-run Response	
	Real Import Price Lags 1-4 (1)	Nominal Exchange Rate Lags 0-4 (2)	Real Oil Price Lags 0-4 (3)	R-bar Squared (4)	1973:Q1-1996:Q4 (5)	1991:Q1-1996:Q4 (6)
Leavers	0.36**	-0.38**	0.11**	0.74	-0.59	-0.81
Stayers	0.49	-0.30**	0.06**	0.79	-0.59	-0.65
Germany	0.51**	-0.22**	0.03**	0.65	-0.45	-0.65
Leavers:						
Finland	0.38	-0.20**	0.10**	0.60	-0.32	-0.49
Italy	0.22	-0.51**	0.15**	0.73	-0.65	-0.71
Spain	0.72**	-0.07	0.04**	0.83	-0.25	-0.39
Sweden	0.18**	-0.53**	0.12**	0.76	-0.65	-0.59
United Kingdom	0.06	-0.52**	0.15**	0.59	-0.55	-0.56
Stayers:						
Austria	0.11	-0.71*	0.07**	0.27	-0.80	-0.77
Belgium	0.74**	-0.10	0.01**	0.85	-0.38	-1.00
France	-0.03	-0.60**	0.22**	0.78	-0.58	-0.50
Netherlands	0.47**	-0.31**	0.04**	0.64	-0.58	-1.44
Switzerland	0.14	-0.64**	0.04**	0.55	-0.74	-0.74

Sources: See Data Appendix

Note: Significance values refer to an F test on the exclusion of the set of lagged variables; ** indicates significance at 1% level, and * at 5%.

Table 5

Regressions Explaining Change in GDP Deflator and Unit Labor Cost, 1963:Q1 - 1996:Q4

Equation Number in Text, dependent variable, type of feedback	Sum of Coefficients and Significance of Sum Long-run Response: Lagged Dependent Variable Lags 1-8 (1)	Change in Labor's Share Lags 1-4 (2)	Output Gap Lags 0-4 (3)	Change in Real Import Price Lags 1-4 (4)	Change in Real Oil Price Lags 1-4 (5)	S.E.E (6)
Leavers:						
(2) π, π	1.00**	---	0.31**	0.14**	-0.01	1.80
(7) π, π and w	1.01**	0.39**	0.08**	0.14**	-0.01	1.67
(4) w, w	0.98**	---	0.46**	0.10	0.01	2.88
(6) w, w and π	0.99**	-0.71**	0.74**	0.09	0.01	2.74
Stayers:						
(2) π, π	0.99**	---	0.15	0.08	-0.00	1.53
(7) π, π and w	0.94**	0.44**	0.00	0.08	-0.01	1.47
(4) w, w	0.97**	---	0.71**	0.11*	0.01	2.99
(6) w, w and π	1.09**	-0.99	0.76*	0.09	0.01	2.95

Sources: See Data Appendix

Note: Significance values refer to an F test on the exclusion of the set of lagged variables; ** indicates significance at 1% level, and * at 5%.

Table 6

Measures of Shifting Behavior after 1992

Equation Number in Text, dependent variable, type of feedback	Sample to 1996:Q4, Dummy Variable on 1993:Q1-96:Q4 (1)	Sample to 1991:Q2, Post-Sample Dynamic Simulations: Mean Error (2)	Sample to 1991:Q2, Post-Sample Dynamic Simulations: Root Mean-Squared Error (3)
Leavers:			
(2) π, π	0.09	0.37	0.81
(7) π, π and w	0.81	2.25	2.73
(4) w, w	0.71	4.04	4.30
(6) w, w and π	-0.71	1.39	2.66
Stayers:			
(2) π, π	-0.12	-0.01	0.57
(7) π, π and w	0.18	1.21	1.48
(4) w, w	1.02	2.40	3.21
(6) w, w and π	0.42	1.99	2.70

Sources: Regression equations as specified in Table 5.

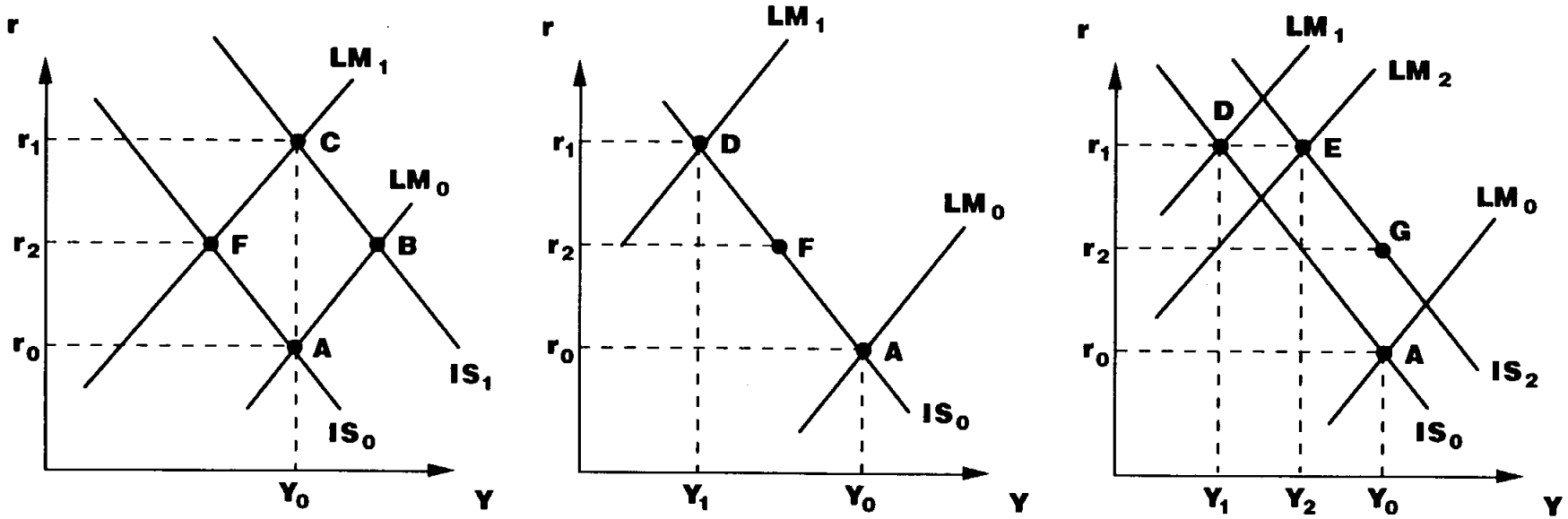
r
LM 1
r1
C
LM 0
r2
F
B
r0
A
IS1
IS0
Y0
Y
r
LM 1
r1
D
LM 0
r2
F
r0
A
IS0
Y1
Y0
Y
r
LM 1
LM 2
D
r1
E
LM 0
G
r2
r0
A
IS2
IS0
Y1
Y2
Y0
Y

