UNIVERSITY OF BIRMINGHAM

Department of Economics

Beggar Thy Neighbour: British Imports During the Inter-War Years and the Effect of the 1932 Tariff

Nicholas Horsewood

Somnath Sen

Anca Voicu

Beggar Thy Neighbour: British Imports during the Inter-War Years and the effect of the 1932 tariff

Nicholas Horsewood[1], Somnath Sen[1]* and Anca Voicu[2]

(1) Department of Economics, University of Birmingham, Birmingham,
B15 2TT, United Kingdom

(2) Department of Economics, Rollins College, 1000 Holt Avenue,

Winter Park, FL 32789

Abstract: With the competitiveness of UK manufacturing declining steadily during the inter-war period, and a significant rise in unemployment in the early 1930s, the UK government responded by introducing the General Tariff in February 1932 in an attempt to halt the increase in unemployment and the deterioration of the current account. This paper focuses formally on UK aggregate imports in the inter-war years, by estimating an import demand function on a new data set, and considers the effectiveness of this fundamental change in trade policy.

1. Introduction

The inter-war years were a remarkable watershed for British economic policy-making, particularly in terms of trade policy. From being the world's leading exponent of free trade, as befitting an imperial power with a dominant hegemonic position in the global trading order of the 19th century, Britain became increasingly concerned about open trade and free market policies, which were leading to large trade deficits and a deflationary impact on aggregate output and employment. Interventionist policies in the context of external trade ranged from exchange rate intervention to import controls to ultimately the imposition of the general tariff in 1932 – the final deathblow to a liberal non-discriminatory international trading regime. Much of the policy debate in Britain during this period hinged around ways to stop the rise of trade deficits as well as how to face the consequence of the rise in the volume of imported goods. It is therefore important formally to evaluate the determinants of British imports during the inter-war years and to assess the role of the increase in protectionism in 1932.

During the 19th century, Britain enjoyed the status of the dominant economic power, both in terms of trade and foreign investment but also in terms of institutional arrangements such as the role of the Bank of England and the presence of the London commodity markets (for example gold, the core asset within the Gold Standard mechanism). With a strong manufacturing economy, and intimate trading relationship with the Empire (Ferguson 2004), Britain was the major international trading nation. British exports rose by over thirty times during the 19th century, fourfold between 1800 and 1850 and eightfold between 1850 and 1913. By 1914 Britain accounted for 14 per cent of world exports, a proportion far higher than its share in world GDP or industrial production. Sterling was the world's leading vehicle currency and British foreign direct investment accounted for 45 per cent of the world total by 1913. The First World War, loss of export markets, and the rise of the United States changed all that so that the inter-war years saw a dramatic reversal of British economic power and prosperity.

The demise of British hegemony in the world economic order is attributed to both political reasons (end of war, nationalism, social support for interventionism and beggar-thy-neighbour policies of its European partners and the United States) and economic reasons (mass unemployment, deflation, Great Depression and its aftermath). However, it was the trading position of Britain that led to maximum concern and angst, in particular the

overvaluation of sterling, the decline in exports attributed to the appreciating real exchange rate and the diminishing trade surplus partly due to rising imports. Britain's share of world export values declined steadily from 14 per cent to 11 per cent between 1914 and 1928. During the 19th century there were only two years when Britain ran current account deficits. In the short span of six years between 1925 and 1931 there were already two years with nominal deficits, while the secular value of the current account surplus was consistently downwards (Eichengreen, 1995). Since the War, Britain had consistent, structural and long-term deficits in merchandise trade.

It is important to investigate whether economic factors were responsible for the increase in imports and hence a continuing reduction in the current account surplus (or a rise in deficits). Further, it is also important to judge whether exports were suffering due to export prices becoming less competitive given the fluctuations in the real exchange rate. A formal study will allow us to explain some of the underlying long-term structural factors behind the British concern at its fall as the world's leading trading power as well the short-run expediency to increase the trade balance through the imposition of the General Tariff of 1932.

Although data issues force us to deal with aggregate imports, it is worth noting that tariffs were not imposed on food, agricultural and raw material items. Thus, much of empire trade was exempted from the tariff wall, particularly the importation of primary products. However, Britain ran predominant deficits with manufacturing and semi-manufacturing nations (USA had the highest trade surpluses with Britain during the post-war period) while British surpluses were often highest for the colonies (for example, India, South Africa). It would be interesting to estimate the import demand equation for foreign (non-empire) countries, at which the tariffs were predominantly aimed, but lack of disaggregated data precludes such an analysis.

Our predominant concern is to look at the *macroeconomic* implications of import demand and protection. The impact of tariffs on aggregate GDP has produced a large *theoretical* literature since the classic Mundellian use of the Laursen-Metzler effect to demonstrate that tariffs will always have a contractionary impact on aggregate output under flexible exchange rates. More recent work (Krugman 1982, Ford and Sen 1985) do come out with opposing points of view using standard macroeconomic models. Fender and Yip (1989), utilising a more formal framework, demonstrate that tariffs do not seem to have a positive impact on

GDP except under special assumptions. Given the controversy in the theoretical literature, our approach is more historical and empirical since the British case study is perfectly poised to show the impact of actual tariffs on import demand and thenceforth to the aggregate economy through its influence on effective demand. Britain's imposition of tariffs almost coincided with its exit from the gold standard (unlike the experience of other European countries analysed in Wolf (2008)), hence the theoretical literature on exchange rates and protectionism may not be fully valid.

The objective of this paper is three-fold. Firstly, to estimate an import demand function for Britain during the inter-war years and to assess the role of various aggregate economic variables (such as GDP or relative prices) that may have affected the volume and value of imports. Secondly, we intend to analyse formally both short-run as well as long-run relationships to investigate both the dynamics of import variation and the long-run equilibrium. Thirdly, to revisit the impact of protectionism in the 1930s and examine whether the tariff led to import substitution, resulting in a better trade balance and consequent improvement in economic performance. In doing so the paper sheds light on an unanswered policy issue in inter-war Britain. Two contradictory points of view dominate the literature: "The tariff had very little effect on the growth of newly protected industries between 1930 and 1935" (Richardson (1967) p 247); "The evidence suggests that at a macroeconomic level of analysis the policy shift to protection in 1932 benefited the British economy by generating a major fall in the manufacturing sector's import propensity"(Kitson and Solomou (1989) p 168). We try to reconcile the two and provide a more balanced centrist viewpoint.

