

# Trade Flows as a Channel for the Transmission of Business Cycles \*

JAN MARC BERK

## 1. Introduction

Business cycles of different countries interact. This interdependence has grown in the last decades as a result of, among other things, the elimination of trade barriers and the liberalisation of international capital markets (Berk and Bikker 1995). There are numerous factors which act as conductors of cyclical fluctuations between countries. Some of these conductors are directly measurable, others are not. Illustrations of the latter are expectations of economic agents, which are partly dependent on the cyclical conditions abroad. These expectations are, among other things, relevant for investment decisions, which in turn determine the business cycle at home. Other channels of cyclical interdependence are directly measurable. Financial variables play an important role in this respect (see Baxter and Crucini 1994 and Baxter 1995). This paper investigates another directly measurable channel of cyclical interdependence, trade flows. Our objective is to investigate the role played by trade flows in the global transmission of business cycles. We try to identify empirically the line of causality of international cyclical movements as suggested by trade flows. Moreover, we present an estimate of the quantitative importance of trade flows as transmission channel.

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□ De Nederlandsche Bank, Monetary and Economic Policy Department, Amsterdam (The Netherlands).

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The structure of the paper is as follows. Section 2 deals with some methodological issues relevant for our research, which are supplemented in Section 3 by theoretical arguments which aim to explain the direction and strength of international trade flows. Following a description of the dataset used in Section 4, the arguments of the previous two sections are put to the test empirically in Section 5. Section 6 concludes.

## 2. Methodological issues

We start with the result of Berk and Bikker (1995), who find that the global business cycle is characterised by a block structure, i.e. is divided into economic regions. These regions are clusters of cyclically homogenous countries, where each regional business cycle is to a great extent determined by factors within the region as opposed to factors outside the region. This result enables us in the present paper, which takes a global perspective, to concentrate on clusters of countries instead of individual countries, without losing a substantial amount of information. Berk and Bikker (1995) find that part of the interdependence of the business cycles of countries within a region can be attributed to their geographical location. Analysing data for OECD countries they distinguish between North America, Europe and Japan. The relatively isolated position of Japan is explained by the fact that the sales markets in the Far East and Australia, which are relevant for Japan, were not included in the analysis.

In order to explain business cycle movements in terms of trade flows, reference is made to 'traditional' business cycle theories (see Gabisch and Lorenz 1989, ch. 2, for details). In the 1930s and 1940s a class of models was developed which was able to generate largely endogenous cycles in aggregate output by using various versions of the well-known investment accelerator and the consumption multiplier, and letting the two interact (Harrod 1936, Kalecki 1937, Samuelson 1939, Metzler 1941, Hicks 1950). Although perhaps rudimentary by modern-day standards,<sup>1</sup> this class of business cycle models

<sup>1</sup> The generation of cycles, for example, relies on an impetus which is not explained in itself by the model.

implies an array of timing sequences relating the demand for different categories of goods to different stages of the business cycle. These sequences are broadly consistent with the empirical evidence (Klein and Moore 1983 and 1985, OECD 1987, Zarnowitz 1992, Berk and Bikker 1995). The general idea underlying these sequences implied by the theory is that there exists a relationship between the different types of goods that are produced and demanded, and the different stages of the business cycle. A cyclical upturn usually begins in the minds of economic agents, i.e. in the expectations of the business community (Santero and Westerlund 1996). At this stage, there is no actual growth in demand for the final products but an expectation of such demand in the future. This expectation in turn elicits a demand for intermediate goods. Stocks of raw materials, for instance, which in times of recession tend to be run down, are replenished. Stock movements are therefore an important indicator of the role played by intermediate products in the business cycle (see Popkin 1984 and Zarnowitz 1992). In addition, demand for the more final intermediate products will also increase.<sup>2</sup> Technological advances mean that today's manufactured goods are more complex and more differentiated than yesterday's. Their production calls for the application of a wider variety of specialised intermediate products (Krugman 1995, pp. 333-35). This creates a dynamic process involving acceleration effects and leading to a derived demand for several intermediate products. This demand will ultimately be sufficient to cause some suppliers to expand capacity, thus creating a demand for capital goods after some time. Another factor is the obsolescence of capital goods, as a result of which, after a number of years of recession, replacement investments become necessary. If companies' perceptions prove correct, their efforts will result in increased final sales. The demand for consumer goods therefore lags the business cycle. This is particularly true of manufactured consumer goods, the purchase of which is largely determined by disposable incomes, which in turn depend on the job market, which trails production. Energy is treated as a separate category in this study, since it is a primary good the demand of which is often determined by specific, non-economic supply side factors.

<sup>2</sup> It should be noted that intermediate products do not necessarily possess non-final form. The crucial factor is whether the products are intended for final use as such.

On the basis of the above, we assume that a movement in the business cycle is first detected in the demand for intermediate products, then in the demand for capital goods and finally in the demand for consumer goods. We therefore classify trade data into intermediate goods, capital goods and consumer goods.<sup>3</sup> If a given region has an export specialisation in or import dependency on one of these product categories, this would provide information on the speed with which that region will respond to movements in the international business cycle and on the role which trade flows play in the global transmission of business cycles. This division is also helpful in answering the question which economic region plays the function of engine of the world economy, the 'center of gravity' of the global business cycle. Berk and Bikker (1995), Fase and de Bondt (1994), among others, find that the United States performs this function. The implication in the context of this paper is that the United States has an import dependency on categories of goods the demand of which is exercised relatively early in the business cycle. This import requirement has to be relatively large, that is, it is an import demand for one or more product categories with a large world market.

### 3. Trade theory

The discussion of the previous paragraph linked movements in the business cycle to a particular classification of trade flows. We now turn to the explanations offered in the literature concerning the determinants of trade flows as well as the observed direction of these flows. Taken together, these explanations should allow us to explain the international transmission of regional business cycles using trade data.

<sup>3</sup> Another argument for this system is that each of these functionally different products has a different type of market structure. This means that, for each product group, the interrelationship between countries will be different and therefore needs to be approached using different policy instruments (see Central Planning Bureau 1995, pp. 8 *et seq.*). Our division is based on the use of the goods and not their origin. It will be apparent that the adopted system does not correspond exactly to that used for expenditure in the familiar components of consumer spending, capital expenditure, exports and imports. For an analysis of the behaviour of the various spending components in business cycles, see Berk (1993) and OECD (1992).