Figure 1

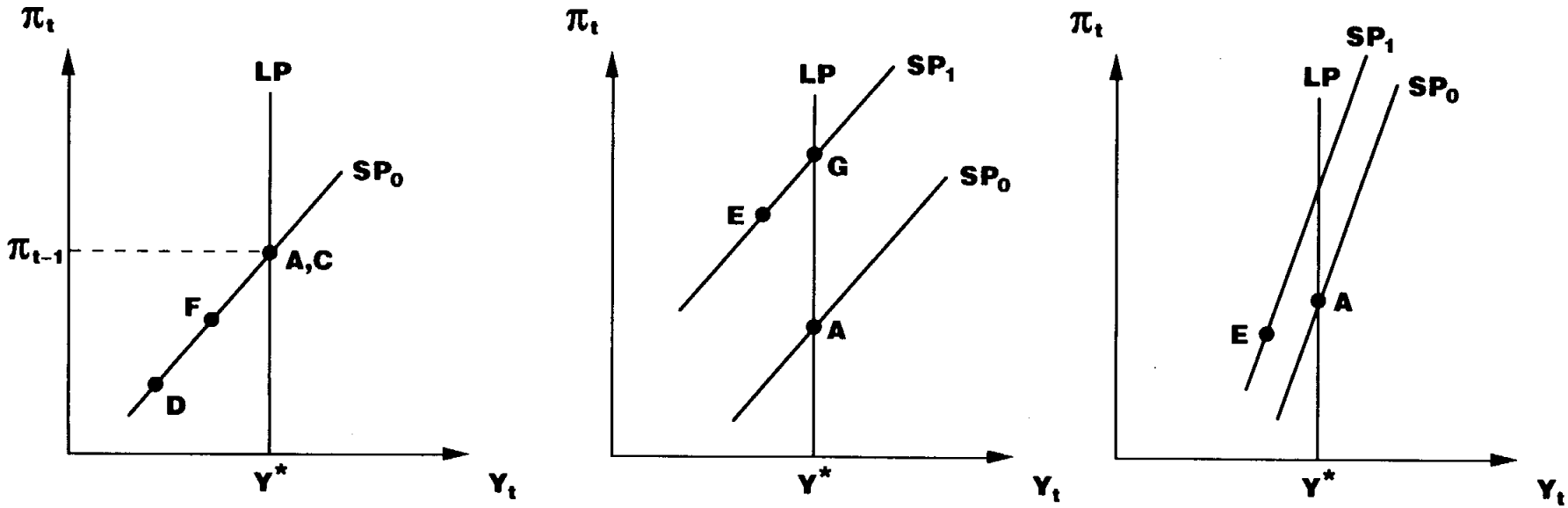
π_t
LP
SP_0
π_{t-1}
A,C
F
D
Y^*
Y_t
π_t
LP
SP_1
G
E
SP_0
A
Y^*
Y_t
π_t
SP_1
LP
SP_0
A
E
Y^*
Y_t

