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Contents

Characteristics and development of Belgium's foreign trade

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Introduction

Belgium's economic development and prosperity are largely based on transactions with neighbouring countries, and more generally on those with the rest of the world. Owing to the small size of the Belgian economy and the limited availability of raw materials, Belgium has to import on a large scale in order to obtain goods and services which are not available at home or which can be produced more cheaply abroad. Conversely, Belgium exports a large proportion of its output, so that it can finance its imports and take advantage of economies of scale.

In the last twenty-five years, international trade has undergone radical changes, notably owing to the globalisation of the economy and the emergence of new markets and new competitors. This article explains the principal changes in the international context and examines how Belgium's foreign trade has behaved in that altered context.

The article is in three parts which reflect the main stages in the analysis. The first part discusses the characteristics of globalisation and its influence on the development and structure of foreign trade. The second part contains an analysis of the main characteristics of Belgian foreign trade, focusing principally on the export side. The third part presents the results for Belgium in terms of movements in the balance of trade and shares of foreign markets. Those results can be used as the basis for examining how Belgium has responded so far to the growing integration of the world economy. In the process, the development of Belgium's foreign trade is compared with that of neighbouring countries, because – apart from their monetary policy – those countries have a considerable number of common economic characteristics.

An additional stage in the analysis would consist in explaining these results by linking them to the factors determining competitiveness. Here it is important to point out that, as a result of the structural changes in the world economy, the competitiveness of an economy can increasingly be defined as its capacity to create and maintain a favourable environment for the development of its prosperity, beyond maintaining its position in international trade. In consequence, the factors to be taken into account have been extended, going beyond the mere comparison of prices and costs with those of trading partners. The selection of appropriate indicators, e.g. in the field of innovation or the business environment, is still under discussion and many of the data concerned have yet to be collected and harmonised. The factors determining the Belgian economy's competitiveness are therefore not addressed in this article.

1. Structural developments in international trade

1.1 Globalisation and international trade

International trade in goods, indicated in this part of the article by the average development in import and export flows at constant prices, expanded sharply in the period 1975-2002, growing at an average rate of 5.6 p.c. per annum. In contrast, world output measured in terms of GDP showed an average annual increase of only 2.9 p.c. over the same period. It is mainly since the second half of the 1980s that the expansion of international trade has outstripped the rise in output.

The fact that international trade is growing faster than output reflects the increasing globalisation of the economy, which also features the strong expansion of international capital movements and international migration.

The increasing globalisation can be explained by a number of fundamental changes in the world economy. First, barriers to the free movement of goods have been reduced by the conclusion of free trade agreements, and capital movements have been liberalised. In addition, the technological progress achieved in recent decades, particularly in transport and telecommunications, has stimulated international trade by reducing transaction costs and by promoting the exchange of information and the mobility of persons and goods. Finally, keener international competition has prompted firms to take advantage of economies of scale by expanding their outlets.

The more efficient allocation of the factors of production – a result of the globalisation of the economy – has been beneficial in boosting both productivity gains and world income. It has also led to fragmentation in the creation of added value in the production process. As a result of this fragmentation, the final output is currently derived from a number of successive phases in the production process in various entities, rather than production in a single entity as used to be the case. Such a production process is common in the manufacturing industry, e.g. in the motor vehicle sector, but is also increasingly seen in the services sector, where it takes such forms as remote data processing for the purpose of business management operations (accounting, administration, distribution) or customer services (call centres). The fact that international trade in goods is growing faster than world production should also be considered from this perspective, as imports and exports are calculated on the

CHART 1   INTERNATIONAL TRADE IN GOODS AND WORLD GDP

(Indices 1975 = 100, at constant prices)
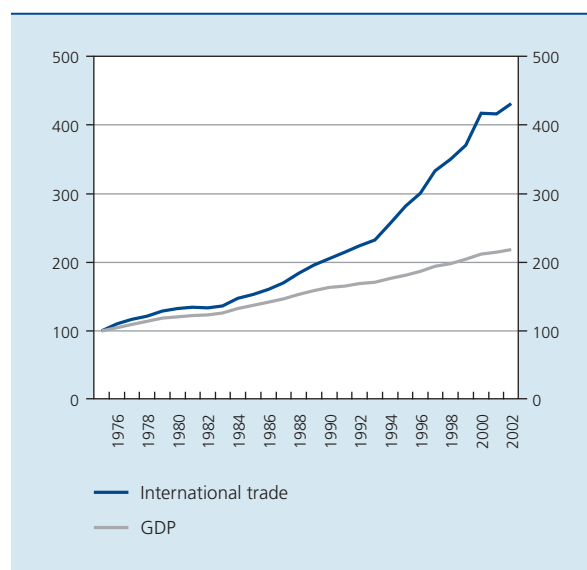
Sources : OECD, World Bank.

basis of gross flows between production entities which are usually located in different countries. In contrast, the final output is calculated on the basis of the sum of the value added in each production entity.

International trade in goods is concentrated mainly in the industrialised countries, since in 2002 the OECD countries accounted for just over 71 p.c. of total world trade. The international trade of the United States represented almost 15 p.c. of the total, and that of Japan came to nearly 6 p.c. The euro area is the biggest trading region with just over 29 p.c. of the total, if transactions between euro area countries are taken into account. Disregarding those transactions, the euro area's share is comparable to that of the United States. While international trade grew faster than GDP in each region during the period from 1975 to 2002, there were nevertheless some variations between regions. In the United States and the euro area, foreign trade expanded most strongly in relation to output, namely by a factor of 2.2 to 2.3. In Japan and in the non-OECD countries, on the other hand, the relative expansion of foreign trade was less marked.

TABLE 1   DEVELOPMENT AND GEOGRAPHICAL STRUCTURE OF INTERNATIONAL TRADE IN GOODS [1]

	Development (annual average growth percentages 1975-2002, at constant prices)			Geographical structure (percentages of the total in 2002, at current prices)	
	International trade	GDP	Ratio	International trade	GDP
World	5.6	2.9	1.9	100.0	100.0
OECD countries . . . . of which :	5.8	2.8	2.0	71.3	81.4
Euro area	5.4	2.3	2.3	29.4	20.6
United States	6.9	3.2	2.2	14.7	32.1
Japan	4.8	2.8	1.7	5.7	12.4
Non-OECD countries	5.1	3.5	1.5	28.7	18.6

Sources : OECD, World Bank.
(1) Average of imports and exports.

1.2 Structural developments in international trade

THE GROWING IMPORTANCE OF MULTINATIONAL ENTERPRISES

The fragmentation of the production process is driven mainly by the multinational enterprises, which want to organise their production process in the best possible way in an increasingly competitive environment. In order to take maximum advantage of economies of scale and optimise their cost structure, these enterprises create new entities or acquire control over firms based in other countries. Foreign direct investment plays a key role here. The desire to have a presence on important markets, or on growth markets, may also provide an incentive for investing directly in foreign countries.

Foreign direct investment may act as a catalyst for foreign trade or it may inhibit it. The net effect is not certain in advance, and depends among other things on the objective of the direct investment : fragmentation of the production process among various entities, or relocation of production closer to the sales market. In any case, both foreign trade and foreign direct investment have expanded considerably in the past two decades, despite a steep decline after 2000, the year in which investment and the stock market bubble reached their peak. Thus, between 1980 and 2002 the expansion of foreign direct investment, which increased by a factor of 12, far outpaced the expansion of international trade, which grew by a factor of 3.5.

In recent decades, multinationals have greatly increased their share in international trade. According to estimates by UNCTAD, in the second half of the 1990s those enterprises accounted for roughly two-thirds of all world trade [1].

CHART 2   FOREIGN DIRECT INVESTMENT AND INTERNATIONAL TRADE IN GOODS [1]

(Indices 1980 = 100, at current prices)
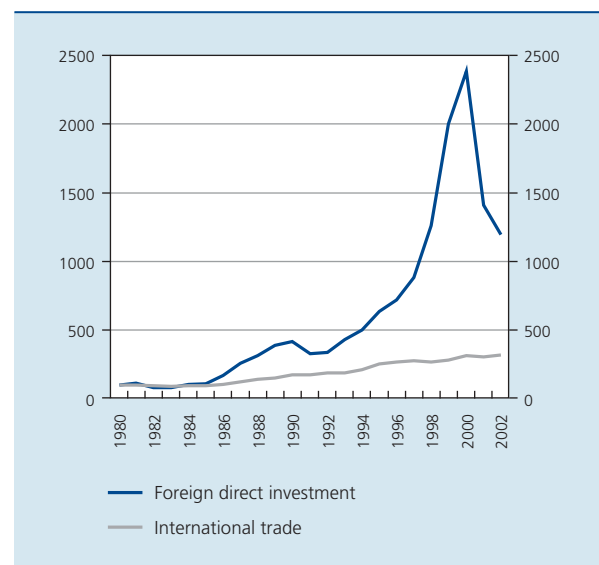
Sources : OECD, UNCTAD.
(1) Average of imports and exports.

(1) UNCTAD (2002).

GROWING INTRA-INDUSTRY TRADE

The increasing internationalisation of production is triggering a strong expansion in international intra-industry trade, which means that products of the same type are imported and exported. A yardstick for the growing importance of this type of international trade is the Grubel-Lloyd index. This indicates the extent to which the product structure is the same on the import side and on the export side.

Since the early 1960s, that index has risen significantly in the industrialised countries. Since the 1990s, international intra-industry trade has represented on average around 72 p.c. of trade in the manufacturing industry of the euro area and the United States, against an average of just around 55 p.c. in the 1960s. In Japan, intra-industry trade accounts for a smaller share of foreign trade, although it does represent almost 60 p.c. In the euro area, Belgium, the Netherlands and France have the highest percentage of international intra-industry trade, and Germany is in an intermediate position.

THE CHANGING PRODUCT STRUCTURE OF INTERNATIONAL TRADE

If the product structure of international trade in goods in 1980 is compared with that in 2002, it is apparent that the share of the total represented by manufacturing industry products has increased substantially, namely from 59 p.c. to 83 p.c. That growth is due to the fact that the prices of manufacturing industry products have risen more sharply than those of agricultural products, food

TABLE 2   INTERNATIONAL INTRA-INDUSTRY TRADE IN MANUFACTURING INDUSTRY [1]

(Percentages of total foreign trade of manufacturing industry)

	1961-1970	1991-2000	2001
Euro area [2]	52.6	71.6	73.7
Germany	54.6	76.5	76.7
France	76.4	86.5	85.6
Netherlands	78.5	87.9	87.4
BLEU/Belgium	73.4	85.4	88.9
United States	57.4	71.8	71.8
Japan	34.8	50.0	58.0

Sources: OECD, NBB.
(1) Grubel-Lloyd index.
(2) Non-weighted average of international intra-industry trade of the twelve euro area countries.

TABLE 3   WORLD TRADE IN GOODS: STRUCTURE PER PRODUCT CATEGORY [1]

(Percentages of total trade in goods, average imports and exports at current prices)

	1980	2002
Agriculture, food and raw materials	41.0	17.0
of which:		
Energy	23.7	7.7
Manufacturing industry products ..	59.0	83.0
Chemicals	7.3	10.1
Manufactured goods classified chiefly by material	16.3	13.6
Machinery and transport equipment	24.8	42.3
Other	10.7	17.0
Total	100.0	100.0

Source: UNCTAD.
(1) The classification in product categories is based on the SITC nomenclature (see Annex).

and raw materials, and primarily to the strong expansion of the product category covering "machinery and transport equipment". The fact that international trade in this last category has grown strongly in relative terms is due partly to the expanding trade in parts and components which plays an important role in this product category. Detailed figures reveal that the increase in trade in manufacturing industry products was most marked in the case of products with a high technological content, which may be explained by the higher income elasticity of demand and the greater potential for product innovation and productivity growth in the case of these products.

In addition, the share of services in total international trade has risen from just under 17 p.c. in 1980 to almost 20 p.c. in 2002. The expansion of trade in services is attributable partly to the growing importance of the production and consumption of services. In addition, technological progress has also encouraged trade in services by making it possible for large and constantly growing volumes of data to be transferred rapidly at ever lower cost. This progress was of decisive importance in financial services, for example. Technological developments have also fostered trade in services, as firms have tried to spread the associated fixed costs by extending their geographical market beyond their national borders. Finally, the growth of foreign trade in goods has also led to more international trade in a number of services, particularly transport and financial services. However, this article focuses mainly on trade in goods.

GROWING IMPORTANCE OF INTRA-REGIONAL TRADE

The growth of international trade in goods during recent decades was also accompanied by the expansion of intra-regional trade. A large and ever growing proportion of international trade takes place between, and principally within, a number of regional blocs, more particularly the European Union, North America and South-East Asia. Roughly two-thirds of all international trade takes place between and within these blocs, mainly as a result of formal regional trade agreements which were concluded particularly during the 1980s. In addition, geographical proximity, economies of scale and the growth of foreign direct investment play a key role within the blocs.

Since the 1980s, trade within the European Union has been encouraged by such factors as the accession of Spain and Portugal in 1986, and by the gradual implementation of the internal market. Monetary union could provide a further impetus for trade between the euro area countries. According to the economic literature, monetary integration has an impact on international trade via three channels : cost reductions resulting from the abolition of the different currency units (simpler accounting, lower transaction costs, etc.), the elimination of the risks associated with nominal exchange rate fluctuations and greater price transparency. Empirical studies on the subject conclude that the net effect of these three factors on trade within the euro area is positive, but the results vary widely, ranging from an increase of 5 p.c. to 50 p.c. in the case of imports[1]. According to these studies, a positive effect is already apparent, but the full effect will only be seen in the longer term.

The enlargement of the European Union by ten countries in May of this year could perhaps provide a further stimulus for trade within the European Union. However, these countries had already concluded "Europe Agreements" (Malta and Cyprus in the 1970s, the others in 1991) and thus created free trade zones – mainly for industrial production – with EU countries[2]. These countries have therefore already been opened up to the European markets to some extent. However, it does look as if their trade with the European Union will expand further in the coming years, though when assessing the potential effect on foreign trade it must be remembered that their markets are rather small in size.

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(1) EC (2003).
(2) The "Europe Agreements" offer these countries faster access to the EU market than vice versa.
(3) Carlin W., Glyn A., and J. Von Reenen (2001).
(4) Banco de España (2003).
(5) Average imports and exports of goods and services at constant prices.

1.3 Implications for the analysis of international trade

The structural developments in international trade have implications for the analysis of foreign transactions and for the assessment of a country's competitiveness.

First, when analysing the movements in the volume of trade in goods it is preferable to examine at the same time the movements in the volume of imports and exports. That neutralises temporary or structural deviations from the pace of globalisation observed at world level. If the movement in the volume of exports or imports is considered on its own, that can lead to biased, and in some cases even erroneous, conclusions.

In addition, owing to the increasing segmentation of production, the short-term pattern of a country's foreign trade will be less affected by temporary fluctuations in cost and price factors, such as the relative costs of labour or the exchange rate. Recent research has indicated that this phenomenon is most common in high-technology sectors and in the core countries of the euro area[3]; furthermore, the high level of re-exports in Belgium and the Netherlands seems to make exports less price-elastic in those countries[4].

2. Belgium's foreign trade

2.1 General importance of foreign trade for Belgium

The tendencies characterising the development of world trade in recent decades are also largely found in the foreign trade of Belgium and of the euro area, as both form an integral part of world trade.

Over the period 1980-2003 the volume of Belgium's foreign trade[5] grew by an annual average of 4.2 p.c., far outpacing the 1.9 p.c. increase in economic activity. Nevertheless, the expansion of Belgium's foreign trade was the weakest of the euro area countries, where the average growth rate was 4.8 p.c.