This paper is organized as follows. Section 2 presents an account of the development of British trade during the inter-war period, with special emphasis placed on imports and the decline in competitiveness of UK industries. The subsequent section discusses British trade policy during the 1920s and 1930s, in particular the move away from free trade in 1932. A survey of the existing literature is then presented and the empirical controversies discussed. This is followed by an outline of the general specification for an import demand function and then a discussion of the core econometric issues takes place, in particular that of non-stationary data and co-integration. The empirical analysis is presented in Section 5, containing the econometric model of import demand in the inter-war period. Section 6 concludes the analysis and discusses policy implications.

2.   The Evolution of British Trade between 1919-1938

For centuries, Britain had been very successful both economically and politically, always seemingly a step ahead of the other nations of the world. However, once the First World War ended, Britain started the process of post-war rebuilding, just like the other nations of Europe. As can be seen from the annual data in Table 1, an early casualty of the war was trade.

Table 1: UK trade in the inter-war years, by value and volume: 1919-1938

	Value (£m)			Volume (1938=100)		
	Imports (Cif)	Exports	Re-exports (Fob)	Imports	Exports	Re-exports
1919	1626	799	165	73	95	129
1920	1933	1335	223	92	123	148
1921	1086	703	107	60	86	129
1922	1003	720	104	70	119	133
1923	1096	767	119	77	129	141
1924	1277	801	140	86	132	159
1925	1321	773	154	89	130	155
1926	1241	653	125	93	117	135
1927	1218	709	123	96	134	141
1928	1196	724	120	93	137	137
1929	1221	729	110	99	141	132
1930	1044	571	87	96	115	126
1931	861	391	64	99	88	120
1932	702	365	51	86	88	106
1933	675	368	49	87	89	99
1934	731	396	51	92	95	99
1935	756	426	55	92	102	103
1936	848	442	61	99	104	102
1937	1028	521	75	105	113	106
1938	920	471	61	100	100	100

Source: Capie (1983)

Trade volumes contracted considerably during the war years, especially on the export side. As UK industry was concentrated on the war effort, overseas markets were lost and they were not fully recaptured in the 1920s. Although the volume of exports remained reasonably high during the early and mid 1920s, it did not increase in line with expanding world trade. The collapse of world trade in the wake of the Great Depression took its toll on exports, which fell precipitously after 1920 and never fully recovered even to its early 1920s level. The trade deficit was as much a product of falling exports and declining competitiveness as it was about

tariff protection. Over the decade 1921-31, imports rose continuously, until the fall in GDP and the impact of the general tariff produced a large decline in the volume and value of imports until its revival in the late 1930s. The inexorable rise in imports during the 1920s, and the beggar-thy-neighbour policies followed by continental Europe and the United States, created the political economy backdrop to the call for protectionism. Our interpretation of the econometric estimates, later in the paper, will attempt to explain whether the policy change could have been potentially successful or not.

By considering the destination of exports and the source of imports into foreign and the Empire, the redirection of trade between the 1920s and 1930s can be gleaned from Table 2. The volume of exports was maintained by an increased reliance on the Empire, where imperial preference may suggest that British producers faced less competition. In the rest of the world the business environment was more cut-throat and the share of sale declined in this region.   A similar shift towards the 'Empire' pattern can be observed for imports, although the change between the 1920s and 1930s were not prominent in spite of the tariff of 1932 (which excluded primary products of Empire countries).

Table 2: Direction of UK trade, 1920-1938 (Averages, percentage shares)

		1920-1929	1930-1938
Foreign:	Imports	70	64
	Exports	57	54
	Exports & Re-exports	61	57
Empire	Imports	30	36
	Exports	43	47
	Exports & Re-exports	39	43

Source: Capie   (1983)

The annual growth rate of trade, broken into its constituent parts, during the 1920s and 1930s confirm this trend of the 'push to the Empire'. In Table 3 we give core data for (approximately) these two decades to show the re-orientation of trade, mostly structural and long term, but also somewhat tariff-induced. Although the Ottawa Conference of 1932 was an important factor in shifting towards a formal imperial preference regime, a comparison of these two decades indicate that increasing Empire trade was a long-term trend and the tariff regimes may only have enhanced the speed at which this movement was taking place during the inter-war years.

Table 3: Annual growth rate of trade among participants, 1922-1938 (percentages)

	1922-1929	1933-1938	Difference
UK-Empire	4.0	7.9	3.9
UK-Foreign	3.6	4.5	1.9
Empire (non UK)-Foreign	3.4	5.6	2.2

Source: Capie (1983)

Table 4 presents a picture of the UK current account from 1925 to 1939. In the 1920s the overall current account balance was generally in surplus. However, by 1932 the figure had become negative and continued so for the remainder of the decade.

Table 4: UK balance of payments-current account, selected years 1925-39 (£million)

	Merchandise exports[1]	Merchandise imports	Visible balance	Invisible balance	Overall current balance
1925	943	1208	-265	+317	+52
1932	425	641	-216	+165	-51
1937	614	950	-336	+289	-47
1930-1939 Annual average	519	779	-260	+209	-51

Source: Feinstein (1972), Table 15, Alford (1996) p. 139, Table 5.1.

3.   British Trade Policy

Since the late 1870s British producers began facing increased competition in international markets, partly as a consequence of the economic development of countries like Germany and the US and partly a result of protectionist measures being implemented in the rest of the world. Although there was some pressure to respond, British governments adopted a free trade policy stance.

---

[1] Includes re-exports.

During the First World War, which can be seen as a watershed in trade policy as traditional British export markets were being lost and those manufacturers able to produce goods for the consumer market were struggling to maintain their market share, the McKenna Duties were introduced in 1915. The goods protected were those deemed necessary for the war effort and ranged from motor vehicles to chemicals. The protectionist measures were maintained in peacetime under the Safeguarding of Industries Act of 1921.

The general sentiment for free trade was still present, although slightly eroded, and one of the first Acts passed by the Labour government of 1924 was the removal of the duties. The following year the Conservative government reinstated the protectionist measures. Although this could be viewed as a policy against free trade, an alternative explanation could be that the return to the Gold Standard at the pre-war rate made British producers uncompetitive in domestic markets. The tariffs were a measure to assist the domestic manufacturers in the UK.