Figure 2

Figure 3

Nominal Effective Exchange Rate, 1991=100, 1987–96

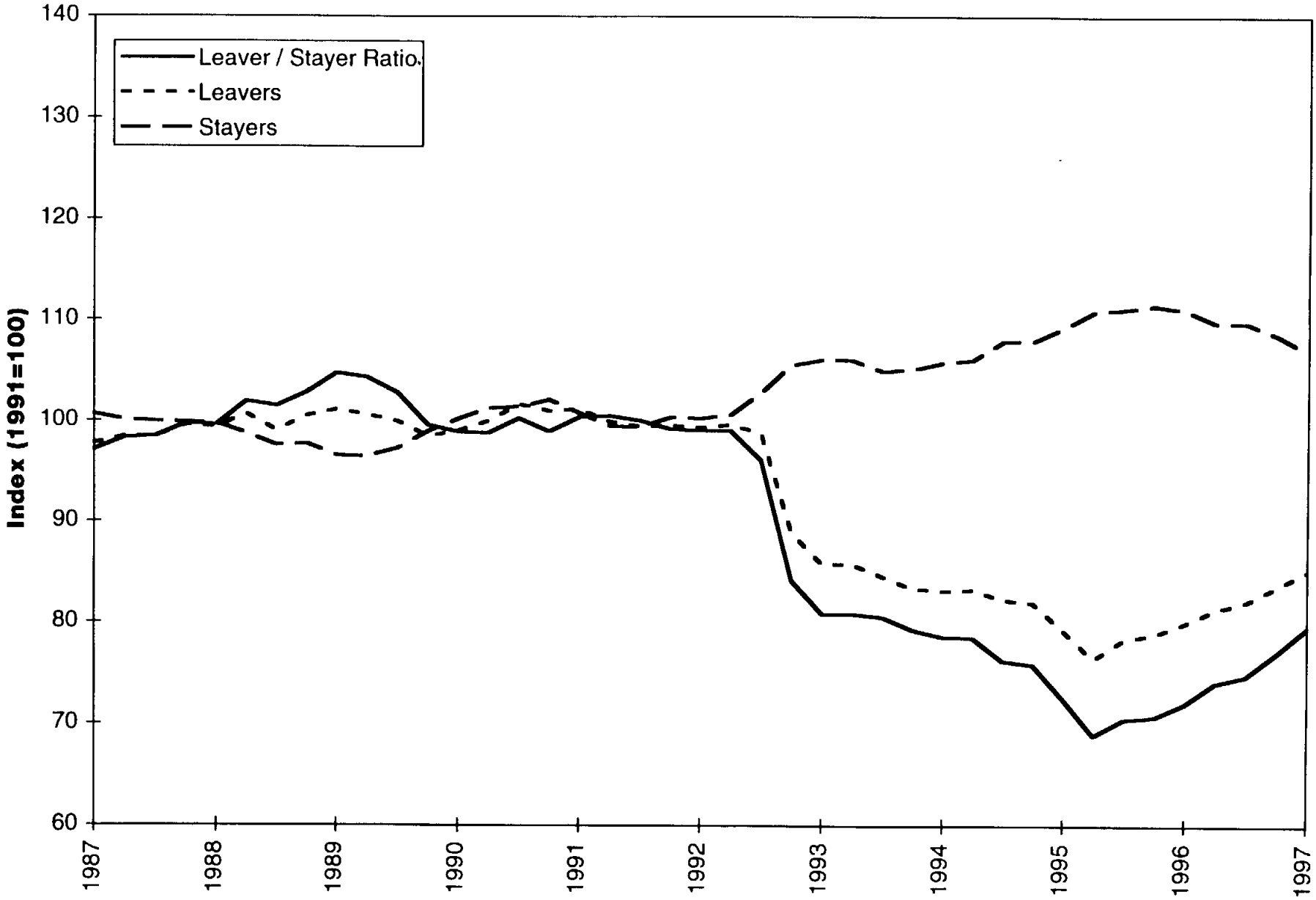

Figure 4

Real Effective Exchange Rate, 1991=100, 1987–96

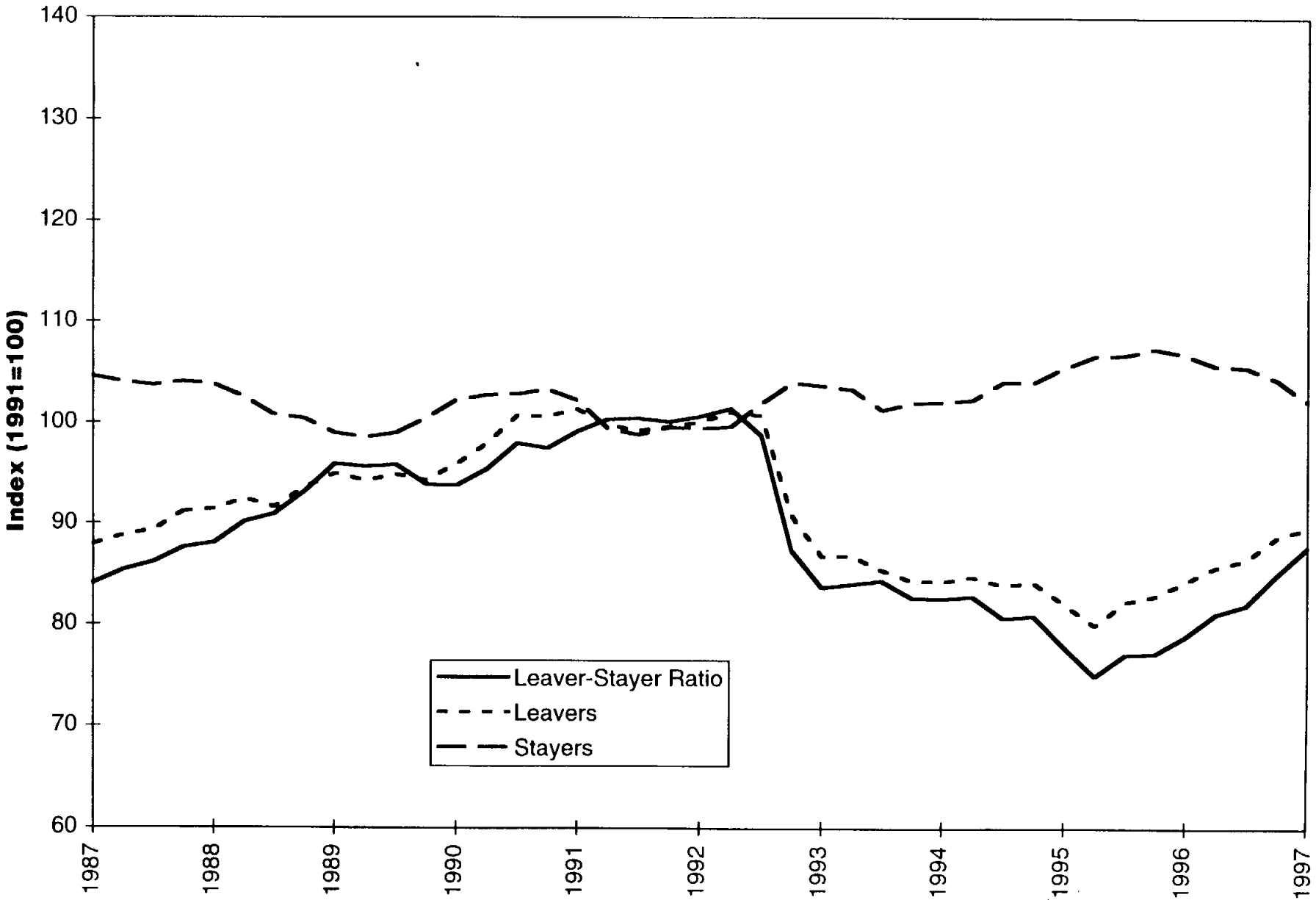

Figure 5