A number of factors account for this divergence in dynamism compared to the euro area. First, the average rate of economic growth in Belgium during that period, at 1.9 p.c., was lower than that of the euro area where it came to 2.2 p.c.; part of the reason was that Spain, Portugal and – above all – Ireland were making up lost ground, but it was also due to growth in Belgium lagging behind that in the three main neighbouring countries – Germany, France

TABLE 4   DEVELOPMENT AND GEOGRAPHICAL STRUCTURE OF THE FOREIGN TRADE OF THE EURO AREA [1] [2]

	Development (average annual growth percentages 1980-2003, at constant prices)			Geographical structure (percentages of the total in 2003, at current prices)	
	Foreign trade	GDP	Ratio	Foreign trade	GDP
Euro area	4.8	2.2	2.2	100.0	100.0
Germany [3]	4.4	2.3	1.9	28.6	29.4
France	4.6	2.0	2.2	15.6	21.4
Italy	4.3	1.8	2.4	13.0	17.9
Netherlands	4.7	2.3	2.1	10.6	6.3
Spain	7.6	2.8	2.8	8.6	10.2
Belgium	4.2	1.9	2.2	8.6	3.7
Austria	4.9	2.2	2.2	4.6	3.1
Ireland	9.4	5.3	1.8	4.0	1.8
Finland	4.8	2.4	2.0	1.9	2.0
Portugal	6.1	2.6	2.3	1.8	1.8
Greece	4.6	1.8	2.5	1.5	2.1
Luxembourg	6.6	4.7	1.4	1.3	0.3

Sources : EC, NAI.
(1) Average imports and exports of goods and services.
(2) Countries are ranked according to the relative size of their foreign trade.
(3) Data for West Germany up to 1992.

and the Netherlands – during the first half of the 1980s. In addition, the integration of the former countries into the European Union also generated a steep rise in international trade, apart from the effects on GDP. Thus, in Spain and Portugal, and furthermore also in Italy and Greece, the expansion of foreign trade in relation to GDP exceeded the average for the euro area. Finally, Belgium – and more generally the BLEU – already had a high degree of openness before 1980.

The openness of the Belgian economy, measured as the ratio between average imports and exports of goods and services on the one hand and final demand on the other, totalled 43.7 p.c. on average during the period 1995-2003. Belgium is in third place among the euro area countries, and also far exceeds the average for those countries, which stands at 24.9 p.c. The degree of openness can be broken down on the basis of the data for trade in services and those for trade in goods. The latter

TABLE 5   DEGREE OF OPENNESS
(Average imports and exports expressed as a percentage of final demand, average for 1995-2003, at current prices)

	Belgium	Ranking within the euro area	Euro area [1]	Germany	France	Netherlands
Total trade	43.7	3	24.9	23.1	20.1	37.7
Services	7.5	4	5.0	4.0	3.4	6.9
Goods	36.2	1	19.8	19.1	16.7	30.8
Euro area	22.5	1	–	8.7	9.4	18.4
Extra-euro area	13.7	3	–	10.4	7.2	12.4

Sources : EC, NAI.
(1) Including trade within the euro area.

can be further subdivided into trade within the euro area and trade outside the euro area.

In the case of foreign trade in services, Belgium has the fourth highest degree of openness of countries in the euro area, at 7.5 p. c, after Luxembourg – where the financial sector is extremely important – Ireland and Austria. In contrast, France and Germany have a very low degree of openness as regards foreign trade in services.

In foreign trade in goods, Belgium has the highest degree of openness of the euro area countries, namely 36.2 p.c. This is because, owing to its central location, Belgium trades on a large scale with the countries of the euro area. However, a number of countries which are more on the outskirts of the euro area, such as Ireland or Finland, have a higher degree of openness than Belgium in the case of transactions with countries outside the euro area.

Since 1980, the expansion of foreign trade in goods and services has almost continuously outpaced the growth of final demand, and that trend persisted in the euro area countries in the second half of the 1990s. In that respect, the creation of the single market evidently acted as a catalyst, since the growth of foreign trade accelerated from 1994 onwards. The degree of openness of the euro area thus increased from 21.7 p.c. in 1980 to 25.9 p.c. in 2003, rising in Belgium from 36.5 p.c. to 45 p.c. over the same period.

2.2 Product structure of foreign trade[1]

If the product structure of Belgian foreign trade in goods is compared at a fairly aggregate level, over the period 1995-2003, it is evident that the percentage of the total represented by agricultural products, food and raw materials (SITC 0 to 4) is rather greater overall than for the three main neighbouring countries and greater than for the euro area. One reason for this is the sale of petroleum products distributed or processed in Belgium.

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(1) The classification by product category is based on the SITC nomenclature (see Annex).

Box 1 – Figures for foreign trade in goods according to the national concept

The statistics for Belgian foreign trade in goods are compiled by the NBB for the NAI in accordance with both the Community concept and the national concept. The first concept is based on international standard rules and is used mainly in international publications. The second is determined independently by each country and takes account of the specific characteristics of the country's foreign trade.

For Belgium, the figures according to the national concept are calculated by making a number of adjustments to the figures according to the Community concept. In 2003 the overall adjustment averaged around 20 p.c. of the figures according to the Community concept. The main element of this is the adjustment in respect of transactions across the customs border effected exclusively between non-residents. These transactions, which represent a growing proportion of the total transactions in goods according to the Community concept, are excluded from the figures according to the national concept [1]. That leads to variations between the development of the volumes – and to a lesser extent of the prices – of foreign trade according to the two concepts.

From an economic point of view, the figures according to the national concept offer the best picture of economic reality as regards output and demand in Belgium. They form the basis for compiling the "goods" heading in the balance of payments and the goods transactions in the national accounts.

From January 2004, the NAI has switched to publishing figures according to the national concept, although the Community concept figures are still available. The figures used in this article are the ones drawn up according to the national concept, available from 1995 onwards.

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(1) For more information on the method of calculating the national concept, see the articles in the Monthly Bulletin of Foreign Trade, March 2001, September 2002 and January 2004.

TABLE 6   PRODUCT STRUCTURE OF GOODS EXPORTS

(Percentages of total exports by value, averages 1995-2003)

	Belgium	Three main neigh-bouring countries	Euro area
Agriculture, food and raw materials	16.9	14.0	13.7
of which:			
Energy	4.2	2.8	2.6
Manufacturing industry products	83.1	86.0	86.3
Chemicals	20.3	13.6	13.8
Manufactured goods classified chiefly by material	24.3	13.6	16.4
Machinery and transport equipment	29.5	46.5	42.3
Other	8.9	12.4	13.8
Total	100.0	100.0	100.0

Sources: EC, NAI.

In Belgium, as in the other countries of the euro area, manufacturing industry products (SITC 5 to 9) represented the bulk of exports, at roughly 85 p.c. Within this product category, however, there are variations in the specialisation of countries. For instance, Belgium specialises in exporting products made by the chemical industry (SITC 5) and products made by processing raw materials (SITC 6). The diamond trade accounts for about 6 percentage points of the larger share of this last product category in Belgian exports; other products within this category which are relatively significant in Belgium are textile yarn, fabrics and made-up articles, iron and steel and non-ferrous metals. In contrast, the product category covering machinery and transport equipment (SITC 7) is relatively under-represented in Belgian exports, despite the very large percentage accounted for by the motor vehicles industry.

With the exception of raw materials, which are not abundant in Belgium, the structure of Belgium's imports is very similar to that of its exports. As already stated in part 1, Belgium therefore has one of the highest percentages of international intra-industry trade of all the countries in the euro area. Overall, the figures per product category reveal that the total trade balance surplus, averaging an annual 8.3 billion euro over the period 1995-2003, is due principally to chemicals and to manufactured goods classified chiefly by material. Plastics, textile yarn, fabrics and made-up articles made a particularly large contribution to the overall surplus, along with road vehicles, which form part of the machinery and transport equipment category. Their positive

contribution more than offset the deficits, particularly in the other items of the machinery and transport equipment category, in the energy products and in clothing.

If the structure of Belgium's exports is compared in more detail with that of the foreign trade of a reference area, on the basis of some sixty product categories[1], it is possible to identify more precisely which product categories have a positive or negative influence on the course of foreign trade.

This is done by combining two criteria. The first criterion concerns the degree of specialisation of foreign trade and consists in comparing the share of a particular product category in total Belgian exports with that in the imports of a reference area. The difference between the two gives the degree to which Belgium specialises in a particular product category: if the difference is positive, then Belgium specialises in that particular product category. The second criterion concerns the relative dynamism of demand for the various product categories compared to trade in general. A particular product category is called progressive if imports in that category increase faster on average than total imports. In the opposite situation, the product category is regressive.

(1) Based on the SITC nomenclature, 2-digit level.

TABLE 7   PRODUCT STRUCTURE AND TRADE BALANCE FOR BELGIUM PER PRODUCT CATEGORY

(Averages for the period 1995-2003, at current prices)

	Exports	Imports	Trade balance
	(Percentages of the total)		(Billions of euro)
Agriculture, food and raw materials	16.9	21.6	−5.4
of which:			
Energy	4.2	8.1	−5.4
Manufacturing industry products	83.1	78.4	13.7
Chemicals	20.3	16.3	7.6
Manufactured goods classified chiefly by material	24.3	20.6	7.4
Machinery and transport equipment	29.5	30.7	0.6
Other	8.9	10.8	−1.8
Total	100.0	100.0	8.3

Source: NAI.

Box 2 – The importance of diamonds in Belgium's foreign trade

Owing to the key international role of Antwerp as a transit centre, the diamond trade occupies an important position in Belgium's foreign trade. However, this sector is much less significant for value added and employment.

Between 1995 and 2003, Belgian imports and exports of diamonds represented, on average, 6.1 and 6 p.c. respectively of the total value of imports and exports. During that period, the trade balance fluctuated between 33 million euro and 836 million euro.

In general, the annual pattern of the international diamond trade is volatile in terms of both prices and volumes. It can therefore have a considerable impact on the overall foreign trade picture. However, in the medium term these movements generally cancel one another out. Thus, in the period from 1995 to 2003, the large fluctuations in volume evidently offset one another to a large extent, so that they had hardly any influence on total foreign trade. Since the growth of the diamond trade was, on average, relatively comparable to that of trade in general, the pattern of Belgian imports and exports in volume terms over the period 1995-2003 was much the same regardless of whether or not the diamond trade was taken into account. In terms of prices, developments in Belgian imports and exports also offered a relatively similar picture, with or without the diamond trade. The prices used by the NAI are market prices supplied by the Belgian Diamond Council.

INFLUENCE OF DIAMONDS ON BELGIUM'S FOREIGN TRADE

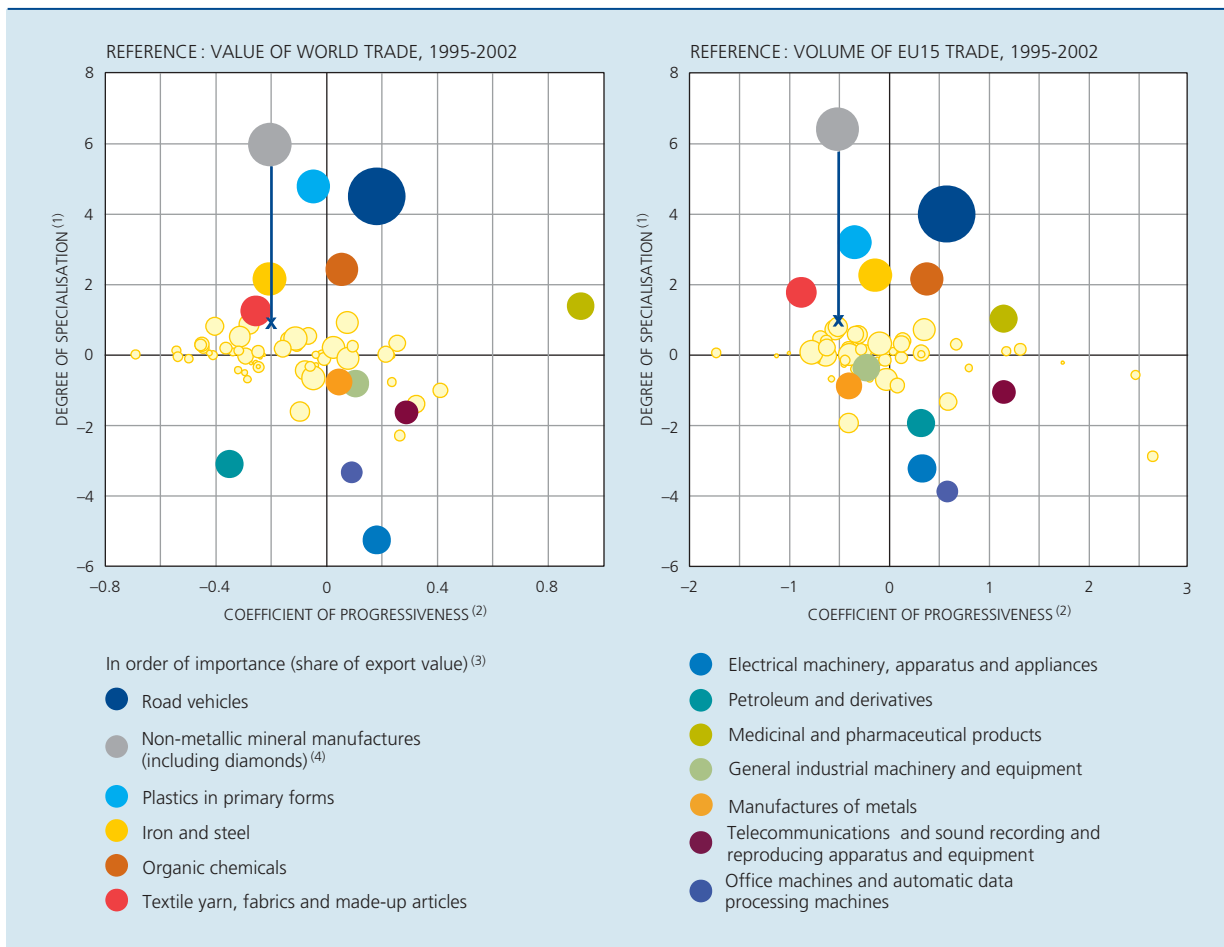|	Total	Diamonds	Total excluding diamonds
	(Billions of euro, annual averages 1995-2003)		
Value			
Exports	152.7	9.2	143.5
Imports	144.3	8.8	135.5
Balance	8.3	0.4	7.9
	(Indices for the year 2003, 1995 = 100)		
Volume			
Exports	131.3	137.1	131.0
Imports	131.2	135.3	130.9
Coverage rate [1]	100.1	101.3	100.0
Prices			
Exports	116.4	113.5	116.6
Imports	120.1	115.6	120.5
Terms of trade [2]	96.9	98.1	96.8

Source : NAI.
(1) Ratio between exports and imports at constant prices.
(2) Ratio between export prices and import prices.

Analysis at a more disaggregated level (SITC nomenclature 2-digits) clearly reveals the impact of the diamond trade. Over the period 1995-2002, non-metallic mineral manufactures represented on average roughly 7.6 p.c. of the value of Belgium's exports and imports, while they accounted for only 2 p.c. of world trade.

CHART 3   SUMMARY OF THE PRODUCT STRUCTURE EFFECT FOR BELGIUM

REFERENCE : VALUE OF WORLD TRADE, 1995-2002

REFERENCE : VOLUME OF EU15 TRADE, 1995-2002

DEGREE OF SPECIALISATION [1]

COEFFICIENT OF PROGRESSIVENESS [2]

In order of importance (share of export value) [3]

- Road vehicles
- Non-metallic mineral manufactures (including diamonds) [4]
- Plastics in primary forms
- Iron and steel
- Organic chemicals
- Textile yarn, fabrics and made-up articles

- Electrical machinery, apparatus and appliances
- Petroleum and derivatives
- Medicinal and pharmaceutical products
- General industrial machinery and equipment
- Manufactures of metals
- Telecommunications and sound recording and reproducing apparatus and equipment
- Office machines and automatic data processing machines

Sources : EC, NAI, UNCTAD.
(1) The degree of specialisation per product category is calculated as the difference between the share of a product category in Belgium's exports and its share in world trade and EU15 imports respectively.
(2) The coefficient of progressiveness per product category is calculated as the relationship, expressed as a percentage deviation, between the growth of the product category and the average growth of all the products in the reference area.
(3) The size of the circles indicates the importance of the product categories in Belgium's total exports.
(4) x : position of the product category non-metallic mineral manufactures, excluding diamonds.

On the basis of the combined results for the two criteria, the product categories can be divided into four classes. The product structure of foreign trade is favourable if exports, in comparison with the reference area, are specialised in progressive product categories and are not specialised in regressive product categories. In the opposite case, the product structure is unfavourable.

Two reference areas were considered for foreign transactions, namely world trade[1] on the one hand, and euro area imports on the other. Since the availability of the data is limited, the figures for the period 1995-2002 had to be expressed in nominal terms for the first reference area but in volume terms for the second. The results for Belgian exports are fairly similar on the basis of the two

reference areas and can be allocated as follows among the four classes:
– specialisation in products for which the markets are progressive (north-east quadrant in chart 3): around 28 p.c. of exports. This concerns more particularly road vehicles, organic chemicals and medicinal and pharmaceutical products;
– non-specialisation in products for which the markets are regressive (south-west quadrant): between 14 and 17 p.c. of exports. Product categories in this class include petroleum and its derivatives if the reference area is taken as world trade, and manufactures of

(1) For statistical reasons, total imports do not tally with total exports at world level. The value of world trade was therefore calculated as the average of the two flows.

