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I am submitting herewith a dissertation written by John Terence Harvey entitled "An Empirical Examination of the Locomotive Process and an Interpretation of those Results in Terms of National Economic Priorities." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Economics.

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AN EMPIRICAL EXAMINATION OF THE LOCOMOTIVE PROCESS
AND AN INTERPRETATION OF THOSE RESULTS IN
TERMS OF NATIONAL ECONOMIC PRIORITIES

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ABSTRACT

The effect of United States imports from France, W. Germany, and the United Kingdom on their respective economies seems to have diminished in the 1980's. The purpose of this work is to discover the nature and extent of that change in the structure of the international economic environment. Using the cusum, cusum-squares, and Chow tests, the locomotive effect of U.S. imports was tested for its structural stability for the period 1970 to 1985 for France, W. Germany, and the United Kingdom.

The results indicated that there had indeed been a decline in the expansionary power of U.S. imports around 1980. For France, this is linked to their inability to devalue the franc (a common measure before the oil crises) and thus lower the leakages of their own imports during domestic expansions. West Germany's refusal to stimulate their economy seems the culprit for them, while for the United Kingdom, an increasing marginal propensity to import due to falling manufacturing competitiveness is deemed the cause. The work concludes on the note that only institutional change within France and the United Kingdom (the two "problem" countries) will lead them to economic success in our increasingly interdependent world.

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CHAPTER I

INTRODUCTION

Introduction

It is widely recognized that domestic economies are greatly affected by economic fluctuations abroad. This economic interdependence has been growing since World War Two. For instance, trade as a percentage of GNP in Organization for Economic Cooperation and Development (OECD) countries rose from nine percent in 1960-63 to nineteen percent in 1976-78 to twenty-two percent in 1980-85. Also, despite the adoption of fluctuating exchange rates, inflation is still transmitted across national boundaries (Davidson 1982); and, as was seen recently, interest rates (and the accompanying monetary policy) in one country can be of genuine concern to another. And there is no indication of a reversal in this trend as trade liberalization continues and organizations like the European Community endure. Within this framework, the United States has traditionally played a pivotal role. United States GNP is forty percent of the combined total of all industrial countries and the United States is the world's leading importing and exporting nation (Kreinin 1987). Consequently, economic fluctuations in the United States have historically been felt extensively throughout the globe. At the same time, however, since trade accounts for such a relatively small percentage of total United States economic activity (exports of goods and services were nine percent of GNP in 1985), external forces have little effect on its "closed" economy. Until recently, the European economies depended on

exports, as a percentage of their GDP, from eighteen percent, for Spain, to 69 percent, for Belgium, with France, West Germany, and the United Kingdom around thirty percent.

Given these statistics, one would expect, *ceteris paribus*, that expansions in the United States would raise United States imports from Europe and that the increased demand would then spur the European economies on to similar growth. This has been referred to as the "locomotive effect" (or, in the general case of the effect of any country's cyclical fluctuations on another country's income, the international transmission mechanism or income adjustment process), and it manifested itself with regularity from World War Two until 1980 (Chacholiades 1981). As indicated by the increasing differences in the growth rates of real GNP between the United States and her trading partners in Table 1.1, these manifestations seem to have diminished in strength in the 1980's. Chacholiades (1981) implies that United States imports still rise in response to an increase in United States economic activity, but those increased exports do not raise GNP/GDP in exporting nations as much as one might expect. If this is true, it is possible that any stimulative measure will result in a smaller impact than was the experience in the 1970's; clearly an occurrence of great import. Whether this is a temporary aberration or a harbinger of future changes is unclear.

For example, Hall (1985) contends that a liquidity crunch of sorts took place in at least France around 1980. This would have the effect of reducing business investment at any given level of exports, so that

Table 1.1. Comparison of Annual Growth Rates of Real Imports and Real GNP of the United States and her Major European Trading Partners, 1970-1985.

Year	FRANCE				UNITED KINGDOM				WEST GERMANY				UNITED STATES			
	GNP	Δ GNP ^{us*}	X ^{us} †	GNP	Δ GNP ^{us*}	X ^{us} †	GNP	Δ GNP ^{us*}	GNP	Δ GNP ^{us*}	X ^{us} †	GNP	GNP	X ^{us} †	GNP	M‡
1970	5.7	5.9	11.6	2.2	2.4	-0.5	5.0	5.2	5.0	-0.2	9.5	-0.2	3.9	9.5	-0.2	3.9
1971	5.4	2.0	9.3	2.6	-0.8	11.0	3.2	-0.2	3.2	3.4	14.4	3.4	4.1	14.4	3.4	4.1
1972	5.9	0.2	19.7	2.0	-3.7	10.2	4.1	-1.6	4.1	5.7	9.0	5.7	10.7	9.0	5.7	10.7
1973	5.4	-0.4	16.0	7.4	1.6	15.5	4.6	-0.8	4.6	5.8	25.3	5.8	6.5	25.3	5.8	6.5
1974	3.2	3.8	22.5	-1.1	-0.5	2.8	0.5	1.1	0.5	-0.6	8.7	-0.6	-1.2	8.7	-0.6	-1.2
1975	0.2	1.4	-16.9	-0.6	0.6	-13.9	-1.6	-0.4	-1.6	-1.2	-27.4	-1.2	-11.5	-27.4	-1.2	-11.5
1976	5.2	-0.2	17.6	3.6	-1.8	8.0	5.6	0.2	5.6	5.4	-3.8	5.4	18.6	-3.8	5.4	18.6
1977	3.0	-2.5	22.3	1.3	-4.2	15.6	2.8	0.2	2.8	5.5	38.0	5.5	7.3	38.0	5.5	7.3
1978	3.8	-1.2	21.9	3.7	-1.3	15.7	3.5	-1.5	3.5	5.0	19.6	5.0	12.9	19.6	5.0	12.9
1979	3.3	0.5	3.4	1.7	-1.1	18.1	4.0	1.2	4.0	2.8	3.4	2.8	6.9	3.4	2.8	6.9
1980	1.1	1.5	-6.5	-1.9	-1.5	15.1	1.8	2.2	1.8	-0.4	-5.3	-0.4	-0.4	-5.3	-0.4	-0.4
1981	0.3	-1.6	3.7	-2.0	-3.9	6.7	-0.2	-2.1	-0.2	1.9	-11.0	1.9	7.2	-11.0	1.9	7.2
1982	1.8	3.5	-11.5	1.5	3.2	-2.6	-1.1	0.6	-1.1	-4.5	-4.5	-1.7	0.2	-4.5	-1.7	0.2
1983	0.7	-2.9	5.9	3.7	0.1	-6.8	1.8	-1.8	1.8	3.6	6.1	3.6	9.7	6.1	3.6	9.7
1984	1.5	-4.9	40.4	2.1	-4.3	3.6	3.0	-3.4	3.0	6.4	23.0	6.4	23.2	23.0	6.4	23.2
1985	1.4	-1.3	1.3	3.7	1.0	6.3	2.5	-0.2	2.5	2.7	11.9	2.7	3.8	11.9	2.7	3.8
1970-1979T	1.8				1.8					1.5						
1980-1985T	2.6				2.3					1.7						

* This country's rate of GNP growth minus that of the United States.

† Real exports to the United States.

‡ Real imports (total).

T Average of the absolute value of Δ GNP^{us} over the period indicated.

Source: Compiled from IMF International Financial Statistics, various years.

this is a possible explanation. Furthermore, concurrent high United States interest rates, perhaps drawing off potential investment capital, would provide a basis for such a crunch. Was this the cause and was it limited to France? This research examines the locomotive process over the fifteen year period 1970 to 1985, testing the hypothesis that the effect of exports to the United States in each country examined is not as great in the 1980's as it was in the 1970's. The study will examine the relationship between United States cyclical fluctuations and the economies of France, West Germany, and the United Kingdom and will also examine the United States import demand function, testing both relationships for their structural stability¹ (the latter with an econometric test which identifies the periods of structural change rather than requiring the economist to conjecture). Furthermore, this study will attempt to put the changing structure of the locomotive process into both a historical and a world context, drawing from this an analysis of the evolving international conditions which have led to this development.

The examination of the changing role of the United States in this process is important from a number of standpoints. First, it has important policy implications for the maintenance of international economic stability. It is by now well established that since the

¹In econometrics, the existence of "structural change" implies that the relationship between a given dependent variable and one or more (or all) of the respective independent variables is significantly different in two populations (in the present case, in two different time periods). This significant difference can take the form of a change in the regression parameters or a change in the variance of the error terms.

institution of a flexible exchange rate system in 1973, this new regime has not performed as expected. Since then we have not experienced the smoothly adjusting exchange rates, the elimination of surpluses and deficits, and the macroeconomic autarky predicted by the prevailing theory (McCulloch 1983). As is clear from Table 1.2, there has been great variability in rates. And since these post-1973 variations were not the theoretically predicted response to balance of payments imbalances, but the effect of intense speculative activity [McCulloch (1983) attributes this to "too much daily economic 'news'"], governments still find it necessary to intervene in order to offset balance of payments deficits and surpluses. Consequently, there has also been no reduction in official intervention or the demand for official reserves. What then, if not the exchange rate regime, is the key to international stability? Several recent articles have pointed to stable and coordinated macro-policies.² If the nations of the world are to synchronize their policies they must understand how they will affect each other and how those effects might change over time. The proposed study's focus on the interrelationships between macroeconomies may provide insights important in guiding policy makers in their efforts to maintain a calm international economic environment.

In addition to policy recommendations, a unique historical viewpoint will be provided. This research encompasses a period in

²Those articles include R. McCulloch (1983), R. M. Dunn, Jr. (1983), M. Goldstein (1984), J. H. Makin (1986), and Stephen A. Meyer (1986).

Table 1.2. Exchange Rate Variance under
Pegged and Floating Exchange
Rates.

	1968	1969	1975	1982
Deutschmark	0.3	1.2	1.7	1.6
French Franc	0.1	2.3	1.6	2.2
Japanese Yen	n.a.	n.a.	0.7	2.5
Pound Sterling	0.7	0.2	1.0	1.1

Source: Thirlwall, A.P. Balance-of-Payments Theory and the United Kingdom Experience. Macmillan Press, London (1986).

economic history when established techniques of applying economic theory to empirical research and policy, especially in macroeconomics, seemed to lose considerable explanatory power. The 1970's were witness to a large measure of intractability in the world economy. Sylvia Ostry, head of the OECD's Economics and Statistics Department, summarized the events as follows:

Signs of social and political tension became evident in the late 1960's associated with the Vietnam conflict, the emergence of the postwar student generation and the ratcheting up of inflationary pressure. The earlier 1970's were dominated by such events as the collapse of the fixed exchange rate system, the unparalleled peacetime commodity and food price boom and the outbreak of the oil crisis. The deflationary demand and policy response to these events culminated in the unprecedented experience of 'slumpflation' in 1974-75 from which recovery has been hesitant and rather uneven as between countries. When the upswing finally began to show some self-sustainable features, a second 'oil shock' hit the oil importing countries in 1979, probably submitting the world to a renewed period of stagflation (Ostry 1980, p.13).

Certainly the 1970's seem to have been a watershed in post World War Two economic experience (Table 1.3 gives one a feeling of the severity of the oil hikes, and Tables A.1 and A.2 in the appendix provide further evidence of the detrimental effects). How these events affected the international transmission mechanism is of great interest.

Third, as well as its contributions to economic history and policy, this research will contribute to the discussion over the ability of economics to explain and/or predict events. Our real world differs greatly from the static equilibrium of neoclassical economics; an economic postulate which is valid today may lose its truth as people and institutions change over time. This implies that economics can explain

Table 1.3. Crude Oil Prices 1970-1984*

year	price	year	price
1970	1.80	1978	12.7
1971	2.18	1979†	17.5
1972	2.48	1979‡	40.00
1973†	2.59	1980	36.00
1973‡	5.04	1981	37.00
1974	11.65	1982	34.00
1975	11.25	1983	29.00
1976	11.50	1984	29.00
1977	12.00		

* US\$ per barrel (current prices).

† Beginning of year.

‡ End of year.

Source: Jenkins, Gilbert. Oil Economists Handbook. Elsevier Applied Science Publishers Ltd., London (1986).

events, but that its ability to forecast is limited; or, as Franco Modigliani (1978) said,

...I believe (that) the real problem is that the world we capture is extremely hard to tame, to cure from inflationary shocks...So the crisis is right there in the structure of the world, not in our ability to capture that structure (Modigliani 1978).

The ability of the econometric model in the proposed research to explain behavior from 1970 to 1985 may help shed some light on the manner in which these changes take place, perhaps suggesting the role for prognosis in economics.

Finally, examination of the relationships involved in the international transmission mechanism provides the opportunity to check the results of several previous works. R. T. Greene and J. M. Lutz (1978) maintain that the "tenure of the United States as a world economic power may be one of the shortest in history" (from the end of World War Two to the 1970's). They contend that international attempts at economic and political unification, more evenly distributed world income, and the tremendous postwar growth of the other industrialized countries have all led to the fall in United States economic supremacy. If this is so, econometric testing of the period 1970 to 1985 may reflect this decline in the United States' ability to affect the national economies in question. Also, a number of papers have been written to determine the stability or instability of the import demand function for the United States. As the import demand function is a part of the locomotive process, its estimation is included in this study. Since those works dealing with it previously are covered in the following section, suffice it to say that controversy remains regarding this subject and that more research is required.

Review of Related Literature

The original concept of the income adjustment process was an offshoot of John Maynard Keynes' General Theory of Employment, Interest and Money (1936), although Keynes himself was not responsible for it. One of the ground-breaking works was Fritz Machlup's International Trade and the National Income Multiplier (1943). Machlup presents a Keynesian model of the macroeconomy with net exports appearing as a component of aggregate demand. An outgrowth of Machlup's 1939 article in the Quarterly Journal of Economics, it develops a simple model rather thoroughly. Since then, almost every international economics text has included a section on the international transmission mechanism, a few singling out the locomotive effect for closer study. Later important works included Metzler (1950) and Robinson (1952), the former examining the effects of income fluctuations in one country on an n-country world, and the latter adding a graphical exposition to the theory. Subsequently, it appears that the theory has been accepted as, for the most part, complete, for works now concentrate (as do those concerned with the OECD's LINK Model) on forecasting the effects of national policy overseas rather than on empirical testing of recent incidents or on theoretical work.

While a number of international linkage-type models exist, only the LINK Model will be discussed at any length here both because it is regarded by most as state-of-the-art and because, for our purposes, it

tends to be representative of the models in existence.³ The LINK Model has figured prominently in the literature since its inception in 1968. It is composed of a number of macroeconometric models (each designed in the country in question so as to preserve the individual idiosyncrasies) connected by a "world trade matrix". Thus linked, the models can be manipulated to show the effects of various policy measures or other exogenous influences. Interestingly, the LINK econometricians do re-estimate their equations periodically; however, as this re-estimation takes place in response to new data set availability and the submission of new national models, it appears that the object of these manipulations is not to capture the effects of any structural change that has taken place, but instead simply to increase the efficiency of the model in estimating the parameters of the already accepted relationships (Klein, Pauly, and Voisin 1982).

While little else exists on the international transmission mechanism per se, there are those works (to which a reference was made in the introduction) which deal specifically with parts of the process. The income adjustment process can be divided into two parts, the first of which is the import demand function of the nation (in our case, the United States) whose economy is the source of the original fluctuation, and the second of which uses the locomotive process to show how the increased imports of the above nation can raise the income of its trading partners. But some investigators conclude that the import

³See B. Hickman (1983) for an especially thorough and insightful listing of those other models.

demand function may be unstable. James Joy and J. D. Stolen (1975) suggest that a significant shift in the import demand function in the United States took place between the 1950's and 1960's, based primarily on a large change in income elasticity of imports. They postulated that the change took place around 1962 (based on scatter diagrams) and then tested their hypothesis.⁴

A more recent work is R. M. Stern, C. F. Baum, and M. N. Greene (1979). This work also finds evidence of structural change in the United States import demand function, but locates the change around 1972 instead of the mid-1960's as suggested by Joy and Stolen. Stern, Baum, and Greene, do not conjecture as to the point of change, but use the cumulative sum (cusum) and the cumulative sum of squares (cusum-squares) techniques (to be used in this research) to show the critical period(s). P. A. Volker (1982), however, attributes their results of structural change to "a disproportionately large error in 1975 that is responsible for about 25% of the total value of the cusum-of-squares statistic" (Volker 1982, p.1295). So while Volker concedes that econometricians should be discouraged from assuming stability in time series equations, he is unconvinced that any instability is present in the United States import demand function in the 1960's and 1970's. In an attempt to improve the results of Stern, Baum, and Greene (1979) and to resolve their conflict with Volker (1982), T. A. Deyak, W. C. Sawyer, and R. L.

⁴Note that the technique Joy and Stolen (1975) employed requires the researcher to conjecture, while the one to be used in this study will itself demonstrate where the structural change has taken place.

Sprinkle (unpublished) reexamine United States imports in the same period, using the cusum and cusum-squares tests and disaggregated (by goods) import demand functions. Their preliminary findings give evidence for instability in three of the six disaggregated import demand functions.

So while a good deal of literature exists describing and testing the characteristics of parts of the international transmission mechanism, recent work dealing specifically with the process does not appear to exist.

Organization of Remaining Chapters

The next chapter sets up the macro model, adopted from Barro and Grossman (1976), and Chapter III will transform that model into econometrically useful forms and detail the estimation and testing techniques. Chapter IV reports the econometric results in a rather straightforward manner, leaving the bulk of the interpretation of those results (and their reconciliation with the qualitative data) to Chapter V. Finally, Chapter VI evaluates this research project in terms of its initial goals and the contribution it has made.

CHAPTER II

THEORETICAL MODEL

The choice of model for any study is extremely important. The relationships defined therein will dictate the structure of the econometric equations used to test the hypotheses put forward in the paper. Any errors committed in the development of the theoretical model will only be compounded once they take the form of misspecified regressions. With this in mind the pertinent theoretical relationships will be developed in some detail.