Nominal Import Price Deflator, 1991=100, 1987–96

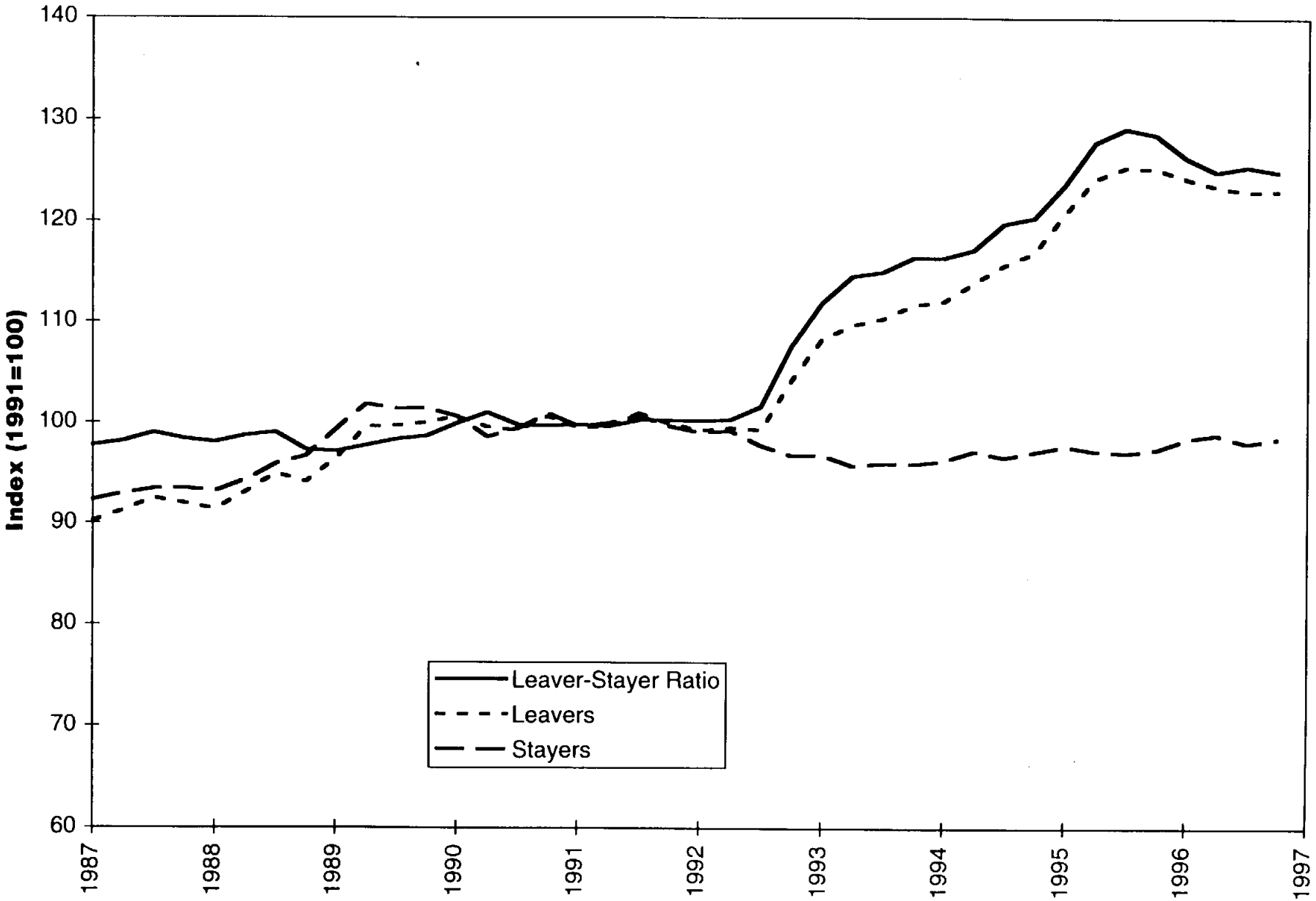

Figure 6

Real Import Price Deflator, 1991=100, 1987–96

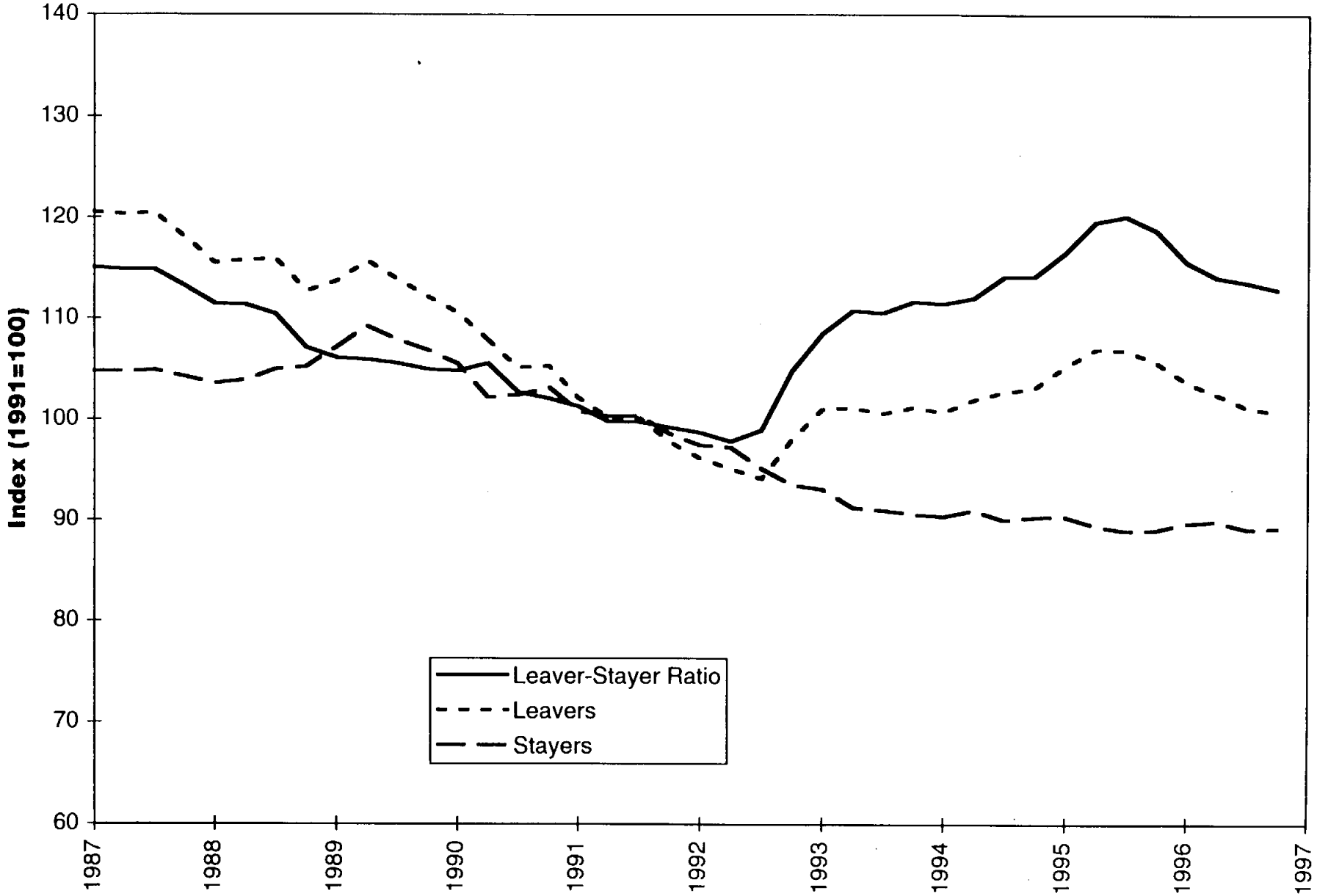

Figure 7