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TABLE 8   SPECIALISATION PROFILE OF BELGIAN EXPORTS AND OF THOSE OF THE MAIN TRADING PARTNERS, BY PRODUCTS

(World trade value data / EU15 trade volume data, average weights for the period 1995-2002)

	Belgium	Netherlands	Germany	France	Italy
A. Favourable for export market share					
1. Specialisation in progressive markets					
World trade [(1)]	28.9	33.1	47.1	46.0	25.7
EU15 trade [(1)]	28.4	24.1	38.4	43.9	9.2
2. Non-specialisation in regressive markets					
World trade [(1)]	14.3	19.4	16.4	17.2	10.3
EU15 trade [(1)]	16.6	16.2	16.5	21.3	10.5
Total					
World trade [(1)]	43.2	52.5	63.5	63.2	36.0
EU15 trade [(1)]	45.0	40.3	54.9	65.2	19.7
B. Unfavourable for export market share					
1. Specialisation in regressive markets					
World trade [(1)]	37.6	26.3	18.4	18.0	37.4
EU15 trade [(1)]	38.8	30.6	29.7	17.2	52.2
2. Non-specialisation in progressive markets					
World trade [(1)]	19.2	21.2	18.1	18.9	26.6
EU15 trade [(1)]	16.3	29.1	15.3	17.6	28.1
Total					
World trade [(1)]	56.8	47.5	36.5	36.8	64.0
EU15 trade [(1)]	55.0	59.7	45.1	34.8	80.3

Sources : EC, NAI, UNCTAD, NBB.
(1) Reference area.

metals and general industrial machinery and equipment if the reference area is taken as EU15 trade ;

– specialisation in products for which the markets are regressive (north-west quadrant) : roughly 40 p.c. of exports. This mainly concerns plastics in primary forms, iron and steel, textile yarn, fabrics and made-up articles ;

– non-specialisation in products for which the markets are progressive (south-east quadrant) : between 16 and 19 p.c. of exports. These markets concern electrical machinery, apparatus and appliances, office machines and automatic data processing machines, and tele-communications and sound recording and reproducing apparatus and equipment.

Thus, over the period 1995-2002, Belgium's export structure was roughly 44 p.c. favourable and 56 p.c. unfavourable. These calculations were also performed for Belgium's main trading partners. The Netherlands had a relatively similar export structure. In contrast, Italy's was far less favourable : 64 to 80 p.c. of exports are on the unfavourable side. France and Germany had a more

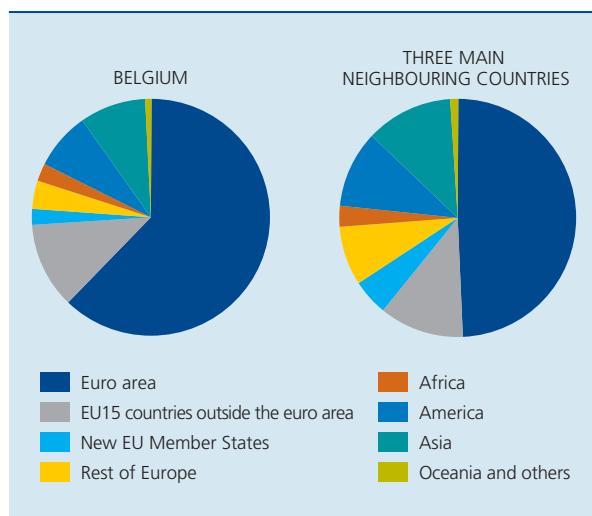favourable product structure, with a positive orientation for around 60 p.c. of exports.

This breakdown gives only a rough indication of the orientation of foreign trade, since it takes no account of the degree of specialisation or progressiveness. In that respect, it is more relevant to examine the impact of product specialisation on the trade results by calculating a product-weighted figure for market growth. The results of such a calculation are discussed in part 3.

2.3 Geographical structure of foreign trade

In terms of geographical structure, Belgium's foreign trade differs from that of the three main neighbouring countries in that transactions with euro area countries represent a higher proportion of total transactions. During the period 1995-2003, that region's share in Belgium's total imports and exports in fact averaged 62.4 p.c., against only 49.4 p.c. for the three main neighbouring countries.

CHART 4

CHART 4 GEOGRAPHICAL STRUCTURE OF FOREIGN TRADE

(Percentages of total foreign trade by value, averages for the period 1995-2003)

BELGIUM

THREE MAIN NEIGHBOURING COUNTRIES

- Euro area
- EU15 countries outside the euro area
- New EU Member States
- Rest of Europe
- Africa
- America
- Asia
- Oceania and others

Sources : EC, NAI.

As regards trade with the major regions outside Europe, a deficit is recorded in trade with Africa and America. In the latter case, this is due mainly to the negative balance of transactions with the United States. The balance is positive for trade with Asia, but negative for transactions with China and Japan. Finally, trade with Oceania and other regions is slightly positive on average.

In general, the trade balance of the three main neighbouring countries is also positive, but not as large in relation to GDP as that for Belgium. This difference is due mainly to the fact that, for those three countries, trade with the euro area made a smaller contribution to the trade surplus, and trade with Asia – alone – produced a negative balance. In contrast to Belgium, on the other hand, the neighbouring countries had a positive trade balance with America, Africa and the EU15 countries not belonging to the euro area.

Almost 50 p.c. of Belgium's total trade is in fact concentrated on these three countries.

The share of the total represented by EU15 countries not belonging to the euro area is comparable for Belgium and its three main neighbouring countries. In contrast, the share represented by all regions outside the EU15 – considered both jointly and individually – is always smaller in Belgium.

The geographical structure of Belgium's foreign trade has remained relatively stable since 1995, though the share of the new EU Member States has more than doubled since then, from 1.2 p.c. to 2.6 p.c. of Belgium's total trade, as these countries are becoming more integrated into international trade. Asia's share has also increased, namely from 8.8 p.c. to 9.8 p.c., mainly because of transactions with India and China. India's share rose from 1.2 p.c. to 1.4 p.c., boosted primarily by the diamond trade. China's share doubled over the period considered, from 0.8 p.c. to 1.6 p.c., partly as a result of that country's strong economic growth.

Belgium's trade surplus, which was running at or around 3.6 p.c. of GDP over the period 1995-2003, is due mainly to trade with European countries, more particularly trade with the countries of the euro area. Trade with the new EU Member States, like trade with the rest of Europe, makes a modest but structural contribution towards Belgium's positive trade balance.

TABLE 9 TRADE BALANCE PER GEOGRAPHICAL AREA

(Percentages of GDP, averages for the period 1995-2003)

	Belgium	Three main neighbouring countries
Total	3.6	2.7
Europe	4.2	2.7
EU15	3.4	2.4
Euro area	3.5	1.5
EU15 countries outside the euro area	−0.1	0.8
New EU Member States	0.4	0.2
Rest of Europe	0.4	0.1
Africa	−0.6	0.2
America	−1.1	0.6
Asia	0.6	−0.8
Oceania and others	0.4	0.1

Sources : EC, NAI.

3. Belgium's foreign trade results

Belgium's foreign trade results are analysed on the basis of the movement in the trade balance and, in more detail, on the basis of the movement in market shares. The intention is therefore to assess competitiveness in the narrow sense, namely a country's ability to maintain its position in international trade. The broader definition of the term competitiveness covers the capability of a country to keep up with its trading partners in a number of areas which are not confined to international trade but also concern growth and employment, for example, and more generally their prosperity.

3.1 The development of Belgium's trade balance

The trade balance reflects a country's ability to maintain equilibrium between the value of goods imports and that of goods exports. Movements in the trade balance are influenced by a change in competitiveness, the effects of which may be felt by both imports and exports. However, they are also determined by other factors, such as commodity prices, exchange rates or divergences in the strength of domestic demand in the various countries.

According to the national accounts data, over the period 1980-1995 Belgium's trade balance was converted from a deficit of 2.4 p.c. of GDP to a surplus of 4.3 p.c. of GDP. That improvement was attributable at the beginning of the 1980s to the slower growth of Belgian domestic demand – in comparison with the main trading partners – as a result of the devaluation of the Belgian franc and the associated wage moderation measures. The devaluation and wage moderation also brought an improvement in Belgium's competitiveness, and therefore bolstered the growth of exports and curbed imports. From the mid 1980s, the improvement in the trade balance had more to do with the marked recovery in the terms of trade, caused by the weakening of the dollar and the fall in commodity prices. Since 1995 the trade surplus has been slowly declining. According to the foreign trade figures, containing the latest information for 2002 and 2003, it dropped from 4.5 p.c. of GDP in 1995 to 3.2 p.c. of GDP in 2003.

The national accounts data reveal that the three main trading partners also saw an improvement in their trade balance over the period 1980-2003. Except in Germany[1], where the effect of unification was a factor, the trends were generally the same as in Belgium. Over the period as a whole, trade produced an annual average deficit of 0.8 p.c. of GDP in France and a surplus of roughly 4 p.c. of GDP in Germany and the Netherlands, higher than the figure of 1.9 p.c. of GDP recorded in Belgium. From 1998

CHART 5 TRADE BALANCE OF BELGIUM AND ITS MAIN TRADING PARTNERS

(Percentages of GDP)

- Belgium (national accounts data)
- Belgium (foreign trade data)
- Netherlands
- France
- Germany (West Germany up to 1991)
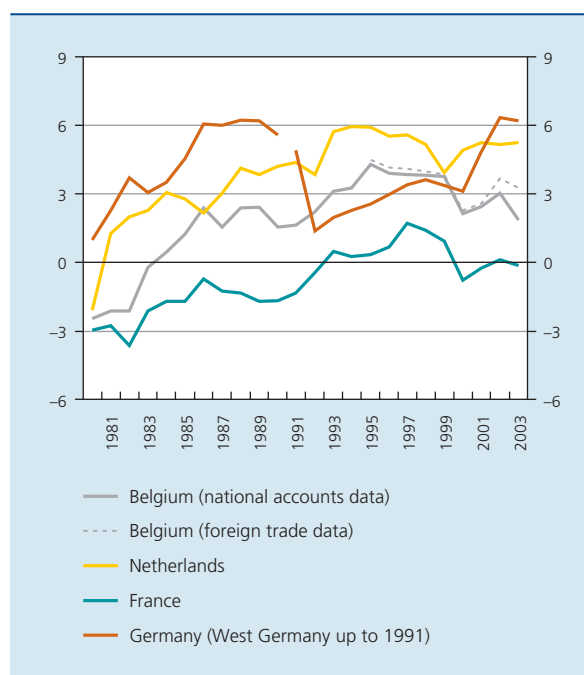
Sources : EC, NAI.

to 2003, the various countries recorded an annual surplus of 0.2 p.c. in France, 3.3 p.c. in Belgium and 4.6 p.c. and 4.9 p.c. respectively in Germany and the Netherlands.

The fluctuations in the balance of foreign trade in goods can also be analysed by distinguishing between the movement in the coverage rate in volume, i.e. the ratio between exports and imports at constant prices, and the movement in the terms of trade, or the ratio between export prices and import prices. A residual statistical factor covers such aspects as the level effect and the combined effect of volume and prices. However, such a breakdown takes no account of the interaction between the various factors, as the movement in prices influences the economy's position in terms of competitiveness, and may therefore influence movements in volume.

Over the period 1995-2003, Belgium's net exports of goods declined by 1.2 percentage points of GDP as a result of the very unfavourable movement in prices which was not entirely offset by the positive contribution made by the movement in volume and in the residual component.

(1) Data for West Germany up to 1991.

The very negative contribution made by the movement in prices over the period considered, amounting to 12 percentage points of GDP, is attributable to the deterioration in the terms of trade over the period 1995-2001, caused by the strengthening of the dollar, since the improvement in the terms of trade in 2002, due to the weakening of the dollar, did not entirely compensate for this effect. In 2003 the terms of trade remained virtually unchanged, as the increase in commodity prices offset the effect of the continued weakening of the dollar.

The positive contribution made by the movements in volume, at 1.3 percentage points of GDP, is in turn the outcome of the opposing contributions made by relative domestic demand and other factors, which largely cancelled one another out.

Belgian domestic demand is of decisive importance for the movement in the import volume, while the domestic demand of Belgium's main economic partners determines the volume of Belgian exports. The divergent evolution in both demands is therefore a key factor in explaining the changes in the coverage rate in volume. A comparison between the development in the combined domestic demand of the twenty main trading partners[1] and that of Belgian domestic demand over the period 1995-2003 shows that the difference in growth rates underlies the improvement in the coverage rate in volume. The average growth of domestic demand among the trading partners, which was somewhat higher than 2.2 p.c., was in fact stronger than in Belgium, where the figure was somewhat lower than 2.1 p.c. This difference can be largely explained by the strong growth of domestic demand in the countries outside the euro area and in a number of euro area countries which produced strong growth in the second half of the 1990s, namely Ireland, Luxembourg, Spain, Portugal and Greece.

The other factors which explain the movement in the coverage rate in volume include the product specialisation of output and foreign trade, and competitiveness. Their contribution was negative over the period 1995-2003. That may point to a general loss of competitiveness on the part of the Belgian economy.

Finally, the residual component – which is calculated as the balance – made a strong positive contribution, amounting to 9.4 percentage points of GDP, primarily as a result of the "level effect". That effect is due to the fact that the trade balance is not equal to zero at the beginning of the period being analysed. Given a positive initial balance, as was systematically the case for Belgium over the period examined, the effect of equal growth in the value of imports and exports will be to cause a further increase in the balance.

3.2 The movement in Belgium's market shares

BELGIUM'S SHARE OF WORLD TRADE AT CURRENT PRICES

The results for Belgium's foreign trade can also be examined on the basis of the movement in the Belgian imports and exports as a percentage of total world trade.

On the basis of the OECD figures at current prices, it is evident that during the period 1980-2002 the share of total world trade represented by Belgian exports remained relatively steady at around 3 p.c. In contrast, the share of Belgium's three main neighbouring countries tended to decline over this period. Germany's share fluctuated widely, but only showed a modest fall, from 10.1 p.c. in 1980 to 9.9 p.c. in 2002. On the other hand, France and the Netherlands saw their share decline much more steeply, from 5.9 p.c. to 5 p.c. and from 3.4 p.c. to 2.9 p.c. respectively.

On the import side, the period 1980-2002 brought a decline in the Belgian share of total world trade, down from 3.4 p.c. to 2.9 p.c., and in that of its main neighbouring countries. Germany's share fell from 9.3 p.c. to 7.6 p.c., that of France from 6.6 p.c. to 4.7 p.c., and that of the Netherlands from 4.7 p.c. to 3.5 p.c. For all countries, the fall was more marked than on the export side.

According to the WTO, Belgium was the world's tenth largest exporter and eleventh largest importer in 2002. The biggest exporters were the United States, Germany and Japan; the biggest importers were the United States, Germany and

TABLE 10	CONTRIBUTIONS TO THE CHANGE IN THE TRADE BALANCE AND TO THE COVERAGE RATE IN VOLUME (1995-2003)
	(Changes in percentages of GDP)

Trade balance	−1.2
Terms of trade	−12.0
Coverage rate in volume	1.3
Difference in domestic demand	4.0
Other factors	−2.7
Residual component	9.4

Sources : NAI, OECD, NBB.

(1) The domestic demand figures are added together according to the weight of the countries in Belgian exports. Altogether, they represented roughly 82 p.c. of Belgian exports over the period 1995-2003.