The study will examine the expansionary effect of United States imports on the macroeconomies of three of the United States' major trading partners during the period 1970 to 1985: France, West Germany, and the United Kingdom. The framework for each macroeconomy will be a non-market clearing model, meaning that, if demand is deficient, the economy is forced to operate with excess supply of labor and capital (i.e., involuntarily unemployed labor and capital).⁵ Within such a system, the effective demand for labor by firms is a function of the amount of output that can be sold, y , rather than a function of the real wage, W/P . In this model W/P is consistent with full employment, but it is assumed that the money wage rate, W , and the price level, P , do not adjust sufficiently to clear the labor and goods markets in the event of a change in demand. In such a system, the real wage rate is constant

⁵This open-economy model is adopted from the closed one outlined by Barro and Grossman (1976).

over the business cycle. Assuming that profit maximization is the objective function of the firm⁶, in a non-market clearing model the demand for labor by firms is not a function of the real wage, but is constrained by the amount of output that firms can sell. Before specifying the first equation, an explanation regarding notation would be appropriate. In equations (1) through (9), lower case letters denote flow variables, upper case letters stocks, the superscript "d" demand, the superscript "s" supply, a "prime" the effective rate (the rate that exists due to the sales constraint), and (+) and (-) indicate the sign of the derivative of the dependent variable with respect to that argument. Variables without superscripts denote the actual flows exchanged or stocks held. Thus, effective labor demand ($\ell^{d'}$) is given by

$$(1) \quad \ell^{d'} = \ell^{d'}(y, K),$$

(+)(-)

where K is the stock of capital in the economy and y is the flow of current output as constrained by effective demand. The concept of non-market clearing implies that, at given prices and nominal wages, firms would be willing to supply more output and households would be willing to supply more labor than can actually be sold in the respective markets.

⁶Such an assumption yields:

$$\max \pi = y - (W/P)\ell^{d'}.$$

The existence of insufficient demand to clear markets at the full employment level also constrains investment by firms. If no constraints existed, and if for the moment it is assumed for simplicity that given

$$(2) \quad y = \phi(\ell, k),$$

that $\phi_{\ell k} = 0$, we would approach our specification of investment by first defining the optimal stock of capital (using K^* for that optimal stock of capital under market clearing conditions) as

$$(3) \quad K^* = K^*(r),$$

(-)

where r = the real interest rate. But if $y < y^S$ (and relaxing the assumption that $\phi_{\ell k} = 0$), the optimal K will be K'

where

$$(4) \quad K' = K'[y, r/(W/P)].$$

(+) (-)

Satisfaction of this equation requires that at the most efficient combination of capital, K' , and labor, $\ell^{d'}$ [equation (1)], the ratio of the marginal product of capital to the marginal product of labor must be equal to the ratio of the rate of return to the real wage $[r/(W/P)]$.

Effective investment demand, k' , will thus be

$$(5) \quad k^{d'} = v'_k(K' - K) = k^{d'}(y, r, W/P, K)$$

(+)(-)(+)(-)

where v' is positive and K is the existing stock of capital. So $k^{d'}$ is related to the target K' by a simple linear adjustment mechanism.

A second component of demand for domestic output is consumption demand (also constrained). As actual employment, ℓ , is given by $\ell^{d'}$, the present value of the household's lifetime resources is given by

$$(6) \quad \Omega' = \Omega + (W/P)\ell \int_0^{\hat{N}} e^{-rt} dt + (W/P) \int_{\hat{N}}^{N'} \ell^{s'}(t) e^{-rt} dt,$$

where the first term on the right-hand side of the equality, Ω , is the present value of assets (and therefore the present value of nonwage lifetime income), the second expression is the present value of real labor income earned during a period of constraint (i.e., a period of insufficient demand), the third expression is the present value of the real labor income during the unconstrained years, $\hat{N}$ is the number of years the household is constrained, and N' is the retirement date for the representative household. The absence of a superscript for ℓ in the period 0 to $\hat{N}$ indicates that ℓ is exogenous to the household during the constrained period. The presence of the s' superscript for the amount of labor supplied during the period $\hat{N}$ to N' indicates that ℓ again becomes a choice variable once the constraint is removed.

Now if Ω'' is the household's lifetime resources, lifetime consumption is limited by Ω' . In particular, if the household leaves a zero bequest, lifetime consumption is given by

$$(7) \quad \int_0^{N'} c^{d'}(t) e^{-rt} dt = \Omega_0 + (W/P)\ell \int_0^{\hat{N}} e^{-rt} dt + (W/P) \int_{\hat{N}}^{N'} \ell^{s'}(t) e^{-rt} dt,$$

where N is the number of years in the household's time horizon. Thus, effective consumption is constrained by ℓ , the number of hours the household is able to work during the period of constraint. If the household's resource parameter is defined as

$$(8) \quad \Omega' = \Omega + (W/P)\ell \int_0^{\hat{N}} e^{-rt} dt,$$

one has

$$(9) \quad c^{d'} = c^{d'}(\Omega', W/P, r) \\ (+) \quad (+) \quad (-)$$

where $c^{d'}$ depends, through Ω' , on the actual level of employment, ℓ , during the constrained years.

The third component of demand for domestic output is net exports.

Net exports, x , are a function of output in the rest of the world (y^{rw}) and the exchange rate for foreign currency (EXC):

$$(10) \quad x^{d'} = x^{d'}(\text{EXC}, y^{rw}, y).$$

(-) (+) (-)

As the sign of $\partial x^{d'} / \partial y^{rw}$ is positive, the transmission mechanism is positive with a magnitude measured by the size of the partial derivative. In the specific case of the $x^{d'}$ function for a country which exports to the United States, the locomotive effect is the partial derivative given by $\partial x^{d'} / \partial y^{us}$, where y^{us} is United States income. Domestic real income of the country is given by y . The partial derivative $\partial x^{d'} / \partial y$ is expected to be negative because, as y rises, imports from other countries are stimulated. EXC would represent the exchange rate for foreign currency in terms of dollars or some related measure. The partial derivative $\partial x^{d'} / \partial \text{EXC}$ is expected to be negative because as the price of domestic currency in terms of the currency of other countries rises, exports are reduced and imports stimulated.

Finally, government expenditures (g) must be included as a component of the demand for domestic output. This variable is considered exogenous, as are taxes (another government policy instrument), whose effects are felt through Ω' where taxes are a negative influence on Ω' and thus on $c^{d'}$.

One can now summarize by saying that output and employment in the domestic economy are determined by effective demand in the goods and labor markets [described below in equations (11) and (12)]:

$$(11) \quad y^s > y = k^{d'}(y, r, W/P, K) + c^{d'}(\Omega', W/P, r) + x^{d'}(y, y^{rw}, EXC) + g^d$$

$(+)(-)(+)(-)$ $(+)$ $(+)(-)$ $(-)(+)(-)(+)$

$$(12) \quad \ell^s > \ell = \ell^{d'}(y, K) .$$

$(+)(-)$

With the structural equations for the goods and labor markets complete, one can trace the effects of a rise in the level of exports to the United States from France, West Germany, or the United Kingdom. Of course, the initial effect of the locomotive process is a rise in $x^{d'}$ in equation (11). This will yield a higher level of y which, as is clear in equation (12), raises ℓ . As ℓ is a component of Ω' [equation (6)], this too will rise, inducing a rise in $c^{d'}$. This rise in $c^{d'}$ further raises y . Again, the rise in y will raise ℓ , and so on. So equation (12) provides the linkages necessary for the multiplier effect in our macro model.

CHAPTER III

METHODS

Regression Equations

Equations (11) and (12) must be transformed in order to be useful for econometric testing. Since equation (12) is used only in the model section to show the route of the multiplier, and furthermore since the effects of the multiplier are already inherent in the data, it is not of concern to us. Equation (11), on the other hand, contains the vital link between United States income and income in the country in question. However, the locomotive process cannot be reduced to a single equation nor its effects traced to a single variable. Consequently, the process must be divided into two stages and two separate tests for stability must be conducted. If instability results in either stage, then instability can be inferred for the process as a whole.

Import Demand Function

As mentioned previously, the first component is simply an import demand function, linking changes in United States income and the exchange rate to changes in United States demand for foreign goods and services. Chapter I gives some impression of the controversy surrounding this relationship, and this study will endeavor to provide a new perspective. The import demand function used in this paper is derived from Houthakker and Magee (1969) and Thursby and Thursby (1984):

$$(13) M_t = X_t^{us} = \alpha_0 + \alpha_1 EXC_{t-i} + \alpha_2 y_{t-i}^{us} + u_t,$$

where M_t is real United States imports in period t (and X_t^{us} is real exports to the United States from the country in question in period t),

EXC_{t-i} is the exchange rate for foreign currency in terms of dollars in some lagged quarter $t-i$, y_{t-i}^{us} is real United States income in some lagged quarter $t-i$, and u_t is the disturbance term.⁷ The variables M_t , EXC_{t-i} , and y_{t-i}^{us} are in log form and thus the α 's will be elasticities.⁸ Once the import demand function for the United States with respect to each nation is estimated, the effect of United States import demand on foreign income, via the multiplier, must be determined.

One must be aware of the potential problems involved in estimating import demand. First, the question as to just how reliable one equation regressions are must be addressed. Thursby and Thursby (1984) focus on this question, concluding that the best one can possibly manage with only one equation is to include lagged dependent variables as regressors. As the cusum and cusum-squares tests would prohibit the use of more than one equation, and, further, since Brown, Durbin, and Evans (1975) expressly prohibit the use of lagged dependent variables, it seems equation (13) is the best one can do under the circumstances. If R^2 's are to be trusted, Chapter IV indicates that it does perform rather well, however. Second, as with all time series regressions, the potential of autocorrelation exists. When Durbin-Watson statistics so indicate, the Proc Autoreg procedure in the SAS package will be employed. Finally, Orcutt (1950) warns of the tendency to underestimate

⁷The lags will be determined empirically.

⁸In Khan (1977) he indicates that the question of appropriate functional form is essentially an empirical one. This work will proceed on that assumption.

the price elasticity of import demand. As this is of some interest, it will be examined in more detail.

Orcutt (1950) listed five potential causes of this tendency to underestimate:

1. Lack of independence between relative prices and the error term in the import demand function;
2. the possibility of errors of observation in the data;
3. the aggregation in the data giving undue weight to some goods with relatively low price elasticities of demand;
4. the indication of empirical work that short run elasticities (the ones usually estimated) are typically lower than long run elasticities;
5. the suggestion by empirical work that devaluation elasticities are larger than short run elasticities, which reflect adjustment to small price changes.

The first potential problem (the most intriguing and least obvious one) is best explained graphically. Given equation (14),

$$(14) \quad m = a + by + c(P_m/P) + u,$$

where m is the quantity of imports, y is real income, P_m/P is the price level of imports divided by the general price level, and u is the error term, Orcutt (1950) focuses on the role of P_m/P . Nominal income and relative prices, he holds, will move together. Thus, the estimate of the price coefficient, c , will be biased if the national income deflator, P , is excluded from that regressor [as it is in equation (13) on page xx]. Since u would then necessarily include P as a component, the relative price variable and the disturbance term would move

together. Inclusion of P in the price regressor does not always solve the problem, however; if one assumes the large country case (in which import supply is less than perfectly elastic), one might observe a situation like that observed in Figure 3.1. Hence import demand is DD and supply is SS . Assume then a random deviation of DD to $D'D'$. There will result an increase in price with no change in SS ; consequently, high values of the random error term u are associated with high levels of price. Further, if one assumes that both supply and demand fluctuate randomly between SS and $S'S'$ and DD and $D'D'$, respectively, then one is left with the set of observations bounded by the parallelogram $abcd$. If one fits a least squares regression line through these points, EE is the result. Clearly, the price elasticity of demand for imports would be underestimated.

Points two through five, self explanatory for the most part, reinforce this tendency. Point four is especially appealing intuitively in the light of contracting and the time necessary to find new sources of supply. With these caveats in mind, this chapter will now outline the remainder of the methods to be used.

Macro Equation

Equation (15), which will not only give an estimate of a given country's own fiscal and monetary policy on its output, but will provide the link between exports (United States imports) and national income, is adapted from that employed by Garrison and Kort (1983):

$$(15) \Delta y_t = \beta_0 + \beta_1 \Delta M^S_{t-i} + \beta_2 FI_{t-i} + \beta_3 \Delta x^{rw}_{t-i} + \beta_4 \Delta x^{us}_{t-i} + u_t,$$

where y_t is real income in quarter t in the country in question, M^S is the real money supply, FI is the fiscal impulse, x^{us} is real exports to

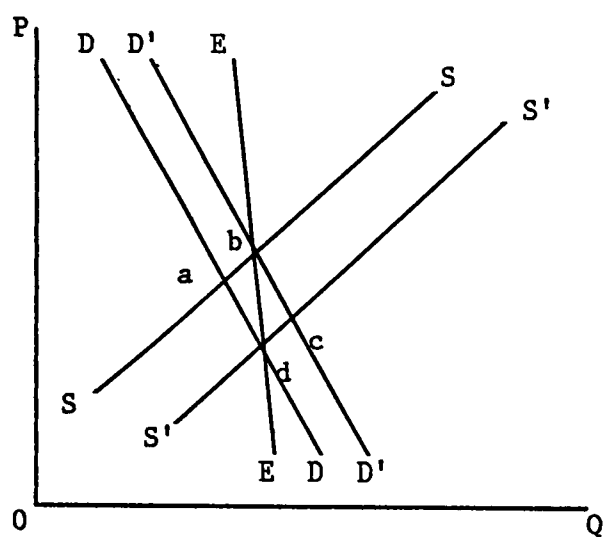


FIGURE 3.1. Downward Bias in the Estimated Price Coefficient.

the United States, x^{rw} is the real value of exports to the rest of the world, and u_t is the disturbance term. The symbol Δ indicates difference from the previous quarter. The influence of M^S , FI, and both export variables on Δy are estimated by a sum of the empirically determined lag structures. For instance, if the appropriate lags for money supply in the above equation were one and two quarters, the regressor would be

$$(16) \Delta M^S = (\Delta M_{t-1}^S + \Delta M_{t-2}^S),$$

so that $\beta_1 \Delta M^S$ is actually

$$(17) \beta_1 \Delta M^S = \beta_1 (\Delta M_{t-1}^S + \Delta M_{t-2}^S).$$

The FI variable is designed to be a measure of government fiscal policy which is independent of the present level of income (i.e., it is akin to the high employment budget surplus in that it eliminates the influence of cyclical fluctuations). The measure, adapted from one outlined in the International Monetary Fund's Occasional Paper #21, is calculated as follows:

$$(18) FI = -(\Delta T - t_0 \Delta y) + (\Delta G - g_0 \Delta y_p),$$

where T =real government revenue, G =real government expenditure, y =actual real GNP, y_p =potential real GNP, t_0 =base year ratio of real revenue to actual real GNP, and g_0 =base year ratio of real expenditure to actual real GNP. The base year selected is 1979 and the potential growth rate of real GNP, 3 percent.⁹ Thus, for a fiscal stimulus, $FI > 0$. Also of interest in equation (15) is the fact that x^{us} and x^{rw} are not net. If they were net of imports, the question arises as to just how independent

⁹As per the OECD's Economic Outlook #34, December 1983, pp. 148-149.

the variables on the right-hand side of the equation are of those on the left.¹⁰ While such a question could arise in almost any econometric study, a much better case could be made for the unrelatedness of simple exports than of net exports.

The data to be used are easily calculated. Real GNP or GDP and real total exports are from the OECD's Quarterly National Accounts Bulletin, nominal exports to the United States and nominal money supplies (M_1) are found in the OECD's Main Economic Indicators, and nominal government revenues and expenditures and the exchange rate for foreign currency in terms of dollars are in the IMF's International Financial Statistics. All nominal data will be deflated using the GNP and GDP deflators from the OECD's Quarterly National Accounts Bulletin and all data are quarterly.

Cusum Test and Cusum-Squares Test

With the econometric model complete, the tests must now be outlined. Two of the tests to be used were created by R. L. Brown, J. Durbin, and J. M. Evans (1975). They are designed specifically to study the stability over time of regression relationships. Their particular usefulness comes from their capacity actually to indicate instances of structural change rather than forcing the researcher to choose a period of potential instability and then test with one of the typical statistics (e.g., the Chow test). The first, the cusum test, looks for a change in the regression parameters, while the second, the

¹⁰ A major determinant of imports is income, the dependent variable.

cusum-squares test, finds periods in which there has been a significant change in the variance of the error terms. Each test is described below.

The tests designed by Brown, Durbin and Evans rely on the examination of residuals to determine structural change. However, since ordinary least squares residuals have neither zero means nor constant variance, recursive residuals (r-residuals hereafter) must be utilized instead. Given the standard regression model,

$$(19) y_t = X_t' \beta_t + \varepsilon_t \quad t = 1, \dots, T,$$

the r-residuals are calculated thus,

$$(20) w_t = \frac{[y_t - x_t' \hat{\beta}_{t-1}]}{[1 + x_t'(X_{t-1}' X_{t-1})^{-1} x_t]^{0.5}} \quad t = k+1, \dots, T,$$

Where $\hat{\beta}_{t-1}$ is the least squares estimate of β from the first $t-1$ observations, k is the number of regressors, and $X_{t-1} = [x_1, \dots, x_{t-1}]$.¹¹

Once the r-residuals have been calculated, either test can be performed. The statistic for the cusum test is calculated

$$(21) C_t = (1/s) \sum w_t, \quad t=k+1, \dots, T,$$

where s is the estimated standard deviation of the disturbances and w_t is summed over $j=k+1$ to T .

¹¹Note that the r-residuals are simply one period ahead prediction errors.

If we refer to the point of change in the structural relationship as between t^* and t^*+1 , it will be observed that the r -residuals will not be affected until t^* . Therefore, the above statistic can be used to determine if the w_t 's differ significantly from their mean of zero (the assumption under constancy). The null hypothesis is thus,

$$H_0: E(C_t) = 0, \quad t=k+1, \dots, T,$$

and must be rejected if at least one of the cusum statistics deviates significantly from zero.

To determine what "significantly" implies, confidence intervals must be constructed. According to Brown, Durbin, and Evans (1975), those intervals are defined as

$$(22) C_\alpha(t) = h_\alpha (T-k)^{0.5} + 2h_\alpha [(t-k)/(T-k)^{0.5}], \quad t=k+1, \dots, T,$$

where h_α is chosen according to the desired power of the test (actually, the $C_\alpha(t)$'s would lie on a parabolic curve, seriously reducing the practicality of the this test; consequently, the above $C_\alpha(t)$ is an approximation of sorts).¹²

On Figure 3.2, if the plot of the cusum statistic were to stray beyond the confidence lines, then instability is inferred (specifically, a change in the regression parameters). If not, the null hypothesis is accepted.