GDP Deflator, 1991=100, 1987–96

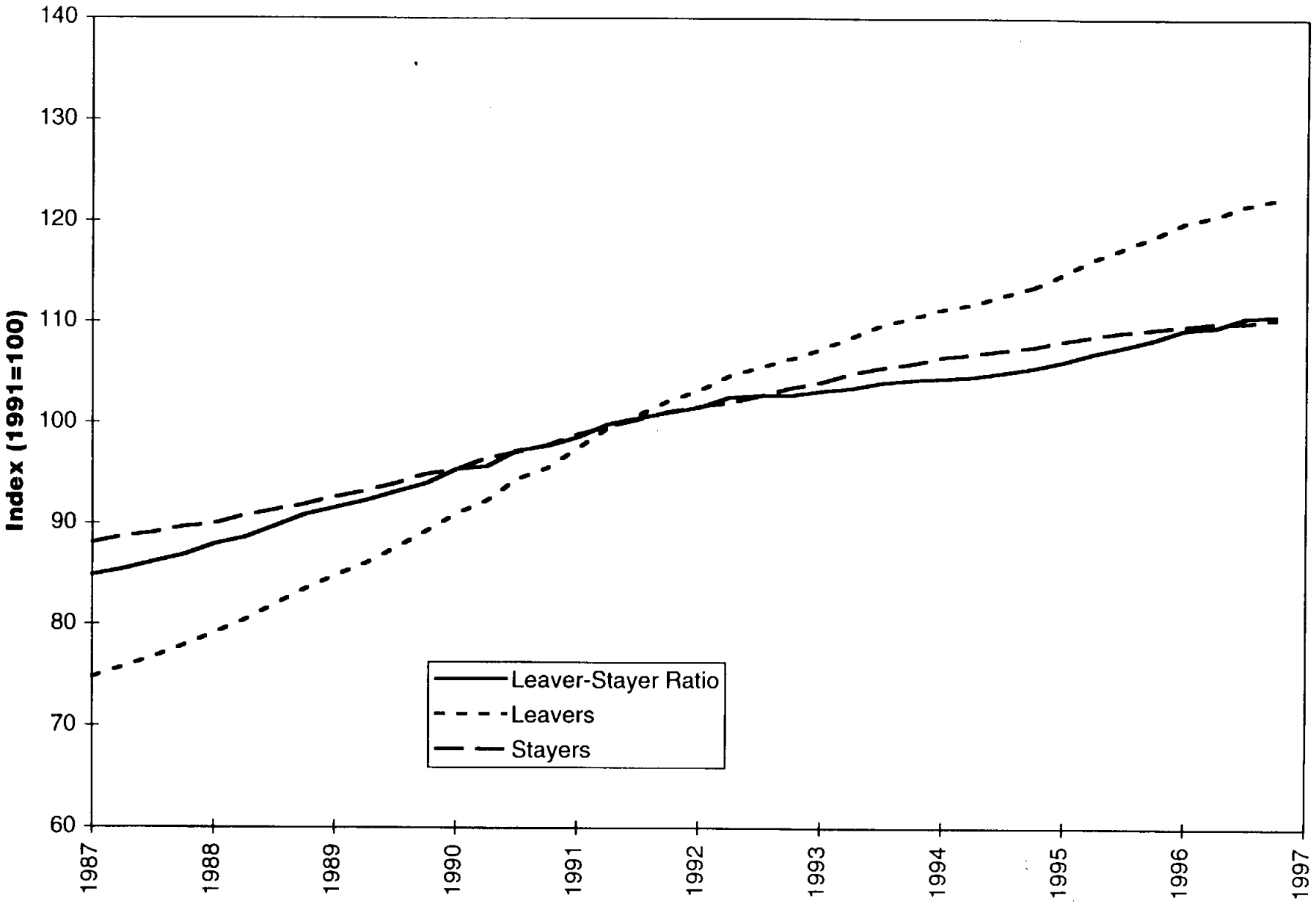

Figure 8

Unit Labor Cost in Local Currency, 1991=100, 1987-96

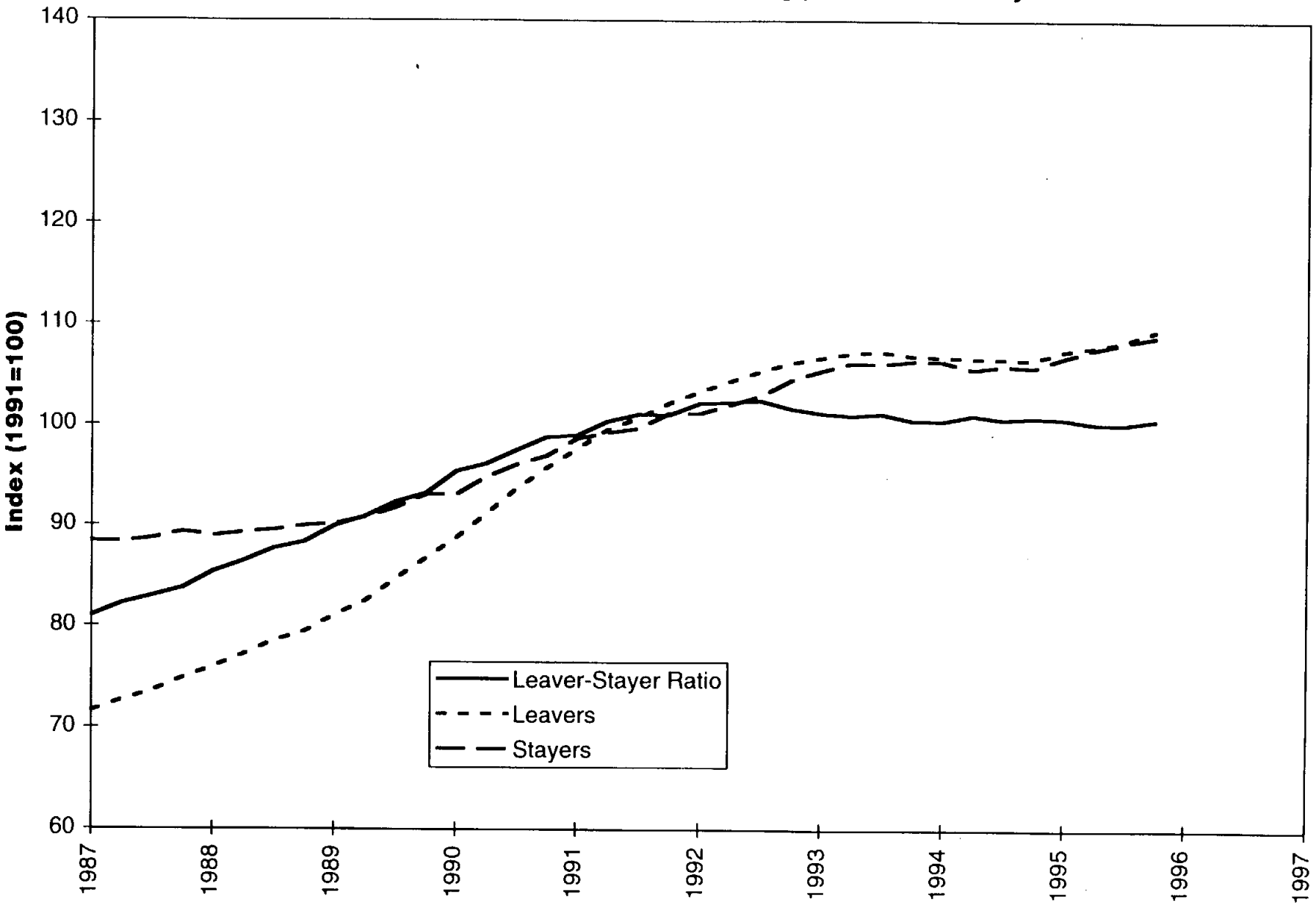

Figure 9
Real Unit Labor Cost, 1991=100, 1987–96