Classical trade theory uses the concept of comparative advantage. Originating from Thornton (1802), this concept was further refined by Ricardo (1817) into a theory in which the differences in comparative labour costs between countries are the key determinant in explaining trade flows. This theory was further refined by Heckscher (1919) and Ohlin (1933), aided by concepts developed by Haberler (1930 and 1933) who decoupled the classical trade theory from the Ricardian theory of the value of labour. Heckscher and Ohlin formulated the theorem bearing their name, which basically states that countries export those goods which require, for their production, relatively intensive use of those productive factors found locally in relative abundance. The necessary assumptions for this theorem to hold are fairly stringent. Principles among them are perfect competition, no transport costs, no mobility of production factors between countries, identical production technology characterised by the same economies of scale, identical and similarly orientated preferences both within and between countries and trade balances which are in equilibrium. The most important empirical implications of this classical trade theory for the present study are that international trade should take place between countries that complement each other: the complementary nature of export specialisation and import dependency is an important determinant of trade flows. Moreover, specialisation should result in the production of entire sectors being concentrated in certain countries and that trade should therefore mainly follow an inter-industry pattern.

What we refer to here as 'modern trade theories' have generally arisen from dissatisfaction with the classical trade theory according to Heckscher-Ohlin. The predictions according to this theory did not tie in with empirical observation, and it was simultaneously recognised that the assumptions underlying the classical theory no longer held true in the modern world. In particular, the observed phenomenon that the biggest and fastest growing part of international trade related to industrialised countries, which were using production factors to more or less the same extent and at comparable cost, contradicted the classical theory. So did the empirical observation that the trade between industrialised countries chiefly comprised a two-way traffic in similar goods, referred to as 'intra-industry trade'. The answer was to combine classical trade theory with the theory of industrial organisation. An important role was played in this by Krugman (1979, 1980 and 1981). Modern trade theory broadly follows two paths. The first

of these concentrates on the economies of scale instead of on comparative advantages as the reasons for international trade. The second identifies imperfect competition as the explanatory factor.<sup>4</sup> Given the diversity of the various models developed along these lines, the empirical implications are less obvious than those stemming from the Heckscher-Ohlin theorem. This is because the specialisation pattern between countries cannot be predicted by modern theory but depends on random and historical factors. One thing is clear, however, and that is that (according to this line of reasoning) there are no reasons to expect trade to follow the inter-industry pattern; on the contrary: economies of scale and imperfect competition imply that trade flows are more likely to follow an intra-industry pattern. Modern manufactured goods are complex and highly differentiated; their production involves a number of different stages and requires the use of a large variety of specialised goods. If, as Krugman (1995, p. 334) notes, the general belief is correct that the trend in manufacturing is to produce the good in a number of stages in a number of locations, adding a bit of value at each stage, this becomes a source of increased trade volume. Krugman (1995, p. 335) illustrates this with the integrated economic region comprising Belgium, Northern France, and the Ruhr plus other neighbouring areas of Northern Germany. Spread across various locations in this region are various links in the same production process in a manner comparable (according to Krugman, at least) with the distribution of manufacturing companies in the motor industry in the mid-west of the USA.

#### 4. The dataset used

For the empirical analysis we used OECD data obtained from the annual publication *Foreign Trade by Commodities*. This database includes detailed trade figures, i.e. exports and imports according to origin and destination pertaining to some 70 product categories for 24 OECD countries. Drawbacks of this database include the fact

<sup>4</sup> These two factors are not independent of each other. Introducing internal economies of scale (i.e. within a given industry) necessitates abandoning the assumption of perfect competition, and the easiest alternative assumption in this case is that of monopolistic competition.

that it relates to international movements of goods only, which are denominated in dollar terms. Moreover, the database is classified according to the Standard International Trade Classification (SITC), which does not correspond to our proposed classification of trade data. We therefore had to translate the SITC into a classification based on intermediate goods, capital goods, consumer goods and energy. Details of this exercise are described in a working paper version of this article (Berk 1996) and will not be reported here in order to save space.<sup>5</sup> After reclassifying the trade data into goods categories, we clustered the 24 OECD countries into regions in such a manner that trade flows within a region, intra-regional trade, are eliminated. This elimination of intra-trade data is the empirical implication of the clustering of countries into regions which are treated as sharing a common economy. Note that this elimination allows us to compare directly a *region* like North America with a *country* like Japan. We clustered the 24 OECD countries into the following regions: 1) North America (USA and Canada), 2) Japan, 3) EU, 4) other OECD countries (Australia, New Zealand, Norway, Switzerland, Turkey and Iceland), 5) Far East (excluding Japan), 6) Middle East, 7) Central and South America and 8) other non-OECD countries (mainly Africa, Eastern Europe and former Soviet Union). Regions 1-4 make the OECD and 1-8 account for the 'world'. 'World market' in the rest of this study is therefore defined as the sum of the inter-regional trade of the different OECD regions (i.e. including that with regions outside the OECD), which will also be referred to below as the OECD total. The trade of the OECD countries within the various OECD regions has therefore been ignored, as has the trade of the non-OECD countries within and between the non-OECD regions. Our clustering of countries is more elaborate than the one used by Berk and Bikker (1995), who restricted themselves to the principal OECD countries. The group of 'other OECD countries' is, of course, not a homogenous region from an economic point of view, and has the character of a balancing item. Similar arguments apply to the 'other non-OECD countries' group. Only for the first four regions does the database permit a full analysis of the trade flows in the sense

<sup>5</sup> We had to make some simplifying assumptions in order to make this translation operational. For example, our trade data included a category 'machinery and transport equipment' (SITC no. 7). This category was counted as investment goods, although it also subsumes some components (motor vehicles for private use, audio-visual and telecommunication equipment) which are in fact durable consumption goods.

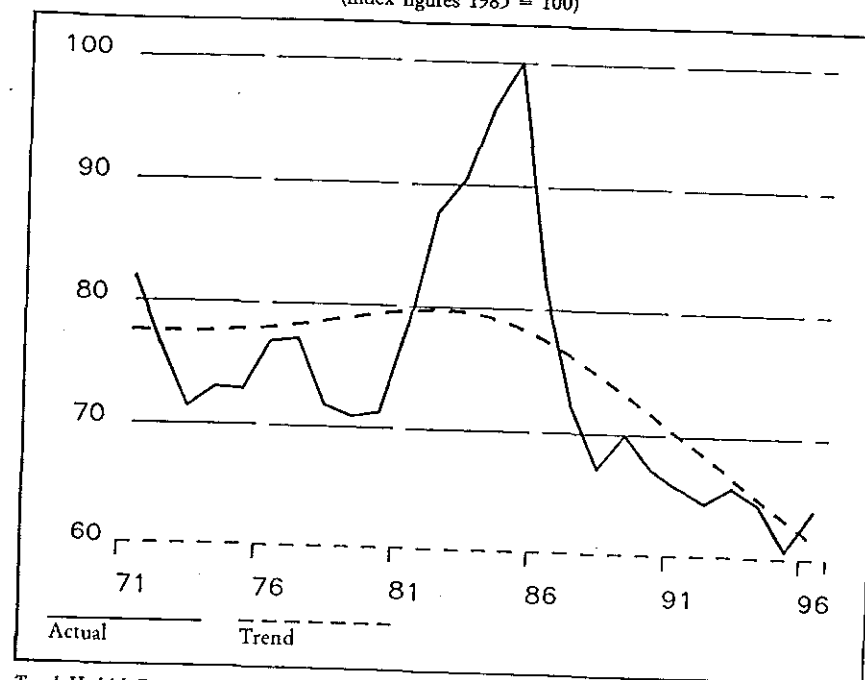
that origin and destination of the flows are fully traceable. Notwithstanding this, it is important to distinguish the 4 non-OECD regions as sales markets or suppliers of OECD regions.