¹²The possible values, given in Brown, Durbin, and Evans (1975), are

$\alpha=0.01$	$a=1.143$
$\alpha=0.05$	$a=0.948$
$\alpha=0.10$	$a=0.850$

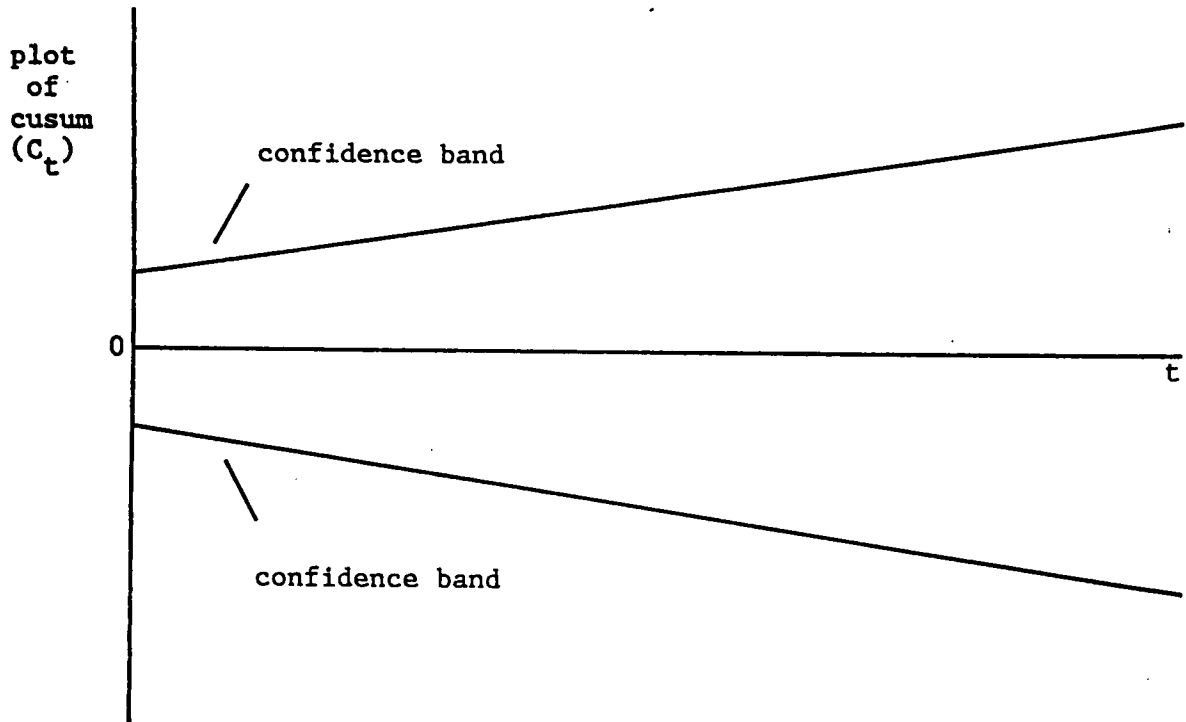


FIGURE 3.2. Graph of the Cusum Test.

A number of the characteristics of the cusum test must be emphasized:

- 1) since the r-residuals are summed, the statistic can detect gradual changes as well as sudden ones;
- 2) the test is conservative;¹³
- 3) the relative reliability of the plot of the statistic beyond t^* decreases as time increases;
- 4) since the plot of the $C_\alpha(t)$'s actually lie on a parabolic curve, substituting the straight lines suggested above leads to uncertainty on the effective error (type I) probabilities for the test.

The second test outlined by Brown, Durbin, and Evans (1975) using r-residuals is the cusum-squares test. This test is based on the cumulative sums of the squared r-residuals and its statistic is calculated

$$(23) \text{CS}_t = \text{sw}_t / \text{sw}_T, \quad t=k+1, \dots, T,$$

where

$$(24) \text{sw}_t = \sum w_t^2,$$

where w_t^2 is summed over $j=k+1$ to t . Again, the test searches for departures by the r-residuals from their zero mean. The statistic will vary from zero (when $t=0$) to one (when $t=T$) and the null hypothesis of constancy is

$$H_0: E(\text{CS}_t) = (t-k)/(T-k), \quad t=k+1, \dots, T.$$

¹³Implying a greater likelihood of rejecting the null hypothesis when it is true.

Confidence intervals must be defined and are this time shown to be

$$(25) \text{CS}_\alpha(t) = \pm c_0 + (t-k)/(T-k),$$

where the c_0 statistics are available in Durbin (1969) and were derived by Durbin as critical values for Pyke's (1959) modified Kolmogoroff-Smirnov statistic. These intervals are seen as parallel to the mean value line, as shown in Figure 3.3. If the plotted CS_t strays outside either band, then a significant change in the disturbance variance can be concluded. And, as in the case of the cusum test, it can detect gradual changes, it tends to be conservative, and once the plot passes beyond either significance band its reliability as an indicator of structural change diminishes.

Chow Test

The last test to be discussed is the Chow (1960) test. As the name implies, this test was outlined first by G.C. Chow (1960) and is designed to determine, given an estimated regression

$$(26) \hat{y}_1 = X_1 \hat{\beta}_1,$$

whether or not any one or more of the parameters of a second estimated regression

$$(27) \hat{y}_2 = X_2 \hat{\beta}_2$$

belong to the same population as the first. Chow (1960) phrased the problem

When a linear regression is used to represent an economic relationship, the question often arises as to whether the relationship remains stable in two periods of time, or whether the same relationship holds for two different groups of economic units. Is the consumption pattern of the American people today the same as it was before World War Two? Do the firms in the steel industry and the firms in the chemical industry have similar dividend policies? Statistically these questions can be answered by testing whether two sets of observations can be regarded as belonging to

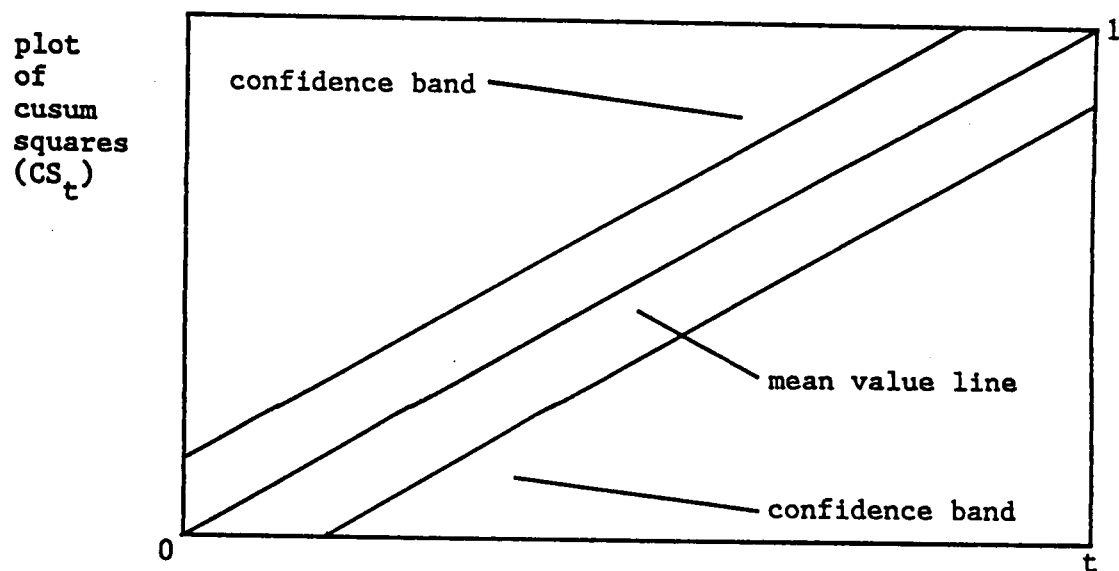


FIGURE 3.3. Graph of the Cusum-Squares Test.

the same regression model (Chow 1960, p.591).

Given this, Chow sets out to test the null hypothesis that subsets of coefficients in two regressions are equal by analysis of variance.

The statistic used is

$$(28) F_{p,q} = \frac{[ESS_p - (ESS_1 + ESS_2)]/p}{(ESS_1 + ESS_2)/q},$$

where $p = (n - 2k + j) - [(n_1 - k) + (n_2 - k)]$, $q = (n - 2k)$, n = the number of observations, n_1 = the number of observations in the first regression, n_2 = the number of observations in the second regression, k = the number of parameters, j = the number of regressors tested, ESS_1 is the error sum of squares from the first regression, ESS_2 is the error sum of squares from the second regression, and ESS_p is the error sum of squares from the pooled regression. The pooled regression contains a separate regressor for each parameter not being tested under the null hypothesis, and for those being tested only one regressor is included (thus, for the pooled regression the degrees of freedom are $n - 2k + j$). As indicated above, the statistic has an F-distribution, and consequently is tested using the appropriate table.

The major differences between the tests using r-residuals (cusum and cusum-squares) and the Chow test are that the former does not require the researcher to conjecture as to when the structural change took place, while the Chow test does, and second, that the Chow test allows one to test for significant change in anywhere from one to k regressors, while with the cusum and cusum squares one must test the entire regression equation.

Employment of Tests

Now that the regression equations to be estimated and the tests to be employed have been outlined, their precise roles in the research will be explained. The bulk of this research lies in estimating, testing, and evaluating the macroeconomic equations. The import demand functions, as a component of the locomotive effect, are important because a great deal of controversy surrounds their structural stability; hence, further evidence is required. Given this, three import demand functions for the United States will be estimated (one each for United States import demand for goods and services from France, West Germany, and the United Kingdom) and then tested using the cusum and cusum squares tests (the most popular approach in the recent literature). These results will then be compared to those of others, hopefully shedding new light on the relationship.

Next, the macro equations will be estimated. However, as we are concerned only with the regressor representing exports to the United States, a cusum or cusum-squares test (effectively testing for a significant change in all the regression parameters) is inappropriate. Further, it has already been postulated that the change took place around 1980, making the Chow test the logical choice for this portion of the research. Once both sets of tests have been completed, the results must be interpreted. As indicated in Chapter I, the findings will be explained in both a historical and world context. This implies that this study assumes, first, that the roots of today's policies in France, West Germany, and the United Kingdom are to found in their respective national predilections and proclivities, and second, that the

consequences of these foundations can only be properly understood in the framework of an increasingly shrinking, increasingly interdependent world.

With the methods defined, the next chapter will present the results of the econometric tests.

CHAPTER IV

ECONOMETRIC RESULTS

Introduction

This chapter is organized as follows: the next section will discuss the estimated import demand functions and the resultant stability tests; the third, fourth, and fifth sections discuss respectively the estimated macro equations for France, Britain, and West Germany and the use of the Chow test in checking for structural change in each case; finally, the last section offers some insight into the strengths and weaknesses of the quantitative evidence here presented.

Import Demand Functions

While several specifications were attempted,¹⁴ the log-linear form suggested by the literature provides the best fit.¹⁵ The results are summarized below.

FRANCE

$$(29) \log x_t^{us} = \begin{matrix} -7.68 \\ (-7.9) \end{matrix} - 0.61 \begin{matrix} (\log EXC_{t-1}) \\ (-9.8) \end{matrix} + 2.23 \begin{matrix} (\log y_{t-1}^{us}) \\ (18.4) \end{matrix}$$

$$R^2 = 0.931$$

¹⁴ A very interesting evaluation of the use of single equation import demand functions is Thursby and Thursby (1984).

¹⁵ Actually, which form to use depends a great deal on the intended use of the model and on the empirical results. See Khan and Ross (1977).

GERMANY

$$(30) \log x_t^{us} = \begin{matrix} -7.6 \\ (-10.5) \end{matrix} - 0.96 \begin{matrix} (\log EXC_{t-1}) \\ (-13.4) \end{matrix} + 2.57 \begin{matrix} (\log y_{t-1}^{us}) \\ (22.4) \end{matrix}$$

$$R^2 = 0.894$$

UNITED KINGDOM

$$(31) \log x_t^{us} = \begin{matrix} -0.7 \\ (-0.4) \end{matrix} - 0.53 \begin{matrix} (\log EXC_{t-1}) \\ (-4.6) \end{matrix} + 1.25 \begin{matrix} (\log y_{t-1}^{us}) \\ (6.7) \end{matrix}$$

$$R^2 = 0.818$$

In adherence with standard practice, the figures in parentheses below each parameter are t-statistics.¹⁶ All the signs were as expected and each regressor was found to be significant at the one percent level (except the intercept in the equation for United States import demand from the United Kingdom). A one quarter lag on both price and income proved to be the most appropriate in all three equations. It is interesting to note how much more income elastic United States import demand is from France and West Germany than from the United Kingdom.¹⁷ The reader should bear in mind the tendency to underestimate the price parameters, so that the above suggested price elasticities versus the income elasticities may not be altogether correct. On the other hand, the price coefficient itself is relatively unimportant in the current context. Also, the rather high R^2 in each case,

¹⁶The reader may wish to refer to Chapter III, pages xx and xx, for a refresher on the specification of these import demand functions.

¹⁷An earlier version of this project included Japan (eliminated due to lack of availability of data for the macro equation). The coefficients for price and income elasticity of United States demand for the Japanese goods were, respectively, -1.54 and 4.38. Such a large value for price surely indicates why Japan is so desperately trying to defend the yen against the dollar today.

while certainly not the ultimate test for any regression model, is encouraging in the light of Thursby and Thursby's comments mentioned in the preceding chapter. Next, the results of the tests for structural stability will be reported. First, the results of the cusum test.

A ten percent confidence interval was chosen for the tests and the results were nearly identical for all three equations. A change in the regression parameters was indicated around 1973 (see Figures 4.1, 4.2, and 4.3). The cusum test was conducted a second time, but for the time period 1974II-1985IV. This time the individual results varied. For France, the change in the regression coefficients are around 1978III; for Britain, 1975II; and for West Germany, 1979II (see Figures 4.4, 4.5, and 4.6).

In the case of each set of tests, these dates seem to coincide with an oil supply shock of one form or another. It is possible that the structural change around 1973 is due not only to the collapse of the fixed exchange rate regime, but the first Arab oil embargo. Subsequent to that price rise, the United States was surely forced to import less from France, West Germany, and the United Kingdom at each given level of real income, lowering the coefficient for y_{t-1} in each equation. Again, the change indicated in the imports from France (around 1978III) and from West Germany (around 1979II) likely has its roots in the second oil shock. The change in the structure of United States import demand from Britain around 1975II coincides with the beginnings of large scale British crude oil production (see Table A.3 in the Appendix), and so represents an oil supply change of a different sort. Given this, one would naturally expect the coefficient for y_{t-1} in the British equation to rise around the period indicated rather than falling at the same time as the French and West German.

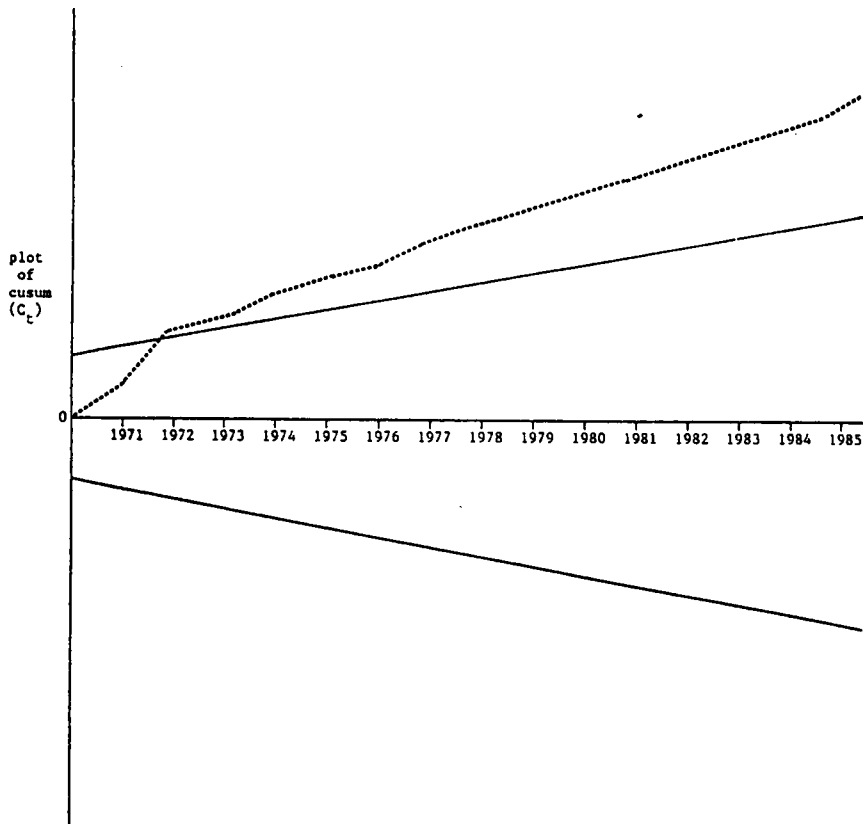


FIGURE 4.1. Cusum Test Results (1970-1985) for France.