CHART 6   MARKET SHARES IN TOTAL WORLD TRADE

(Percentages of total world trade by value)
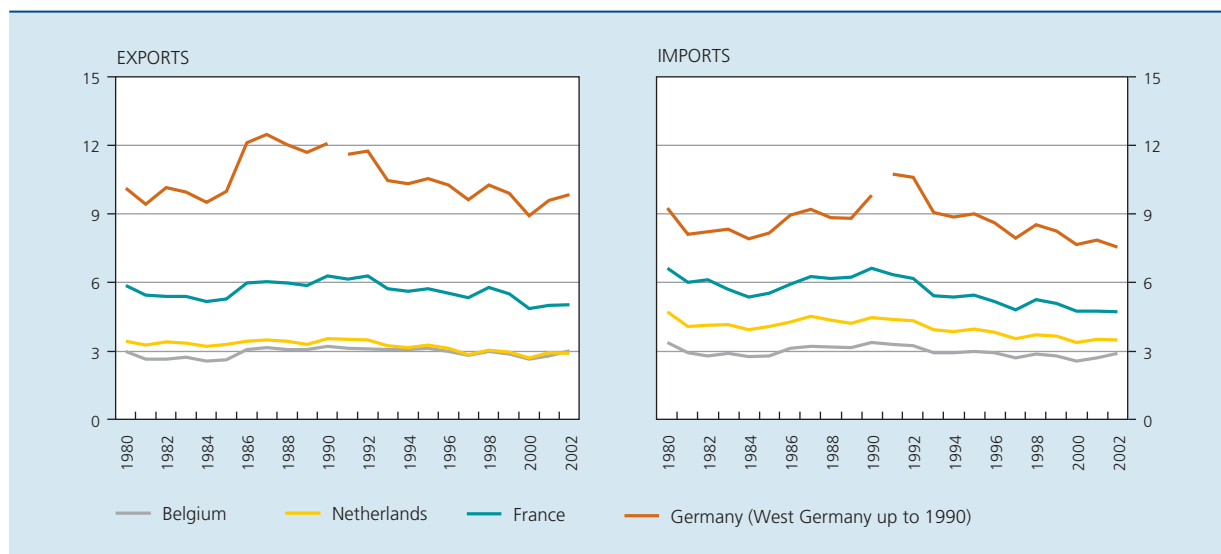
Source : OECD.

the United Kingdom. If the countries are ranked on the basis of world output[1], Belgium comes only 27th with 0.6 p.c. of the total. This illustrates once again the importance of foreign trade in the Belgian economy.

BELGIUM'S SHARE OF FOREIGN MARKETS AT CONSTANT PRICES

The "customer market" approach permits a more detailed analysis of the movement in market shares. It consists in comparing the growth of exports with the growth of the potential markets.

As in most studies of this type, volume data are chosen instead of value data since the former take no account of exchange rate and price movements during the period under consideration[2]. Those movements can in fact distort the analysis since they may also be influenced by factors other than competitiveness. For instance, movements of a speculative nature on the financial markets can trigger sharp exchange rate fluctuations which are liable to affect the movement of market shares in terms of value.

However, in order to obtain reliable figures in volume terms, adequate deflators are needed to neutralise the impact of exchange rate and price movements on the figures in value terms. A comparison of the deflators available at various international institutions in fact shows that there are problems in regard to international comparability, especially in the case of the national accounts figures. The

results obtained on the basis of those data for the movement in market shares must therefore be interpreted with due caution. In an international comparative study it is preferable to use deflators which are methodologically comparable. The foreign trade figures best satisfy that condition and will therefore be used in this article.

The growth of Belgium's potential export market is calculated as the weighted average of the change in the import volumes of Belgium's trading partners. It can be arrived at in two different ways, depending on the structural effects taken into account in the calculations. According to the first method, the weights are assessed on the basis of the share of the trading partners in the total value of Belgium's exports, thus only taking account of the geographical structure of Belgian exports. According to the second method, the weights are calculated on the basis of the trading partners' shares per product category, thus also taking account of the product structure of Belgian exports. While it is generally only the first measure that is used, e.g. for the prediction exercises conducted by the international organisations, this article calculates both.

(1) Percentages of world GDP in 2001, on the basis of purchasing power parities, according to World Bank data.
(2) Bundesbank (2002) and (2003).

The movement in Belgium's market share will be compared with that of its main trading partners in the euro area, namely the Netherlands, Germany, France and Italy.

The first – i.e. exclusively geographically weighted – measure of market growth was calculated on the basis of the European Commission figures for foreign trade for the EU15 countries[1] and the OECD figures for the other trading partners. In the latter case, seven large geographical regions are identified: OECD countries which are not among the EU15, Africa and the Middle East, dynamic Asia, China excluding Hong Kong, other Asian countries, Central and South America, and Central and Eastern Europe. The OECD data were adjusted to make them methodologically as comparable as possible with the foreign trade data for the EU15.

The results show that the development of market growth was fairly similar for Belgium and its trading partners over the period 1995-2002, with a trade-weighted average increase of 34.4 p.c. for the three main neighbouring countries. Belgium's market growth was slightly above that average, at 34.9 p.c., Germany saw the strongest expansion at 35.5 p.c., while growth was weakest in the Netherlands at 32.5 p.c. There were wider variations as regards the increase in the volume of goods exports over the same period. The average increase for the three main neighbouring countries was 39.4 p.c. against only

27.1 p.c. for Belgium, or 27.7 p.c. excluding diamonds. The volume of Germany's exports saw the strongest rise at 49.4 p.c., contrasting with increases of 34.2 p.c. in France and 32.5 p.c. in the Netherlands. Italy had the weakest rise in the volume of exports at 25 p.c.

Over the period 1995-2002, Belgium therefore saw its share of the foreign markets fall by 5.8 p.c., with a maximum cumulative loss of just over 8 p.c. in 1998. Italy's market share contracted even more sharply, namely by 6.6 p.c. between 1995 and 2002. However, the other important trading partners succeeded in maintaining a stable market share, particularly the Netherlands and France, or actually increasing it, with 10.2 p.c. in the case of Germany. On average, the market share of the three main neighbouring countries increased by 3.8 p.c.

As already stated, the second measure of market growth takes account of the influence of not only the geographical structure but also the product structure. The classification used here – in some sixty product categories – was the same as that used to calculate the specialisation structure in part 2. In the absence of sufficient detailed data for the other countries, market growth was calculated solely on the basis of the import volume data for the EU15 countries. These countries represented on average around 75 p.c. of Belgium's exports over the period 1995-2002.

The product structure effect corresponds to the ratio between the two measures of market growth. It is negative if the market growth weighted both geographically and by products is not as strong as the geographically-weighted market growth as such. This means that the export product structure is not sufficiently oriented towards the product markets which grew fastest during the period under consideration.

For Belgium, the product structure effect over the period 1995-2002 was negative, as it was – to an even greater extent – for Italy. In Belgium the cumulative effect was most negative in 1998; after that, it gradually improved. In contrast, in the three main neighbouring countries the product structure effect was positive, as those countries' exports were sufficiently oriented towards the fastest growing product markets. The detailed results reveal that the difference can be explained mainly by the relatively small share of Belgian exports represented by the "Machinery and transport equipment" category (SITC 7). This was one of the fastest growing categories

TABLE 11   MARKET SHARE OF BELGIUM AND ITS MAIN TRADING PARTNERS (2002)

(Geographically weighted market growth in relation to world trade, indices 1995 = 100)

	Volume of export	Market growth	Market share
Belgium			
Total	127.1	134.9	94.2
Total excluding diamonds	127.7	–	94.6 [1]
Netherlands	132.5	132.5	100.0
France	134.2	134.5	99.7
Germany	149.4	135.5	110.2
Three main neighbouring countries [2]	139.4	134.4	103.8
Italy	125.0	133.8	93.4

Sources: EC, CBS, NAI, OECD, NBB.
(1) Calculated on the basis of total market growth (including diamonds).
(2) Trade-weighted average.

TABLE 12   PRODUCT STRUCTURE EFFECT FOR BELGIUM
AND ITS MAIN TRADING PARTNERS (2002)

(Market growth in relation to EU15 trade, indices 1995 = 100)

	Market growth (weighted both geographically and by products)	Market growth (geographically weighted)	Product structure effect
Belgium	131.7	132.3	99.5
Netherlands	131.7	127.9	102.9
France	140.4	131.6	106.7
Germany	137.0	134.0	102.3
Three main neighbouring countries [1]	136.8	131.5	104.1
Italy	127.2	129.9	97.9

Sources : EC, NAI, NBB.
(1) Trade-weighted average.

on the export markets. More specifically, the categories which explain the bulk of this difference are office machines and automatic data processing machines, telecommunications and sound recording and reproducing apparatus and equipment, and electrical machinery, apparatus and appliances.

Conclusion

In the last quarter century, the globalisation of the economy has brought a considerable expansion in international trade, which has grown almost twice as fast as GDP over that period. During the same period, international trade has also undergone fundamental changes. Multinationals are now playing an increasingly important role in foreign transactions, intra-regional trade has expanded strongly and new markets and competitors have emerged. These structural changes have culminated in the fragmentation of the value added creation process in the production chain, and that has had an impact on the pattern of international trade.

Belgium has long formed an integral part of the European and global economy, and Belgium's economic development and prosperity are largely determined by its close trading links with other countries. Besides, at the time when the globalisation of the economy was gathering momentum, the Belgian economy already featured a high degree of openness.

Since 1980, Belgium has succeeded overall in maintaining its competitiveness. Though its trade balance was still negative at that time, it soon recovered and has remained positive at around 3 p.c. of GDP since the mid 1980s. In value terms, Belgium's shares of the world market remained relatively stable overall.

However, a more detailed analysis of Belgium's export volume over the period 1995-2002, based on data which had been harmonised as far as possible between the various countries, reveals that Belgium has lost export market shares in comparison with the average of the three main neighbouring countries, and particularly in comparison with Germany. On the other hand, Italy has lost an even larger share of the market. One of the reasons for Belgium's loss of market share, which came to around 6 p.c., is an unfavourable export product specialisation. Despite the importance of such items as passenger cars and pharmaceuticals, Belgium's exports consist mainly of products for which demand has been relatively weak in recent years, e.g. basic chemicals, metal products and textiles. Belgium's exports are also insufficiently oriented towards machinery and data processing equipment, electronics and telecommunications, products in which international trade expanded the most during the period under consideration, and which have a high technology content on average.

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Annex: Breakdown of international trade by product category according to the standard international trade classification (SITC), 2-digit level

0	Food and live animals
00	Live animals other than those of division 03
01	Meat and meat preparations
02	Dairy products and birds' eggs
03	Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof
04	Cereals and cereal preparations
05	Vegetables and fruit
06	Sugar, sugar preparations and honey
07	Coffee, tea, cocoa, spices and manufactures thereof
08	Feeding stuff for animals (not including unmilled cereals)
09	Miscellaneous edible products and preparations
1	Beverages and tobacco
11	Beverages
12	Tobacco and tobacco manufactures
19	Beverages and tobacco n.e.s.
2	Crude materials, inedible, except fuels
20	Goods transported by post, from section 2
21	Hides, skins and furskins, raw
22	Oil seeds and oleaginous fruits
23	Crude rubber (including synthetic and reclaimed)
24	Cork and wood
25	Pulp and waste paper
26	Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric)
27	Crude fertilizers (imports only), except those of division 56, and crude minerals (excluding coal, petroleum and precious stones)
28	Metalliferous ores and metal scrap
29	Crude animal and vegetable materials, n.e.s.
3	Mineral fuels, lubricants and related materials
32	Coal, coke and briquettes
33	Petroleum, petroleum products and related materials
34	Gas, natural and manufactured
35	Electric current
39	Mineral fuels, lubricants and related materials, not elsewhere specified or included
4	Animal and vegetable oils, fats and waxes
41	Animal oils and fats
42	Fixed vegetable fats and oils, crude, refined or fractionated
43	Animal or vegetable fats and oils processed; waxes and inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s.
49	Animal or vegetable fats, oils and waxes not elsewhere specified or included

5	Chemicals and related products, n.e.s.
50	Goods from section 5, transported by post
51	Organic chemicals
52	Inorganic chemicals
53	Dyeing, tanning and colouring materials
54	Medicinal and pharmaceutical products
55	Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations
56	Fertilizers (other than group 272)
57	Plastics in primary forms
58	Plastics in non-primary forms
59	Chemical materials and products, n.e.s.
6	Manufactured goods classified chiefly by material
60	Exported components of complete industrial plants from section 6
61	Leather, leather manufactures, n.e.s., and dressed furskins
62	Rubber manufactures, n.e.s.
63	Cork and wood manufactures other than furniture
64	Paper, paperboard, and articles of paper pulp, paper or paper board
65	Textile yarn, fabrics, made-up articles, n.e.s., and related products
66	Non-metallic mineral manufactures, n.e.s.
67	Iron and steel
68	Non-ferrous metals
69	Manufactures of metals, n.e.s.
7	Machinery and transport equipment
70	Special transactions and commodities from section 7
71	Power generating machinery and equipment
72	Machinery specialized for particular industries
73	Metalworking machinery
74	General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.
75	Office machines and automatic data processing machines
76	Telecommunications and sound recording and reproducing apparatus and equipment
77	Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts of household type, n.e.s.)
78	Road vehicles (including air-cushion vehicles)
79	Transport equipment, n.e.s.
8	Miscellaneous manufactured articles
80	Special transactions and commodities from section 8
81	Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.
82	Furniture and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings
83	Travel goods, handbags and similar containers
84	Articles of apparel and clothing accessories
85	Footwear
87	Professional, scientific and controlling instruments and apparatus, n.e.s.
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks
89	Miscellaneous manufactured articles, n.e.s.
9	Commodities and transactions not classified elsewhere in the SITC

91	Postal packages not classified according to kind
93	Special transactions and commodities not classified according to kind
94	Exported components of complete industrial plants, not classified according to kind
96	Coin (other than gold coin), not being legal tender
97	Gold, non-monetary (excluding gold ores and concentrates)
98	Precious stones, precious metals and articles thereof, imitation jewellery, coins, transported by post
99	Confidential trade not classified according to kind.

Source : United Nations

Inflation differentials in the euro area : size, causes, economic policy implications and relative position of Belgium

L. Aucremanne
M. Collin

Introduction

The creation of the Economic and Monetary Union was a milestone in the European construction and integration. On 1 January 1999, eleven countries – followed a year later by Greece – voluntarily opted to introduce a common currency, the euro, and thus to relinquish their monetary autonomy. Since then, the European Central Bank has been in charge of monetary policy for the euro area, and in accordance with the Maastricht Treaty, its primary objective is to maintain price stability in the EMU. The ECB Governing Council has defined price stability as an annual rise in the harmonised index of consumer prices (HICP) for the euro area below, but close to, 2 p.c.

Since the beginning of the nineties, the level of inflation in all EMU countries has fallen significantly, and the inflation rates have also converged to a considerable extent. The (unweighted) standard deviation of the HICP, which stood at 4 percentage points in the early nineties, gradually declined to 1 percentage point at the time of introduction of the single currency. Yet the past few years have seen a slight increase in inflation differentials within the euro area. The differences are still comparable to those observed in the United States in terms of size, although there are clearly some divergences in their nature. In some European countries, there have been persistent differentials in one particular direction. Thus, for the period 1999-2004 there were two distinct groups : on the one hand, countries such as Germany, France and Austria where the

level of inflation was consistently below the EU average, and on the other hand, countries such as Greece, Spain, Ireland and Portugal where inflation systematically outpaced the average for the euro area. The situation in the Netherlands, where inflation was running well above the level for the euro area from 2000 to the end of the second quarter of 2003, but has since remained below the average – shows that although those differences are fairly persistent they are not permanent. Belgium, Luxembourg and Finland appear to be an exception, since inflation there is close to the average for the euro area.

There has been a considerable amount of research[1] focusing on the reasons for such trends and their implications. It should be pointed out that the Eurosystem has no instruments at all which it can use to control these inflation differentials, because under the Treaty the Eurosystem only takes account of the HICP for the euro area. It is therefore up to the Member States with inflation deviating from the EMU average to identify the undesirable inflation differentials and take appropriate measures to ensure their reduction and to limit the impact on their competitiveness.

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[1] See for example ECB (2003), "Inflation Differentials in the Euro Area : Potential Causes and Policy Implications".