During the boom period of the late 1920s no new duties were introduced as the public pressure for their introduction was low. The onset of the Great Depression saw a series of trade barriers implemented in foreign markets and British producers experienced a decline in their share of the shrinking volume of world trade. By 1931 the UK current account went into deficit and there was a significant decline in invisible earnings. The crisis came to a head in September and the government allowed sterling to come off the Gold Standard. The decision gave the government more room to manoeuvre and an expansionary monetary policy was pursued to attempt to halt the rise in UK unemployment. As a consequence of leaving the Gold Standard, sterling depreciated against other currencies. While some contemporaries believed that the exchange rate would remove the external imbalance, others thought that a significant depreciation would lead to a loss of competitiveness and high inflation, via increased import prices.

The supporters favouring protection won the debate and in November 1931 the Emergency Abnormal Importations Act was passed. However, the effect was not thought to be sufficient enough to support British industry and so the Import Duties Act came into law in February 1932, which imposed a 10 per cent tariff on manufactured imports. The Import Duties Advisory Committee subsequently raised the tariff to 20 per cent, and a duty of 30 per cent

was imposed on a select group of goods. In 1934 and 1935 further increases in the tariff rate were implemented.

The 1932 General Tariff was not uniformly imposed on all imports into the UK; countries can be considered to fall into four separate groups. The Empire and Commonwealth countries were granted preferential treatment under the Act. Manufacturers from these countries further benefitted as their economies were part of the sterling bloc, maintaining a fixed exchange rate with the UK. In comparison the nations that kept to the Gold Standard faced a loss of competitiveness via the tariff and the devaluation of sterling in the 1930s. A third group of countries, comprising those that followed the UK's lead and left the gold standard, benefitted through the devaluation but faced the tariff. The final bloc was made up of non-British countries that were given preferential treatment due to special arrangements.

Considering the interwar period in the UK, there was a significant shift in trade policy during the 1930s, partly as a response to the increasing unemployment and partly a consequence to the general loss of competiveness since the end of the First World War. The passing of the General Tariff in 1932 coincided with a reduction in the value of imports and a redirection of the pattern of trade towards the Empire and the Commonwealth. The precise size of the impact of the Import Duties Act will be the focus for the empirical work.

4.   Previous literature

Many studies have investigated the effect of the 1932 tariff on the British economy, especially import demand. One of the earliest was Leak (1938), which focused on identifying the areas affected by the introduction of the tariff by calculating the average rates, using 1930 as the base year. The process was complicated as specific or mixed rates of duty were levied on many goods. After comparing the reduction of import volumes with the size of the tariff, his initial findings were that there was no simple relationship between the magnitude of the duty and the reduction of imports. Further research suggested that the tariff resulted in a significant change in the origins of imports, with a switch from foreign countries to 'British countries'. Leak also looked at the pricing of imports and found that the imposition of the tariff enabled British manufactures to become more competitive. His overall conclusion was that the British economy was affected by the 1932 tariff, switching demand to domestic goods and increasing production.

Richardson (1967) adopts an alternative view and considered that the 1932 tariff did not have a significant impact on the newly protected industries in the 1930s. The reduction of import volumes between 1930 and 1935 for the newly protected industries was less than the decrease for the other industries. He concluded that the substitution of imports by domestically manufactured products was not a major factor in the recovery of the British economy. As pointed out in Kitson and Solomou (1990), the analysis of Richardson assumes that the newly protected industries started from the same position in 1930. As these industries comprise many of the poorly performing ones in the 1920s, there is a weakness in the analysis carried out by Richardson.

Rather than focusing on nominal tariff rates, Capie (1983) calculated the effective rates of protection and failed to find a relationship between these and the sectors showing increased economic activity. The idea is that resources should move away from industries with low rates of effective protection towards those sectors with high rates. However, this description of events would only occur in a world of full employment, which is not an accurate description of the British economy in the 1930s. A number of criticisms have been levelled at Capie's work, in particular the construction of effective rates of protection requires knowledge of input-output tables, which only exit for 1935. The use of inputs in the early 1930s is likely to differ from those in 1935 due to changes in relative input prices and the recovery of the British economy.

Kitson and Solomou (1990) carry out detailed analysis on the impact of the duty as well as considering the influence of the currency devaluation in 1931, when sterling came off the Gold Standard. Their conjecture was that the 1932 tariff was responsible for the reduction of imports in the 1930s and an empirical model of import demand was used to support their view. They found that the income elasticity of UK imports was high, being above 2, and that the relative price elasticity was approximately equal to -1. The effect of the introduction of the tariff on import demand ranged from -2.6 to -3.4 per cent, a magnitude significantly greater than the relative price effect. It was also proposed that the impact of the tariff did not work via the price mechanism. The estimation of the import demand function failed to incorporate any dynamics and no acknowledgement was given to the recent developments in econometric techniques, in particular the recognition of non-stationary data.

While the studies discussed above focus on the industrial impact of the 1932 tariff, other research has considered the macroeconomic impact of the switch in trade policy, especially on the overall level of demand. Foreman-Peck (1981) used a Keynesian income expenditure model to assess the macroeconomic consequences of the duty and he concluded that it provided a major stimulus to the British economy. Based on some restrictive assumptions, the tariff was responsible for a 41 per cent reduction in imports, which, via the foreign trade multiplier, accounted for over 40 per cent of the increase in GDP in the 1930s.

Within a macroeconomic model combining an income-expenditure approach with the supply side of the inter-war period, Dimsdale and Horsewood (1995) estimate an import function which is more complex than the equation in the Keynesian model proposed by Thomas (1981). The volume of imports is modelled as a function of real income, the level of stocks, relative price of imports and a dummy for the tariff 1932. If the level of stocks in the UK was relatively high then there was less pressure to import commodities from abroad. The long-run income elasticity of imports is constrained to be equal to 1, equivalent to analysis on the average propensity to import. The elasticity of the relative price of imports was estimated to be -0.558 and corresponding figure for the level of stocks was -1. Both coefficients were highly significant, which was surprising given the poorly determined import price term in Kitson and Solomou (1991). As the tariff is incorporated in the import price, the dummy for 1932 to 1938 captures the non-price protectionism and its coefficient is highly significant. Such a finding suggests that models that exclude a measure of protectionism, for example Matthews (1989), are mis-specified. However, there are some issues with the work of econometric analysis of Dimsdale and Horsewood (1995). Firstly, the speed of adjustment to steady state is high and rather implausible. Secondly, the effect of the level of stocks on imports is positive in the short run and negative in the long run; no explanation is given for the change in sign.