We used the OECD trade data in a cross-section fashion. This is because the primary purpose of this study is to chart the structural trade patterns of the world, and to see how these patterns function as a transmission channel for cyclical movements. It appears unlikely that this transmission channel will be subject to rapid change, and, if this is indeed the case, we capture this transmission channel sufficiently by studying the inter-regional trade flows in detail using one year's worth of data. On a more practical note, narrowing down the empirical analysis in this manner was the only feasible option, since the handling of more years of data would require a prohibitive amount of additional computing and processing time: to give an impression, owing to the broadness of the countries covered, the elimination of intra-regional trade, and the reclassification of the trade data our empirical research entailed processing some 47,000 observations. The base year taken for the study was 1989, the last year before factors like German reunification and the introduction of a new recording system for inter-EU trade complicated the analysis of foreign trade. According to Figure 1, although the trade-weighted value of the US dollar was slightly below its long-term value in 1989, it was not substantially adrift (as it was, for example, in the mid-80s). Moreover, the discrepancy between the actual value and the trend curve in 1989 probably has more to do with the peak around 1985, which still had a significant effect on the trend in 1989, owing to the method of calculation. The value of the dollar is important since the source material is denominated in dollars. A dollar value substantially different from the underlying trend could significantly affect the results (which are based on an analysis at current prices).

## 5. Empirical results

By way of introduction, Table 1 contains information on the importance of the different regions in international trade, and the

FIGURE 1  
NOMINAL WEIGHTED VALUE OF THE DOLLAR - ACTUAL AND TREND  
(index figures 1985 = 100)



Trend: Hodrick Prescott with a lambda of 400.

importance of international trade in the gross domestic product (GDP) of the individual regions. It can be seen from the Table that

THE REGIONS STUDIED: SOME STYLIZED FACTS

TABLE 1

Region	Share of OECD trade		Nominal GDP in USD billions	Measures of openness	
	Exports	Imports		Export ratio*	Trade ratio*
North America	26.6	35.0	5801	5.2 ( 7.9)	6.4 ( 9.2)
Japan	24.3	16.4	2875	9.6 ( 9.6)	8.4 ( 8.4)
EU	37.8	37.4	5326	8.0 (23.1)	8.4 (23.5)
Other OECD	11.3	11.2	705	18.1 (18.9)	19.1 (19.9)
OECD total	100.0	100.0	14705	7.7 (14.3)	8.1 (14.7)

Notes: Export ratio: nominal exports as percentage of GDP. Trade ratio: average nominal value of exports and imports as percentage of GDP.

\* Figures within brackets indicate ratios without elimination of intra-regional trade. The regional figures are net of intra-regional trade (unless indicated otherwise). The OECD total excludes intra-regional trade within the 4 regions.

the EU is the biggest player in the inter-regional trade market, with an export share of almost 38% and an import share of 37%. The direct economic importance of this trade for Europe, however, at around 8% of GDP, is not as great as the share of export trade suggests. North America is the number two trading continent, with an export share of nearly 27% and an import share of 35%. Based on the measures of openness provided by the Table, this continent is clearly more of a closed economy than Europe. The Table further shows that the importance for total OECD trade of other OECD countries, which should not be thought of as having a shared economy with synchronous business cycles<sup>6</sup> but instead should be seen as a balancing item which will not be analysed in greater detail in the rest of the study, is rather limited. The importance of intra-regional trade for each region can be derived by comparing the measures of openness as corrected for intra-regional trade with the figures in brackets from which intra-regional trade has not been eliminated. In Europe in particular, intra-regional trade plays a prominent role (15% of GDP). It may thus be concluded that, for the economies of Europe, intra-regional activity is far more important than that between the regions. This conclusion is in line with the findings of Frankel and Wei (1993), who explain the substantial importance of intra-regional EU trade by a combination of the small distance between the countries, high incomes and considerable openness of the European economies. The empirical importance of intraregional trade implies a confirmation of the modern trade theories.

We now turn to analysing the strength of trade flows. In Table 2, the significance of a particular region's trade in a certain category of goods is expressed in relation to total, i.e. world, trade. Figures 2 and 3 present the information of Table 2 in Graph form for both regions and categories of goods. Table 2 reveals that the trade in capital goods is the biggest market in the industrialised world and, despite elimination of intra-regional trade flows, the trade in intermediate products also occupies a prominent position. Some 32% of North American exports to other continents is still accounted for by intermediate products.<sup>7</sup>

<sup>6</sup> This would indeed be difficult to imagine in the case of a region made up of countries like Iceland, Turkey, Australia, New Zealand, Switzerland and Norway.

<sup>7</sup> This figure will be artificially high because Mexico, an important regional trade partner of the USA in particular, has been included in the statistics as a non-OECD country and therefore not as part of the North American region.

TABLE 2

## SHARE OF GOODS AND REGIONS IN TOTAL TRADE

Region	Intermediate goods		Capital goods		Consumer goods		Energy		Total	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
North America	8.5	6.6	10.6	14.9	5.9	8.6	0.9	4.1	26.6	35.0
Japan	4.6	6.1	17.1	2.2	2.2	4.5	0.1	3.5	24.3	16.4
EU	13.0	10.9	15.3	11.2	7.8	8.6	1.1	6.0	37.8	37.4
Other OECD	4.5	3.8	1.9	4.2	2.9	2.3	1.5	0.7	11.3	11.2
OECD total	30.6	27.3	44.8	32.5	18.8	24.1	3.6	14.3	100.0	100.0