CHART 1

INFLATION DISPERSION IN THE UNITED STATES AND THE EURO AREA

(percentage points)

UNWEIGHTED STANDARD DEVIATION

Stage I of EMU   Stage II of EMU   Stage III of EMU

COEFFICIENT OF VARIATION (1)

Stage I of EMU   Stage II of EMU   Stage III of EMU

— United States

— Euro area
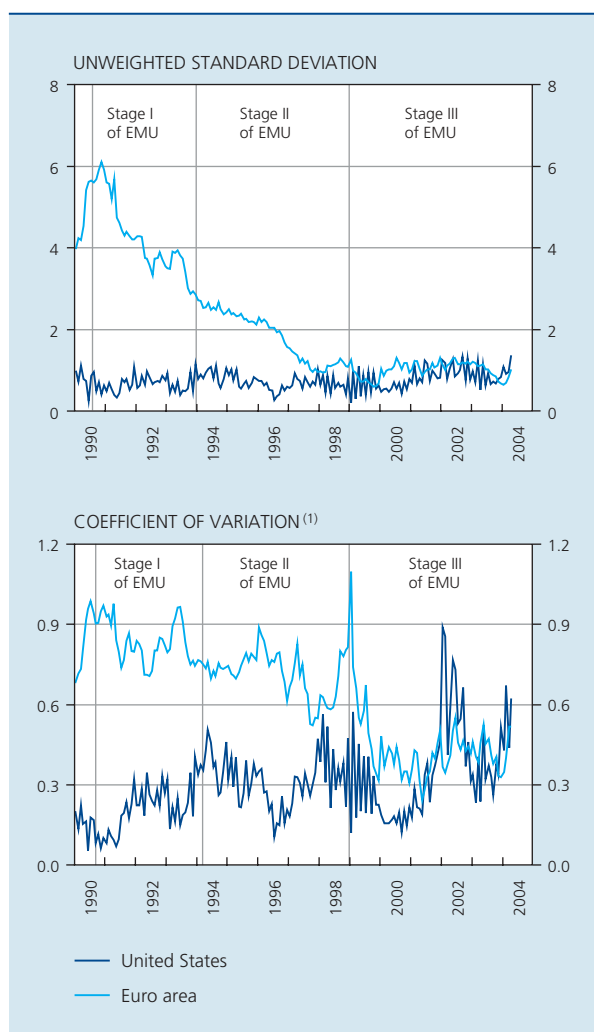
Sources : BLS, EC, NBB.
(1) The coefficient of variation is defined as the ratio between the unweighted standard deviation and the average.

Nevertheless, following its evaluation of the monetary policy strategy the ECB Governing Council did clarify the definition of price stability, in order, inter alia, to take account of the persistent inflation differentials which have been observed since the beginning of Stage Three of EMU. That clarification of the Eurosystem's monetary policy strategy was also intended to avert any risk of deflation in the euro area and to take account of any measurement errors caused, for example, by the quality bias in the HICP. Before 8 May 2003, no signal had ever been given if inflation remained below the 2 p.c. threshold. Now, the monetary authorities have specified that the inflation rate needs to remain close to that threshold, thus creating a safety margin against deflation in

the euro area in general, and making it possible for the various countries to show negative and even persistent inflation differentials without that leading to any absolute fall in the general price level in the countries concerned.

It is essential to determine the factors underlying these differentials, since the Member States – now that they have relinquished their monetary sovereignty – can no longer adjust their monetary policy to correct the national imbalances resulting, for instance, from asymmetric shocks. In that situation, the mobility of the production factors and the relative flexibility of prices and wages between the Member States will play a crucial role in restoring equilibrium. In some cases, the inflation differentials are therefore nothing else than the mechanism for effecting the adjustment.

However, in the event of price or wage rigidity, restoring equilibrium may take rather a long time and entail considerable costs. Moreover, the process is hampered by the fact that the inflation differentials trigger two separate mechanisms, only one of which acting as a stabiliser. If, as a result of an asymmetric shock, a country experiences a boom (slump), then the recovery of the equilibrium can only take the form of positive (negative) inflation differentials in so far as the pro-cyclical effect on the real interest rate is offset by the anti-cyclical effect on the real exchange rate. As the nominal interest rate has been the same for all participants since the start of Stage Three of EMU, a positive inflation differential in the country in question in fact causes the real interest rate to fall. That fall may in turn stimulate demand and push up the general price level, so that the divergent position in the cycle and the inflation differential could also become more persistent. The second mechanism works via the real exchange rate, taking the form of a change in relative prices. This mechanism, which generally operates more slowly, will eventually outweigh the impact of the first mechanism, since a positive inflation differential causes a loss of competitiveness and, therefore, a gradual fall in both demand and inflation.

On the basis of the origin of the inflation differentials, the economic policy makers of the Member States can therefore judge whether it is desirable to apply economic policy instruments in order to speed up the reduction in those differentials, either via an appropriate fiscal policy or via a structural policy aimed at improving the flexibility of the labour market and of the goods and services markets and thus reinforcing the self-correcting mechanisms. An inappropriate national economic policy, such as a strongly pro-cyclical fiscal policy, may of course be a reason underlying the inflation differentials.

Furthermore, inflation differentials may reflect a process whereby an economy is "catching up". The theoretical explanation is based on the "Balassa-Samuelson" effect whereby – provided certain assumptions are fulfilled – differences in relative productivity between tradable and non-tradable goods lead to real appreciation and positive inflation differentials. In principle, these differentials are not associated with any loss of competitiveness since real convergence is taking place. In view of the characteristics of the inflation differentials in the euro area – particularly their persistence – a great deal of research has been conducted on this factor[1]. This effect appears to explain inflation differentials in some countries up to a certain point. According to the ECB (2003b), the theory is applicable in part to Greece, Ireland and Portugal, and to a lesser extent to Spain, in other words economies with relatively high inflation levels. The relatively low inflation rate in Germany is apparently also attributable to some extent to the "Balassa-Samuelson" effect. However, the results of all these studies need to be interpreted with caution, as the estimates are not very accurate and the basic hypotheses underlying the "Balassa-Samuelson" effect do not always seem to hold true.

This article focuses on Belgium and more particularly on the paradox apparent from the research conducted so far into the "Balassa-Samuelson" effect. Recent studies have shown that the "Balassa-Samuelson" effect is a major factor in Belgium, implying that the inflation rate should be higher, in trend terms, than the average in the euro area. Those results are at odds with the fact that, on the basis of the harmonised index of consumer prices (HICP), the main indicator of European monetary policy, inflation differentials are currently nearly non-existent in Belgium, and that in the past the Belgian franc never showed any tendency to appreciate in real terms (against the German mark).

This article is structured as follows. The first section comprises a brief outline of the Belgian situation as regards inflation differentials, based on earlier analyses. After that, special attention is paid to the existence of a possible "Balassa-Samuelson" effect in Belgium. The final section presents the conclusions.

1. Overview of Belgium's relative position

Since the second half of the seventies, inflation in Belgium has been below the average for the euro area. These systematic negative inflation differentials are largely attributable to the fact that, throughout that period, Belgium's monetary policy was geared more closely to price stability than was the case on average in the other countries belonging to the monetary union. This was because the Belgian monetary authorities were trying to keep the Belgian franc stable against the German mark and achieve price stability in line with the example set by Germany.

However, at the beginning of the period, wage fixing and fiscal policy were not sufficiently compatible with such an ambitious monetary policy, so that during the second half of the seventies and the first half of the eighties persistent positive inflation differentials were recorded in relation to Germany. Those differentials necessitated adjustments to the parity against the German mark, e.g. the devaluation of the franc in 1982. However, that devaluation was accompanied by a number of supporting measures, particularly in regard to wage fixing, so that it initiated a radical turnaround which was then further reinforced when a start was made on restoring sound public finances.

CHART 2   INFLATION IN BELGIUM, GERMANY AND THE EURO AREA: LONG-TERM TREND

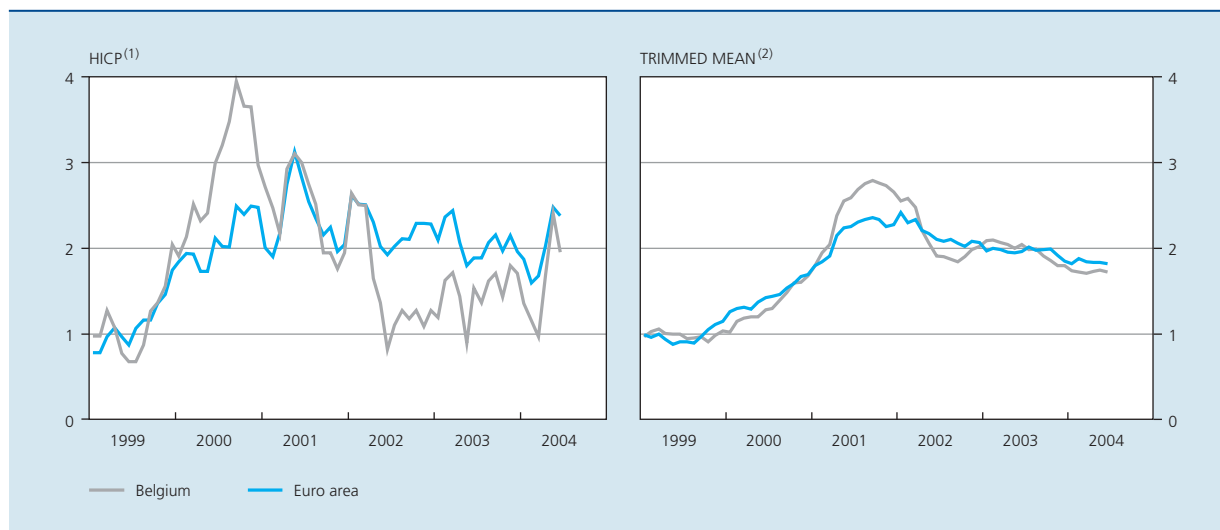(percentage changes compared to the previous year)
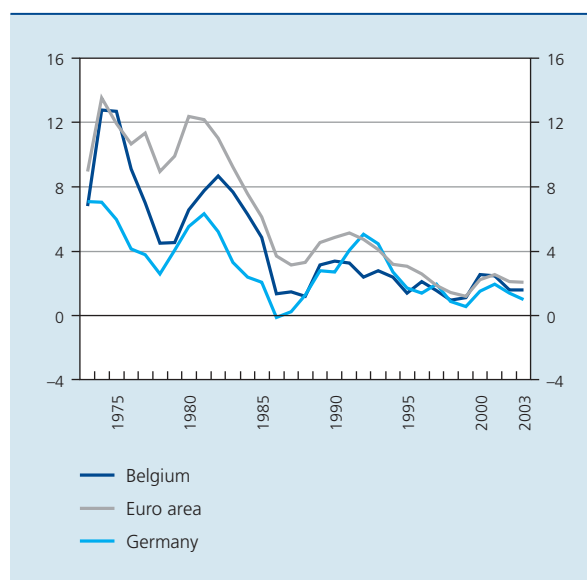
Sources: OECD, NBB.

(1) See for example Alberola-Ila and Tyrväinen (1998), De Grauwe and Skudelny (2000) and Canzoneri et al. (2001).

HICP[1]

TRIMMED MEAN[2]

Belgium   Euro area

Sources : ECB, NBB.

(1) Excluding the estimated effect, in January and July 2000, of the inclusion of the prices discounted in the sales in the Belgian HICP from 2000 onwards.
(2) Measured by the components of the HICP, according to the JB-Monthly estimator, explained in Aucremanne L. (2000), *The use of robust estimators as measures of core inflation*, National Bank of Belgium Working Papers – Research Series, No. 2 (March).

After 1987, the Belgian franc was not devalued again in relation to the German mark, and in June 1990 it was pegged more specifically and explicitly to the mark. Since then, the inflation differential between Belgium and Germany has ceased to be systematically positive, and that differential has tended to be more a reflection of the differences in the position of the two economies in the business cycle. For example, at the beginning of the 1990s the inflation differential between the Belgian and German economies was negative, and reflected the overheating of the German economy at the time of reunification. However, in the past few years the opposite has happened, and there has been a positive inflation differential, which is partly an indication of Germany's relatively weak economic situation.

For the euro area as a whole, the convergence of inflation towards a level compatible with price stability only took place at a later stage, namely during the two years preceding the monetary union.

Since the introduction of the single currency, inflation in Belgium has not shown a persistent deviation from the average for the euro area; in certain periods it has exceeded that average, while in others it has remained below it.

The Bank[1] has conducted various studies examining the Belgian situation, analysing certain factors which may cause those inflation differentials. According to that research, inflation in Belgium presents hardly any structural or cyclical characteristics which differ from those in the euro area. The only apparent exception is the short-term sensitivity of inflation to fluctuations in the oil price. This factor is a source of very short-lived inflation differentials with no systematic upward or downward deviation. It seems that the short-term elasticity of consumption prices to changes in the oil price is greater in Belgium than in the euro area. That difference is largely attributable to the relatively lower excise duty on petrol, diesel and heating oil, and to the greater weight of those products in the consumer price index.

However, since April 2002 a negative inflation differential has been recorded which is due primarily to administrative measures by the government[2], while similar factors – mainly an increase in indirect taxes – have instead caused inflation to increase in the euro area. The underlying trend in inflation in Belgium, measured by the "trimmed mean" method, which enables extreme price changes to be disregarded, does not deviate from the trend observed during the latest business cycle in the euro area.

(1) See for example NBB (2003) and NBB (2004).

(2) The main factor curbing inflation was the abolition of the television and radio licence fee in Flanders and Brussels, and the reduction in that fee in Wallonia.

Earlier research on the above factors has shown that the inflation differentials between Belgium and the euro area are only very short-lived and that they have no upward or downward bias. Nonetheless, some studies of the "Balassa-Samuelson" effect conclude that Belgium should be an economy with a relatively high inflation rate.

2. The relevance of the "Balassa-Samuelson" effect for Belgium

This effect, described by Balassa and Samuelson in 1964, refers to the mechanism whereby, in countries whose economies are in the process of catching up, the real exchange rate appreciates, in general, as a result of the increase in the relative productivity of tradable as opposed to non-tradable goods.

Relative productivity and real exchange rate

The "Balassa-Samuelson" theory splits the economy into two sectors. The tradable goods sector corresponds to the sector exposed to international competition. It consists mainly of industry and is generally capital-intensive. It is assumed that prices in this sector are determined by demand and supply at world level. In contrast, the second sector – non-tradable goods – is not subject to international competition and comprises mainly services. It is less capital-intensive. The "Balassa-Samuelson" effect predicts that in an economy which is catching up, the difference in relative productivity of the tradable goods sector as opposed to the non-tradable goods sector will be growing because the first sector attains productivity gains more quickly. This increase in labour productivity is usually due to increased capital accumulation.

In the tradable goods sector, these productivity gains lead to a rise in real wages. Assuming perfect mobility of labour within an economy, wages in the non-tradable goods sector follow a similar pattern. The increase in the cost of labour then has a greater impact on prices in the latter sector since the productivity gains are smaller. The movement in relative prices in one sector as opposed to the other therefore fully reflects the increase in relative productivity, which is more marked in the countries which are catching up than in the developed countries. Moreover, if purchasing power parity is maintained in the tradable goods sector, these developments in regard to relative productivity (or relative prices) lead to real appreciation for the country which is catching up. On the basis of a real exchange rate model which is relatively general, the box provides a detailed explanation of the underlying hypotheses of the "Balassa-Samuelson" effect, namely not just the respect of purchasing power

parity for the tradable goods but also a situation of perfect competition (absence of any mark-up) and equalisation of wages between the two sectors of the economy. Research on whether these hypotheses are correct is crucial for determining whether a "Balassa-Samuelson" effect applies in Belgium.

In a monetary union with a fixed nominal exchange rate, real exchange rate changes take the form of inflation differentials. According to the "Balassa-Samuelson" effect, there would in that case have to be a positive inflation differential in countries where the rise in relative productivity is most pronounced. This question is often presented in the form of the "equilibrium inflation rate". That concept adjusts for each Member State the target inflation rate set by the monetary authorities for the union as a whole, on the basis of differences between the countries in relative productivity (or relative prices).

The studies conducted so far have produced fairly surprising results, in that the Belgian economy ought to have a relatively high equilibrium inflation rate. In contrast, Germany is systematically presented as a country where the equilibrium inflation rate would be well below the average.

These results are due to the fact that these studies systematically showed that there was a marked increase in relative productivity in Belgium, while in Germany the increase was more modest, and also to the fact that the movement in relative prices – measured by the value added deflator – closely follows the movement in relative productivity. Although the equilibrium inflation rate in some analyses is calculated on the basis of productivity differentials, while other studies are based on the differences in relative prices, they all assume the respect of purchasing power parity for tradable goods even though that assumption could often be refuted empirically.

This article proceeds to apply these theoretical concepts to Belgium. The conclusions are then compared with the results already published in the literature. In the absence of sufficiently long time series for EMU as a whole, the analysis is confined to the real exchange rate between Belgium and Germany, the largest euro area country in terms of GDP. Moreover, choosing Germany guarantees a degree of coherence with earlier studies in which that country also acted as the reference economy. The analysis was initially based on the value added deflator, as in most other studies, but the "Balassa-Samuelson" effect is also studied on the basis of the consumer price index, the inflation yardstick which the monetary authorities use as a guide for their decisions.