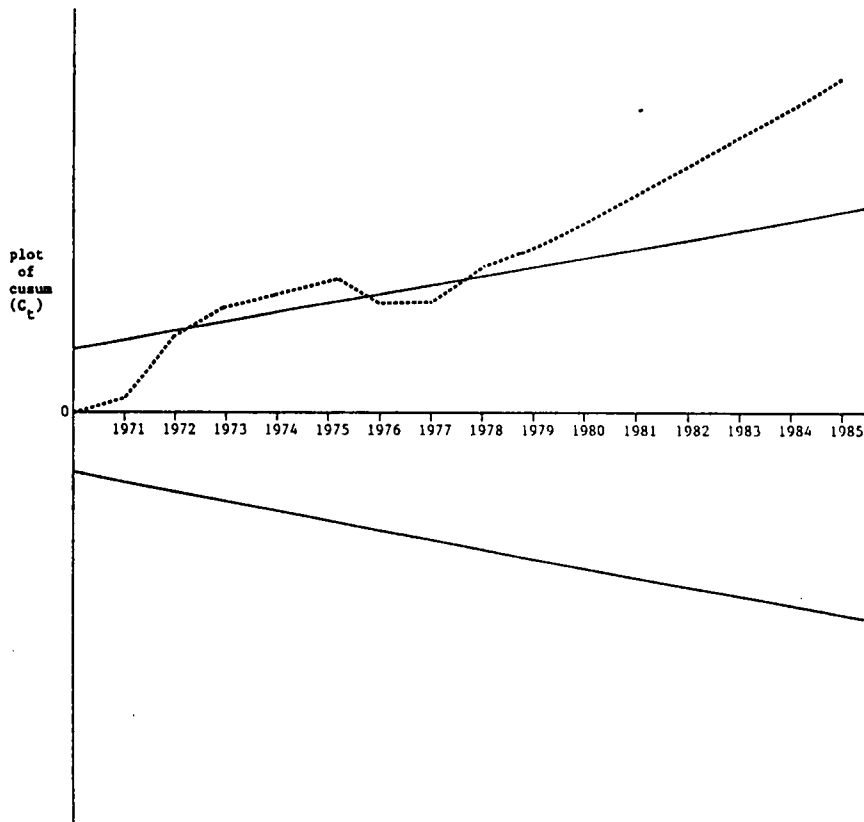


FIGURE 4.2. Cusum Test Results (1970-1985) for Germany.

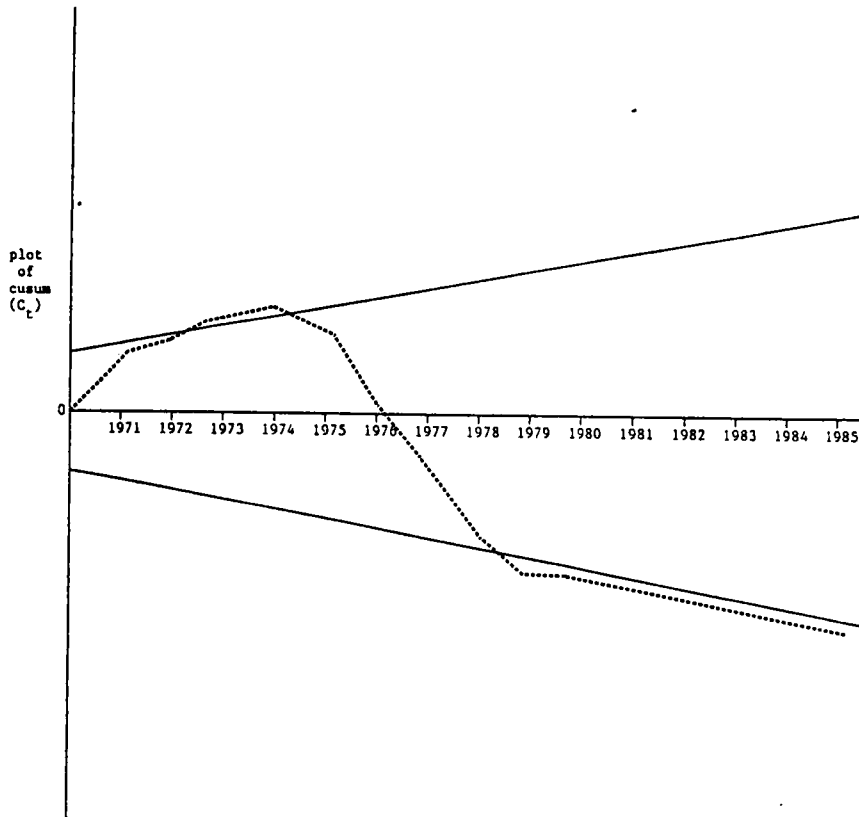


FIGURE 4.3. Cusum Test Results (1970-1985) for United Kingdom.

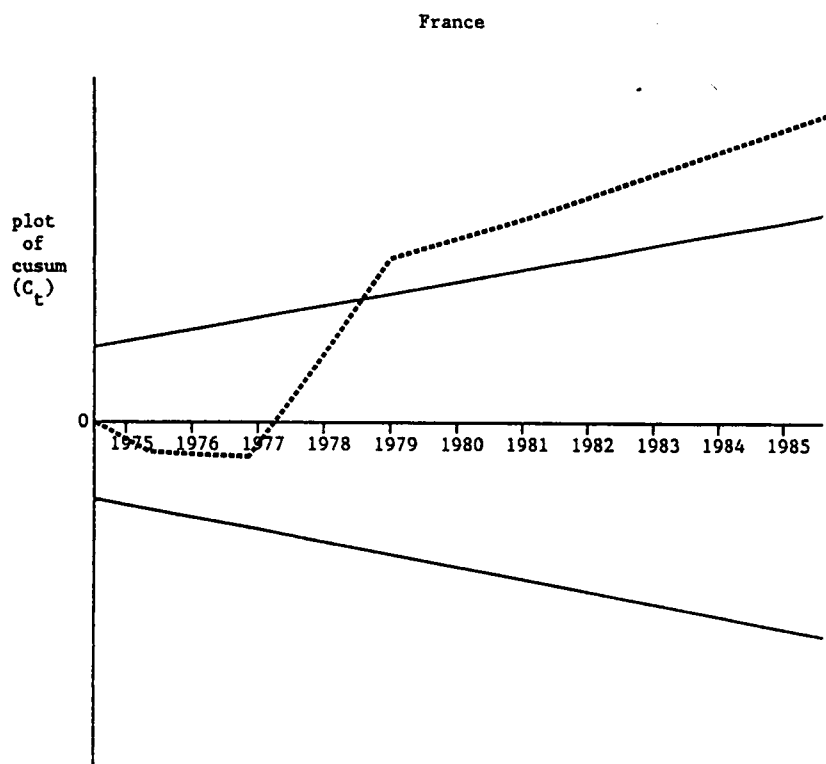


FIGURE 4.4. Cusum Test Results (1974-1985) for France.

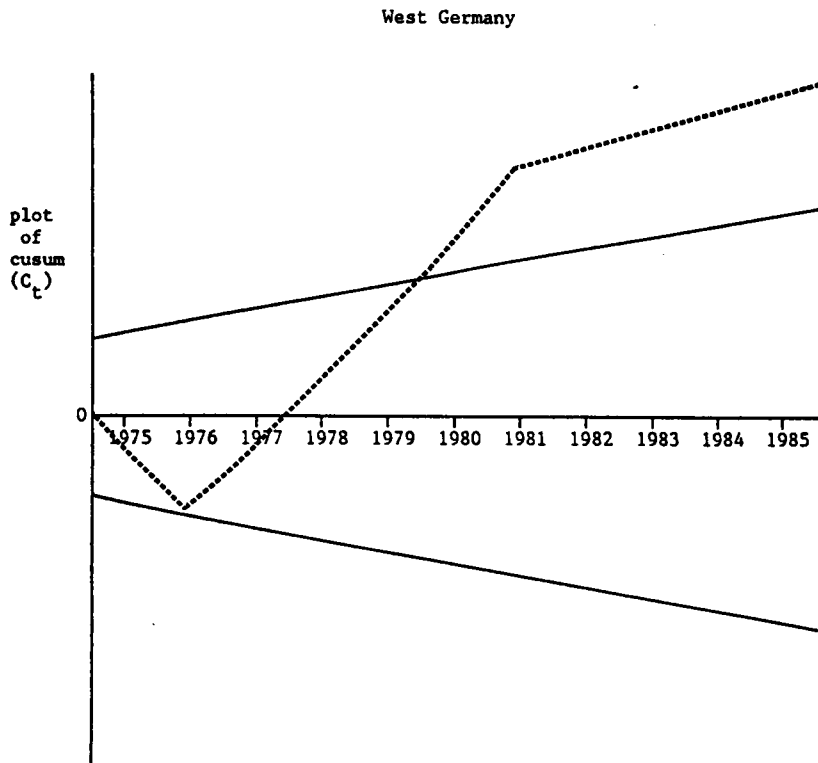


FIGURE 4.5. Cusum Test Results (1974-1985) for Germany.

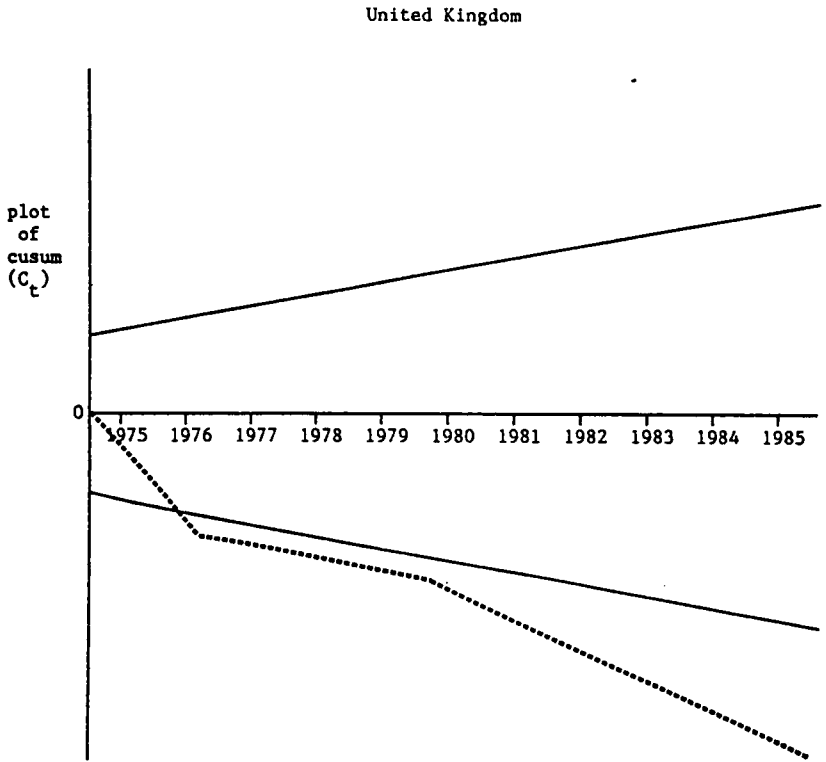


FIGURE 4.6. Cusum Test Results (1974-1985) for United Kingdom.

The results for the cusum-squares tests were somewhat different. Both the United States' import demand functions for French and West German goods and services showed stability throughout the period, but that for British goods and services indicated instability (i.e., a significant change in the variance of the disturbances) in 1977 (see Figures 4.7, 4.8, and 4.9).

Here again, the change in 1977 coincides with the take off of British crude oil production (see table A.3 in the Appendix).

France

Since the Chow test will be run postulating a structural change in the macro equation in quarter 1980I (the total time period being 1970I to 1985III), three macro equations are estimated: the first from 1970I to 1979IV, the second from 1970I to 1985III, and the third, the pooled regression from 1970I to 1985III. The results are as follows:

1970I to 1979IV

$$(32) \Delta y^F = 1.414 + 0.111\Delta M_1^S + 0.017FI_1 + 0.579\Delta x_1^{rw} + 0.576\Delta x^{us}$$

$$(4.578) \quad (3.082)^1 \quad (1.919)^1 \quad (2.512)^1 \quad (2.506)$$

$$R^2 = 0.50 \quad ESS = 53.9;$$

1980I to 1985III

$$(33) \Delta y^F = 0.981 + 0.061\Delta M_2^S + 0.880FI_2 + 0.338\Delta x_2^{rw} + 0.339\Delta x^{us}$$

$$(2.822) \quad (0.578)^2 \quad (1.902)^2 \quad (1.444)^2 \quad (1.445)$$

$$R^2 = 0.38 \quad ESS = 22.1;$$

1970I to 1985III

$$(34) \Delta y^F = 1.088 + 0.133\Delta M_1^S + 0.100\Delta M_2^S + 0.017FI_1 + 0.078FI_2 + 0.506\Delta x_1^{rw}$$

$$(4.82) \quad (3.169)^1 \quad (1.403)^2 \quad (1.783)^1 \quad (1.613)^2 \quad (3.095)^1$$

$$+ 0.505\Delta x_2^{rw} + 0.503\Delta x^{us}$$

$$(3.088)^2 \quad (3.089)$$

$$R^2 = 0.47 \quad ESS = 104.58.$$

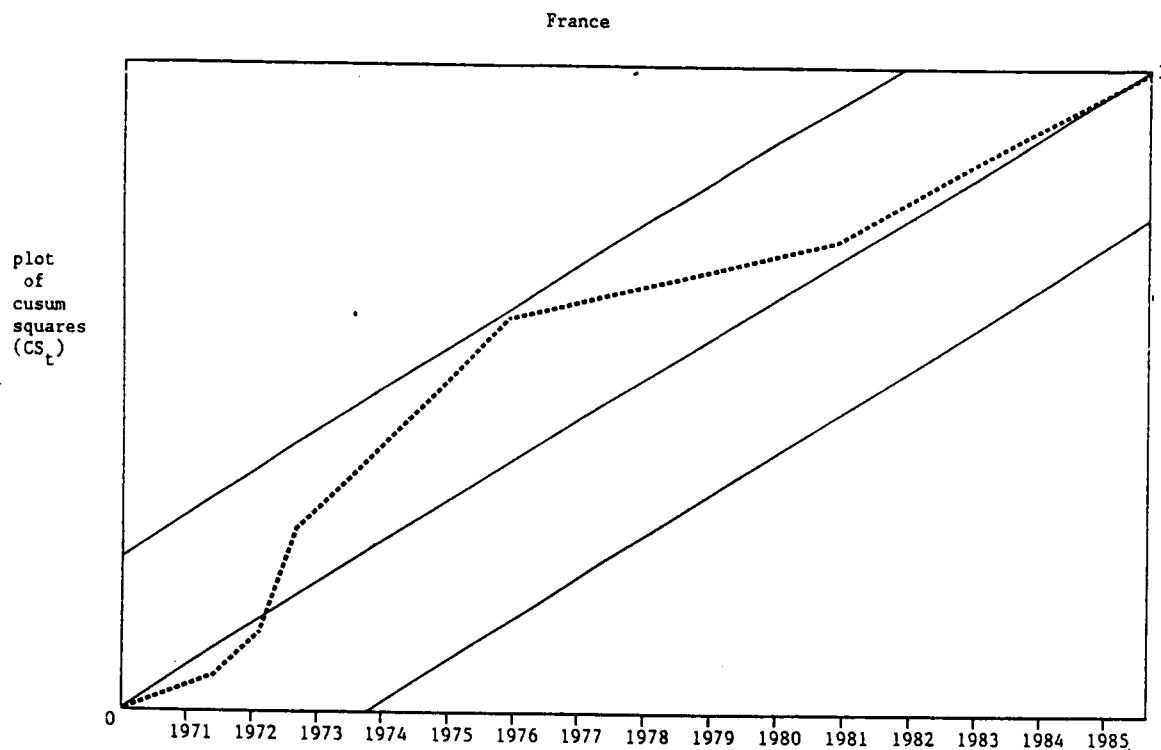


FIGURE 4.7. Cusum-Squares Test Results (1970-1985) for France.

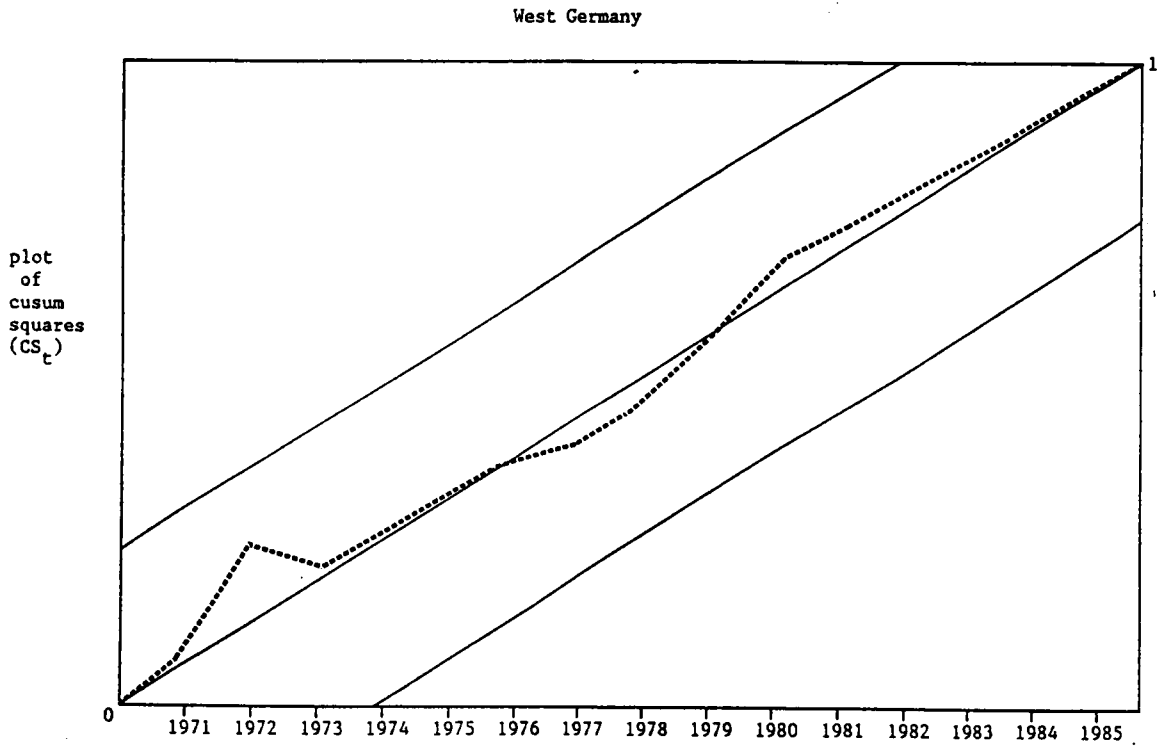


FIGURE 4.8. Cusum-Squares Test Results (1970-1985) for Germany.