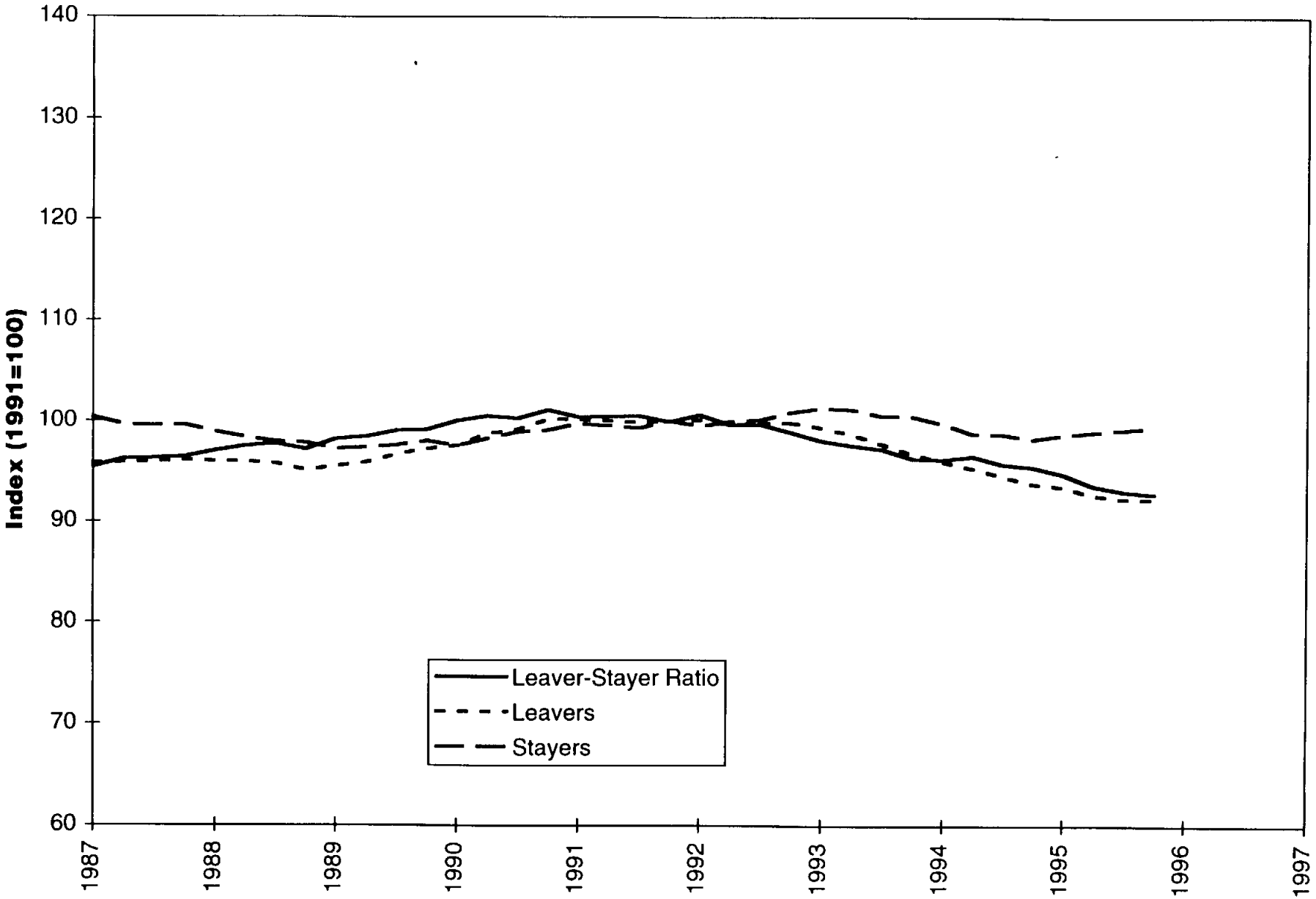

Figure 10
Nominal GDP, 1991=100, 1987–96

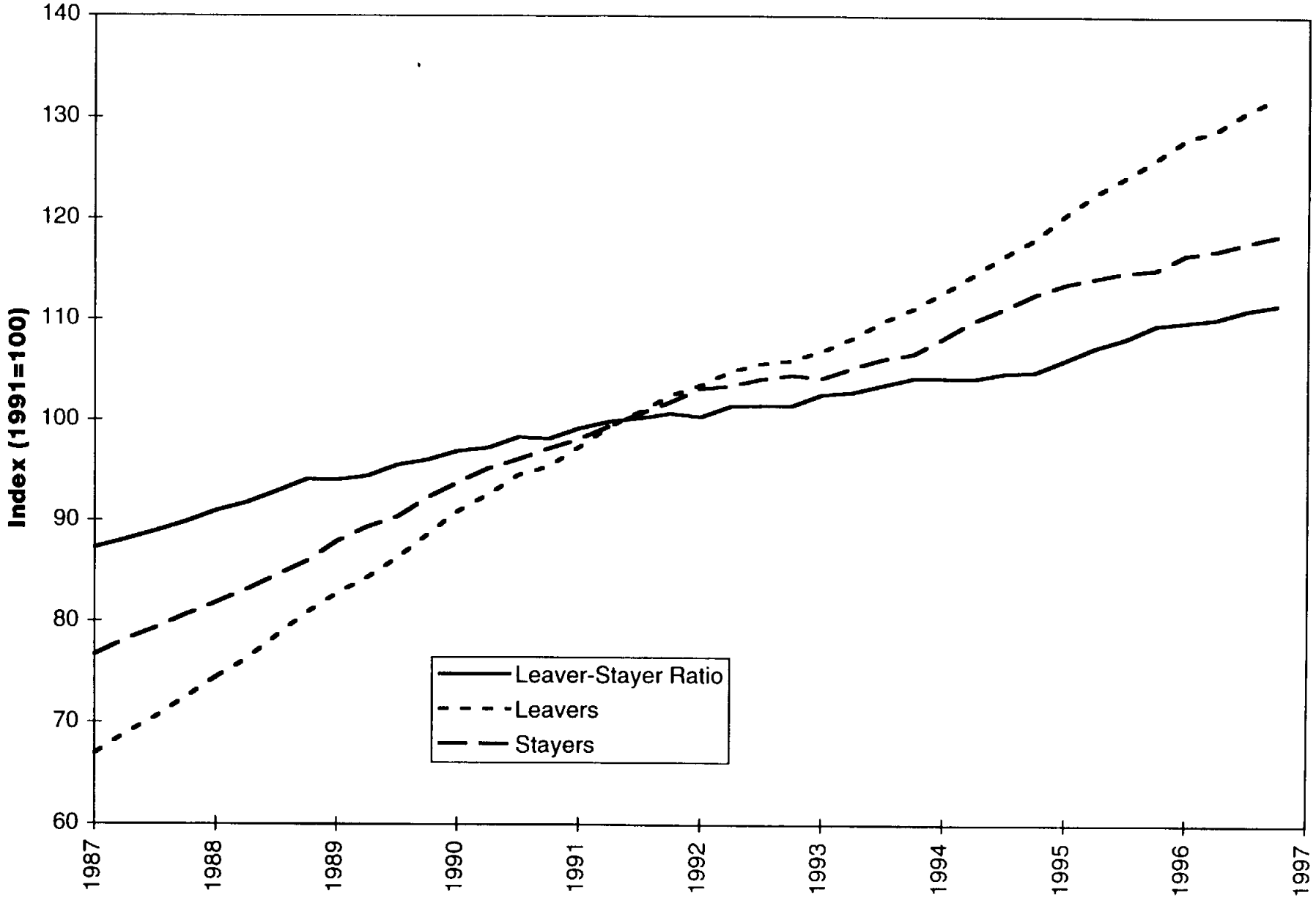

Figure 11
Real GDP, 1991=100, 1987–96

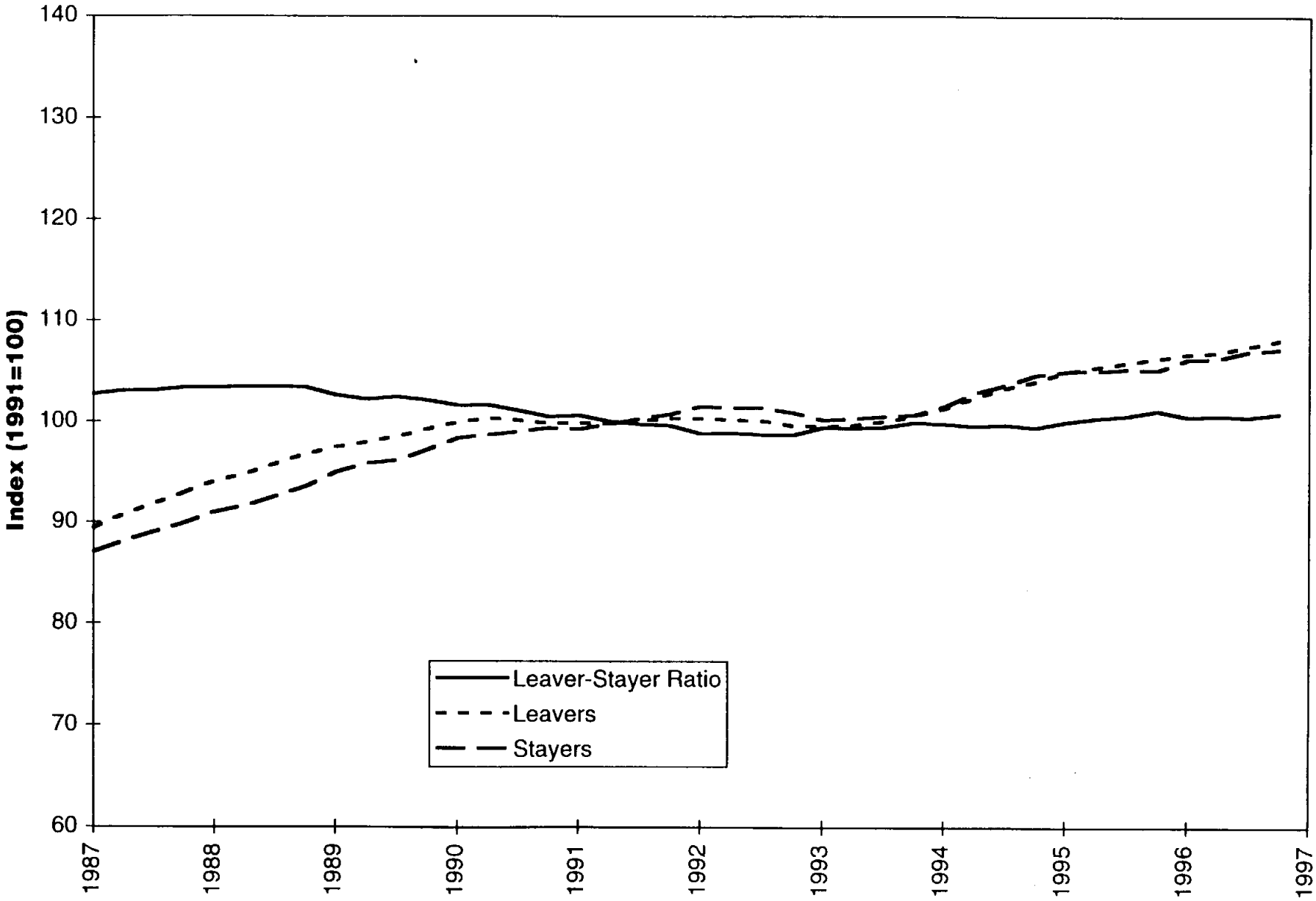

Figure 12