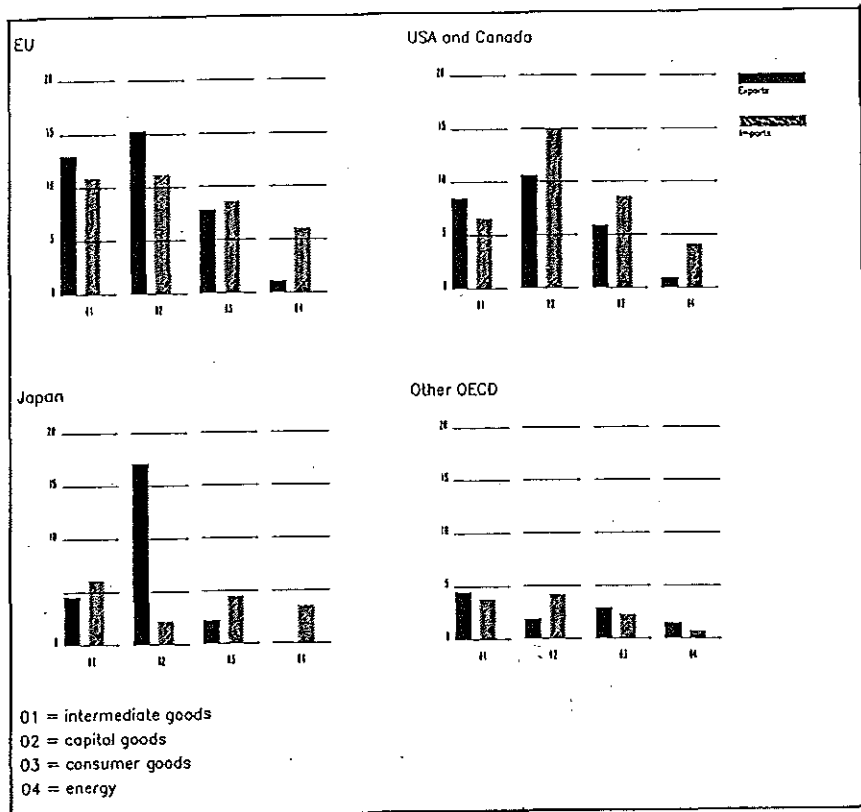
Note: Figures are corrected for intra-regional trade.

From the fact that the trade in intermediate products is not restricted to an intra-regional level, it may be deduced that these products offer sufficient added value for the trade with other continents not to be impaired by prohibitively high transport costs. Capital goods occupy an important position in North America's trade with other regions. This is true of both imports and exports. Another conclusion to be derived from Table 2 is the prominent position occupied by Europe as a global trading partner, with market shares of as much as 42.5% and 41.5%, respectively for exports of intermediate goods and consumer goods and a figure of 34.2% for capital goods. This combination of 'market power' is not found in the other regions. Japan only occupies an important position in the global export market for capital goods. The trade in energy products is a totally different story since this largely has to do with the availability of natural resources. In what follows, therefore, this product group receives only summary treatment.

Table 2 and Figures 2 and 3 lead to two general conclusions: Europe is the biggest inter-regional trade partner, a position which it occupies thanks to the diversity of its trade. Where Japan only plays a major role in the trade in capital goods, and then purely as an exporter, and North America is a major importer (of capital goods), Europe plays an important role in both the export and import of intermediate, capital and consumer goods. The relatively large North American import share of capital goods implies that other regions will profit from a North American demand for capital goods (in contrast

FIGURE 2

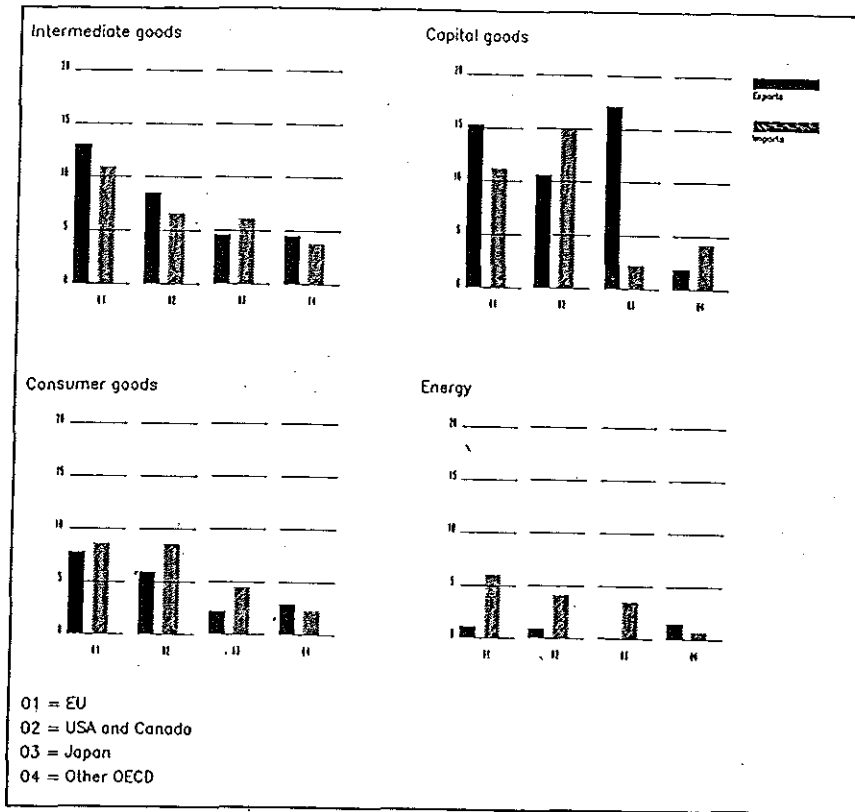
THE IMPORTANCE OF REGIONS IN THE WORLD MARKET,  
GROUPED BY GOODS CATEGORY  
(as percentages of total OECD trade)



Corrected for intra-regional trade.

FIGURE 3

THE IMPORTANCE OF GOODS CATEGORIES IN THE WORLD MARKET,  
GROUPED BY REGION  
(as percentages of total OECD trade)



Corrected for intra-regional trade.

to Japan, which is only a strong exporter of capital goods).<sup>8</sup> This confirms the hypothesis that the function of the USA as the engine of the world economy is transmitted via a demand for imports of product categories with a large world market. North America incidentally plays a more important role in the transmission of business cycles to industrialised countries via intermediate goods than is suggested in the Table and the Graphs. This is because this category of goods also comprises raw materials (excluding energy), which North America possesses in relatively large measure and therefore does not import to any great extent. The North American import demand as regards intermediate products therefore relates to more high-tech products than, for example, Japan's import demand for intermediate products, which is of roughly the same order of magnitude.<sup>9</sup>

It should also be mentioned, as an aside, that the economic powerhouse function of the United States identified by Berk and Bikker (1995) and Fase and de Bondt (1994), among others, could be performed equally well by the EU on the basis of the trade data presented in Table 2. Europe is a bigger overall importer than North America and occupies prominent positions in all the major world markets. A possible explanation for the fact that, despite this, the USA (or North America as we have here) and not the EU acts as the engine of the world economy lies in the field of the coordination of economic decisions, which is much stronger in the North American region than in the EU owing to the dominant influence of the USA (thus ensuring a unified policy). This would imply that, when EMU is achieved and the countries of the EU coordinate their economic decisions much more than at present, the EU might possibly be in a position to assume North America's role as the engine of the world economy.