TABLE 1

TABLE 1 "EQUILIBRIUM INFLATION" RESULTING FROM THE "BALASSA-SAMUELSON" EFFECT
(SELECTION FROM VARIOUS EMPIRICAL STUDIES)

(percentage points)

Sample	Alberola-Ila and Tyrväinen (1998) 1975-1995	Canzoneri and al. (2001) 1973-1997	De Grauwe and Skudelny (2000) 1970-1995	Sinn and Reuter (2001) 1987-1995	Average of the studies	Standard deviation
Euro area	2.0	2.0	2.0	2.0	2.0	0.0
Germany	1.3	1.0	1.7	1.0	1.2	0.3
Austria	1.8	1.8	2.5	2.4	2.1	0.4
Belgium	**3.1**	**2.6**	**2.1**	**1.8**	**2.4**	**0.6**
Spain	2.1	2.4	2.0	2.5	2.2	0.2
France	1.7	2.4	1.6	2.3	2.0	0.4
Greece	–	–	–	5.3	5.3	–
Finland	2.4	2.4	1.4	3.7	2.4	0.9
Italy	2.4	2.8	2.4	2.5	2.5	0.2
Ireland	–	–	–	3.4	3.4	–
Netherlands	2.3	–	2.0	2.4	2.2	0.2
Portugal	–	–	2.1	1.8	1.9	0.2

Sources : ECB, NBB.

Box – Real exchange rate model

The real exchange rate of an economy is defined as the ratio between the general level of prices in the national economy and the general level of foreign prices, expressed in a common currency. In logarithmic form, the real exchange rate of the economy (q) and that of the sector exposed to international competition (q_T), is defined as follows :

$$q = p - p* + e \tag{1}$$
$$q_T = p_T - p*_T + e \tag{2}$$

where e, p (p_T) and $p*$ ($p*_T$) respectively indicate the logarithm of the nominal exchange rate (defined as the value of the national currency in a foreign currency), the logarithm of the price index of the home country (in the tradable goods sector) and that of the foreign country.

The general price level can be expressed as a weighted geometrical mean of the prices in the two sectors. As a logarithm :

$$p = \gamma p_{NT} + (1 - \gamma)\, p_T \tag{3}$$
$$p* = \gamma* p*_{NT} + (1 - \gamma*)\, p*_T \tag{4}$$

where p_{NT} stands for the logarithm of the prices in the non-tradable goods sector and γ stands for the nominal share of that sector in the economy as a whole.

▶

By substituting equations (3) and (4) in equation (1), we obtain:

$$q = p - p^* + e = p_T - p^*_T + e + [\gamma(p_{NT} - p_T) - \gamma^*(p^*_{NT} - p^*_T)] \tag{5}$$

The first term on the right-hand side of equation (5) stands for the real exchange rate of the sector exposed to international competition. The second term of the same equation represents the weighted difference in the relative prices.

If the firms are operating under imperfect competition, the price on the goods and services market comprises a mark-up on top of the wages per unit of output, i.e. the ratio between wages per person and productivity per person[1]. As a logarithm:

$$p = \mu + w - p^m \tag{6}$$

where μ, w and p^m are respectively the logarithms of the mark-up, of wages per person and of productivity per person.

By substituting this new equation in expression (5), we obtain:

$$
\begin{aligned}
q = p - p^* + e = p_T - p^*_T + e &+ [\gamma\,(\mu_{NT} - \mu_T) - \gamma^*\,(\mu^*_{NT} - \mu^*_T)] \\
&+ [\gamma\,(w_{NT} - w_T) - \gamma^*\,(w^*_{NT} - w^*_T)] + [\gamma\,(p_T^m - p_{NT}^m) - \gamma^*\,(p^{*m}_T - p^{*m}_{NT})]
\end{aligned} \tag{7}
$$

Consequently, the "Balassa-Samuelson" effect appears in pure form if the assumptions of purchasing power parity in the tradable goods sector ($q_T = 0$), perfect competition (absence of any mark-up) and wage convergence between the sectors within the economy ($w_{NT} = w_T$) hold true. In these circumstances, only the difference in productivity between the two sectors will influence the real exchange rate of the economy. It is also important to establish the link with inflation differentials. For that purpose, the variables have to be expressed in the form of growth rates.

$$
\begin{aligned}
\Delta q = \Delta(p - p^* + e) = \Delta(p_T - p^*_T + e) &+ \Delta\,[\gamma\,(\mu_{NT} - \mu_T) - \gamma^*\,(\mu^*_{NT} - \mu^*_T)] \\
&+ \Delta\,[\gamma\,(w_{NT} - w_T) - \gamma^*\,(w^*_{NT} - w^*_T)] + \Delta\,[\gamma\,(p_T^m - p_{NT}^m) - \gamma^*\,(p^{*m}_T - p^{*m}_{NT})]
\end{aligned} \tag{8}
$$

In a system of fixed nominal exchange rates ($\Delta e = 0$), such as that applied in the euro area since 1 January 1999, the growth rate of the real exchange rate is equal to the inflation differential.

$$
\begin{aligned}
\Delta q = \pi - \pi^* = \pi_T - \pi_T^* &+ \Delta\,[\gamma\,(\mu_{NT} - \mu_T) - \gamma^*\,(\mu^*_{NT} - \mu^*_T)] \\
&+ \Delta\,[\gamma\,(w_{NT} - w_T) - \gamma^*\,(w^*_{NT} - w^*_T)] + \Delta\,[\gamma\,(p_T^m - p_{NT}^m) - \gamma^*\,(p^{*m}_T - p^{*m}_{NT})]
\end{aligned} \tag{9}
$$

The symbols π and π_T respectively stand for inflation in the economy as a whole and inflation in the tradable goods sector.

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(1) Since marginal wages and marginal productivity cannot be observed, they are estimated here on the basis of average wages and average productivity respectively.

CHART 4   RELATIVE PRODUCTIVITY [1] AND RELATIVE PRICES [2] OF TRADABLE AND NON-TRADABLE GOODS

(index 1973 = 100)

ON THE BASIS OF THE VALUE ADDED DEFLATOR

ON THE BASIS OF THE CONSUMER PRICE INDEX

— Relative prices
— Relative productivity
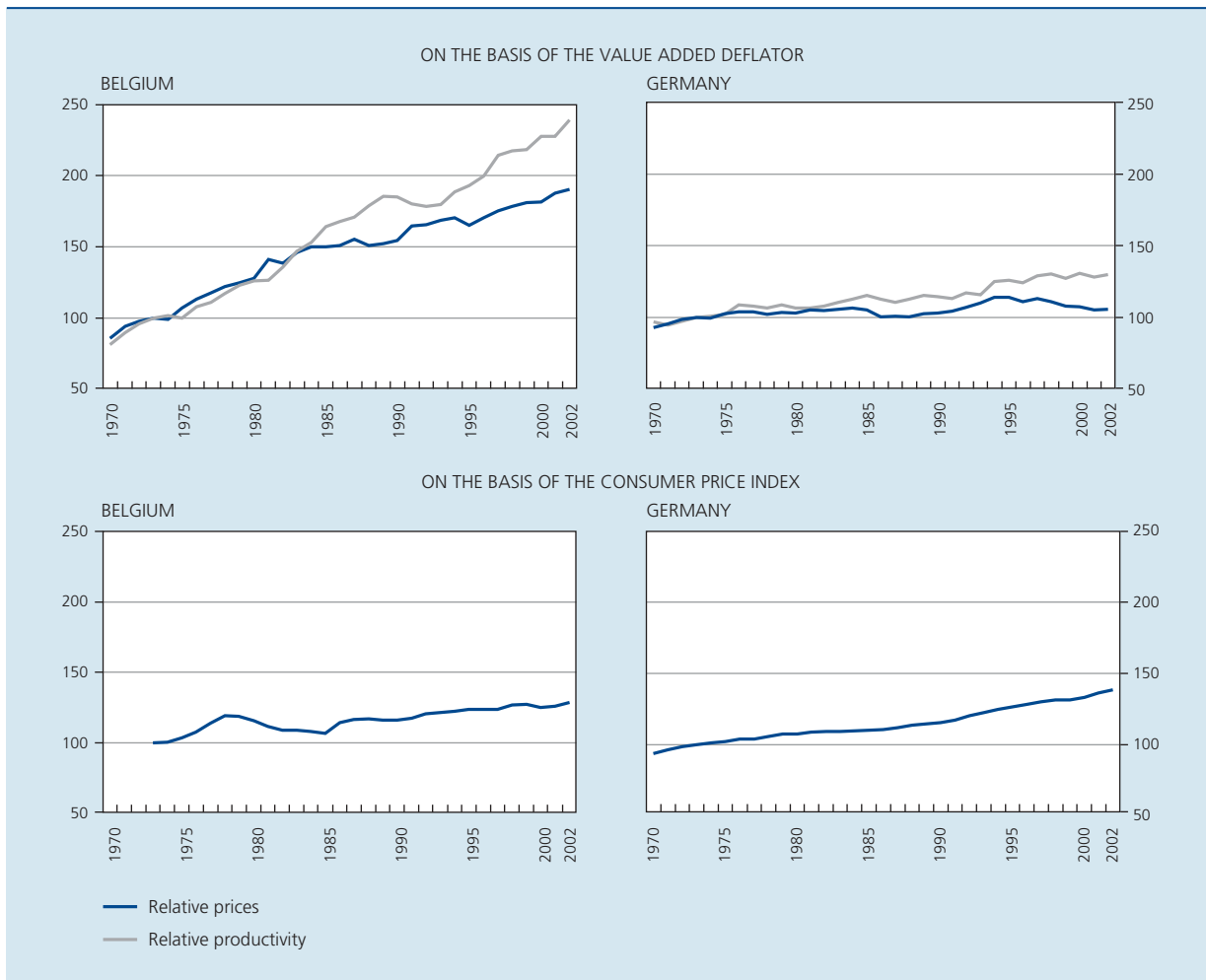
Sources : Bundesbank, Datastream, NBB.
(1) Relative productivity is defined as the ratio between productivity in the tradable goods sector and that in the non-tradable goods sector.
(2) Relative prices are defined as the ratio between prices of non-tradable goods and prices of tradable goods.

Real exchange rate between Belgium and Germany on the basis of the value added deflator

The national accounts data on value added provide an indication of the movement in relative productivity between the sectors which are exposed to international competition [1] and those which are not [2]. Throughout the period 1970 – 2002, productivity per worker in Belgium [3] was increasing faster in the first sector, on an almost continuous basis. The trend growth of relative productivity was therefore substantial, rising faster in Belgium than in Germany. These developments were largely reflected in comparable movements – albeit in the opposite direction – in relative prices : the trend increase in relative prices measured on the basis of the value added deflator for non-tradable goods as opposed

to tradable goods was much higher in Belgium than in Germany.

(1) For the purposes of this article, the sector exposed to international competition consists mainly of industry. The analysis takes no account of the agricultural sector as its products are to a large extent subsidised by the European Community so that prices are not dictated by supply and demand at world level. The analysis also disregards the extractive industries because of their very minor significance in the two economies examined.

(2) The sector not exposed to international competition consists of all services as defined by the OECD. It comprises the rest of the economy excluding the building sector and the gas and electricity sector. Those sectors are often under debate because they contain both elements of the tradable and non-tradable products. They are therefore not included in the study.

(3) Productivity per worker is obtained by taking the value added at constant prices and dividing it by total employment. Wages are calculated in the same way, namely by dividing total pay by total employment. The use of this measure thus implies that the wage level per person is reduced by the complement of the share of employees – i.e. the part of the self-employed workers in overall employment – whereas that complement has an upward effect on the level of the mark-up. Insofar as the variation of the share of employees over time is but slight, this distortion would have but a limited impact on the development of the wages per person and the mark-up.

Although these developments appear to be largely compatible with some of the underlying assumptions of the "Balassa-Samuelson" theory and apparently tally with the results of earlier studies, the correlation observed between relative productivity and relative prices is not perfect. This implies that the other price determinants explained in the box, namely wages and the mark-up, have played a role to some extent. For instance, in Germany, in the sector protected from competition, wages increased more slowly than in the sector exposed to competition, curbing the increase in the relative prices. During the period considered, the movement in relative prices was also influenced to some extent by the mark-up, particularly in Belgium, where it declined significantly for non-tradable goods. Even though this indicates that not all the fundamental conditions of the "Balassa-Samuelson" theory are satisfied, the existence of a significant positive "Balassa-Samuelson" effect in Belgium cannot be ruled out, because despite everything the movement in relative prices was far more pronounced there than in Germany.

CHART 5 REAL EXCHANGE RATE BETWEEN BELGIUM AND GERMANY ON THE BASIS OF THE VALUE ADDED DEFLATOR

(percentage point deviation from the average for the period examined)

— Real exchange rate of the economy
— Weighted relative price differential [1]
— Real exchange rate of the exposed sector
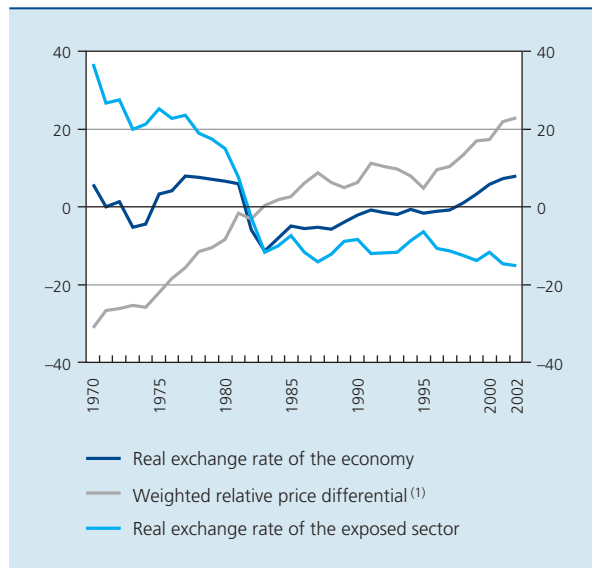
Sources : IMF, OECD, NBB.
(1) Relative prices are defined as the ratio between prices of non-tradable goods and prices of tradable goods.

However, the rest of this analysis does not confirm the conclusions formulated in earlier studies on the difference in the equilibrium inflation rate. During the period considered, there was not in fact any trend towards real appreciation in relation to Germany. Instead, the real exchange rate of the Belgian economy remained rather stationary.

This paradox is clearly connected with the fact that another – essential – assumption underlying the theory of the "Balassa-Samuelson" effect does not hold true, namely the purchasing power parity for tradable goods. An unequivocal correlation between the real exchange rate (or the inflation differentials) and the relative price differentials is in fact possible only if there is purchasing power parity in the sector exposed to competition. The studies conducted so far assume that this condition is satisfied; however, a simple graphic analysis shows that, on the basis of the value added deflator of tradable goods, purchasing power parity does not appear to exist between Belgium and Germany. The real exchange rate of the sector exposed to competition depreciated very sharply, especially in the seventies and up to the mid eighties. An econometric analysis designed to check whether time series are stationary confirms that finding.

This absence of purchasing power parity means that the link between the inflation differentials and the relative productivity differentials (or relative price differentials) is not one-to-one and that the real exchange rate of the sector exposed to competition may therefore also influence inflation differentials between Belgium and Germany. During the period examined, the real exchange rate of that sector did in fact make a largely negative contribution to the movement in the real exchange rate of the economy as a whole, and thus compensated for the effect of the positive relative price differential.

Real exchange rate between Belgium and Germany on the basis of the consumer price index

All the studies considered rely mainly on the value added deflator as the price index, because this index can be broken down into various elements permitting the "Balassa-Samuelson" effect to be explicitly demonstrated. However, it is important to take account of the consumer price index as well, since that index serves as a benchmark for the European monetary authorities. It is paradoxical that the lessons drawn from an analysis based on the consumer price index differ somewhat from the findings based on the value added deflator. That contrast is found not only at the level of relative prices, but also in the real exchange rate in the tradable goods sector.
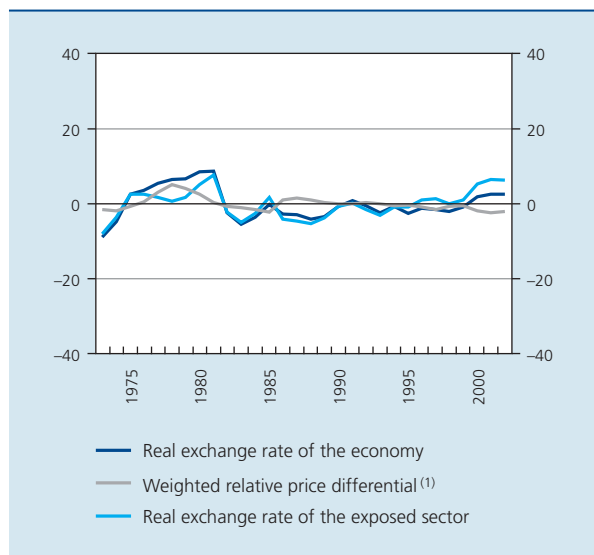
Sources : Bundesbank, IMF, OECD, NBB.
(1) Relative prices are defined as the ratio between prices of non-tradable goods and prices of tradable goods.