Unemployment Rate, 1991=100, 1987–96

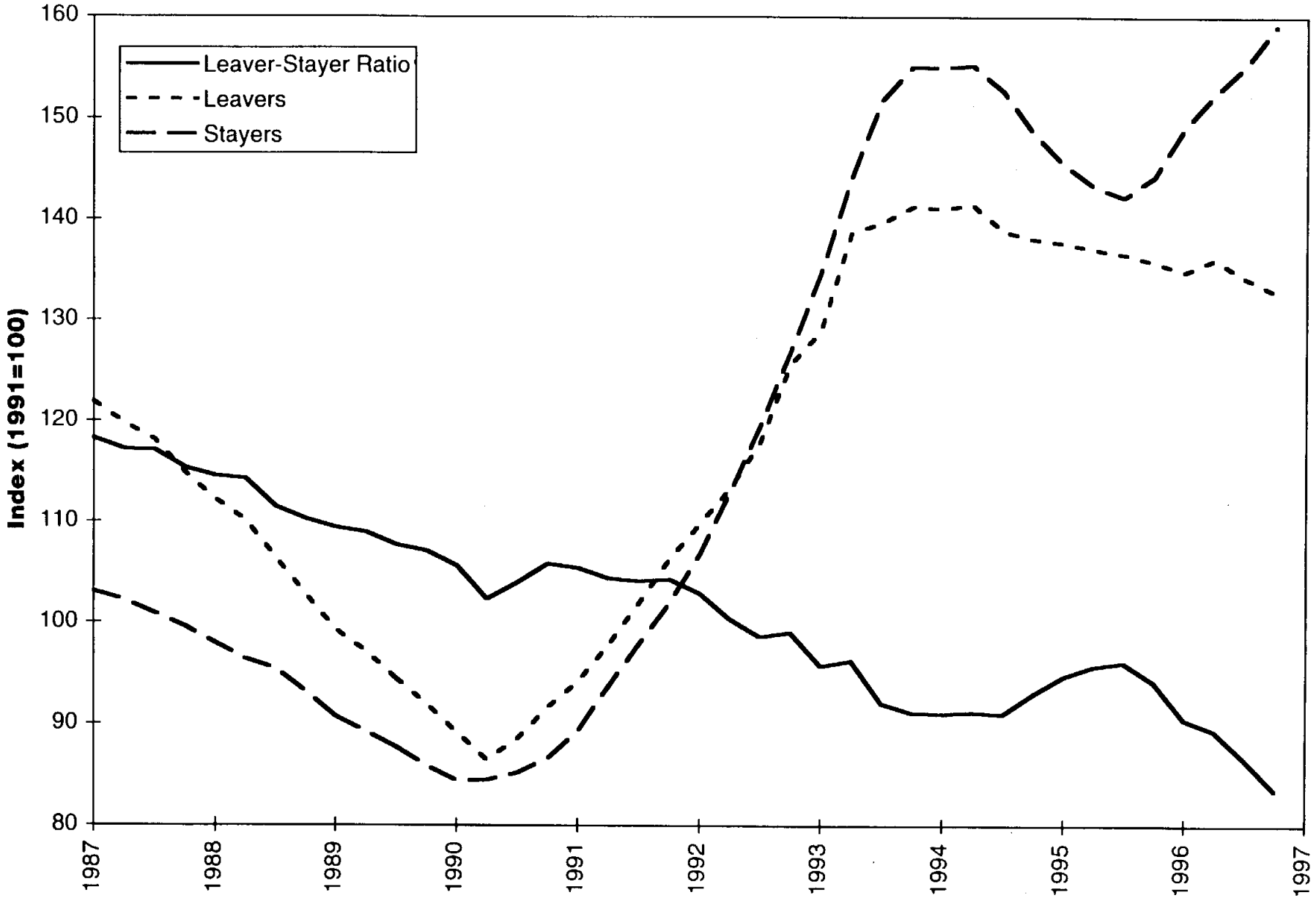

Figure 13
Dynamic Pass-Through Ratios, 1993:Q1–1996:Q4

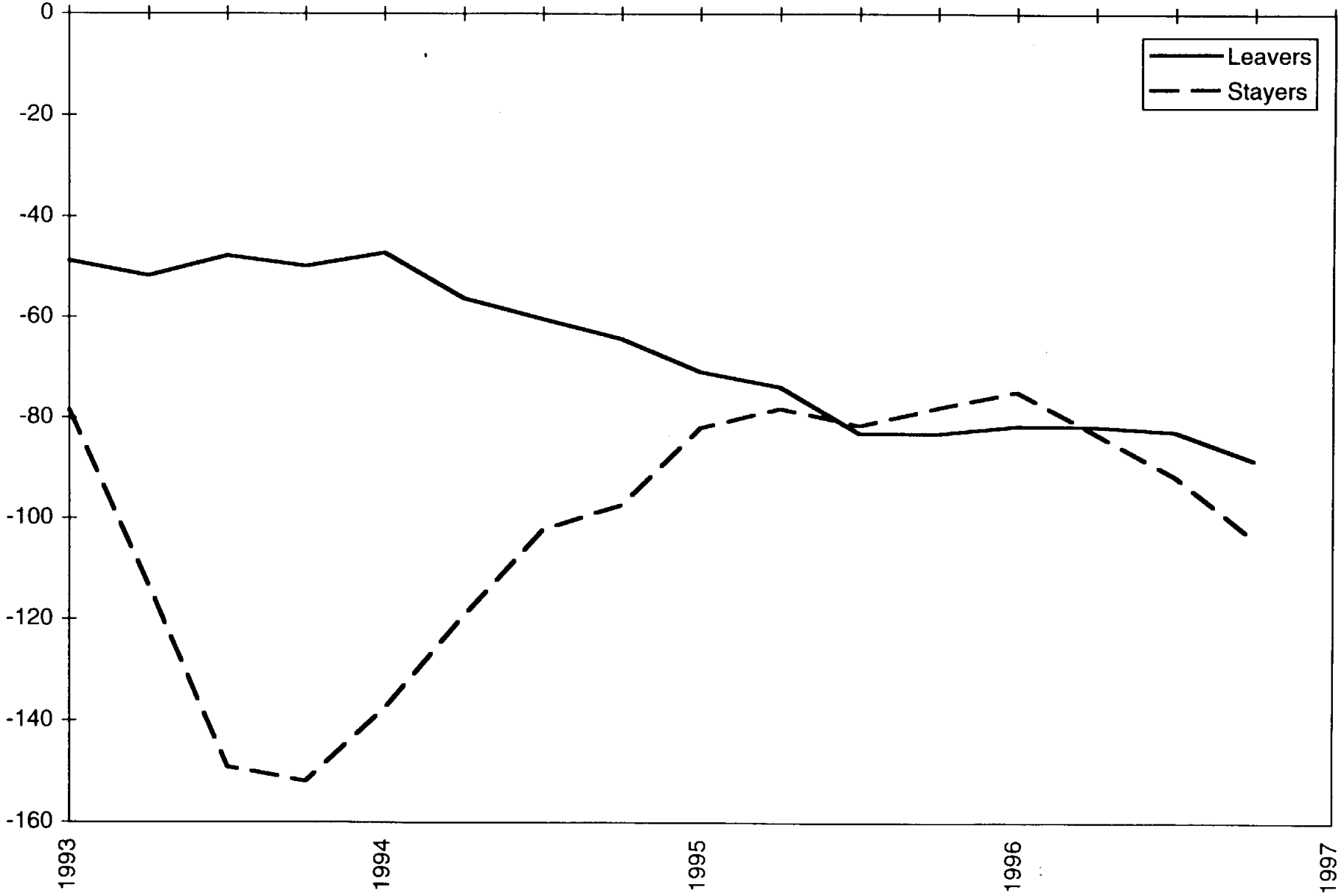

Figure 14
Dynamic Pass-Through Ratios, 1993:Q1–1996:Q4