To determine whether, as the classical trade theory suggests, the complementarity of export specialisation and import dependency in product categories is an important determinant of international trade flows, we next derive figures concerning export specialisation and

<sup>8</sup> For this reason, Japan cannot possibly function as a global powerhouse. This does not imply that a prerequisite for acting as a global powerhouse is a current account deficit. A country/region running a surplus on the current account can equally well perform such a function if it also has substantial import demand for product categories with a large world market.

<sup>9</sup> 88% of the North American demand for intermediate products is accounted for by chemicals and semimanufactures. In the case of Japan, this figure is 56%.

import dependence from Table 2. We formalise these concepts by applying export specialisation and import dependence coefficients as previously used by, for example van Nieuwkerk *et al.* (1982). The idea here is that a product group is relatively important to a region if the share of that product group in that region's trade exceeds the importance of that product group in the trade of all the regions together.

Expressed as a formula, this takes the form:

$$SC_{(i,j)} = [X_{(i,j)}/\sum_j X_{(i,j)}]/[X_{(i, OECD)}/\sum_i X_{(i, OECD)}]$$

or, equivalently:

$$SC_{(i,j)} = [X_{(i,j)}/X_{(i, OECD)}]/[\sum_i X_{(i,j)}/\sum_i X_{(i, OECD)}]$$

where:

- $SC_{(i,j)}$  = export specialisation/import dependence coefficient;  
 $X_{(i,j)}$  = exports/imports of product group  $i$  by/from region  $j$   
 $i$  = intermediate, capital and consumer goods, and energy;  
 $j$  = EU, North America, Japan, other OECD;  
 $X_{(i, OECD)}$  = export/import of product group  $i$  by the OECD, where of course  $\sum_j X_{(i,j)}$ .

If the coefficient is greater than 1, then the region concerned is relatively specialised in/dependent on that particular type of goods, otherwise there is no relative specialisation/dependence. These expressions may be directly applied to the relevant entries of Table 2. See Table 3 for the results.

TABLE 3

## EXPORT SPECIALISATION AND IMPORT DEPENDENCE OF THE REGIONS

Region	Intermediate goods		Capital goods		Consumer goods		Energy	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
North America	1.0	0.7	0.9	1.3	1.2	1.0	0.9	0.8
Japan	0.6	1.4	1.6	0.4	0.5	1.1	0.1	1.5
EU	1.1	1.1	0.9	0.9	1.1	1.0	0.8	1.1
Other OECD	1.3	1.2	0.4	1.2	1.4	0.9	3.7	0.4

Note: Figures are corrected for intra-regional trade.



The small differences in the coefficients presented in Table 3 and their small magnitude in absolute terms indicate that there are no really strong specialisation patterns. The most pronounced are the differences in the trade in energy products, where other OECD (thanks to Norwegian oil) is clearly export-specialised, and where Japan in particular is dependent on imports. If we examine the other categories of goods, we obtain the following picture. North America specialises in consumer goods and shows an import dependence in the field of capital goods. Japan is an obvious specialist in capital goods, while being dependent on imports in intermediate and consumer goods. The picture as regards Europe *vis-à-vis* the other regions is more complex, in the field of both imports and exports. If an attempt is nevertheless made to find areas of specialisation and dependence, then a slight specialisation in the field of intermediate and consumer goods is discernible, and an import dependence in the field of intermediate products. The 'other OECD' region profits from its wealth of natural resources and specialises in the export of intermediate products, but also exhibits import dependence in this category. The latter probably relates to the more technologically advanced semi-manufactures.

Japan seems to be unique in the sense that the country has relatively little simultaneous import and export of products in the same category (intra-industry trade). The latter finding is in line with earlier studies (see, for example, Lawrence 1987, Noland 1992 and OECD 1994, pp. 38 *et seq.*). A relatively small volume of intra-industry trade may be seen as a possible comparative disadvantage in a world which has seen vertical disaggregation of the production process due to technological advances. If export specialisation in a particular product category is an important determinant for meeting the import requirement of another region with respect to that same category, then Japan would appear to be best qualified to profit from the substantial North American demand.

We conclude by pointing out an important difference between the information in Tables 2 and 3. The latter Table *ex hypothesi* focuses on relative variables, and the conclusion that a complementary relationship between relative export specialisation and import dependency does not explain the observed trade flows has to be relativated as the concepts used do not take into account the difference in size of the regions. A region is capable of occupying an important position in the world trade market on the basis of the

absolute magnitude of the inter-continental trade flows alone. In order to understand this phenomenon, too, we shall take a closer look at the bilateral trade relations between the various regions in the next Section.

### 5.1. Analysis of trade in the principal sales markets

Here we study the three main OECD regions. As regards the sales markets (in the case of exports) and regions of origin (imports), the number of regions has been increased by three non-OECD regions since, although the trade figures of the OECD regions have been corrected to eliminate trade within each region, they still contain trade with non-OECD regions. The results are given in Table 4. This Table is divided into two parts, left and right, separated by a bold line. The first column lists the various combinations of regions, with the first region in each case being treated as the home market and the second region as the sales market in the case of exports or region of origin in the case of imports. The next two columns indicate the importance of the home market region to the region of destination/origin in question. This is measured as a percentage of the total exports/total imports of the home region. These figures give information on the geographical spread of the foreign trade of the various regions. For instance, the EU is North America's most important export market, accounting for over 32% of that region's export business, followed by the Far East (almost 20%), Japan and Latin America (both around 16.5%). On the import side, the EU, the Far East and Japan each account for around a quarter of North America's import demand, and Latin America follows with a share of around 14%.<sup>10</sup> The EU is thus clearly seen to be influenced by North America but the Asiatic region (Japan and the Far East) profits from North American import demand (and thus from any economic powerhouse effect) more than the EU countries. Regional factors explain the geographical spread of Japanese foreign trade; more than half of the country's trade is with the USA and with other countries in Asia. It will be noticed that the importance of the USA to Japanese trade is greater than the other way round. As regards the geographical

<sup>10</sup> Although Latin America is obviously a less important supplier to North America than Europe and Asia, the importance of this trade flow for Latin America should not be underestimated; it corresponds to a share of around 6.5% of Latin America's GDP.