The trend increase in relative prices in the non-tradable goods sector [1] in relation to the tradable goods sector [2] is much lower in Belgium if the consumer price index is used to measure prices, rather than the value added deflator. Also, that increase is far more comparable in size to the increase in Germany where the use of the other source of information has less effect. Consequently, the effect of the weighted relative price differential, which does not produce any trend pattern, is very small. On the basis of these findings, there therefore seems to be little scope for any (upwards) "Balassa-Samuelson" effect characterising the movement in the real exchange rate between Belgium and Germany.

The picture presented by the real exchange rate of the sector exposed to competition – measured on the basis of the CPI – also differs from that shown on the basis of the value added deflator. That macroeconomic variable exhibits some stability – which is confirmed by an econometric test of stationarity – which means that, measured on the basis of the consumer price index, there appears to be purchasing power parity between Belgium and Germany for tradable goods.

The fact that the real exchange rate of the sector exposed to competition remains stationary, and that the same applies to the weighted difference in relative prices during the period considered, implies that the real exchange rate of the economy as a whole also remains stationary. Although that stability is due to the stationary behaviour of the components of the real exchange rate – in contrast to what is obtained on the basis of the value added deflator – nonetheless, this last conclusion endorses the results of the analysis on the basis of the value added deflator. In all, for the economy as a whole, no real appreciation in relation to Germany was recorded during the period considered; this seems to refute the existence of a "Balassa-Samuelson" effect and hence an equilibrium inflation rate over 2 p.c. in Belgium's case.

Summary of the results for the "Balassa-Samuelson" effect and tentative explanation of the paradox for Belgium
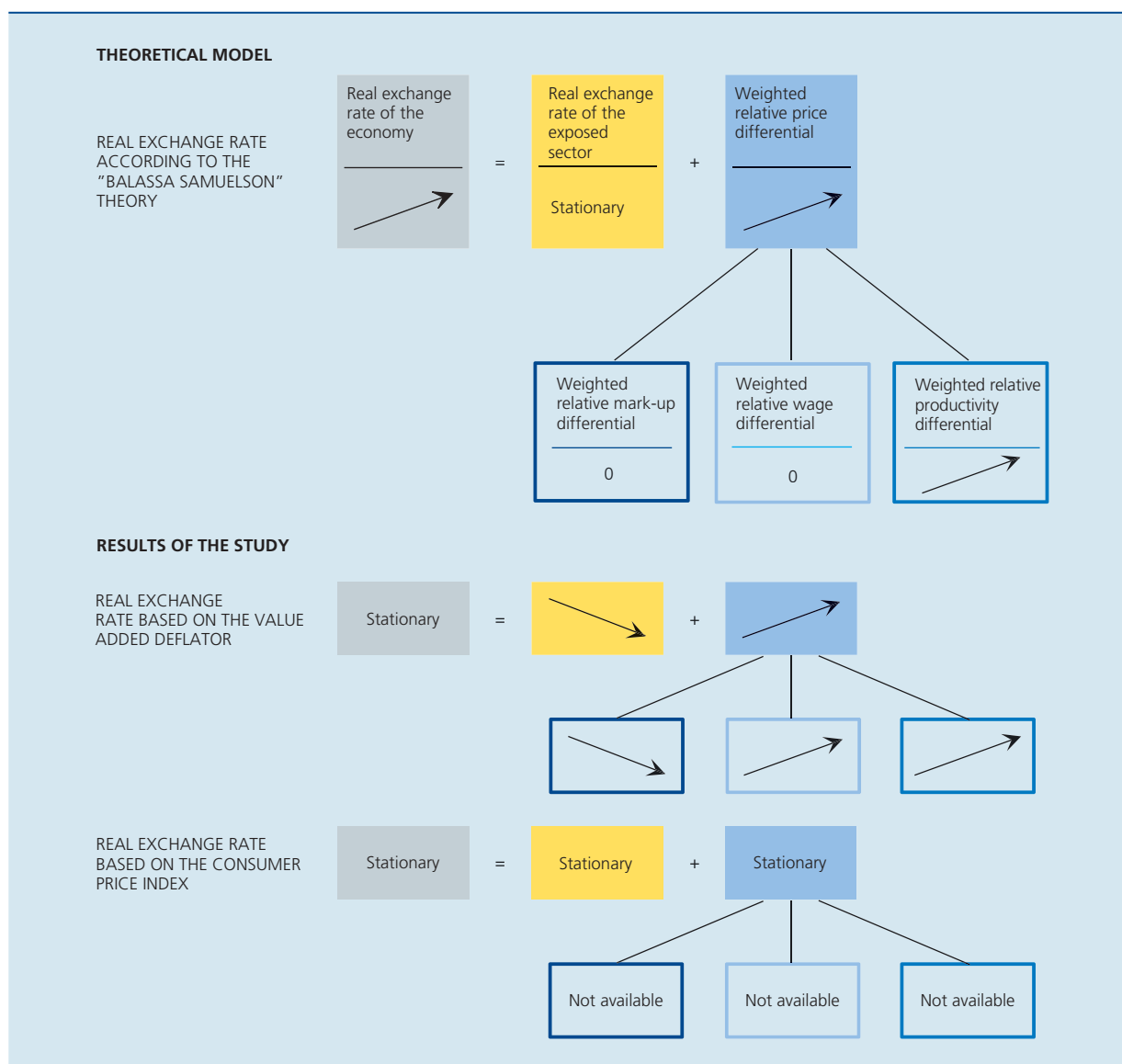
The fact that relative productivity between tradable and non-tradable goods rose much faster in Belgium than in Germany does not appear to give rise to a high equilibrium inflation rate. Of all the implications of the "Balassa-Samuelson" theory, only the link between the relative productivity and the relative movement in the value added deflator have been empirically confirmed. In the non-tradable goods sector, the value added deflator does in fact increase much faster than in the tradable goods sector, and that phenomenon is also far more marked in Belgium than in Germany. However, the contribution of relative mark-ups and relative wages is not equal to zero, as in the "Balassa-Samuelson" theory; but, those factors largely cancel one another out.

The movement in relative productivity and relative prices, measured by the value added deflator, nevertheless does not imply that the real exchange rate in relation to Germany showed a trend increase during the period considered. That is because a crucial assumption underlying the "Balassa-Samuelson" theory, namely the purchasing power parity in the sector exposed to international competition, does not hold true. The real exchange rate of the tradable goods sector depreciated sharply during the period considered, offsetting the effect of the positive productivity differential.

(1) The HICP for services was used as an approximation for the prices of non-tradable goods.
(2) The HICP for non-energy industrial goods was used as an approximation for the prices of tradable goods.

CHART 7   SUMMARY OF THE RESULTS

THEORETICAL MODEL

REAL EXCHANGE RATE
ACCORDING TO THE
"BALASSA SAMUELSON"
THEORY

Real exchange rate of the economy

= Real exchange rate of the exposed sector / Stationary

+ Weighted relative price differential

Weighted relative mark-up differential / 0

Weighted relative wage differential / 0

Weighted relative productivity differential

RESULTS OF THE STUDY

REAL EXCHANGE
RATE BASED ON THE VALUE
ADDED DEFLATOR

Stationary =   +

REAL EXCHANGE RATE
BASED ON THE CONSUMER
PRICE INDEX

Stationary = Stationary + Stationary

Not available   Not available   Not available

The analysis reveals that this phenomenon is attributable largely to the moderate movement in the value added deflator in the sector exposed to international competition in Belgium, justifying rejection of the purchasing power parity. In comparison with Germany, but also in relation to the consumer price index for non-energy industrial goods, that deflator increased only slightly. This seems to be due to the characteristics of Belgium's production structure. While the Belgian and German consumption baskets are very similar, Belgium's industrial structure is very different from Germany's, as Belgium is specialised in producing semi-finished goods with relatively low added value, while German products generally have a higher added value.

Given the relatively high price elasticity of demand for the type of products made by Belgian industry, and taking account of the fierce competition in that sector, Belgian firms had relatively little room for manoeuvre in setting their prices; in that sector, real depreciation actually proved necessary. In Belgium the room for manoeuvre was all the smaller, as wage increases during certain sub-periods were incompatible with the maintenance of firms' competitiveness. Belgian industrial firms were therefore forced not only to moderate their price increases but also to achieve substantial productivity gains, which were attained via radical restructuring.

In contrast, if the real exchange rate of the economy is broken down on the basis of the consumer price index, the movement in relative prices in Belgium is comparable with the situation in Germany, and there appears to have been purchasing power parity in the tradable goods sector during the period considered. In that case, the baskets of goods on which the price measurements in the two countries are based appear far more similar.

Conclusion

In recent years, there have been numerous analyses and empirical studies on the scale and persistence of inflation differentials in the euro area. In EMU, that phenomenon may be important because those differences may influence the effectiveness of the Eurosystem's monetary policy. In order notably to take account of the inflation differentials, the Eurosystem recently clarified the definition of price stability and specified that the annual increase in the HICP in the euro area should be below but close to the 2 p.c. threshold. In addition since relinquishing their monetary sovereignty, the states are no longer able to correct imbalances by adjusting their monetary policy. Moreover, the Eurosystem does not have any instrument for eliminating such discrepancies. In some cases the EMU member countries therefore need to take appropriate measures to reduce those differences.

Since the monetary unification, the inflation differentials between Belgium and the euro area have not appeared to be very persistent. Nevertheless, empirical studies on the "Balassa-Samuelson" effect show that Belgium has a relatively high equilibrium inflation rate which exceeds the medium-term objective of the Eurosystem. This article examined those conclusions, which at first sight seem rather paradoxical.

The analysis shows that the high equilibrium inflation rate is due mainly to the fact that a crucial assumption underlying the "Balassa-Samuelson" theory, namely purchasing power parity in the sector exposed to international competition, does not hold true. The real exchange rate between Belgium and Germany for the tradable goods sector – on the basis of the value added deflator – seems to have depreciated sharply during the period examined, offsetting the positive productivity differential. Non-fulfilment of that assumption implies that the real exchange rate for the economy as a whole has remained relatively stable.

These studies were also based mainly on the value added deflator; however, since the consumer price index is the benchmark for the monetary authorities, it is essential to examine to what extent the conclusions obtained from analysis of the value added deflator can be extended to the HICP. The study on the basis of that price index also shows that the real exchange rate of the economy as a whole has remained relatively stable. Therefore, there does not seem to be any structural reason why inflation should be systematically higher in Belgium than in the euro area.

In conclusion, the inflation differentials between Belgium and the euro area do not seem to be very great or persistent. The ECB's monetary policy therefore seems appropriate to the Belgian economy from that point of view in the current environment.

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Determinants of Belgian bank lending intrest rates

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M. Hradisky *

In Belgium, as elsewhere in the euro area, bank lending is an important source of finance for companies and individuals, and the lending rates charged by credit institutions therefore play a decisive role in the transmission of monetary policy. This article analyses the determination of lending rates charged by Belgian banks on the basis of the available statistical information, which recently underwent some fundamental changes.

Section 1 offers an overview of the key determinants of credit institutions' lending rates, and includes a box describing the impact of the solvency requirements. Section 2 analyses the transmission of monetary policy impulses to the risk-free market interest rates for various maturities, followed by the pass-through from market interest rates to the lending rates charged by Belgian banks. Section 3 draws first lessons from the new statistics on bank interest rates for the period June 2003-May 2004.

1. Main determinants of bank lending rates

Bank lending rates are a key link in the monetary policy transmission process[1]. The central bank has tight control over very short-term money market rates. Changes in these rates affect the longer term interest rates on the money and bond markets, because those longer term rates must correspond to the combination of current and expected future short-term rates and a risk premium linked to the uncertainty over that future development, plus a possible liquidity premium[2]. The risk-free yield curve forms a basis for determining the banks' lending rates, since it influences the cost of their resources and can also be regarded as an opportunity cost of lending.

The banks set their deposit rates below the risk-free yield curve, at least as regards "retail funds", as they offer depositors a flexibility and service which are not available on the direct finance market. They set their lending rates at a higher level in order to cover, among other things, their administrative expenses and the credit risk. Since they often practise maturity transformation, their liabilities having a shorter duration than their assets, the interest margin will also be influenced by the slope of the risk-free yield curve, which is positive on average (reflecting the interest rate risk, i.e. uncertainty over future short-term interest rates).
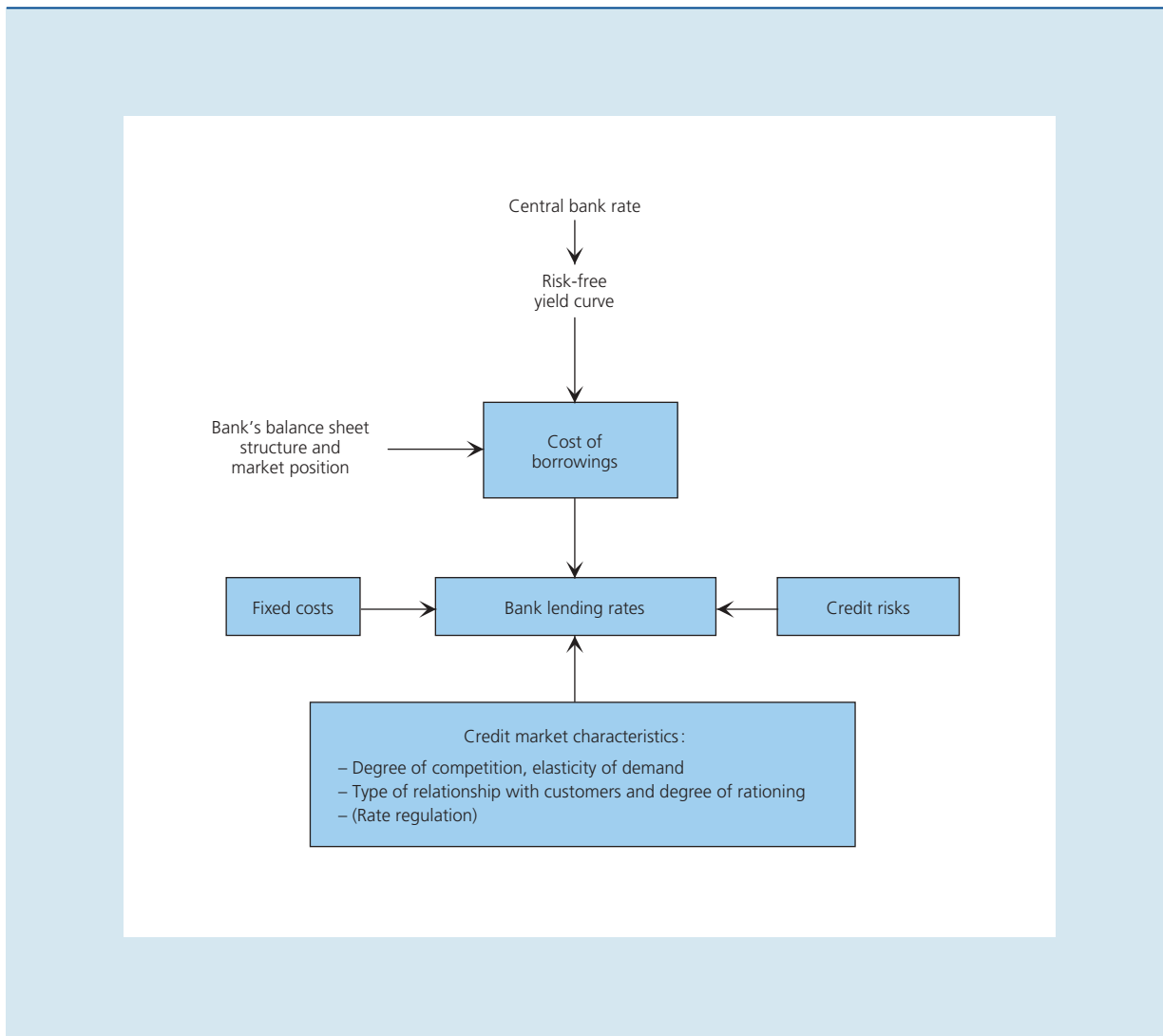
(1) For a summary of this process, see Périlleux V. and Wibaut Q. (2004).