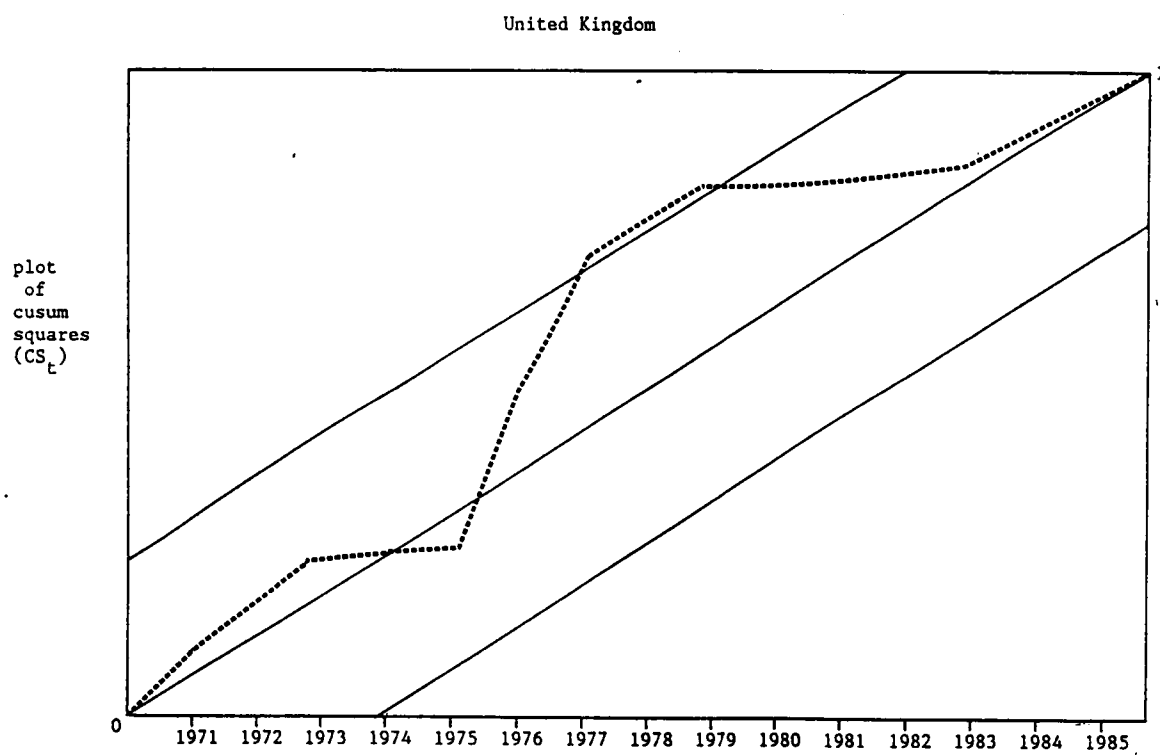


FIGURE 4.9. Cusum-Squares Test Results (1970-1985) for United Kingdom.

Again, the figures in parentheses below each parameter are t-statistics.

Each equation was estimated using ordinary least squares. Recalling Chapter III, page 25, M_1^S consists of a one and two quarter lag, M_2^S of a one quarter lag, FI_1 of a one, two, and four quarter lag, and FI_2 of a one, two, three, and four quarter lag. It was determined that lags are not appropriate for the export variables.

The estimate of the pooled regression is included only for consistency as it has no real significance except for the calculation of the error sum of squares and to show the reader exactly how a pooled regression is formed.

In the equation for 1970I to 1979IV, all regressors are significant at the one percent level except FI_1 , which is significant at the ten percent level. In the equation for the time period 1980I to 1985III, the intercept is significant at the five percent level, FI_2 at the ten percent level, the export variables at the twenty percent level, and M_2^S is not significant except at the sixty percent level. Finally, in the pooled regression, all regressors are significant at the one percent level except FI_1 , which is significant at the ten percent level, and FI_2 and M_2^S , which are significant at the twenty percent level.

The reader should take note of the decline in the magnitude of the parameter and the decline in the level of significance for both types of exports, monetary policy, and the intercept. The parameter for fiscal policy falls, but its significance declines as well (although only slightly). If the Chow test indicates structural change for the regressor for exports to the United States, the above lends heavy evidence to the proposition that the strength of all stimulative measures had fallen.

With the regressions estimated it remains only to test for a significant change in the coefficients for exports to the United States around 1980I. Recalling the error sums of squares,

$$ESS_1 = 53.93$$

$$ESS_2 = 22.13$$

$$ESS_p = 104.58$$

where the subscripts 1, 2 and p indicate the regression equation for the periods 1970I-1979IV, 1980I-1985III, and the pooled regression, the values are then plugged into the statistic for the Chow test. The statistic becomes

$$(37) \frac{[104.58 - (53.93 + 22.13)]/1}{(53.93 + 22.13)/(63 - 10)} = 19.87.$$

Since $F_{1,50} = 7.17$ (where $\alpha = 0.01$), the null hypothesis of the equality of the regression parameters of exports to the United States in the two sub-periods is rejected. By examining the French macro equations and bearing in mind the result of the Chow test it can be concluded that the contention that French exports to the United States had less expansionary effect on the French economy from 1980-1985 than it did from 1970-1979 is not contradicted by the empirical evidence. With this conclusion to the quantitative study for France, let us move on to the results for West Germany.

West Germany

As with France, the results presented for West Germany include three equations (estimated for the periods 1970I-1979IV, 1980I-1985IV, and 1970I-1985IV) and the conclusions of the Chow test. Presented below are the estimated equations:

1970I to 1979IV

$$(38) \Delta y^G = 150.9 \Delta M_1^S + 0.413 FI_1 + 0.836 \Delta x_1^{rw} + 2.830 \Delta x^{us}$$

$$(2.988)^1 \quad (1.869)^1 \quad (4.584)^1 \quad (1.039)$$

$$R^2 = 0.56$$

$$ESS = 161,835,947;$$

1980I to 1985IV

$$(39) \Delta y^G = 152.7 \Delta M_2^S - 2.980 FI_2 + 0.204 \Delta x_2^{rw} + 1.110 \Delta x^{us}$$

$$(3.110)^2 \quad (-2.53)^2 \quad (2.130)^2 \quad (2.720)$$

$$R^2 = 0.58$$

$$ESS = 90,581,260;$$

1970I to 1985IV

$$(40) \Delta y^G = 228.8 \Delta M_1^S + 59.34 \Delta M_2^S + 0.134 FI_1 + 0.045 FI_2 - 0.075 \Delta x_1^{rw}$$

$$(3.435)^1 \quad (1.310)^2 \quad (0.305)^1 \quad (0.231)^2 \quad (-0.85)^1$$

$$+ 0.001 \Delta x_2^{rw} + 8.607 \Delta x^{us}$$

$$(0.496)^2 \quad (3.935)$$

$$R^2 = 0.37$$

$$ESS = 416,777,427.$$

Again, the estimate of the pooled regression is included for consistency alone, as we are interested only in the error sum of squares obtained in its estimation. The monetary and fiscal policy variables take the same form as those in the French equations; M_1^S consists of a one and two quarter lag, FI_1 of a one quarter lag, M_2^S of a one, two, and three quarter lag, and FI_2 of a one and two quarter lag. The export variables are not lagged.¹⁸

In the West German equation for 1970I to 1979IV, M_1^S and x_1^{rw} are significant at the one percent level, FI_1 at the ten percent level, and x^{us}

¹⁸ Notice that the macro equation for West Germany (and later that for the United Kingdom) does not include an intercept. When included, the intercept proved to be insignificant; also, once forced through the origin, the performance of the macro equations was very much improved. For these reasons, the intercept is suppressed in the reported equations for West Germany and the United Kingdom.

at the forty percent level. In the equation for 1980I to 1985IV, M_2^S is significant at the one percent level, and FI_2 , x_2^{rw} , and x^{us} at the five percent level. Finally, in the pooled regression, M_1^S and x^{us} are significant at the one percent level, M_2^2 at the twenty percent level, X_{1rw} at the forty percent level, and FI_1 , FI_2 , and x_2^{rw} at the eighty percent level.

Both the parameters and the level of significance of the monetary policy variables are remarkably similar in the two sub-periods. The parameter for exports to the rest of the world falls considerably, while the t-statistic declines as well. However, this hopeful sign that the hypothesis of the weakening locomotive effect is supported by the statistical analysis is not clearly borne out by the regressor for exports to the United States; while the value of the parameter does fall considerably, the level of significance rises. Still, it seems safe to contend that if a structural change is indicated, that it is a decline and not a rise in the power of the locomotive effect. Fiscal policy remains something of a puzzle, however, as, while the absolute value of its parameter and t-statistic rise considerably from 1970I-1979IV to 1980I-1985IV, the sign in the second period is not what one would expect. It may be that the West German refusal to use stimulative fiscal policy during the 1980's (see Table A.5. in the Appendix) means that the FI variable is simply not a major source of cyclical fluctuations in GNP, giving misleading results when examined econometrically.

The model does not work quite as well as it did for France in terms of the levels of significance of each regressor, but the R^2 's are superior. Note here that the much larger error sums of squares in this set of

equations is due to the different unit of measure, not to any interesting statistical reason.

Once again, the null hypothesis of the equality of the coefficients of the regressors representing West German exports to the United States in the two sub-periods is rejected. Given the values of the error sums of squares

$$ESS_1 = 161,835,947$$

$$ESS_2 = 90,581,260$$

$$ESS_p = 416,777,427$$

the statistic becomes

$$(41) \frac{[416,777,427 - (161,835,947 + 90,581,260)]/1}{(161,835,947 + 90,581,260)/(64 - 10)} = 35.16.$$

Since $F_{1,50} = 7.17$ (where $\alpha = 0.01$), H_0 is rejected and a significant change in the β associated with x^{us} can be concluded. The empirical evidence does not contradict the postulate that effects of exports to the United States on the economies of France and West Germany have diminished since 1980. Only Britain then remains.

United Kingdom

The three equations for Britain are reported (estimated over the same periods as the West German), as are the results of the Chow test. The estimated regressions are:

1970I to 1979IV

$$(42) \Delta y^B = 0.301 \Delta M_1^S - 0.092 FI_1 + 0.692 \Delta x_1^{rw} - 0.728 \Delta x^{us}$$

$$(1.770)^1 \quad (-1.83)^1 \quad (2.852)^1 \quad (-0.18)$$

$$R^2 = 0.36$$

$$ESS = 23,113,151;$$

1980I to 1985IV

$$(43) \Delta y^B = 0.532\Delta M_2^S + 0.047FI_2 + 0.261\Delta x_2^{rw} - 0.522\Delta x^{us}$$

$$(3.402)^2 \quad (1.928)^2 \quad (0.771)^2 \quad (-0.19)$$

$$R^2 = 0.60 \quad ESS = 3,570,600;$$

1970I to 1985IV

$$(44) \Delta y^B = 0.207\Delta M_1^S + 0.292\Delta M_2^S - 0.093FI_1 + 0.032FI_2 + 0.631\Delta x_1^{rw}$$

$$(1.598)^1 \quad (1.466)^2 \quad (-1.97)^1 \quad (0.782)^2 \quad (3.142)^1$$

$$+ 0.611\Delta x_2^{rw} - 0.126\Delta x^{us}$$

$$(1.228)^2 \quad (3.935)$$

$$R^2 = 0.33 \quad ESS = 30,997,243.$$

In the above equations, M_1^S consists of a two quarter lag, FI_1 of a two and three quarter lag, M_2^S of a three quarter lag, and FI_2 of a two, three, and four quarter lag. The export variables are not lagged.

In the British equation for 1970I to 1979IV, x_1^{rw} is significant at the one percent level, FI_1 at the ten percent level, M_1^S at the twenty percent level, and x^{us} is not significant even at the eighty percent level. In the equation for 1980I to 1985IV, M_2^S is significant at the one percent level, FI_2 at the ten percent level, x_2^{rw} at the sixty percent level, and again x^{us} is not significant even at the eighty percent level. Finally, in the pooled regression, x^{us} and x_1^{rw} are significant at the one percent level, FI_1 at the ten percent level, M_1^S and M_2^S at the twenty percent level, x_2^{rw} at the forty percent level, and FI_2 at the sixty percent level.

The results of the econometric estimations for Britain are most interesting. The coefficient of the regressor for monetary policy rises, as does the t-statistic, in the second period, perhaps due to the active use of that tool by the Thatcher government in inducing cyclical movements in GNP (Morris 1985, p.902). The significance of the fiscal impulse variable rises in the second period, as does its coefficient; the negative

value of that regressor in the period 1970I to 1979IV is disturbing (especially at a ten percent level of significance) and it is difficult to rationalize such a result. Perhaps the fiscal impulse variable itself, which seems to work well France and West Germany and the United Kingdom in the second period, is for some reason ill suited to 1970's Britain, despite the International Monetary Fund's support of its use. The results for the export variables are most disappointing. While the coefficient for exports to the rest of the world falls, as does its level of significance, it is unlikely that for 1980I to 1985IV the t-statistic would be so small. The parameters for exports to the United States are of the wrong sign and are associated with extremely small t-statistics. The shortcomings of the two export variables led to further research and an eventual change in the specification of the British macro econometric model.

Table A.3 in the Appendix shows the trend of British production of crude oil. In Table 4.1 it is very clear that a growing percentage of British exports in the past fifteen years has been, not surprisingly, mineral fuels. The importance of such fuels to the world economy is the reason for the above contention that the level of significance of British exports in 1980I to 1985IV should perhaps be higher. On the other hand, if the demand for fuel is less cyclical than the demand for other goods, then one would expect that the econometrics would assign a lower t-statistic to exports to the rest of the world in the second period. After all, "significance" in statistics is not synonymous with "importance" in the real world. And Table 4.2 supports this contention; oil may have been rising in importance, but as its export in the 1980's was tied much more to

Table 4.1. Composition of British
Exports, 1970-1985.

year	Total Value*	Mineral Fuels*	Mineral Fuels as % of total
1970	1613.8	41.5	2.6
1971	1863.2	47.9	2.6
1972	2030.0	49.7	2.4
1973	2545.5	74.6	2.9
1974	3228.0	150.3	4.7
1975	3655.0	150.4	4.1
1976	3863.9	186.6	4.8
1977	4793.9	300.4	6.3
1978	5976.2	382.1	6.4
1979	7600.9	769.2	10.1
1980	9611.0	1247.6	13.0
1981	8567.3	1610.5	18.8
1982	8082.8	1624.4	20.1
1983	7632.1	1655.9	21.7
1984	7817.9	1697.0	21.7
1985	8438.2	1784.4	21.1

* Millions of current U.S. dollars, monthly average.

Source: Compiled from IMF International Financial Statistics, various years.

Table 4.2. Nominal Growth Rate of
British Exports in the
1980's.

year	Rate of Growth Non-fuel Exports	Rate of Growth Fuel Exports
1980	22.4	62.0
1981	-16.8	29.0
1982	-7.2	0.8
1983	-7.5	1.9
1984	2.4	2.5
1985	8.7	5.2

Source: Compiled from IMF International Financial Statistics, various years.

supply considerations and a relatively inelastic demand, it performs poorly as an explanation for cyclical fluctuations in GNP.

This suggests re-estimation of the above macro equations, substituting non-oil exports for exports to both the United States and the rest of the world. As would be expected, the equation for the period 1970I to 1979IV was little different; in fact, its inferior performance led to the retention of the first model for the first period. The new "non-oil" model of the second period, however, yielded an estimate with more significant regressors (at the cost of a slightly lower R^2). The non-oil estimated regression is given below:

1980I to 1985IV (non-oil)

$$(45) \Delta y^B = 0.192 \Delta M_2^S + 0.099 FI_2 + 0.243 \Delta x_2^{rw} - 1.614 \Delta x^{us}$$

$$(2.377)^2 \quad (2.363)^2 \quad (1.242)^2 \quad (-0.677)$$

$$R^2 = 0.58$$

$$ESS = 3,946,009;$$

When compared to the original model¹⁹ of the first period one finds that the coefficient of monetary policy falls, while the significance of the regressor rises. Also, the t-statistic for the fiscal impulse variable rises more than it did for the original model of the second period. Most importantly, while the parameter of the regressor for exports to the rest of the world is still lower in the second period (lower, in fact), the t-statistic does not fall as far (this time the regressor is significant at the twenty-five percent level instead of the 60 percent level). This would lend support to the original contention that led the exclusion of oil

¹⁹The lags determined to be most appropriate for the non-oil model were the same as for the original model.

exports: that the export of oil, especially when production is just getting under way, is not very cyclical in nature. Finally, while the sign for exports to the United States is still not what one would expect, the significance of that regressor rises somewhat.

What can be garnered from all this? Below are the results of the Chow test conducted using the original models. The Chow test again rejects the null hypothesis of no structural change. The error sums of squares are

$$ESS_1 = 23,113,151$$

$$ESS_2 = 3,570,600$$

$$ESS_p = 30,997,243$$

and the Chow test's statistic becomes

$$(46) \frac{[30,997,243 - (23,113,151 + 3,570,600)]/1}{(23,113,151 + 3,570,600)/(64 - 10)} = 8.729.$$

As $F_{1,50} = 7.17$ (where $\alpha = 0.01$), H_0 is rejected. Conducting the same test using the new model will require the estimation of a new pooled regression: 1970I to 1985IV (non-oil)

$$(47) \Delta y^B = 0.254\Delta M_1^S + 0.330\Delta M_2^S - 0.112FI_1 + 0.039FI_2 + 0.006\Delta x_1^{rw} \\ (1.782)^1 \quad (1.580)^2 \quad (-2.106) \quad (0.939)^2 \quad (0.037)^1 \\ + 0.124\Delta x_2^{rw} + 1.019\Delta x^{us} \\ (0.871)^2 \quad (0.563)$$

$$R^2 = 0.19 \quad ESS = 37,309,754.$$

The new Chow test yields,

$$ESS_1 = 23,113,151$$

$$ESS_2 = 3,946,009$$

$$ESS_p = 37,309,754$$

and the Chow test's statistic becomes

$$(48) \frac{[37,309,754 - (23,113,151 + 3,946,009)]/1}{(23,113,151 + 3,946,009)/(64 - 10)} = 20.46.$$

As $F_{1,50} = 7.17$ (where $\alpha = 0.01$), H_0 is rejected.

It is interesting that the null hypothesis is rejected most clearly when exports of oil are excluded from the model for the period 1980I to 1985IV. This would imply that the break would have been more complete in the absence of the North Sea oil.