The political economy of tariffs, why and when actually it was imposed, has been an issue with some of the previous literature, specifically Capie (1981). Although countries such as the United States have a long history of trade protectionism, based on the infant industry argument, British tariffs were remarkable in that they were imposed in the 'motherland of free trade'. Our empirical results, specifically the difference between the short run and long run impact of tariffs, points to the (National) government with a 'conservative' social welfare function (using the terminology of Capie (1981)) which provides protection for the

macroeconomy under severe pressure from rising unemployment due to falling aggregate demand.

5. Model specification

A number of studies exist in the literature estimating aggregate import functions for countries in the post-war period (see *inter alia* Urbain (1996), Hamori & Matsubayashi (2001), Tang (2003) and Narayan & Narayan (2005)). When modelling an aggregate demand for imports it is customary to follow the imperfect substitutes model and assume that imports are not perfect substitutes for domestic goods. This is a cause for concern in the case of the UK during the interwar period as the rest of the world might not be able to increase its supply of exports without an increase in prices. Assuming an infinite price elasticity of supply simplifies the econometric issues as this enables a single equation model of an import equation to be estimated. The validity of the assumption can be checked by testing for weak exogeneity within the system of equations.

Econometric studies on import demand hypothesise that the long-run demand for imports can be expressed as

$$M_t = f\left(Y_t, \frac{Pm_t}{Pd_t}\right) \tag{1}$$

where M_t denotes real imports, Y_t is real income and $\frac{Pm_t}{Pd_t}$ represents the relative price of import. The relative price ratio, rather than two separate terms, rules out money illusion in the long run and is a common assumption in most empirical studies. However, when modelling the dynamics of import demand this assumption of price homogeneity might be dropped in the short run as agents might use different information sets concerning the two price series, with the response to short-run domestic price effects being quicker than those for import price effects.

The effectiveness of an import trade policy can be measured by the magnitude of the real income and relative import price elasticities. Two approaches exist to capture the effects of the protectionism introduced in 1932. A dummy variable is one method of quantifying the impact of the trade policies. Although this proxies the introduction of the tariff, it assumes that the degree of protectionism remains constant over time, which was not the case. An alternative approach is to use the data from Leak (1938) and adapt the relative price term to

become $\frac{Pm_t}{Pd_t}(1 + \tau)$ where τ is the average tariff rate. Which of the two methods is appropriate is an empirical issue and can be tested for when estimating the long-run demand for imports.

6.   Econometric issue

The existence of non-stationary macroeconomic variables has been recognised since the 1980s and there is a vast literature on unit root testing. The Dickey-Fuller tests, the Phillips-Peron test and the KPSS tests are the main procedures employed to test for the existence of a unit root in a series. The econometric analysis adopted in this study will account for the non-stationarity of the data but it will allow for the possibility of a linear combination of the variables being stationary. Several estimation and testing techniques exist to detect the presence of cointegration among a vector of non-stationary variables, the main techniques being Engle & Granger (1987), Banerjee *et al* (1993), Johansen (1991) and Pesaran *et al* (2001). Although the approach proposed by Pesaran *et al* has better small sample properties, the Johansen's maximum likelihood framework is employed to consider the possibility of multiple long-run relationships. Given the focus of this study and the variables under analysis, there is the possibility that more than one cointegrating vector exists and it is an issue that needs to be tested. If more than one long-run relationship existed among the vector of variables then using a procedure that assumes a single cointegrating vector would result in inappropriate estimated parameters, with the coefficients being a complex combination of all the distinct cointegrating relationships. The Johansen technique has an additional advantage of enabling weak exogeneity to be tested, which enables single equation estimation to be undertaken.

To investigate whether a long-run relationship exists among the level of import volumes and its determinants the following p-dimensional vector autoregressive model was estimated

$$X_t = A_1 X_{t-1} + \cdots + A_k X_{t-k} + \mu + \varphi \text{Tariff} + \varepsilon_t$$

where $\varepsilon_t \sim iid(0, \Sigma)$. The vector X_t comprises real imports, real GNP and the relative price of imports. A vector representing the deterministic part of the system is given by μ.

The p-dimensional vector X_t is modelled conditionally on the General Tariff, which is fixed and non-stochastic. Hence, the tariff dummy variable is excluded from the cointegrating space.

The general model can be re-parameterised as

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_{k-1} \Delta X_{t-k+1} + \pi X_{t-k} + \mu + \varphi \text{Tariff} + \varepsilon_t$$

with the long run being given by π. If π is of reduced rank then it possible that linear combinations of X_t, a vector of non-stationary variables, results in stationary distributions. Furthermore the reduced-form matrix π can be expressed as two separate k x r matrices α and β, each with rank r. The matrix β contains r cointegrating vectors and the matrix α represents the adjustment to equilibrium.

The test for the number of cointegrating vectors is based on the eigenvalues of the system. The trace statistic is given by the likelihood ratio

$$LR_{tr}(r|k) = -T \sum_{i=r+1}^{p} \log(1 - \lambda_i)$$

where λ_i is the ith eigenvalue when they are ranked in descending order. The testing procedure revolves around a sequence of tests with the null hypothesis that the number of cointegrating vector is less than or equal to r, for $r = 0, 1, 2, ... , k$-1 where k denotes the number of endogenous variables in the system ($k = 3$ in our model).

7. Empirical results

a) The data

The empirical analysis is unique as quarterly import value and volume data have been extracted from various issues of the Board of Trade journal for the period from fourth quarter 1924 to fourth quarter 1938. Different constant prices were used for the import volume series and the data have been spliced with 1930 as the base year and are presented in Figure 1, along with the price of imports, real GDP and the GNP deflator.