ANALYSIS OF EXPORTS AND IMPORTS IN THE PRINCIPAL REGION SALES MARKETS  
(The figures to the left of the bold line are percentages of the total OECD exports/imports)

Regions <sup>1</sup>	Importance of		Intermediate goods		Capital goods		Consumer goods		Energy		Total	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exp.	Imp.	Exp.	Imp.
NA, EU	32.1	25.0	2.6 rm+tc	2.5 c+sm	4.0 m	3.7 m	1.5 mc	1.8 mc	0.3	0.5	8.5	8.8
NA, FE	19.8	24.6	1.9 rm+c	1.3 sm	2.2 m	3.1 m	1.0 f+mc	3.9 mc	0.1	0.2	5.3	8.6
NA, JP	16.5	23.8	1.8 sm	0.9 sm	1.0 m	6.5 m+t	1.3 f+mc	0.8 mc	0.2	0.0	4.4	8.3
NA, LA	16.4	14.4	1.3 c+sm	0.9 sm	1.8 m	1.3 m	0.9 f+mc	1.4 f+mc	0.2	1.2	4.4	5.0
NA, OO	6.0	3.6	0.5 c	0.4 sm	0.7 m	0.2	0.3 mc	0.4	0.0	0.2	1.6	1.3
NA, ONO	5.1	4.5	0.3	0.3 sm	0.4	0.0	0.6 f	0.2	0.0	1.0	1.4	1.6
NA, ME	3.9	3.8	8.5 rm+tc	0.2	0.5 m+t	0.1	0.3 f	0.1	0.0	1.0	1.0	1.3
NA, total				6.6 sm	10.6 m	14.9 m	5.9 f+mc	8.6 mc	0.9	4.1	26.6	35.0
JP, NA	36.5	27.4	1.0 sm	1.8 rm	7.0 m+t	1.0 m	0.7 mc	1.3 f	0.0	0.3	8.9	4.5
JP, FE	29.9	31.2	2.4 sm	1.7 rm+sm	4.1 m	0.5 m	0.6 mc	1.8 f+mc	0.1	1.1	7.3	5.1
JP, EU	19.3	14.5	0.5 c+sm	0.9 c+sm	3.6 m	0.7 m+t	0.5 mc	0.8 mc	0.0	0.0	4.7	2.4
JP, OO	4.7	7.6	0.2	0.6 rm	0.8 m+t	0.0	0.1	0.3 f	0.0	0.3	1.1	1.3
JP, ONO	3.7	4.1	0.2 sm	0.4 rm+sm	0.6 m+t	0.0	0.1	0.1	0.0	0.1	0.9	0.7
JP, LA	3.2	4.2	0.1	0.4 rm+sm	0.6 m+t	0.0	0.1	0.2	0.0	0.1	0.8	0.7
JP, ME	2.7	11.0	0.2 sm	0.1	0.4	0.0	0.1	0.0	0.0	1.7	0.7	1.8
JP, total			4.6 sm	6.1 rm+sm	17.1 m+t	2.2 m	2.2 mc	4.5 f+mc	0.1	3.5	24.3	16.4
EU, NA	24.2	22.2	2.6 sm	2.6 rm	4.0 m	3.8 m	2.0 mc	1.5 mc	0.4	0.3	9.1	8.3
EU, ONO	21.4	20.0	3.1 c+sm	2.5 sm	3.2 m	0.4 m	1.5 f+mc	1.6 f+mc	0.1	2.8	8.1	7.5
EU, OO	18.5	14.7	2.6 sm	2.3 sm	2.4 m	1.0 m	1.7 mc	1.2 mc	0.2	0.9	7.0	5.5
EU, FE	12.6	13.9	1.9 sm	1.3 sm	2.1 m	1.5 m	0.7 mc	2.3 mc	0.0	0.0	4.8	5.2
EU, ME	7.2	5.9	1.1 sm	0.3	0.9 m	0.1	0.7 f+mc	0.1	0.0	1.7	2.7	2.2
EU, JP	5.8	12.5	0.8 c+sm	0.5 sm	0.7 m+t	3.6 m+t	0.7 mc	0.6 mc	0.0	0.0	2.2	4.7
EU, LA	5.4	6.9	0.6 c+sm	1.0 rm+sm	1.0 m	0.2	0.4	1.1 f	0.0	0.3	2.0	2.6
EU, total			13.0 c+sm	10.9 sm	15.3 m	11.2 m	7.8 mc	8.6 mc	1.1	6.0	37.8	37.4

<sup>1</sup> Exports from A to B/imports by A from B. <sup>2</sup> Percentage of total exports/imports of the first region in the pair.

Note: m = machinery, t = transport, mc = manufactured consumer goods, f = food, sm = semi-manufactures, c = chemicals, rm = raw materials.  
NA = North America, LA = Central and South America, JP = Japan, FE = Far East, ME = Middle East, OO = Other OECD, ONO = Other non-OECD.  
The regional figures have been netted of intra-regional trade.

spread of the inter-regional trade of the EU, there are two points worth mentioning. Firstly, there is the relatively large importance of the other non-OECD (ONO) region as trade partner; over one-fifth of the EU's inter-regional trade is with the ONO. This is because Africa, Eastern Europe and the former Soviet Union - all grouped together in the ONO - are important trade partners for France and the Scandinavian countries, respectively. Secondly, the EU exports to Japan are relatively small and, for example, much smaller than the EU's exports to other countries in Asia. This is therefore an area in which the countries of the EU still have a lot of work to do.

The figures to the right of the bold line give information on the analysis of both exports and imports for the various markets, taking into account the size of the markets and regions. This has been done by expressing all trade flows as a percentage of the total OECD exports/imports; thus the Table may be seen as a subdivision of the cells in Table 2 according to customer/supplier region. The biggest trade flows are those between North America and the EU (8.7% of the total OECD trade takes place between these two regions). North America is the EU's most important trade partner and North American import demand is greatest for European goods (8.8% of world trade). There is always room for improvement, however; North American demand for products from the two Asiatic regions is twice as great as that for EU products.

If the *North American* import demand is analysed in greater detail, we find that two-thirds is accounted for by capital goods and consumer goods. The biggest suppliers in these two product categories are the Asiatic regions, which are thus able to profit from North America's powerhouse function particularly in these two areas. The EU only plays a leading role in satisfying North America's demand for intermediate goods from abroad - a demand which, as we have already seen, is relatively small but of a high-grade level technologically. The Table gives little indication of a possible indirect effect of the North American powerhouse function on Europe via Japan. This effect might involve the supply of Japanese capital goods to meet North American demand, manufactured using intermediate products obtained from Europe. Japan apparently prefers suppliers in the Pacific rim, however, i.e. North America itself and the other countries of Asia. Japan has similar preferences, too, as regards its own demand for foreign consumer goods. Europe does, however,

profit indirectly from a North American import demand for manufactured consumer goods from the Far East. Some of the machines with which these goods are produced come from European suppliers.