Evaluation of Econometric Methods

Econometrics can be used only to complement qualitative data; it cannot stand on its own. In econometrics one is able only to "reject" or "fail to reject", rather than "accept" or "fail to accept". Consequently, theory must normally precede the econometrics. To promote a test (cusum and cusum-squares) which purports to allow the researcher simply to enter data into the computer and obtain the points of change as output is perilous.

This sentiment, however, is hardly new. A.F.M. Smith in the comments following Brown, Durbin, and Evans (1975), says

The topics dealt with in this paper are of considerable practical importance and provide a number of challenging problems for the theoretical statistician. The authors have adopted an unashamedly exploratory, data-analytic approach, and are careful to point out that their proposals "should be regarded as yardsticks for the interpretation of data rather than leading to hard and fast decisions".

I wonder if this is really satisfactory? Data exploration is certainly a necessary preliminary, but it seems to me that sooner or later one must provide a more formal, **theoretical framework** within which to assess the outcomes of the significance tests, or the departures occurring in the cusum plots (Brown, Durbin, and Evans 1975, pp.175-176; emphasis added).

Of course, as with most complications involved in the utilization of most econometric techniques, this shortcoming can be somewhat rectified (or at least compensated) once it is recognized. The present researcher has endeavored to do this. However, the authors of the literature referenced

in this work who use the cusum and cusum-squares technique do not seem to be aware of its limitations. Stern, Baum and Green (1979), Khan (1974), and an early version of Deyak, Sawyer and Sprinkle (unpublished) all go to great lengths to present the empirical results of their tests for structural change (and the likely periods of change) and then mention only in passing the possible causes. One would hope the emphasis would be reversed, if not balanced.

In addition to problems in employment of the tests, there exists technical problems as well. Deyak, Sawyer and Sprinkle, as well as this researcher, have found that a slight, acceptable change in the specification of the model often yields a greatly different result. Also, as Volker (1982) pointed out, a "disproportionally large error" (Volker 1982, p.1295) can result in inaccurate conclusions. Reservations are expressed by G. Phillips, as well:

However I find some difficulty in deciding the likely usefulness of the proposed tests in the absence of any investigations of their power under a range of alternative hypotheses. I noticed that the authors referred to the fact that they have not investigated the problem of serial correlation on their tests. There is some evidence in a paper by R.A. Johnson and M. Bagshaw, in Technometrics (1974), 16, 103-112, which suggests that the cusum tests are not robust to departures from independence.

A further point is that recursive residuals are independent only when disturbances are normal. When there is a departure from normality perhaps recursive residuals may be no more effective than the ordinary least-squares residuals (Brown, Durbin, and Evans 1975, p.175).

In light of these difficulties, and despite the interesting results presented for these tests, it would be most prudent to downplay these findings for the remainder of this work. It appears that the controversy surrounding the stability of the United States import demand function will not be resolved until new approaches are employed. Whether that involves

further sophistication of the cusum and cusum-squares tests (this time hopefully combining theory with the statistics) or some new method, the present work can only say that great difficulty remains and that further research is required.

CHAPTER V

QUALITATIVE DATA

Introduction

The qualitative evidence must now be presented and interpreted and reconciled in the light of the econometric results. France will be examined first, followed by West Germany and then the United Kingdom.

France

As the reader will recall, the econometric evidence clearly supported a structural change for France in terms of decline in the expansionary effect of exports to the United States between the periods 1970I-1979IV to 1980I-1985IV. In addition, the estimated regressions suggested that a general decline in the expansionary power of all stimulative measures had occurred. Whether or not this is supported by the qualitative evidence remains to be seen. The first step in evaluating the results for France must be a description of the institutions and predilections of the French economy and of French economic policy. In characterizing the French economy, the term "dirigisme" (direction or management) must surely come to mind. Unlike their Anglo-American counterparts, French policy makers play an active role in planning and supervising business activity (not unlike those in Japan), although some controversy exists over who is directing whom.²⁰

²⁰Hayward (1986) in his Chapter II discusses some of the arguments and concludes with his view that the relationship is more clearly seen as "collusive interdependence".

This relationship between government and business in France has its roots in the history of industrialization in the North Atlantic community. France modernized much later than the remainder of the major Western powers. As economic historians will confirm, the slow pace of French industrialization [in fact, so slow that Dudley Dillard (1967) claims one should not call theirs a "revolution" at all] was due in large part to national character rather than to any factors one might consider as outside their control. Despite their ample resources, large population, numbers of capable "potential" entrepreneurs, and sense of national pride, it took three major defeats and near defeats in the Franco-Prussian War (1870), World War One (1914) and World War Two (1939)²¹ to convince French statesman to make modernization a priority. At the base of this hesitance is, according to Andre Siegfried (1930) a French publicist, the refusal to sacrifice cultural values to routine mechanization. Perhaps this is related to the tendency of French statesman and citizens to be, as one would say in economics or finance, "risk averse". This inclination has had dramatic effects.

The "frugal" French worker would for example, seek the safest haven for his savings, which was often foreign government securities. While this sometimes backfired on the individual investor, it surely always sabotaged the industry of France (Dillard 1967). The French were and are risk averse in a more fundamental and far reaching sense as well. Jack Hayward (1986) writes,

²¹Dillard claims France's under-industrialization was in large part responsible for these defeats.

In the traditional system, the state sought to reduce social conflict and preserve the status quo by regulations restricting both foreign and domestic competition, slowing down the pace of change because this helped both preserve social harmony and France's capacity to go its own way in the world economy. Business performance was only a secondary matter (Hayward 1986, p.25).

A large part of this "mission" dates back to the customary French hostility toward business. When Napoleon allegedly referred to the British as a "nation of shopkeepers", it was not meant as a compliment. The best and the brightest in France entered science, art, letters, medicine, law or government; if one took up business, it was in the hopes one could later join government (Dillard 1967).

Thus, when the French finally realized that industrialization would be necessary for national survival, it took on peculiarly French characteristics. First, the historically strong central government took charge, not only as directors but as owners as well. Second, their strong nationalist tendencies led them to leave in place the protectionist measures already a common tool in the French economy.²² When it was finally general knowledge that lack of industrial capacity had made France weak, it created a sense of crisis which has led to a national determination to correct this impotence.

Consequently, today's France is one in which government protection and direction are not only expected, but seen as a basic duty of the statesman. The term *laissez-faire* is from the French language only, not

²²This desire to industrialize versus the protectionist/isolationist sentiment proved strange bedfellows for French business. Outside capital was desired in theory, but detested when it became fact. See Paintor and Kazimirski (1979).

from its ideology. Table 5.1, Table 5.2, Table 5.3, and Table 5.4 clearly illustrate this point. Table 5.1 shows the tremendous dissatisfaction of the French worker with his lot as compared to that of his fellow countrymen. The remaining tables' indication of French desire for reduction of inequalities, large numbers of stable jobs, and earlier retirement only add to the evidence that economic productivity and free enterprise have historically not been high on the French list of priorities. In modern France, although shifting toward encouraging more competition, it is still true that "economic matters are felt to be far too important to be left to businessmen, industrialists and unruly workings of the marketplace" (Paintor and Kazimirski 1979). In sum, it can be said that French society's disdain and distrust of the "market" and their strong sense of national identity has led them to place affairs of the state ahead of those of business. Industry is fostered only insofar as it promotes France. With this in mind, the economic and political events around 1980 will now be examined in an attempt to perceive the causes of the change in the economy of France.

One possible explanation for the structural change is that the accession to power of the socialists caused the business community to lose confidence, effectively lowering the multiplier effect of exports.²³

²³It may be necessary at this point to remind some that the textbook description of the multiplier is a gross simplification. Very briefly, $k = 1/mps$ is a rough average; the multiplier rises and falls given many factors, including the availability of credit, business confidence, and the stage of the process. See Keynes (1936) for a more detailed description.

Table 5.1. Opinion of the Legitimacy of the Differences in Standards of Living among French and British Workers (1980).

	French workers	British workers
Completely just	10	46
Should be less great	60	38
Should be much less great/ should be no difference	30	16

Source: Lauber, Volkmar. The Political Economy of France. Praeger Publishers, New York (1983).

Table 5.2. French Opinion of Objectives for Economic Development (1972).*

	Total†	UDR (Gaullists)	Rep. Ind. (Giscard)	Centrists (Lecanuet)	Noncommunist Left	Communists
Reduction of inequalities	55	45	47	54	70	65
Protection of environment	31	38	35	38	28	22
Reduce work, more leisure	25	21	17	23	29	42
Develop public investments, services	25	21	32	23	21	28
Increase French economic power	23	34	30	20	19	10
Aid to underdeveloped countries	15	21	18	25	10	7
Development of individual consumer goods (domestic appliances, cars, television sets, and so on)	12	10	14	8	11	17
No opinion	5					

* In percentages.

† Responses to the question, "What two goals should be given priority in the economic development of a country such as France?"

Source: Lauber, Volkmar. The Political Economy of France. Praeger Publishers, New York (1983).

Table 5.3. French Opinion of the Two Main Objectives Public Enterprises Should Seek (1980).

	All %	Left %	Right %
Provide a large number of stable jobs	64	68	55
Give the best possible service to customers	56	57	56
Contribute to the country's economic growth	48	49	57
Develop new techniques	17	16	21

Source: Hayward, Jack. The State and the Market Economy. Wheatsheaf Books Ltd., Brighton (1986).

Table 5.4. French Images of Economic Progress (1972).

What does economic progress represent to you?	Total	Employees	Blue-Collar Workers
Earlier retirement	51	41	65
Pay less taxes	41	31	39
More interesting, less tiring work	28	37	18
Make as much money with less work	26	30	34
Be able to buy more things	20	23	19
Have more leisure	17	30	16
No opinion	5	2	2

Source: Lauber, Volkmar. The Political Economy of France. Praeger Publishers, New York (1985).

Until Francois Mitterrand and his socialist party came to power in 1981, France had been under the control of the political right for over 20 years. In many respects, from an Anglo-American viewpoint, the victory by itself was not so disturbing; France already had a long history of state direction and intervention in the economy. This new Socialist sort of "dirigisme" professed to include redistribution of income to workers, clearly something to be perceived as a setback for business; still, the Socialists had also vowed to work to lower unemployment, to stop what they perceived as the deindustrialization of France, slow import penetration and to broaden the increasingly narrow base of French industry (Machin and Wright 1985, p.2). But, there were those in the business community who viewed the events with apprehension.

However, if such worries had any effect (which is doubtful),²⁴ the complete reversal of Mitterrand's policies--the virage--soon ended them. From June 1981 to March 1982, the Socialists had instituted a program of redistribution and reform, without, as Janice McCormick (1985) points out, "the support of the business and financial community" (McCormick 1985, p.48). The intent was to implement many of the "110 propositions" the Socialists hoped to use to "faire de notre pays le creuset de la liberation de l'homme et de la construction du socialisme" (Machin and

²⁴Business investment did decline ten percent in 1981. Many Socialists blamed business for trying to subvert their plans, and it is probably true that the Mitterrand government's anti-business rhetoric did not help business confidence; however, this likely was not the only or even main cause. Investment had been declining since 1973, and potential business capital had been steadily eroded by rising social security payments and taxes on business. See Jane McCormick (1986), p.51.

Wright 1985, p.1). By March 1982, it was clear that no progress had been made toward the creation of the model socialist state, and the "virage" came in the form of the first austerity plan of 1982 (a second one came in 1983). The reason for the U-turn was, quite simply, poor economic performance. Investment was down (see previous footnote), inflation rising, and the trade deficit rose from 20 billion francs in 1980 to 105 billion francs in 1981 (McCormick 1985, pp.50-51). It was clear that the break with capitalism could not be made (Machin and Wright 1985, p.2). The priorities then adopted by the administration could have easily passed for those of a more conservative government:

1. balance of payments took precedence over unemployment;
2. public expenditures became tightly controlled;
3. household demand was squeezed in favor of company profits;
4. the finances of unemployment compensation and social security were reorganized;
5. downward pressure was exerted on wages in the public sector;
6. the number of jobs in the civil service was reduced;
7. nationalized industries were ordered to put their finances in order--even at the expense of layoffs;
8. painful restructuring plans were pushed through;
9. a tougher line was adopted with private sector industry seeking financial aid;
10. a less nationalistic pose was struck;
11. a more relaxed view was taken of foreign investment and takeovers (Machin and Wright 1985, pp.2-3).

Mitterrand himself said,
les Francais commencement a comprendre: c'est l'entreprise qui cree

la richesse, c'est l'entreprise qui cree l'emploi, c'est l'entreprise qui determine notre niveau de vie et notre place dans la hierarchie mondiale (Machin and Wright 1985, p.3).

If business had worried before, surely the "reconcilier les Francais avec l'industrie" allayed their fears (Machin and Wright 1985, p.3).

Having above dismissed low business confidence due to the new Socialist government's policies, another potential cause of the diminished strength of the locomotive effect will be examined: the high United States interest rates. The large differential between the rates in the United States and those in Europe might have led to capital flight to American banks, causing a liquidity crisis in Europe. There seems to be absolutely no basis for this proposition in the case of France. The high United States interest rate had an impact, but not through capital flows; and there was a liquidity problem for French firms, but it had its roots elsewhere. And here will be found the reasons for the structural change in France.

France is the second most imported energy dependent country in Western Europe. Under Mitterrand, France was importing 80% of her energy requirements. France, as had been the rest of the West, was hit hard by the two oil shocks. Peculiarly, though, the cost of the supply shock was borne primarily by business profits. According to Peter A. Hall (1985),

Between 1975 and 1981 the share of value-added going to profits fell from 17 percent to 9.6 percent while the share going to wages rose from 6.8 percent to 7.5 percent and that of taxes increased from 2.7 percent to 4.3 percent. Profits were squeezed and an investment crisis ensued. The volume of private investment in France fell by 14 percent between 1971 and 1981. At the same time, corporate debt rose precipitously and the rate of **autofinancement** fell. This, in turn, weakened in the ability of the French state to stimulate investment by expanding demand. Low profit margins and high debt levels meant that French firms were slow to respond to a demand stimulus and a lengthy stimulus brought immediate balance of payment problems in the more open economy of the 1980's (Hall 1985, p.82).

So a liquidity crisis existed, but not due to high United States interest rates; OPEC oil prices and the structure of the French response were the cause.

But surely, the reader might say, the "oil glut" of the 1980's has alleviated this impediment to growth? There is more, however, to the French troubles. Oil prices (as are the prices of 37 percent of all French imports) are denominated in United States dollars. This leads to two related obstacles to French policy--one of which is a problem only when United States economic policies are conducted in a certain manner and another which has made traditional French policy (1945 to 1974) impotent in today's interdependent world. The lesser of the two problems, the United States policy related one, will be examined first.

Above it was implied that high United States interest rates did have an effect on the French economy, but not in the manner suggested in Chapter I. As any student in intermediate international economics will relate, large interest rate differentials lead to, *ceteris paribus*, appreciation of the currency in the country with the higher rate. And appreciate the dollar did. From 1980 to 1985 it rose 149 percent in terms of the franc. That same economics student might now conclude that good times for France would follow. French exports to the United States should rise and imports from there fall, and indeed this substitution effect worked itself out. But the volume of foreign trade is more sensitive to changes in world income than changes in price, so that the actual change in revenue was not as large as it might have been (Muet, 1985). On the other hand, with a relatively low short run price elasticity of demand for energy, France found that the dollar rise

created a huge balance of payments burden with respect to oil exporting nations (not to mention those other French imports denominated in dollars). For every ten centimes that the franc fell against the dollar, the French import bill rose by 2.5 billion francs (Hall 1985).

International coordination of macro policies (more on this in Chapter VI) could avoid or at least mitigate the consequence of such United States policies. But the French tendency to use frequent market intervention has created a legacy which cannot survive in today's more interdependent world. It is here that one sees a crucial break with the France of the pre-oil shock era.

From 1945 to 1974, according to Pierre-Alain Muet, "economic growth was largely based on strong demand stimulation leading to foreign deficits which were always absorbed by devaluations" (Muet 1985, p.94). But it appears that the first oil crisis, and then as a final blow the second oil crisis, put an end to such policies; just as much as a dollar appreciation due to United States economic policy makes energy more expensive to France, so, quite clearly, will a franc depreciation engineered in Paris. Moreover, given that such a devaluation is normally employed when the French economy is expanding (as it would be with the locomotive effect), the rise in the price of oil is coupled with a rise in the demand for it. Thus, one would expect to find that the coefficient of exports to the United States in any estimated French macroeconomic equation would be lower from 1980I to 1985III than in 1970I to 1979IV, given the French inability to devalue. Indeed, any given expansionary measure should have less effect in the 1980's. Furthermore, it is likely that such a change would be apparent around 1973-1974, the

first oil crisis. Interestingly, during an early stage of this research a Chow test for structural change in the coefficient for exports was run, rejecting the null hypothesis for the equality of those coefficients in the sub-periods 1970I-1974I and 1974II-1985III. At the time it was assumed that the break was so sudden and so complete in 1980 that it was possible, since those values are included in the 1974II-1985III equation, to show the change earlier than it really occurred. Now it appears that, while the break has become clearer in the 1980's (due especially to the unusually strong United States dollar), it did begin with the first oil crisis.

To reiterate, the external constraints of high oil prices (even with the "oil glut", prices were higher than their pre-1973 level), the dollar denomination of France's external energy needs, and the highly valued United States dollar have led to an international environment in which the French can no longer pursue policy in the same "dirigiste" fashion to which they were once accustomed. This is made clear by Table 5.5. While the price of oil fell 27.5 percent in the 1980's, the 112.6% appreciation of the dollar in terms of the franc meant that oil imports as a percentage of French GDP could only fall 14.5 percent over that same period. The historical attempt by the state to reduce social conflict and to preserve "France's capacity to go its own way in the world economy" has backfired (Hayward 1986, p.25). While the constraints in the early 1980's may have been especially stringent given the strong United States dollar, French dependence on competitive devaluation rather than increases in productivity have led to an untenable situation under any circumstances.