Figure 1: Plots of volume of imports, import prices, gross national product and GNP deflator
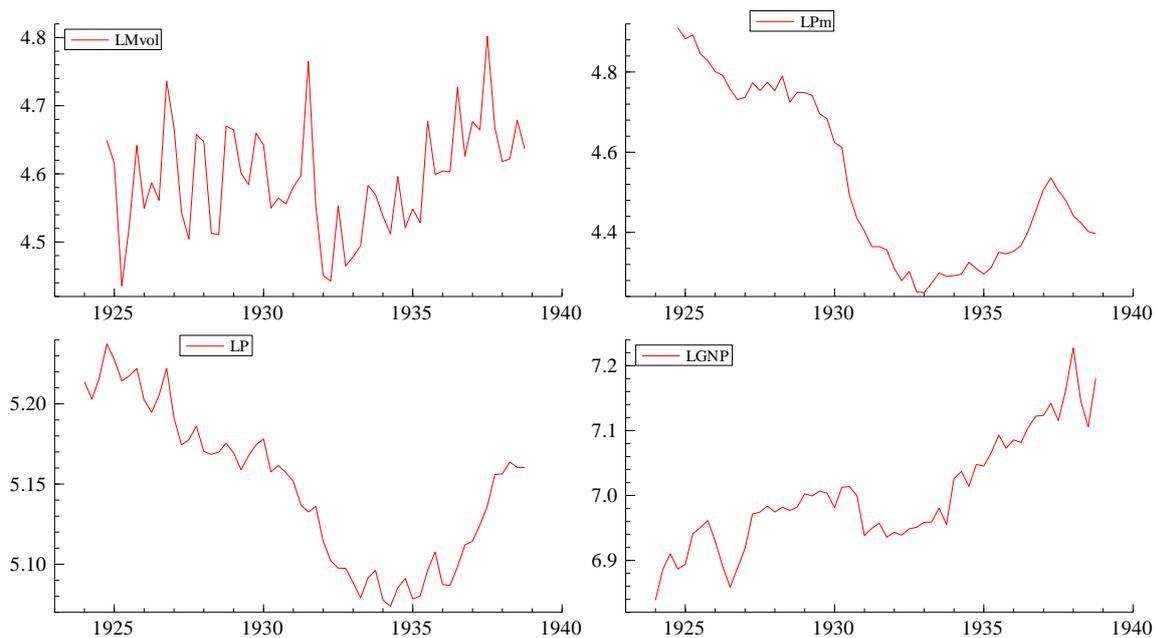
 After displaying a reasonable amount of volatility around a constant mean during the 1920s, import volumes declined in first quarter 1932. A recovery can be directly observed, with imports following an upward trend until 1938, by which time the volume had exceeded that of the 1920s. There does appear to be a seasonal pattern in goods entering to the UK, especially in the 1930s.

The price of imports was calculated from real imports and the value of imported products. With a plateau for the boom in the late 1920s, the price series follows a long decline until 1933. After increasing for a few years, the price of imports again shows signs of decreasing. The various trade policies undertaken by British governments would have had an influence on the downward trend in import prices.

Annual real GNP is provided by Feinstein (1972). To create a quarterly series, the data are interpolated using the business activity from the Economist, reported in Capie and Collins (1983), and are presented in Figure 1. The effect of the General Strike in 1926 can be gleaned, with the recovery taking 3 quarters before GNP returned to its previous trend. From a peak of 1929, the drop in output in the Great Depression can be observed. It must be noted that the decline in UK output was not as great as that witnessed in other countries nor as significant as the increase in British unemployment in the 1930s (for example see Dimsdale

and Horsewood (2002) and Dimsdale and Horsewood (2006).   The recovery of output can be seen from 1934, with the trend growth being higher than in the 1920s.

As no quarterly series exists for the GNP deflator, the annual series from Feinstein (1972) had to be interpolated. In Dimsdale *et al* (1989) the quarterly prices of imports and exports were used to generate quarterly data. However, such an approach was viewed as inappropriate in this situation. The retail price series from Capie and Collins (1983) was employed to derive a quarterly GNP deflator. Like import prices, the series declined until 1933, with no plateau in the boom of the late 1920s discernible. However, the deflation was not a great as that observed in the price of imports. The GNP deflator did not respond quickly to the recovery and it remained relatively constant until 1935. After this time, it began to increase up to the outbreak of the Second World War.

b)   Time series properties

Before embarking on the econometric analysis, the time series properties of the data need to be investigated and a series of standard unit root tests were applied. Table 4 present the Augmented Dickey-Fuller tests, where a constant and trend have been included.

Table 4: Augmented Dickey-Fuller tests

Variable	ADF test	Lag length
LnMvol	-2.366	4
LnPm	-1.439	2
LnP	-1.424	4
ln(Pm/P)	-2.262	4
LnGNP	-2.347	0
ΔlnMvol	-4.077*	3
ΔlnPm	-3.031*	1
ΔlnP	-1.791	3
Δln(Pm/P)	-5.882**	0
ΔlnGNP	-7.098**	1

 Undertaking unit root tests on interwar data is fraught with grave difficulties. The sample period is relatively short, being 51 observations, on a very disturbed time period, containing the General Strike and the Great Depression. Although such data abnormalities can be removed with the introduction of dummy variables, this affects the critical values and creates further problems. On a pragmatic level it is sensible to proceed recognising that the interwar

period is a unique epoch in British history and that the results from unit root tests are an indication of the time series patterns of the data in that era.

Even taking the above warning into consideration, the results presented above suggest that each of the variables comprising the import demand function are integrated of order one, implying that they are non-stationary. The technique of cointegration is employed to examine whether there exists a long-run relationship among the volume of imports, real GNP and the relative price of imports.

c)   Cointegration

A 3 variable vector autoregressive model, comprising import volumes, real income and relative import prices, was estimated with a lag length of 4 periods. The linear time trend was restricted to be in the cointegrating space, which ruled out the possibility of quadratic trends, and dummies were introduced in unrestricted form to partial out the effect of the tariff and the General Strike. The inclusion of the dummies causes a slight problem as the critical values should be adjusted.

The trace tests statistics for the number of cointegrating vectors are presented in Table 5 and the null hypothesis of no long-run relationship can be rejected but not the null of one cointegrating vector. While the p-value is relatively close to 5 per cent, the use of dummy variables to partial out the certain aspects of the data has an effect on the distribution of the statistic and hence the critical value. It is sensible to adopt a cautious approach and conclude that there is one long-run relationship among the 3 variables.

Table 5: Testing cointegration

H0: rank < or = trace	Test statistic	p-value
0	49.299	(0.009) **
1	24.229	(0.078)
2	2.304	(0.932)

** Significant at 1%

The diagnostic test statistics show no evidence of autocorrelation, heteroscedasicity or non-normality. The corresponding matrices for β and α are given by:

β

LMvol	1.0000	0.20783	-2.5988
LGNP	-0.38066	1.0000	-18.295
LRPm	-0.18184	-0.40824	1.0000
Trend	-0.0040052	-0.0083329	0.14301

α

LMvol	-0.97245	-0.47633	0.0096148
LGNP	0.19800	-1.0063	0.0039535
LRPm	0.056963	0.11696	0.013792

As the first column of β provides the coefficients for the cointegrating vector, one obvious problem is the incorrect sign on relative import prices. There is the additional issue that the elements in α suggest a very quick speed of adjustment to the long-run equilibrium.