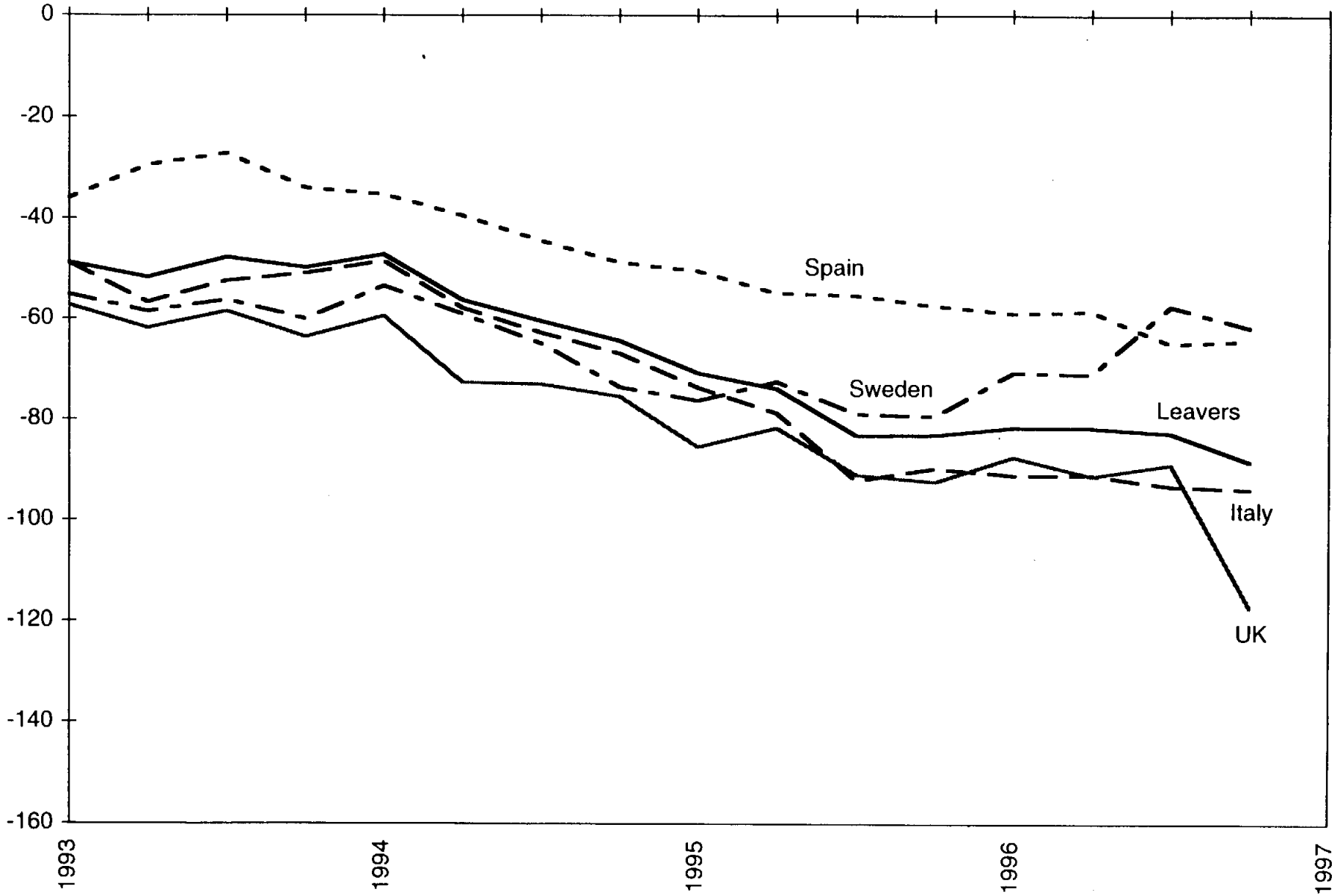

Figure 15
Ratio of Real to Nominal Depreciation, 1993:Q1–1996:Q4

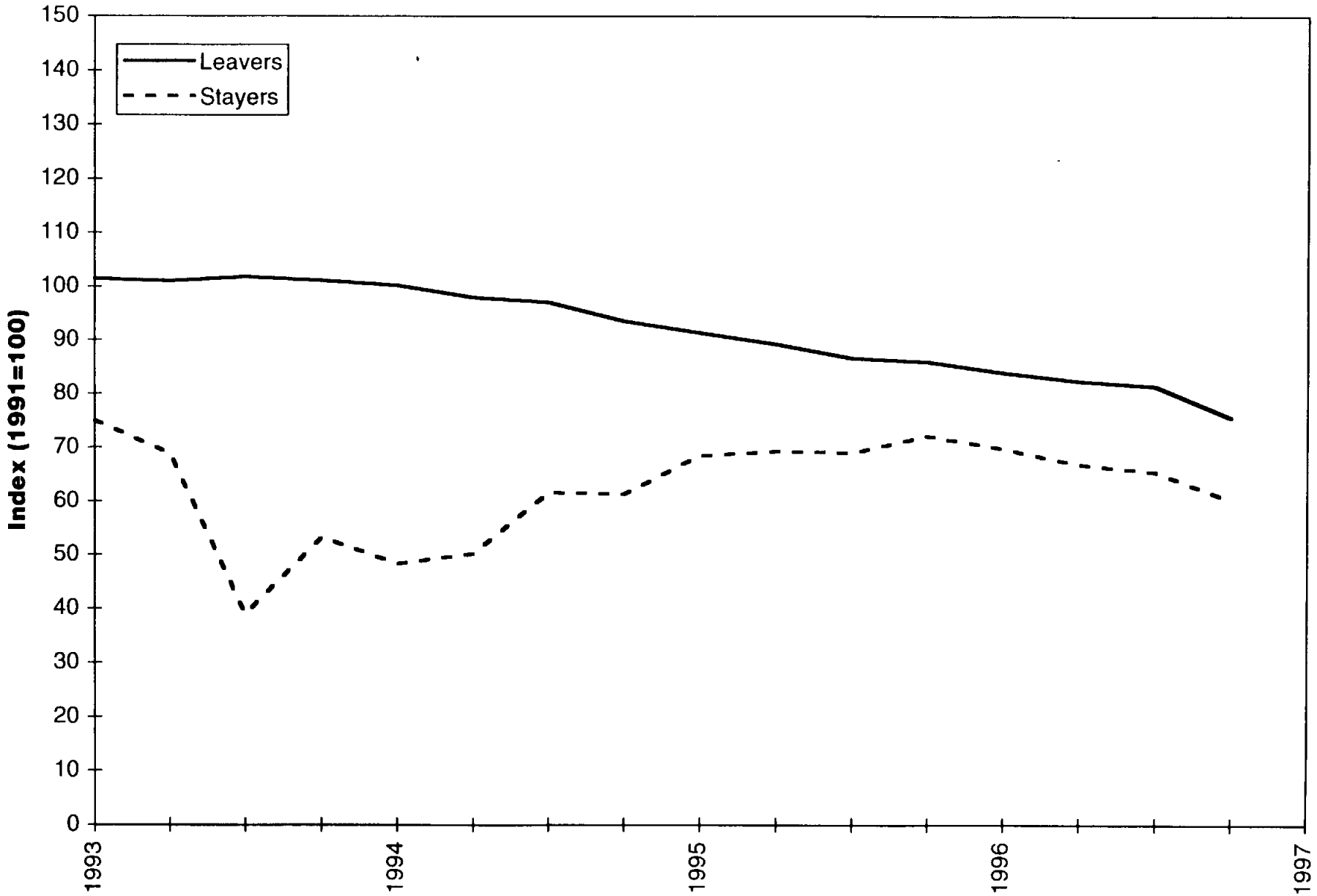

Figure 16
Ratio of Real to Nominal Depreciation, 1991:Q3–1996:Q4