Europe's import requirements are fairly diversified, as regards both supplier and product. For instance, Europe imports mainly capital goods from North America and Japan while the countries of Eastern Europe (including the former Soviet Union) and also North America are important suppliers of raw materials and energy, with the other countries of Asia supplying consumer durables. It should also be noticed, incidentally, that the Asiatic countries and Japan together constitute a bigger supplier to the EU than North America. The EU's most important export goods on the principal sales markets are mostly capital goods. This has to do with the considerable diversity of the European export pattern, having a market interest in nearly all the world's sales regions and serving markets all over the globe. This diversification is probably a result of the colonial past of the majority of EU countries.

To summarise, we have the following picture concerning the transmission of business cycles. Assuming that North America plays the role of engine to the global economy (although this is by no means an automatic conclusion, given the magnitude of the trade flows – see previous Section), then it is mainly the Asiatic region (Japan and the Far East) which is the first to profit from any forward momentum and which gains the most. Almost 37% of all Japan's exports, for instance, go to North America, and Japanese exports account for 9.6% of Japan's GDP (see Table 1). In other words, Japanese exports to North America represent 3.5 percentage points of Japan's GDP. Although the trade flows between North America and the EU are also intensive (indeed, the biggest in the world), the cyclical link between the two regions resulting from the trade flows is less obvious than the link between North America and the Asiatic region. This is because the European region is so diversified in its export markets (in terms of both geographical spread and types of goods) that the region is less dependent on anyone other region.

The above conclusion does not imply that the EU will not benefit from the pull of the North American economy. From Tables 1 and 4, it may be calculated that EU exports to North America account for almost 2% of EU's GDP (24.2% of EU exports goes to North America and exports amount to 8% of EU's GDP). This figure represents the lower limit of the true strength of trade flows as a

transmission channel between North America and Europe since it does not take any account of indirect effects such as the export of machinery to the Far East from Europe for the production of consumer goods destined for the North American market, as has already been referred to. Quantifying the latter effect is difficult, but an upper limit can be estimated as follows. Suppose that the total North American import demand for Asiatic products consists of goods which the Asiatic region (Japan and the Far East) itself has to import. Suppose also that the share of the EU in this import demand corresponds to the share of the Asiatic regions in EU exports (18.4%). Given these admittedly unrealistic assumptions, the total effect of a North American import demand works out at something less than 3.5 percentage points of EU's GDP at the most. This means that a 10% increase in North American import demand, other things being equal, would ultimately produce an increase of between 0.2 and a maximum of 0.35 percentage points in EU's GDP. This minimal influence thus mainly results from the minimal openness,<sup>11</sup> rather than from the small size of trade flows. We are therefore forced to the conclusion that the role of trade flows in the transmission of international business cycles is relatively limited.

In sum, the complementary nature of export specialisation and import dependence is unable to explain all trade flows, as the classical theory would have us believe. But in some cases it does. For instance, Japan's import pattern is largely a reflection of Japan's lack of natural resources, in accordance with classical theory. The absence of intra-industry trade in Japan's case is also in line with classical trade theory. Modern theories, on the other hand, explain the trade flows between the countries of Europe and between the European region on the one hand and the regions outside Europe on the other, which involve obvious intra-industry trade and specialisation in goods produced using comparable production factors. Technological progress means that manufactured goods are now produced using a whole range of specialised intermediate products. This production process itself has also become more complex and the number of links in the process has increased. Combined with imperfect competition and different production methods in the various countries, this development in turn made possible a vertical disintegration of the production process. The

<sup>11</sup> As far as the EU is concerned, the minimal openness refers to the trade with regions outside the EU.

result is that the various production phases in the manufacture of a given product take place at different locations, determined by economies of scale. This then explains the importance of the European intra-industry trade (both within and outside the European region), which is largely made up of trade in intermediate products (see also Krugman 1995).

## 6. Concluding comments

Based on the division of the global economy into economic blocks, with the North American region performing the role of engine, this paper examined the role played by trade flows as a channel for the transmission of business cycles. The first findings to come out of our empirical analysis were that, on the basis of the magnitude of the trade flows, continental Europe would also be in a position to perform the function of engine for the global economy, since the region is the biggest trade partner for all the major world markets. The fact that North America nevertheless acts as the powerhouse possibly has to do with the relatively low level of coordination of economic decisions in the EU compared with the situation in the North American region. It was also found that it is the Asiatic regions in particular which benefit first and also most strongly from the impetus provided by an economic upturn in North America, in the form of higher export sales. Dependence on North America is somewhat less in the case of the European countries, not least because of their close trade relations among each other. Moreover, the structure of the extra-EU trade of the European countries is characterised by a large measure of diversification in both the geographical and product sense. In other words, the EU has more than one iron in the fire and its trade package spans the whole spectrum of the business cycle, from products required early on in the cycle (intermediate products) to products for which demand rises late in the cycle or which are hardly cyclical at all (manufactured consumer goods/food). In addition, this diversification makes it difficult for other regions, even those as big as North America, to exert a clear influence on the European region via trade flows. The trade patterns of the regions studied, given a world in which there is no such thing as perfect competition and in which the utilisation of economies of scale

in a vertically disaggregated production process is an important source of international trade, is better explained by modern trade theories than by the classical Heckscher-Ohlin model.

If the picture as regards the direction of the cyclical transmission brought about by regional differences in patterns of specialisation is not always clear, things become even more problematical when account is taken of the strength of this transmission mechanism as well as the direction in which it acts. Japan is able to profit most from a surge in North American import demand, but the direct effect which the resultant exports have on Japanese GDP, at around 3.5 percentage points, is relatively minor, owing to the closed nature of the Japanese economy. For the countries of Europe, too, trade flows to areas outside the EU have a relatively minor effect on their GDP. Even the biggest trade flow in the world, that between the EU and North America, when both direct and indirect effects are taken into account, only accounts for between 2 and at most 3.5 percentage points of the EU's GDP. The implication of all this is that growth in North American demand for imports would have to be really strong to have a substantial effect on the GDP of other regions.

All in all, the inevitable conclusion appears to be that the importance of trade flows as a channel for cyclical transmission – and the power of the North American economic engine – is far less significant than is often maintained. This is certainly true of the relation between North America and Europe. This does not mean, however, that there are no substantial ties between the major economic blocks in the world, merely that the interactions are transmitted via channels other than trade flows, such as financial/monetary variables and the expectations of participants in economic activity.