Although the initial cointegrating vector does not appear to be an import demand function, restrictions need to be placed on the loading vector α to test for weak exogeneity, which is a simple test for single equation estimation of import demand. Equally, coefficient constraints can be imposed on the long-run vector to investigate whether unit elasticity of income is valid and if the time trend can be excluded from the cointegrating relationship. Once these restriction are imposed on the data, the vectors α and β become

β

LMvol	1.0000
LGNP	-1.0000
LRPm	0.20120
Trend	0.00000

and

α

LMvol	-0.66328
LGNP	0.00000
LRPm	0.00000

The test for the validity of the restrictions on the cointegrating vector and the loading vector follows a χ^2 distribution and equals 11.315, with a p-value of 0.0791. At the 5 per cent significance level, the restrictions are not rejected and a single equation dynamic model of import demand is valid. This implies that import prices and GNP do not have to be estimated

when modelling the volume of imports into Britain during the interwar years, even though the UK was a major world economy during the period.

The import demand function is given by:

$$\ln(Mvol)_t = \ln GNP_t - 0.2012 \ln(Pm/P)_t. \qquad (2)$$

The average propensity to import is given by :

$$(Mvol/GNP)_t = (Pm/P)_t^{-0.2012} \qquad (3)$$

The unit elasticity on *GNP* indicates that the attention may also be focused on the average propensity to import (equation (3)), which is negatively related to relative import prices. The import demand is price inelastic and so a 20 per cent increase in relative prices, even bigger than the 1932 tariff, leads to only a 4 per cent decrease in the volume of imports into the UK. Such a finding may explain the long-lasting controversy concerning the effect of the 1932 tariff as it is difficult picking up such a small price elasticity. The speed of adjustment given by the vector α, estimated to be 0.663, is rather fast but it is consistent with the findings of others in the literature.

d)   Dynamic equation

As the econometric results suggest that a long-run import demand function can be estimated from the data set, it is important to see whether a dynamic model can be obtained and if this is able to shed further light on the protectionist measures introduced in the 1930s. The above cointegrating relationship is embedded in a dynamic equation, where the growth of import prices and domestic inflation have been allowed to enter separately. The dummy variables used in the cointegrating analysis are now explicitly employed in the modelling procedure and the general dynamic model is given in Table 6.

Table 6: $\Delta\ln(Mvol)_t$ estimated by OLS

The estimation sample is: 1925 (4) to 1938 (4)

Variable	Coefficient	t-value
$\Delta\ln(Mvol)_{t-1}$	-0.933	-5.24
$\Delta\ln(Mvol)_{t-2}$	-1.075	-5.28

$\Delta\ln(Mvol)_{t-3}$	-1.073	-4.85
Constant	-1.537	-3.1
$\Delta\ln(GNP)_t$	0.126	0.347
$\Delta\ln(GNP)_{t-1}$	0.172	0.519
$\Delta\ln(GNP)_{t-2}$	-0.354	-0.981
$\Delta\ln(GNP)_{t-3}$	-0.225	-0.625
$\Delta\ln(Pm)_t$	0.824	0.749
$\Delta\ln(Pm)_{t-1}$	1.802	1.68
$\Delta\ln(Pm)_{t-2}$	1.160	1.06
$\Delta\ln(Pm)_{t-3}$	-1.319	-1.23
$\Delta\ln(P)_t$	0.568	1.83
$\Delta\ln(P)_{t-1}$	0.147	0.406
$\Delta\ln(P)_{t-2}$	0.576	1.8
$\Delta\ln(P)_{t-3}$	-0.018	-0.0565
Tariff	-0.127	-3.57
Q1	0.021	0.547
Q2	0.040	0.921
Q3	0.086	2.26
ECM_{t-4}	-0.628	-3.1
D26q123	0.044	1.05

sigma = 0.0516038 R^2 = 0.789   DW = 1.94

AR 1-4 test: $F(4,27) = 1.4420 \ [0.2473]$
ARCH 1-4 test: $F(4,23) = 0.17473 \ [0.9491]$
Normality test: $Chi^2(2) = 0.59749 \ [0.7417]$
hetero test: $Chi^2(37) = 31.762 \ [0.7128]$
RESET test: $F(1,30) = 0.014318 \ [0.9056]$

The estimated general equation has variables with perverse coefficients. The overall effect of the growth of income is negative and the growth of import prices positive. However, the majority of these coefficients are not statistically significant at the 5 per cent level. The diagnostic test statistics do not indicate evidence of autocorrelation, heteroscedasticity or non-normality. The exclusion of the tariff dummy results in the coefficient on the equilibrium-correction mechanism becoming insignificant.

Using the Hendry general-to-specific methodology, a parsimonious dynamic import demand function can be derived and is given below.

Table 7: Modelling $\Delta_4\ln(Mvol)$ by OLS: 1925 (4) to 1938 (4)

	Coefficient	t-value
Constant	-1.688	-7.33
Seasonal	-0.001	-0.07
Seasonal_1	0.066	1.85
Seasonal_2	0.096	2.92
D26q123	0.052	1.41
ECM_{t-4}	-0.674	-7.22
Tariff	-0.104	-5.15
$\Delta_2\ln GNP$	0.490	2.24
$\Delta_2\Delta lnP_{t-1}$	2.616	3.29

sigma = 0.0542 $\qquad R^2 = 0.588 \qquad$ DW = 1.55

AR 1-4 test: $\qquad$ F(4,40) = 0.80976 [0.5264]
ARCH 1-4 test: $\qquad$ F(4,36) = 1.1817 [0.3353]
Normality test: $\qquad$ Chi^2(2) = 1.6849 [0.4307]
hetero test: $\qquad$ F(11,32) = 0.38174 [0.9538]
RESET test: $\qquad$ F(1,43) = 0.40194 [0.5294]

The F-test for the validity of the restriction equals 2.961, indicating that the parsimonious equation captures the salient features of the data. It should be noted that the dependent variable is now the annual growth of the volume of imports, $\Delta_4\ln(Mvol)_t$ The diagnostic test statistics do not indicate signs of autocorrelation, heteroscedasticity and non-normality.

The coefficient on the equilibrium-correction mechanism suggests that the adjustment speed to equilibrium is fast and indicates that there is a cointegration relationship consistent with a demand for import function. The dynamics of the annual growth of the volume of imports into the UK are positively affected by the two period changes in gross national product and the first lag of quarterly inflation. Both results are consistent with an import demand function.