Table 5.5. French Oil Imports and
the Effect of the
Dollar, 1970-1984.

year	francs per dollar	dollars per barrel of oil	oil imports as percentage of French GDP
1970	5.53	1.8	1.6
1971	5.51	2.18	1.8
1972	5.05	2.48	1.8
1973	4.46	2.59/5.04*	1.8
1974	4.81	11.65	4.4
1975	4.29	11.25	3.6
1976	4.78	11.50	4.1
1977	4.91	12.00	3.9
1978	4.51	12.70	3.2
1979	4.25	17.50/40.00*	4.0
1980	4.23	36.00/40.00*	5.5
1981	5.43	37.00	6.1
1982	6.57	34.00	5.7
1983	7.62	29.00	4.6
1984	8.74	29.00	4.7
Rate of Growth 1980-1984	+112.6%	-27.5%	-14.5%

* Beginning of year/end of year.

Source: Compiled from IMF International Financial Statistics, various years.

One is led to question the very rationality of the French policy at this stage. Even in the absence of the institutional barriers outlined above, is a pattern of market interference aimed at social control wise conduct? Is the route to such stability the French desire to be best found through the suppression of domestic and international competition? It seems a strong argument to the contrary could be made. At any rate, this was the choice of the French throughout this century, and the costs must be borne by the succeeding generations. A fitting conclusion to this discussion can be found in Pierre-Alain Muet's "Economic Management and the International

Environment, 1981-1983":

This structural change (a real break with the French growth characteristics of the 1945-74 period) is clearly one of the major developments of the 1980's....

.....

The external constraint on policy-making in France since 1981 highlights the gulf between the national political structures of the past and the international economic realities of today. At the present time the national framework is no longer the relevant framework for macro-economic policy-making (Muet 1985, p.94).

West Germany

The econometric results for West Germany, while not as clear cut as those for France perhaps, also indicated a decline in the power of exports to the United States to stimulate real income. Are the reasons the same as for France? A logical starting point is again the examination of national/cultural institutions. The case of West Germany presents a fascinating contrast to that of France. Here again is a historically interventionist government, but one which has seemingly weathered the oil crises in better shape than her western neighbor. And

again it seems the answers to this economic riddle lie in the process of industrialization (and before).

While Germany industrialized before France, it was not blessed by many of the advantages had by the French. There were not the plentiful resources necessary for the modern economy (Dillard 1967, p.308). Also, the legacy of a strong, recognized central government was absent. Finally, there existed a deep distrust of the market pricing system (Zweig 1976, p.5). These are not characteristics one would consider conducive to modernization. Yet Germany did industrialize, and well before France; furthermore, as mentioned above, its style of industrialization led to the development of an economy so resilient that it did not collapse under the strain of the oil crises. Why?

The answer must in part be the early recognition of the importance of human capital in Germany (or what was later to become Germany). Frederick the Great initiated compulsory education over one hundred years before similar programs in the United Kingdom, the United States, and France. Coupled with traditional German discipline, a trait developed well before industrialization, German leaders were blessed with a very educated, very scientifically minded populace, capable of overcoming the obstacles to economic power nature (in terms of scarce resources) had placed in their path.

Industrialization in Germany took a completely different route than that in England. Konrad Zweig (1976) relates,

The advice to the King of Prussia, allegedly given by Prince Hardenberg, his Chancellor, at the beginning of the nineteenth century: 'We must do the same from above as the English do from below...' sums up neatly the basic totalitarian thinking on economics up to 1918 and beyond (Zweig 1976, p.5).

So while the British middle class took the initiative in the United Kingdom, in Germany it was the state that directed the development. Given the above results for France, one might consider such a state policy a recipe for disaster; yet it was not. How did Germany's plan differ from France's?

First, there was not the disdain for business. Whether it was the protestant ethic mentioned before or simply German stoic discipline versus the French fiery individualism, the former saw business as a worthy, respectable career, while the latter saw it as unimaginative and stifling. Hence, the fine young minds of Germany saw business as a very reputable career choice (Dillard 1967). Second, no doubt because of the long history of disunity in Germany, its leaders were inclined to subordinate the well being of the populace to that of the state. In France, economic change was avoided in order to maintain social harmony; in Germany, economic hardships were endured for the good of the Fatherland. It appears that while modern science and technology had an early arrival in Germany, liberal philosophy and political thought were not to come for many years (Landes 1969, p.129). Finally, Germans were very adept at "borrowing" technology. Like Japan in the nineteenth century, Germany learned early on how to adapt to their own needs techniques developed abroad.

So German industry advanced under the auspices of the state, subjugating a well educated, at least in a technical/scientific sense, populace for the good of the Fatherland; perhaps not everyone's idea of Utopia, but certainly very effective and, to the population of Germany,

quite acceptable.²⁵ By 1871, the area of Germany had risen from the status of individual fragmented states to the strongest power on the Continent of Europe.

After Germany's defeat in 1945, liberal political institutions, as yet foreign to them, were finally superimposed on a society still fairly well characterized by the description above. For instance, education is still emphasized (see Table 5.6) and business is still fostered (see Table 5.7). To this day, a sense of servitude to the state permeates Germany, despite its reindustrialization "from below". Consequently, West German monetary authorities, for instance, have been able to hold inflation at a lower rate than in the remainder of the West throughout the 1970's with policies that would probably have been considered too harsh in Britain, France or the United States (Markovits 1982, pp.4-5).²⁶ In addition, one has not seen in the Bundesrepublik the regular "bailing out" of failing firms from which the French government is just beginning to move away. In fact, except for a new found love of the free market pricing system, the following list of principal economic policies in West Germany from 1972 to 1975 (from Zweig 1976, pp.3-4) is very consistent with this work's characterization of that country thus far:

1. The Bundesbank (BB) pursued a restrictive policy from 1972

²⁵While Germany emphasized technical advancement at the expense of liberal freedoms, there seems to have been no widespread resistance to this process. One need only look at the most popular German philosophers of the day to get a sense of how noble working for the Fatherland was thought to be. Hegel is an excellent example.

²⁶The experience with hyperinflation on the 1920's is a strong influence, as well.

Table 5.6. Vocational Qualifications of the
Labor Force, Britain (1974-78)
and West Germany (1978).

Persons with stated qualification as a percentage of the labor force:			
	University	Intermediate	None
All manufacturing			
Britain	3.3	28.7	68.0
West Germany	3.5	60.8	35.7
All industry			
Britain	5.5	30.0	64.4
West Germany	7.1	59.9	33.0

Source: Morris, D. editor. The Economic System in the UK.
The Oxford University Press, Oxford (1985).

Table 5.7. Corporate Profit Tax Rates:
UK, France, and Germany.

83

	Maximum Rate %	Maximum Rate Starts at £
United Kingdom	83	22,800
France	54	55,300
Germany	56	65,300

Source: Meyer, F.V., editor. Prospects for recovery in the British Economy. Croom Helm, London (1985).

and by March 1973, gaining full control over the monetary base. Since 1973, the monetary base and money supply have increased at a moderate and nearly even rates. The monetary base target was subsequently officially announced for each year in advance, viz. eight percent for 1976. The chief target is the quantity of money and not the level of interest rates.

2. Both Government and BB stated that internal cost increases, particularly high wage agreements and their recovery in prices would not be underwritten by a corresponding expansion in the money supply, **even at the cost of unemployment, lower profitability and bankruptcies**. Gradually the market would again have to determine price relativities flanked by appropriate monetary policies.
3. The Government assisted necessary structural changes in the economy. They also encouraged the redirection of resources misallocated caused by inflation, **but did not rescue firms in difficulty simply for the sake of keeping untenable work places open**. Mobility was encouraged.
4. The Government used fiscal measures to prevent the recession from falling into a "secondary" self-perpetuating deflation, this policy being supported by the BB, **but not at the cost of renewed inflationary money creation** (held by the West German policy makers as the primary cause of inflation).
5. There were large deficits in the public sector in 1974 and 1975 as anti-cyclical supports for the economy. But plans were

agreed in the autumn of 1975 gradually to reduce this, mainly by expenditure cuts, to approximately one third by 1979.

However, the budget deficit was not to be financed by raising the money supply.

6. The Federal Government's economic report for 1976, published at the end of January 1976, **reaffirmed in strong language the principles of a free market:** policies for the restructuring of part of the West German economy, it states, must continue, but such policies must not abrogate the self-steering of the economy via market forces. Government direction of investment is bound to hinder the ability of the economy to adapt to the ever-changing market and production conditions. Policies for restructuring were determined to primarily assist technical progress and the mobility of the factors of production, labor and capital. This was supported by the BB's determination not to exceed the growth in monetary base by 8 percent on average thus avoiding stimulations of dangerous cost and price rises.
7. A sophisticated statistical tool was forged to divide the total budget deficit into a "cycle neutral" (full capacity utilization deficit) and a contra-cyclical component. This made for a more intelligent and realistic appraisal of budgetary policies (Zweig 1976).

What does all this mean in terms of the structural break hypothesized? To anticipate this section's conclusion, it means that Germany's postwar pattern of expansion has not been characterized by demand stimulation accompanied by devaluation as in France. Their bad

memories of the "inflation trauma" of the 1920's has led them to value a strong and stable mark. Their heavily export dependent economy (one out of every four jobs) survived by being more efficient, not through manipulation of the currency. Hence Germany is not faced with the problems of reevaluating their policy for the 1980's, as are the French.

In fact, the structural change in West Germany has a very simple explanation: the United States' real income was expanding (and thus West German exports to the United States rising) when West Germany was not. The figures for 1970I-1979IV indicate that real income in West Germany and the United States tended to move in the same direction (Morris 1985, p.897), suggesting that as exports to the United States would rise, West Germany would be simultaneously stimulating its economy. As one might imagine, these would reinforce one another, leading to a greater overall effect. In the period 1980I-1985IV, West Germany was still holding demand (and prices) in check with its fiscal and monetary policy (refer to Table A.5 in the Appendix), meaning that as exports to the United States rose, West German y did not rise proportionately. While an oddity, this phenomenon is clearly not an indication of major structural change (as it was in the case of France). Thus, West German adherence to conservative economic principles has put them in a position to negotiate the increasingly interdependent world of the 1980's with much more flexibility than France.²⁷

²⁷At this point it bears emphasizing that there was not a change in the trend of West German economic policy or in that of the United

United Kingdom

In the case of Britain, the only clear result to drawn from the econometric analysis is that there is evidence that the structural would have been more complete in the absence of the North Sea oil. The key to understanding the British case lies not in its process of industrialization but in the causes of the eventual decline of British industrial capitalism. Already at the close of the nineteenth century Britain's economic leadership was beginning to falter. The perquisites of being the first to industrialize rapidly faded. Dudley Dillard mentions four reasons for the British decline just before the twentieth century; as their legacy seems to hold sway over the U.K.'s fortunes, it would be beneficial to review them. First, despite British attempts to stem the tide, the inevitable export of machines, capital, techniques, and skilled workmen took its toll. Ironically, it was the development of the free-trade policy around 1843 that led to the rapid dissipation of this British comparative advantage. Second, Britain was even less naturally inclined to industrialization than Germany (Dillard 1967, pp.277-278). Thus, when the United States and Germany entered the race it was only a matter of time before these larger, more populous, and naturally wealthy states would overtake her. Third, and perhaps most

States. This Chapter clearly demonstrates that West Germany was still emphasizing the same forces in their economy (i.e., free enterprise, increasing productivity, and low inflation), but for the first time international economic conditions were such that the respective orientations of United States and West German economists led to dramatically different policy pursuits (more real income growth in the United States as opposed to lower prices in Germany).

important, was the drawback of industrializing first. Just as anyone who buys a new computer today will have a significant advantage over the person whose model was designed five years ago, so it goes with industrial equipment. By the time the United States and Germany began to catch up, Britain was stuck with an inadequate rail system, inferior blast furnaces, and a well established gas lighting system that retarded the electrification of Britain (Dillard 1967, pp.278-279). Finally, despite the revolutionary advances in economic development already to their credit, a deficient education system (one emphasizing the humanities at the expense of the sciences) condemned Britain to a back seat in the technological improvements of the twentieth century (Landes 1969, pp.340-348).

While these causes may be acceptable for the explanation of Britain's initial decline from first place in the world economic hierarchy, the reader may at this point wonder as to how the British found themselves so close to the bottom in the late twentieth century. In fact, each of the above four causes of the initial decline have been again invoked (in slightly different forms and not all by the same author) in explaining Britain's recent precipitous decline. With respect to the inadequate education system, Aubrey Jones (1985) relates:

According to Dr. Arnold, headmaster of Rugby, 'Christian morality was more important than scientific knowledge: rather than have it [science] the principal thing in my son's mind, I would gladly have him think that the sun went round the earth' (Jones 1984, p.4).

Apparently, the British took hold of the romantic movement that had spread across Western Europe in the eighteenth century and have yet to let go (Jones 1984, p.4). The consequences of such an orientation in a

resource poor nation must be obvious, and the current crisis in Britain's industrial base is evidence of the results.

The modern version of the disadvantages of being the first to industrialize has found a home in the United States as well as Britain. While the United Kingdom suffered under the attacks of the Luftwaffe in World War Two, there is no doubt that the destruction in Germany and Japan (the latter one of the newest leaders in the race) was far more complete and devastating. The rebuilding of these Axis economies with United States capital following the war meant that the vanquished would have all the technological advantages the victors had used to conquer them; meanwhile, Britain (and the United States) would be overshadowed. Along similar lines is the argument that Britain's early industrialization meant that she early on developed close links with the primary producing, backward world instead of the newly developing one.

The contention that Britain's free-trade policy has led to the export of industrialization has, in explaining the British economic demise of the late twentieth century, been submitted in a new, more sophisticated framework. Britain's economy has become more and more open, as evidenced by Table 5.8 (a clear factor in this trend was Britain's entry into the European Community in 1973), and as she has lost her overseas markets to competitors she has begun to decline. According to Andrew Gamble (1982):

The course of the hundred years decline was shaped by two momentous choices. The first was the continued adherence to free trade and to the institutions of the liberal world order long after the conditions which had originally recommended it had disappeared. The second was the decision to fight Germany rather than the United States. In two world wars the British helped destroy German ambitions to become the dominant world power. But instead of Britain's power being preserved, that of the United States was

Table 5.8. The Ratio of Imports and Exports
to UK Gross Domestic Product,
1960-1981 (percentages).

	Exports	Imports
1960	21.3	—
1964	19.7	21.3
1966	19.7	19.7
1969	22.4	22.0
1972	22.4	22.3
1975	26.6	28.1
1978	29.4	27.9
1981	27.3	24.4

Source: Morris, D. The Economic System in the UK. Oxford University Press, Oxford (1986).

established (Gamble 1982, p.58).

To the casual observer of history, the suggestion that Britain could have fought the United States instead instead of Germany might seem ludicrous. To a large extent, however, the "traditional" alliance among the United States, Britain, France, and Russia was more a matter of convenience and coincidence than strong ideological identification. At any rate, Germany was the British the "enemy" whose interests least coincided (and therefore least conflicted) with her own. As to the mention of free trade as a detriment, the natural inclination of the international economist is to recoil in disgust. However, it seems that such an orientation on the part of the British, encouraging an intense degree of specialization, may have led to the development of a very narrow base for her economy. When the up and coming foreign economies began to overtake Britain's edge in industry, she was unable to cope. The tremendous structural unemployment of today is the manifestation.

But if Britain is so utterly unprepared to compete in today's world, and if the causes for this inability have been in place for almost one hundred years, why does one see, for instance, the favorable trend of the balance of payments in Britain? As Table 5.9 indicates, the answer must be the discovery of the North Sea oil in the 1960's and the subsequent commencement of production in the mid-1970's (Thirlwall 1986, pp.171-172). Two tremendously important events took place in the 1980's. First, the United Kingdom began to export oil (see Table A.3 in the Appendix). This may have allowed her to expand even more (or at least not less) than otherwise in response to changes in stimulative activity, and thus explains this works contention that the stimulative power of the

Table 5.9. United Kingdom: Balance of Payments
and the Effects of Oil.

	(£ billions)				
	1980	1981	1982	1983	1984
Trade balance	1.4	3.4	2.1	-1.1	-4.1
of which: oil	0.3	3.1	4.6	6.9	7.3
non-oil	1.0	0.2	-2.5	-8.0	-11.4
Invisible balance	2.1	3.6	2.8	3.4	4.3
Current balance	3.5	6.9	4.9	2.3	0.2

Source: European Economy, March 1984.

locomotive effect in Britain has not fallen as much as it might have. Second, for the first time in history, Britain recorded a balance of payments deficit in manufactured goods. Table 5.10 shows the employment effects of this disaster. As A.P. Thirlwall (1986) explains,

Very worrying from the point of view of the real economy, however, and its future prospects was the fact that in 1982/83 the country recorded a trade deficit in manufactured goods for the first time in economic history. Oil, and a surplus on the invisible account [services], now alone pay for essential raw materials and food and the country's appetite for foreign manufactured goods. As the production and export of oil level off and decline, this adverse trend will not be sustainable. The United Kingdom will have to export more manufactures or 'die' (Thirlwall 1986, p.172)!

So it would appear that an increasing propensity to import, partially offset by the North Sea oil exports, has led to the decline in the expansionary effect of exports to the United States. Worse yet, many feel that the North Sea oil has led British policy makers to put off until tomorrow what no longer need be done today:

Nevertheless, the size of the discoveries and the importance of oil in the western economy have begun to cushion the British economy against the worst effects of the recession. **They have helped disguise the serious decline of competitiveness of large sectors of British industry, and have removed for a time balance of payments problems despite the level of import penetration.** It has also led since 1976 to a rapid appreciation of sterling to a level where it reflects the security of the oil wealth rather than the relative productivity of British industry. The revenues, although they have barely begun to flow, are expected to ease the problems of funding public spending, particularly the costs of the growing numbers of the unemployed, as well as leaving some scope for tax cuts (Gamble 1981, p.203; emphasis added).

and,

North Sea oil started to save and earn foreign exchange immediately it came on stream in 1973, and in 1980 the United Kingdom became a net exporter of oil....The trade balance in oil is now just over £7 billion. In addition, the various taxes and royalties that the government collects gives it around 70 per cent of the earnings from North Sea oil and amounted in 1984/85 to approximately £12 billion. These earnings of foreign exchange and tax revenue provided the country with a golden opportunity to embark

Table 5.10. Changes in Employment in British Manufacturing Sector, 1975 to 1982.