We conclude by mentioning some caveats. First, the relatively low weight of international specialization in our findings could be partly explained by the fact that our functional classification is not especially suitable for capturing technological and commodity specific characteristics, factors that are usually connected to trade specialization (Krugman 1995). Second, our dataset only includes international trade in goods. The international trade in services is therefore neglected. Although the importance of the latter is relatively small (total OECD exports of services amounted to 3% of OECD's GDP in 1989, against a figure of 14% for goods exports), there are

indications that the importance of services in international trade is rapidly increasing (Francois and Reinert 1995). Third, since our empirical analysis is based on data for a period of one year, it is unable to give any indication of the evolution of the trade patterns over time. The present study therefore cannot say anything about the possibility of realistic further integration between the blocks. This could be an interesting topic for further investigation.

## REFERENCES

- BAXTER, M. (1995), "International trade and business cycles", *Working Paper*, no. 5025, NBER, Cambridge, Mass.
- BAXTER, M. and M. CRUCINI (1994), "Business cycles and the asset structure of foreign trade", *Working Paper*, no. 4975, NBER, Cambridge, Mass.
- BERK, J.M. (1993), "The present cyclical downturn in a historical perspective", *Quarterly Bulletin*, no. 2, pp. 1-13, De Nederlandsche Bank, Amsterdam.
- BERK, J.M. (1996), "Trade flows as a channel for the transmission of business cycles" (in Dutch), *MEB Series*, no. 1, De Nederlandsche Bank, Amsterdam.
- BERK, J.M. and J.A. BIKKER (1995), "International interdependence of business cycles in manufacturing industry: the use of leading indicators for forecasting and analysis", *Journal of Forecasting*, vol. 14, pp. 1-23.
- CENTRAL PLANNING BUREAU (1995), "Specialisation and price competition by the Netherlands and Germany in the trade in manufactured goods" (in Dutch), *Research Memorandum*, no. 123.
- FASE, M.M.G. and G.J. DE BONDT (1994), "Germany as a hub of economic activity" (in Dutch), *ESB*, vol. 79, pp. 864-68.
- FRANCOIS, J.F. and K.A. REINERT (1995), "The role of services in the structure of production and trade: stylized facts from a cross-country analysis", *CEPR Discussion Paper*, no. 1228, London.
- FRANKEL, J.A. and S.J. WEI (1993), "Trade blocs and currency blocs", *Working Paper*, no. 4335, NBER, Cambridge, Mass.
- GABISCH, G. and H.W. LORENZ (1989), *Business Cycle Theory: A Survey of Methods and Concepts*, Springer-Verlag, Berlin.
- HABERLER, G. (1930), "Die Theorie der komparativen Kosten und ihre Auswertung für die Begründung des Freihandels" (The theory of comparative costs and their evaluation as a basis of free trade - in German), *Weltwirtschaftliches Archiv*, Bd 32, pp. 350-70.
- HABERLER, G. (1933), *Die Internationale Handel* (International Trade - in German), Springer-Verlag, Berlin.
- HARROD, R.F. (1936), *The Trade Cycle*, Clarendon Press, Oxford.
- HECKSCHER, E. (1919), "The effect of foreign trade on the distribution of income", translated as Chapter 13 in *Readings in the Theory of International Trade*, American Economic Association, Philadelphia, 1949.
- HICKS, J.R. (1950), *A Contribution to the Theory of the Trade Cycle*, Clarendon Press, Oxford.
- KALECKI, M. (1937), "Theory of the Business Cycle", *Review of Economic Studies*, vol. 4, pp. 77-97.
- KLEIN, P.H. and G.H. MOORE (1983), "The leading indicator approach to economic forecasting: retrospect and prospect", *Journal of Forecasting*, vol. 2, pp. 119-35.
- KLEIN, P.H. and G.H. MOORE (1985), "Monitoring growth cycles in market oriented countries: developing and using international economic indicators", *NBER Studies in Business Cycles Series*, vol. 26, Cambridge, Mass.
- KRUGMAN, P.R. (1979), "Increasing returns, monopolistic competition and international trade", *Journal of International Economics*, vol. 9, pp. 469-79.
- KRUGMAN, P.R. (1980), "Scale economies, product differentiation and the pattern of trade", *American Economic Review*, vol. 70, pp. 950-59.
- KRUGMAN, P.R. (1981), "Intra-industry specialization and the gains from trade", *Journal of Political Economy*, vol. 89, pp. 959-73.
- KRUGMAN, P.R. (1995), "Growing world trade: causes and consequences", *Brookings Papers on Economic Activity*, no. 1, pp. 327-62.
- LAWRENCE, R.Z. (1987), "Imports in Japan: closed markets or minds?", *Brookings Papers on Economic Activity*, no. 2, pp. 517-54.
- METZLER, L.A. (1941), "The nature and stability of inventory cycles", *Review of Economics and Statistics*, vol. 23, pp. 113-29.
- NIEUWKERK, M. VAN, N.P. DRIESPRONG and A.C.J. STOKMAN (1982), "Aspects of the Dutch balance of payments" (in Dutch), *ESB*, vol. 67, pp. 1224-27.
- NOLAND, M. (1992), "Protectionism in Japan", *Open Economies Review*, vol. 4, pp. 67-81.
- OECD (1987), "OECD leading indicators and business cycles in member countries - 1960-1985", *Sources and Methods*, vol. 39, Paris.
- OECD (1992), "Comparison of the current downturn with past cyclical episodes", *OECD Economic Outlook*, no. 52, pp. 31-40.
- OECD (1994), *Economic Outlook*, no. 56, Paris.
- OHLIN, B. (1933), *Interregional and International Trade*, Harvard University Press, Cambridge, Mass.
- POPKIN, J. (1984), "The business cycle at various stages of process", *Journal of Business and Economic Statistics*, no. 1, vol. 2, pp. 215-23.
- RICARDO, D. [1817] (1951), *Principles of Political Economy and Taxation*, Cambridge University Press, Cambridge.
- SAMUELSON, P.A. (1939), "Interactions between the multiplier analysis and the principle of acceleration", *Review of Economics and Statistics*, vol. 21, pp. 75-78.

- SANTERO, T. and N. WESTERLUND (1996), "Confidence indicators and their relationship to changes in economic activity, *Working Paper*, no. 170, OECD, Economics Department, Paris.
- THORNTON, H. [1802] (1962), *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*, A.M. Kelley Press, Fairfield.
- ZARNOWITZ, V. (1992), *Business Cycles: Theory, History, Indicators and Forecasting*, The University of Chicago Press, Chicago.