There are a number of interesting findings relating to the impact of the 1932 tariff. Firstly, the growth of import prices does not explicitly enter the dynamic import equation, which rules out a direct effect in the short run. However, we note that there is some influence via the long-run import function but, as has already been discussed, the magnitude of the effect is small. Secondly, the role of the General Tariff is plain to see with a large and highly significant coefficient, implying that the effect of the duty work not through the price mechanism as some authors had claimed. According to our results, the imposition of the duty and the build up of unemployment lead to protectionist sentiment, which resulted in a 10 per cent reduction of import growth.

A severe challenge facing any proposed econometric relationship for the inter-war period is whether the import demand function remained stable over the 1930s. Recursive estimation enables the constancy of the demand for foreign goods to be investigated over a very disturbed time period and the key graphs are provided in figure 2. The coefficients on the main variables in the dynamic equation, ECM_{t-4}, $\Delta_2 LGNP_t$ and $\Delta_2 \Delta LP_{t-1}$, remain constant over an extremely volatile time period and provide supporting evidence of the validity of weak exogeneity. The sequence of Chow break-point tests and forecast tests do not suggest that the import demand equation collapsed in the 1932 and beyond. Rather the opposite appears to hold and the simplified dynamic model captures the salient features of the data in the 1930s.

Figure 2: Recursive graphics
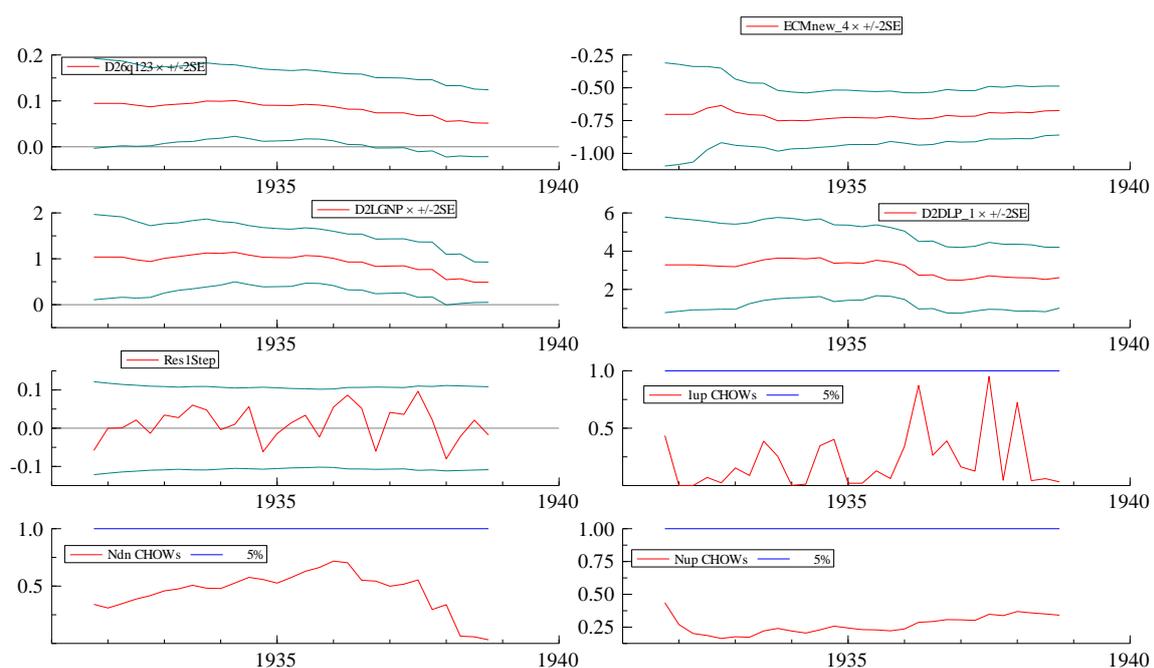
8.   Policy Implication

The long-run equilibrium relationship (equation (2)) estimated by an unique data set constructed by us, and obeying stringent and formal econometric criterion, gives a relatively stable representation of import behaviour during this major epoch. A number of important policy issues can be analysed from this equation. First, import demand was relatively inelastic with respect to prices. The initial tariff rate of 10% would have done little to stem the flow of imports (even leaving out non-essentials such as food). In the long run it could potentially reduce imports by only 2% from its initial average level since equation (2) implies a price elasticity of only 0.2. Secondly, the estimated elasticity is not only low, but exceptionally low. These levels are often found in import demand functions for developing countries in recent years. Britain, as a leading industrial nation ,should have had far more flexibility in import substitution and such low price elasticity means that any policy of import reduction (substitution) could not have depended on price effects alone. A physical quota could have been more effective, although by raising prices substantially it would have entailed a much higher welfare cost. Thirdly, it is clear, as mentioned earlier, that the tariff, by changing relative prices, could not have much impact on the macroeconomy since the multiplier effects of reduced imports (and the reduction of the trade deficit) would be small since the initial shock would be of low order of significance.

Equally important, the share of imports in GDP also displayed a low elasticity with respect to relative price. Equation (3) shows that a rise in import prices by 10% (say through a general tariff of 10%) would reduce import share by only around 2% from its mean value. Thus, the share of imports or the average propensity to import seems generally stable, almost as if Britain was importing core goods whose share in aggregate income was relatively price insensitive. Thus, the stable long-run relationship in imports was not strongly affected by prices and could only change via income. Clearly, the long-run policy implication was that tariffs were relatively 'neutral'. What then explains the decline in imports in the early and middle 1930s? Given the high income elasticity of imports (equals 1), it is clear that the ultimate decline in imports were caused by the Great Depression and the negative growth rates of the post-1929 adverse macroeconomic shock.

However, the dynamic equation estimated in Table 7 shows that tariffs did have a highly significant impact on imports (measured quarterly between 1925 and 1938). The tariff dummy has a significant coefficient of – 0.1 so that imports in the post-tariff period fell strongly after 1932 compared to 1925-1931. The short-run dynamics emphasises that quarter by quarter, imports were significantly lower after the imposition of tariffs. In terms of the dynamic specification, the post-tariff economy would have significantly lower volume of imports compared to the pre-tariff economy.