	1975-79 %	1979-82 %
All Manufacturing	-2.9	-21.4
Food, Drink, and Tobacco	-2.7	-13.8
Coal and Petroleum Products	-7.7	-33.3
Chemical and Allied Industries	+5.2	-15.7
Metal Manufacture	-10.9	-36.1
Mechanical Engineering	-2.9	-23.3
Instrument Engineering	+1.3	-15.7
Electrical Engineering	+1.2	-15.3
Shipbuilding and Marine Engineering	-9.0	-15.6
Vehicles	-1.4	-27.2
Metal Goods	+0.8	-23.4
Textiles	-13.1	-29.9
Leather, Leather Goods, and Fur	-14.6	-22.9
Clothing and Footwear	-8.3	-26.2
Bricks, Pottery, Glass, Ceramics, etc.	-3.0	-23.5
Timber Furniture, etc.	-5.3	-17.7
Paper, Printing, and Publishing	+0.5	-11.8
Other Manufacturing Industries	-4.3	-26.0

Source: Thirlwall, A.P. Balance-of-Payments Theory and the United Kingdom Experience. Macmillan Press, London (1986).

on a programme of economic rejuvenation. Instead, there was an economic retrenchment and the early 1980s witnessed the worst recession since the Great Depression of the 1930s. Over the period 1979 to 1983, national output was virtually stagnant, and actually fell by 3.7 per cent between 1979 and 1981; unemployment rose by over two million; investment contracted, and the demise of manufacturing industry accelerated. It appears that the tax revenue from North Sea oil has been largely used to finance growing levels of unemployment and to reduce the size of the Public Sector Borrowing Requirement (i.e. saved), and that the foreign exchange has been used to purchase ever increasing quantities of foreign manufactured goods largely for consumption purposes and certainly not as a consequence of a planned program of economic expansion. In short, there appears to be little, if anything, to show for the bounty of North Sea oil. What should have been a blessing seems to have turned out to be a curse. Economic historians will look back with incredulity at this period in British economic history when the country was one of the major oil producers in the world, yet suffered so chronically (Thirlwall 1986, p.282).

This would certainly be a sad eulogy for the initiator of a system whose attributes have become synonymous with the terms "developed", "modern", and "Western".

Summary

In conclusion, it is theorized that the effect on GNP/GDP of the countries studied by exports to the United States has diminished in France, West Germany, and the United Kingdom. This work hesitates to refer the West German case as a "structural change" as it was primarily due to a lack of coordination between its policies and those of the United States. Had West Germany decided to expand with equal vigor, it is likely a similar hypothesis would not have emerged. The French case is a more serious one, for, while United States policy in the form a strong dollar were in part responsible for the decline, it was the French tendency to rely upon currency depreciation as a tool for increasing export competitiveness that really led to the break with the past behavior. As this tendency has its roots in the particular institutions

of France, this is clearly a deep seated problem. However, the "virage" of the Mitterrand government offers hope that they have recognized the divergence of their cultural/sociological tendencies from economic reality and will make a sincere attempt to redress these problems. The case of Britain is an anomaly, for, while they "appear" statistically (at least with respect to balance of payments) in the best shape of the three, it is in fact here that the most serious problems lie. Only the North Sea oil has prevented the ability to stimulate Britain's economy from falling further; in 1982/83 the balance of payments deficit with respect to manufactured goods made strikingly clear how decreasing competitiveness has caused British consumers and firms to turn abroad for many goods once purchased domestically. Oil cannot hide Britain's declining competitiveness forever. Again, institutional factors are to blame, but unlike the French case, while perhaps recognized, the problems have been ignored for now. The oil has become a curse, not a blessing.

So this work has examined three approaches to an increasingly interdependent world (Table A.4 in the appendix gives an overview of the effectiveness of these approaches in terms of changing productivity), whose results have been investigated in terms of the locomotive process and whose roots are found their respective economic histories.

CHAPTER VI

FINAL CONCLUSIONS

Recapitulation

A number of facts regarding the locomotive effect have been established to this point. For France, the Chow test rejected the hypothesis of no structural change in the macro equation around 1980I, and the accompanying macro equations clearly indicated a decline in the power of the locomotive effect (and most likely all stimulative measures). In addition, it was discovered that the hypothesized decrease in the power of the locomotive effect is related to the French practice of devaluing the franc during periods of expansion in an attempt to diminish the contractionary effect of rising imports. The tremendous French dependence on dollar denominated imported energy, however, has meant that since the oil crises, every fall in the price of the franc simply makes that energy more expensive, resulting in a contractionary rather than expansionary effect for devaluation. This new relationship was especially clear in the early 1980's, when the dollar was unusually strong. But the French government does seem to be aware of this dilemma and is working toward building a France that can be competitive as a result of rising productivity and not simply due to devaluations.

In the case of West Germany, the Chow test again rejected the null hypothesis of no structural change. The estimated macro equations indicate a decline in the coefficient of the regressor for exports to the United States (although a rise in its significance). In this instance, the decrease in the parameter was theorized to be linked to the West

German refusal to stimulate their economy at the same time as the United States. As this had not been the trend in the past, one would naturally expect a lower coefficient for exports to the United States after 1980. Obviously, this is not a structural change on the same scale as that for France.

For the British, two Chow tests were run, both indicating structural change. On the basis of these, it was hypothesized that the production of the North Sea oil has led to a smaller decrease in the locomotive effect than otherwise possible since the tremendous injections generated by the oil exports have somewhat offset the increasing propensity to import caused by the decreasing competitiveness of British manufactured goods. Unfortunately, it seems that the windfall of oil has only encouraged British policy-makers to delay the inevitable restructuring of their economy.

With respect to the import demand function and the question of its stability, this study has provided evidence for the contention that searching for structural change without the guidance of an accompanying theory must necessarily be futile. Not only do there exist methodological problems with the cusum and cusum-squares tests, but technical ones as well. These popular tests are surely not the proper path to discovering the behavior of the import demand function.

Implications

When this project began its goals were to discern the cause(s) for the apparent declining power of the locomotive effect. What it has also become is an assessment of the historically rooted national economic priorities of three European states and their adaptability and likelihood

of success in an increasingly interdependent world. The change in the structure of the international transmission mechanism (indicated by the econometric work and partially confirmed by the wealth of descriptive statistics), it seems, is merely a symptom of more fundamental changes.

In Chapter I, four aims of this work are set forth: first, to provide insights important in guiding policy makers in their efforts to maintain a calm international economic environment; second, to provide a new historical perspective on the 1970's; third, to suggest a role for prognosis in economics; and last, to check the results of several previous works. These will be addressed in reverse order.

In studying the import demand function it was realized that the tests based on the examination of recursive residuals, the popular approach in the literature, are so unreliable as to preclude any conclusions on this front. A new approach must be found if further progress is to be made. As for Greene and Lutz's (1978) contention that the "tenure of the United States as a world power may be one of the shortest in history," the response must be twofold. On the one hand, the contest for the United States position at the top of the hierarchy of international economic powers does seem to have some new, viable contenders. On the other hand, the tremendous international response to United States monetary policy in the early 1980's, a policy with the strictly domestic goal of price stabilization, showed the continued influence of American actions (though not in the form of the locomotive effect). Perhaps Green and Lutz's (1978) eulogy was premature.

For aim number three, the advice of John Maynard Keynes (1936) seems most appropriate:

The object of our analysis is not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organized and orderly method of thinking out particular problems; and after we have reached a provisional conclusion by isolating the complicating factors one by one, we then have to go back on ourselves and allow, as well as we can, for the probable interactions amongst themselves. This is the nature of economic thinking (Keynes 1936, p.297).

Although Keynes' implied criticism is not of econometrics, but of "pseudo-mathematical methods" (Keynes 1936, p.297), the principle is the same. Without the institutional analyses of the French, British, and West German economies, one cannot discover the origins of the structural changes from simply examining the parameters of some set of estimated econometric equations. Yet, without such equations, how is one to forecast?

The historical approach of this work has not only given a new view point on the 1970's, but has added a new chapter to the history of the industrialized West. It has illuminated, by way of the locomotive process, the progress of three national programs, based on historical and cultural precedent, whose basic aims have not changed since their "inception".

It is natural to ask at this point the role played by OPEC in the apparent failure of France to achieve commercial success in the 1980's. Would they, one might wonder, have been able to succeed, at least "muddle along", in the absence of that tremendous supply shock? OPEC has only hurried the inevitable. A system based on reducing competition and competitive devaluation could not have lasted long in the increasing interdependence of today's international economic environment. According to A.P. Thirlwall (1986),

...many countries' balance-of-payments difficulties originate from

the supply side and in non-price factors, for which price adjustments are not appropriate. Downward price adjustment, by manipulating exchange rates, merely makes countries more competitive in the short run in goods with a given set of characteristics which were the source of the balance-of-payments difficulty in the first place. In a growth context continual depreciation would be required to raise the balance-of-payments equilibrium growth rate permanently, and again the industrial structure would be ossified (Thirlwall 1986, p.277).

In conclusion, this work has shown how the 1970's and early 1980's have been a watershed in economic history. They have brought to a head the effects, good and bad, of the national priorities adopted in the previous century(ies) of these three states.

Finally, this study leads to some very important policy conclusions. As implied in Chapter I, the pre-1973 predictions of the benefits of flexible exchange rates missed the mark by a considerable margin.²⁸ First, advocates of the fluctuating regime held that the changes in the rates under such a system would be small and systematic, allowing each economy time to adjust; under fixed rates, changes, when they came, were sudden and rather large and typically only after macroeconomic policy failures. Table 1.2 (page xx) shows the fallacy of this argument. Even before the switch in 1973, some had warned that the potential large variability of rates under a floating regime might add an "additional cost [that] would push world trade back toward barter" (McCulloch, 1983). There is, in fact, some evidence of this.

Consequently, there has been an increasing emphasis on the use of international policy coordination as the key. This move toward the

²⁸See especially Friedman (1967).

advancement of policy coordination among the industrialized countries is widespread in both the theoretical literature and in practice. The Group of Five (the United States, France, West Germany, Japan, and the United Kingdom) have already met and agreed, at least rhetorically, to begin coordination of their policies (Meyer 1986). Had such been the case before the early 1980's, it is likely that the simultaneous expansion in the United States and the controlled recessionary-growth in West Germany would not have taken place. In the event, a valuable opportunity for simultaneous demand stimulation in the West was lost, and the aims of policy in both countries were blunted. As Rachel McCulloch says,

Countries acquired the technical capacity to pursue autonomous monetary policies because they were no longer required to peg their exchange rates, but they were severely constrained in exercising this autonomy on account of the undesirable effects of large exchange-rate movements on their domestic economies. Furthermore, the system of flexible exchange rates could not suppress structural interdependence; the system proved to offer ample channels for the continued international transmission of macroeconomic disturbances (McCulloch 1983).

If the West is to achieve anything resembling the average rate of growth of the 1950's and 1960's, it must do so together.

Of course, all this has been said before. What has this work added to this general policy orientation? A better understanding of the motivations behind the pursuit of the different policies and an incentive to search out those motivations in the general course of economic research.

Hence, once one is aware of the reluctance of the French to allow foreign interests into their borders, or of the Germans to permit inflation to take a firm hold (regardless of the costs), or of the British to subject their youth to the morally barren fields of science

and technology, one's understanding of the events described above becomes much more accurate. Expectations, too, become more realistic. This is not to say that the economist should pursue policies that are only second best. On the contrary, but once institutions are set in place, it is difficult to change them.

And herein lies the problem with the United Kingdom and France today. The prepossession of policy in the three nations studied here has remained largely the same for over a hundred years. For France and Britain, this is spelling their decline as industrial powers. While cultural identities and differences, when not leading to conflict, are to be nurtured and enjoyed, it is difficult to see how the British and French can continue do so in the midst of massive structural unemployment and declining productivity. Already, the French are beginning to realize this; the British, perhaps because the North Sea oil is delaying the inevitable, are not. Even in the case of West Germany, it was part of the liberal political philosophy forced upon them by their conquerors following World War Two that led to their sudden love for the market pricing system. In that sense, it is only in France (so far) that both the realization of the need for change, and the beginnings of change itself (under a Socialist regime, no less!) have come from within. Perhaps this is a sign that the same could occur in Britain as well.

Obviously, this is a problem "coordination of macro-policies" cannot resolve. How does one go about changing institutions? The same way the French are starting. No other institution in modern society has the power, resources, and incentive to set into motion the forces of change that the government does. From simple propaganda to actual vocational

training, the governments of the stagnating West can stage a comeback. France has made a start; Britain must as well. And as no one benefits from an impoverished trading partner, all the industrialized countries can and should coordinate these efforts as well. This researcher sincerely hopes and believes that we can again attain at least something approaching the high levels of growth once the trademark of the West. The key, however, is institutional change.

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APPENDIX

Table A.1. Performance of Major Economies after First Oil Shock (differences between outcomes in 1974-75 and 1969-73).

	GDP*	Consumer price inflation*	Unemployment†	Current balance‡
United Kingdom	-4.5	12.1	0.4	-6.4
France	-3.9	6.5	0.9	-0.8
Germany	-4.8	1.2	1.8	5.6
Italy	-4.0	11.5	-0.2	-6.1
Japan	-7.4	10.6	0.4	-5.7
United States	-4.1	5.1	2.0	11.0

* Differences in average annual percentage rates.

† Differences in percentages of the labor force.

‡ Differences in US\$ billion, annual rates.

Source: Morris, D. The Economic System in the UK. Oxford University Press, Oxford (1986).

Table A.2. Performance of Major Economies
after Second Oil Shock
(1976-1982).

	GDP*†	Consumer price inflation†	Unemployment‡	Current balance§
United Kingdom	0.6	12.6	7.8	3.5
France	2.2	11.3	6.0	-1.8
Germany	1.9	4.5	3.9	-1.1
Italy	2.2	16.5	7.5	-1.7
Japan	4.6	5.1	2.1	3.3
United States	2.1	9.2	7.1	-3.9

* The two terminal periods of this period are cyclically not strictly comparable (1976 was a year of rapid recovery, 1982 was a year of semi-recession), but while this impairs growth comparisons with earlier periods, it does not impair inter country comparisons.

† Average annual percentage changes.

‡ As percentage of the labor force.

§ Annual Averages, in US\$ billion.

Source: Morris, D. The Economic System in the UK. Oxford University Press, Oxford (1986).

Table A.3. World Crude Oil Production,
1973-1983.*

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
United Kingdom	†	†	30	240	765	1095	1600	1650	1835	2125	2360
France	25	20	20	20	20	20	25	30	35	50	35
West Germany	130	120	115	110	105	100	95	90	90	85	80
Western Europe	445	440	625	910	1410	1820	2380	2560	2720	3070	3485
United States	9210	8795	8375	8130	8245	8705	8550	8595	8570	8650	8655
OPEC	31280	31055	27530	31090	31690	30275	31465	27470	23270	19875	18275
World	58515	58610	55685	60075	62555	63075	65785	62780	59245	56995	56395

* Thousands of barrels per day.

† Less than 5 thousand barrels per day.

Source: Jenkins, Gilbert. Oil Economists' Handbook. Elsevier Applied Science Publishers, London (1986).

Table A.4. Productivity Trends* (average annual percentage changes)

	<u>entire</u> <u>period</u>	<u>break down</u>		
	1953-79	1953-61	1961-73	1973-79
United Kingdom	2.2	2.0	2.9	1.2
France	4.3	5.0	4.6	2.8
Germany	4.4	5.2	4.5	3.2
OECD Europe	3.8	4.1	4.4	2.3
United States	1.3	1.4	2.0	0.1
Japan	6.6	7.1	8.1	2.9
OECD	3.1	3.3	3.8	1.5

* GDP per employed person.

Sources: Morris, D. The Economic System in the UK. Oxford University Press, Oxford (1986).

Table A.5. Comparison of Monetary and Fiscal Policies over the Period 1971-1985.

year	<u>France</u>		<u>W. Germany</u>		<u>United Kingdom</u>		<u>United States</u>	
	%ΔM	FI	%ΔM	FI	%ΔM	FI	%ΔM	FI
1971	6.1	0.16	4.4	-130.1	-1.0	36.4	4.3	1.36
1972	7.9	0.10	8.4	201.2	-0.2	270.9	3.2	3.40
1973	2.1	-0.97	-1.1	-6.2	3.5	-130.1	0.7	-4.37
1974	3.3	2.41	-0.9	-414.6	12.5	499.0	-2.5	-1.48
1975	-0.6	-1.10	8.4	-129.0	-4.7	-217.1	-4.9	6.80
1976	3.2	-2.35	10.4	175.9	7.4	-82.6	-0.3	-1.14
1977	-0.6	-0.45	4.3	-28.9	1.0	-115.1	0.5	0.91
1978	2.5	-1.07	8.7	47.8	-7.8	462.4	2.3	-2.81
1979	2.1	0.24	3.1	119.1	4.1	-124.9	-3.8	-0.99
1980	-3.8	0.21	-1.8	-360.0	-6.8	-138.2	-0.6	0.31
1981	0.6	-0.93	-2.2	-297.6	-3.9	-952.9	-2.8	0.71
1982	-1.7	5.4	-0.6	-534.4	0.3	441.0	0.6	6.52
1983	0.5	2.2	6.5	-54.7	3.7	-78.9	7.4	-4.93
1984	2.1	-2.1	1.6	-181.9	3.5	-75.6	3.0	6.87
1985	1.2	NA	2.2	-130.5	-0.9	-86.3	6.2	2.44

%ΔM: Annual percentage change in the real money supply.

FI: Calculated $-(\Delta T - t\Delta Y) + (\Delta G - g\Delta YP)$, where T=government revenue, G=government expenditure, YP=potential real GNP, t=base year ratio of revenue to GNP, and g=base year ratio of expenditure to GNP. The base year is 1979 and the potential growth rate of real GNP is 3%. As the unit of measure for each country is different, the magnitude of these values are not comparable across countries.

VITA

John Terence Harvey was born in London, England on January 20, 1961. He attended various elementary schools in the eastern United States and was graduated from Knoxville Catholic High School in Knoxville, Tennessee in June 1979. The following September he entered The University of Tennessee, Knoxville, and in June 1983 received a Bachelor of Arts with highest honors in Economics and Political Science. In the fall of 1983 he accepted an assistantship with the Department of Economics at The University of Tennessee, Knoxville and began work toward a Doctor of Philosophy. This degree was awarded in June 1987.

While in graduate school Mr. Harvey served the student government in various capacities, including President of the Graduate Student Council during the academic year 1985-86.

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