This difference in results for the long-run and short-run econometric processes also helps us to understand the nature of the controversy regarding the impact of the British General Tariff. If the impact effect is to be measured in terms of relative price changes, tariffs were not successful. It could not have changed the volume of imports significantly, nor did the propensity to import or the average share of imports in national income change dramatically. It seems the underlying reference function for home and domestic products were relatively unchanged by the modest relative price changes induced by the tariff. Yet, the population did respond to tariff imposition by cutting their imports in the post-tariff period. This could have been a political economy issue where Britain responded to the concern of its leaders, regarding the beggar-thy-neighbour policies followed by Europe and the United States and decided in the short run to consume less importables in aggregate. This result therefore supports the claims of those economic historians who believe that tariffs did have the desired impact – until of course the advent of the Second World War and the deep structural changes they brought about.

9. Conclusion

The interwar period is a unique time period in British economic history, with the return to Gold in 1925, the General Strike, the Great Depression, the departure from the Gold Standard in 1931 and the imposition of the General Tariff in 1932. All these factors should have had a strong influence on the volume of imports into the UK. Using the technique of cointegration on a new data set from the *Board of Trade Journal*, an equation consistent with a long-run import demand function has been estimated and then embedded in a dynamic model. The econometric model satisfies the diagnostic tests and there is no evidence of a structural break in the proposed relationship.

The long-run coefficient on the relative price of imports shows that import demand was price inelastic and that the effect of the imposition of tariff did not impact directly via the price mechanism. It is possible that the imposition of the trade duty represented a political economy based policy change, which reflected societal preferences moving away from foreign produced products in the short run given that foreign countries (Europe and the United States) had instituted beggar thy neighbour protectionist policies for so long. Tariffs did reduce imports after its imposition, but it did not create a long-run structural adjustment. Equally, the reduction of gross national product, consequent to the depression, was an important long-run factor in reducing UK imports.

Data Appendix

Variable, symbol	Variable, name	Definition	Source
M	Volume of imports	Expenditure on imports at 1930 prices	Board of Trade Journals, various issues
Pm	Price of imports	Price index with 1930=100	Board of Trade Journals, various issues
P	GDP deflator	Annual GDP deflator interpolated using retail price index	GDP deflator: Feinstein (1972) Retail price index: Capie & Collins (1983)
Tariff	Tariff	Dummy variable equalling 0 upto 1931 and 1 1932 to 1938	
GNP	Gross National Product	Annual GDP data interpolated using business activity	GDP: Feinstein (1972) Business activity: Capie & Collins (1983)

References

Alford, B.W.E. (1996), *Britain in the World Economy Since 1880*, London: Longman

Banerjee, A., Dolado, J., Galbraith, J.W. and D.F. Hendry (1993), *Co-integration, Error Correction, and the Econometric Analysis of Non-stationary Data.* Oxford: Oxford University Press

Capie, F. (1981) "Shaping the British Tariff Structure in the 1930s", *Explorations in Economic History,* 18, 155-173

Capie, F. (1983) *Depression and Protectionism: Britain between the Wars*. London: George Allen & Unwin

Capie, F and M. Collins (1983) *The Interwar Economy: A statistical abstract*. Manchester: Manchester University Press

Dimsdale, N.H., Nickell, S.J. and N. Horsewood (1989) "Real wages and unemployment in Britain during the 1930s", *Economic Journal,* 99, No. 396, 271-292

Dimsdale, N.H. and N. Horsewood (1995) "Fiscal policy and employment in interwar Britain: Some evidence from a new model", *Oxford Economic Papers*, 47, 369-396

Dimsdale, N.H. and N. Horsewood (2002) "The Causes of unemployment in interwar Australia", *The Economic Record*, 78, 243, 388-405

Eichengreen, B. (1995) *Golden Fetters: The Gold Standard and the Great Depression 1919-1939,* Oxford: Oxford University Press

Engle, R.F. & C.W.J. Granger (1987) "Cointegration and error correction: Representation, estimation and testing", *Econometrica*, 55, 251-276

Fender, J. and CK Yip (1989) "Tariffs and employment: an intertemporal approach." E*conomic Journal,* 99, 806 - 17

Ferguson, N. (2004) *Empire: How Britain Made the Modern World*, London: Penguin

Feinstein, C.H. (1972) *National Income, Expenditure and Output of the United Kingdom, 1855-1965*. Cambridge: Cambridge University Press

Ford, J. L. and S. Sen (1985) *Protectionism, Exchange Rates and the Macroeconomy*, Oxford, Blackwell

Foreman-Peck, J. (1981) "The British Tariff and industrial protection in the 1930s: An alternative model" *The Economic History Review, 34,* 132-139

Hamori, S. & Y. Matsubayashi (2001) "An empirical analysis of the stability of Japan's aggregate import demand function", Japan and the World Economy, 13, 135-144

Johansen, S. (1991) "Estimation and hypothesis testing of cointegration in vector Gaussian autoregression models", *Econometrica*, 59, 1551-1580

Kitson, M and S. Solomou (1989) "The macroeconomics of protection: Britain in the 1930s" *Cambridge Journal of Economics*, 13, 155-169

Kitson, M and S. Solomou (1990) *Protectionism and Economic Revival: The British interwar economy*. Cambridge: Cambridge University Press

Krugman, P. (1982) The macroeconomics of protection with a floating exchange rate, *Carnegie-Rochester Conference Series on Public Policy*, vol. 16, Amsterdam: North Holland, 141-82

Leak, H. (1937) "Some results of the Import Duties Act*", Journal of the Royal Statistical Society,* 100, 558-606

Matthews, K.G.P. (1986) *The Inter-war Economy: An Equilibrium Analysis*. Aldershot: Gower

Narayan, P.K. & S. Narayan (2005) "Estimating income and price elasticities of imports for Fiji in a cointegration framework", *Economic Modelling*, 22, 423-438

Pesaran, M.H., Y. Shin & R. J. Smith (2001) "Bounds testing approaches to the analysis of level relationships", *Journal of Applied Econometrics*, 16, 289-326

Richardson, H.W. (1967) *Economic Recovery in Britain, 1932-9*. London: Weidenfeld and Nicolson

Tang, T.C. (2003) "An empirical analysis of China's aggregate import demand function", *China Economic Review*, 14, 142-163

Thomas, T.J. (1981) "Aggregate demand in the United Kingdom 1918-45" in R. Floud and D.N. McCloskey (eds), *The Economic History of Britain since 1700*, 2, Cambridge: Cambridge University Press

Urbain, J-P. (1996) "Japanese import behaviour and cointegration: A comment", *Journal of Policy Modeling*, 18(6), 583-601

Wolf, N. (2008) "Scylla and Charybdis. Explaining Europe's exit from gold, January 1928-December 1936", *Explorations in Economic History*, 45, 383-401.