(2) The existence of this liquidity premium originates from the liquidity preference theory of J.M. Keynes, which states that investors prefer assets which are least susceptible to capital losses due to a change in interest rates. As the risk of capital loss increases over time, long-term securities are therefore more vulnerable to these losses and thus less liquid than short-term securities. According to this theory, long-term securities should therefore offer a higher interest rate than short-term securities in order to compensate the investor for this type of risk.

CHART 1   KEY FACTORS DETERMINING BANK LENDING RATES

Central bank rate

Risk-free
yield curve

Bank's balance sheet
structure and
market position

Cost of
borrowings

Fixed costs

Bank lending rates

Credit risks

Credit market characteristics:

– Degree of competition, elasticity of demand
– Type of relationship with customers and degree of rationing
– (Rate regulation)

Lending rates are influenced by a series of factors other than the risk-free yield curve. These factors result from the specificity of the loan market and may also feel the effects of monetary policy decisions.

By definition, the financial markets do not feature perfect competition with perfect information. A loan is not a conventional commodity, but a promise to repay which may prove worthless (risk of default). The information is asymmetrical – the lender does not have as much information as the borrower about the latter's ability and willingness to repay the sum borrowed – which leads to the problems of *moral hazard* (risk that the borrower may fail to meet his obligations) and *adverse selection* (risk of attracting the least reliable borrowers). The banks play an essential role in the financial system by reducing the problem of asymmetric information, as they specialise in selecting and monitoring borrowers, and take on the credit risk.

The fixed costs and the risk associated with this function have to be paid for, and are therefore also factors which determine lending rates. The existence of fixed costs explains why the interest rate on small loans is higher than that on large loans. The existence of default risks leads to variations according to the borrower, the term of the loan, the collateral provided (mortgage, etc.) and even the size of the banks (law of large numbers). In addition, these risks are influenced by the economic situation and therefore also by the effect of monetary policy on overall demand. This comes under the heading of "balance sheet channel" in the transmission of monetary policy via credit ("credit view"): all other things being equal, a tightening of monetary policy increases the default risk, because the contraction of demand for goods and services in the economy and the increase in interest charges cause a deterioration in the balance sheet position of borrowers; the increase in longer term interest rates also reduces the

value of the collateral (property, equities); the banks therefore have to impose tighter restrictions on lending[1].

The asymmetric information and other market imperfections also affect the other aspect of banking activity, the raising of funds. For that reason, we must go back to the cost of the funds. Owing to the imperfections of the financial markets, the balance sheet structure of the banks plays a role – their liquidity and solvency, and the availability or non-availability of deposits at low interest – as does the banks' position on the capital market, particularly their size, which makes it easier or less easy for them to finance themselves by issuing securities. The absence of perfect substitutes to deposits as resources for the banks lies at the root of another channel for the transmission of monetary policy, namely the credit channel in the narrow sense, or the "bank lending channel": all other things being equal, a tightening of monetary policy which leads to higher market interest rates encourages the economic agents to replace deposits (earning lower interest) with securities, and the reduction in deposits forces the banks in turn to restrict the supply of loans.

(1) Cf. for example Stiglitz J. E. and Greenwald B. (2003).

Box – Impact of capital requirements on interest margins

N. Masschelein

The Basle Committee on Banking Supervision has now finalised the second Basle Accord which will take effect at the end of 2007. In the first accord dating from 1988, this committee stipulated that banks must maintain a minimum capital totalling 8 p.c. of the risk-weighted assets. The second accord aims to achieve a better match between the amount of capital that a bank must set aside for loans and the risk profile of the borrower. Since the costs of holding this capital are taken into account in the interest margin, a reduction or increase in the capital requirements according to the level of creditworthiness will be reflected in a reduction or increase in the interest margin.

Basle II provides for two ways of calculating the capital requirements to cover the credit risk: the standardised approach and the internal ratings based approach or IRB. The standardised approach is the less advanced method and comes closest to Basle I. In this approach, the creditworthiness of a counterparty is determined on the basis of external ratings, set by independent credit rating agencies (such as S&P, Moody's or Fitch IBCA). Banks applying the sophisticated method can use internal rating models to calculate their capital requirements.

These capital requirements are meant to form a buffer to cope with unexpected losses. Unexpected losses are defined as the difference between the expected losses and a certain limit value as determined by the Value-at-Risk or VaR concept (see chart below)[1]. Under Basle II, this limit value was set in such a way that the regulatory capital requirements are sufficiently high to cover all losses with the exception of the extreme 0.1 p.c. of cases. In other words, there is a 0.1 p.c. risk that a deteriorating situation in the loan portfolio may cause the bank to fail.

(1) The expected (or average) losses are covered by forming provisions. The amount of these provisions is calculated by taking the probability of counterparty default and multiplying it by the losses incurred if that counterparty defaults and the size of the claim. The VaR (Value at Risk) is a method of calculating potential losses in a loan portfolio with a particular reliability interval and for a particular period (usually one year in the case of the credit risk). For more details of this method, see BIS (1999).

▶

In practice, however, most banks set a percentile which is lower than 0.1 p.c. so that the capital held by these banks exceeds the amount specified by the regulations. One of the main reasons for this is the importance of the disciplinary role of the market. Banks very often choose a limit value which corresponds to a desired external rating, because in many cases a good external rating is necessary in order to guarantee access on attractive terms to certain important markets (such as the interbank market).

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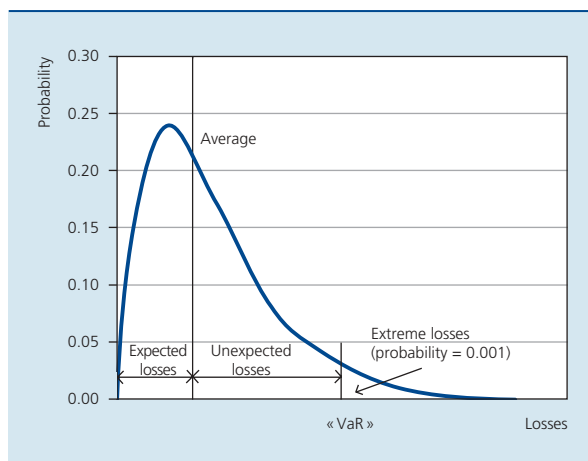
We can illustrate the impact of the new capital requirements on the interest spread by means of an example. We assume that the bank applies the internal ratings based approach and that it aims at a return on equity (ROE) of 13 p.c. We also take the case of a bank making a loan to a large enterprise[1].

The table below shows the impact of the borrower's risk profile on the provisions and the capital requirements. For an enterprise with a default ratio of 0.14 p.c. (corresponding to an A rating by S&P) and a loss given default (LGD) of 45 p.c., the bank holds provisions totalling at least 0.06 p.c. Basle II requires an additional buffer for unexpected losses of at least 2.72 p.c.[2] That corresponds to capital costs of 0.35 p.c. For a loan granted to an enterprise with a default ratio of 2 p.c. (corresponding to a BB rating by S&P), Basle II requires a capital ratio of at least 8.67 p.c. This capital requirement entails capital costs of 1.13 p.c. Both the provisions and the capital costs, which vary according to the creditworthiness of the borrower, will clearly be passed on in the interest which the enterprise is charged.

(1) A large enterprise is one with a turnover of more than € 50 million. Basle II has special rules covering loans to SMEs.
(2) For the exact formulas for calculating the capital requirements, see the accord itself (www.bis.org). Here, a scale factor of 1.06 was applied as currently proposed by Basle. That may change in the future.

IMPACT OF THE CREDIT RISK ON PROVISIONS AND CAPITAL REQUIREMENTS
(as p.c. of the claim, except for the probability of default)

Probability of default (PD)	Loss given default (LGD)	Provisions (PD × LGD)	Capital requirement for IRB[1]	Capital costs if ROE = 13 p.c.	Total costs (capital and provisions)
0,02 (AA)	45	0.01	0.86	0.11	0.12
0.14 (A)	45	0.06	2.72	0.35	0.41
0.75 (BBB)	45	0.34	6.25	0.81	1.15
2,00 (BB)	45	0.90	8.67	1.13	2.03

(1) It is not possible to make a straight comparison between these capital requirements and the 8 p.c. set by Basle I, because the concepts used are different. It should be borne in mind that the general aim of Basle II is to tailor the capital requirement more closely to the risk incurred by each individual bank, but not necessarily to alter the overall amount of capital.

In addition, the prudential regulations, which impose minimum capital requirements according to the risk-bearing assets, influence the attitude of the banks towards risk and the cost of the resources required, in the knowledge that equity is more expensive than deposits (see box).

Finally, the lending rates are not, of course, determined on the basis of the average costs regardless of any interaction with demand for credit, but are also dependent on the characteristics of the credit market. On the one hand, the level of competition influences prices, as on any market, and that has repercussions on profits and even on the fixed costs in so far as the employees receive part of any monopoly rent. Taking account of the characteristics of the relationship between a bank and its borrower, it is possible that the banking sector may feature monopolistic competition, in which each bank is confronted by demand that is not perfectly elastic and where the "law of one price" does not apply. The level of competition and the elasticity of demand may vary according to the type of loan and the circumstances.

On the other hand, the specific characteristics of the financial markets are also a factor in the type of interaction between the supply and demand for credit. In fact, it is not necessarily in the banks' interest to increase their lending rates : above a certain threshold, there is a danger that customers with the least risky projects will be discouraged, while it is mainly potential borrowers for the riskiest projects (and even over-optimistic or deceitful borrowers) who will be attracted (adverse selection), so that the effect of the increased default outweighs the effect of the higher interest rate, and the expected return declines. In these circumstances, it makes sense for the banks to stick to that maximum interest rate and to ration any additional demand for loans.

It is therefore evident that the lending rates need not reflect the bank financing conditions as a whole. Banks which have built up a long-term relationship with their customers are better equipped to assess the risks and will have less need to resort to rationing, which will tend to be confined to new borrowers. Finally, the regulations on lending rates may sometimes involve rationing. That is only the case at present for consumer credit, where maximum rates were fixed in order to protect the weakest consumers : the financial institutions may not lend money at a rate which exceeds the (very high) maximum rates, and are thus obliged to refuse credit to borrowers presenting the highest risks ; that helps to curb excessive debt levels.

2. The transmission of monetary policy impulses to bank lending rates

The efficiency of the monetary policy transmission process depends on various parameters, such as the size and speed of the adjustments which credit institutions make to deposit and lending rates following a change in the central bank's key rate. As already stated, the central bank only has direct control over very short-term interest rates. However, fluctuations in these rates affect the yield curve to varying degrees, and may influence the rates applied by financial institutions. The rates at which banks remunerate deposits and grant loans are a key factor affecting the majority of decisions by economic agents concerning consumption, savings or investment. The behaviour of the financial institutions is therefore of fundamental importance, since these institutions may reinforce, weaken or even neutralise the impact of monetary policy on the real economy.

This section discusses the transmission of monetary policy impulses to lending rates charged by Belgian banks, and can be divided into two stages. The first stage will examine how changes in the overnight rate affect the other interest rates on the risk-free yield curve. That is followed by an analysis of the impact of fluctuations in these market rates on lending rates with similar maturities. The advantage of this two-stage approach is that it takes better into account the marginal costs of the financial institutions and does not confuse two different mechanisms.

The market interest rates considered here are the rates on Belgian government debt securities. The data used for the lending rates were obtained from the old survey of Belgian credit institutions (RIR : Retail Interest Rates [1]) covering the period from January 1993 to December 2003. The rates thus recorded relate to six types of contract, two of which are intended for individuals and four for companies. The year 1993, when short-term interest rates see-sawed as a result of the crisis in the European exchange rate mechanism, was eliminated from the sample.

In the period considered, 1994-2003, interest rates were lower than in the two preceding decades, which had begun with accelerating inflation followed by the gradual restoration of the credibility of monetary and fiscal policy in the majority of industrialised countries, and which ended with the effects of the German reunification. During the first five years of the period under review, which preceded the start of European monetary union, interest rates generally followed a downward trend. In the ensuing five years they initially increased in response to the economic boom and the inflationary pressure, and then subsided again.

2.1 From the central bank rate to the market rates

The central bank's key interest rate acts as a benchmark for money market interest rates and influences longer term interest rates. However, the longer the maturity, the more market interest rates are affected not just by the risk and liquidity premiums but also by expectations regarding future movements in short-term interest rates, which are in turn dependent on macroeconomic variables, such as the outlook for growth and inflation, as well as the credibility of the policy conducted by the central bank. Other variables, such as the movement in yields on the US bond market, also affects the level of long-term interest rates in the euro area and in Belgium. At the end of the day, the effect of a fluctuation in the key rate is uncertain. For example, an increase in that rate may have hardly any impact on longer term interest rates because it was expected; then again, it may trigger a knock-on effect

CHART 2   MARKET INTEREST RATE FOR VARIOUS MATURITIES

- Overnight rate
- Rate on 3-month treasury certificates
- Rate on 6-month treasury certificates
- Yield on 3-year linear bonds
- Yield on 6-year linear bonds
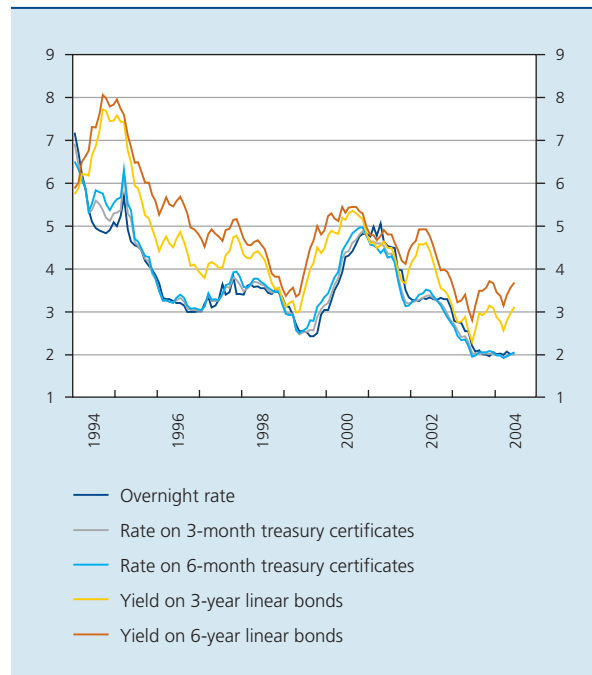
Source : NBB.

because it is regarded as sustainable owing to better growth prospects; and finally, it may cause long-term interest rates to fall if it contributes towards restoring the credibility of the central bank in an inflationary context.

If we take the overnight rate on the money market, over which the central bank has fairly tight control, we find that the interest rates on treasury certificates with a maturity of less than one year track its movements fairly closely. In contrast, the yield on linear bonds, with a longer maturity, may move entirely in the opposite direction for a time. For instance, in the first half of 1994, short-term interest rates fell by more than 200 basis points, continuing the downward trend which started in 1993 after the exchange rate crisis, while long-term interest rates increased by an equivalent amount, as a result of a contagion effect following the US bond market crash. Similarly, the hopes of an economic recovery on both sides of the Atlantic in late 2001 and early 2002 caused long-term interest rates to rise by just under 100 basis points, while short-term rates dipped by around 50 basis points, before stabilising.

The pass-through of changes in the overnight rate to the other market interest rates was estimated for the period from January 1994 to June 2004 using the non-linear least squares method on the basis of equations with an error correction term in the following form [1]:

$$\Delta mr_t = \alpha + \beta * \Delta cbr_t - \gamma * (mr_{t-1} - \delta * cbr_{t-1}) + \varepsilon_t \quad (1)$$

where mr is the market interest rate (rates on 1-month, 2-month, 3-month, 6-month and 12-month treasury certificates, yields on 3-year and 5-year linear bonds) and where cbr corresponds to the overnight rate. Coefficient β refers to the degree of transmission in the short term, more precisely within the month, while coefficient δ represents long-term transmission and ε is the error term.

It must be made clear that this econometric analysis can only reflect part of the impact of monetary policy on market interest rates. In fact, the movements in the market rates may precede the changes to the central bank rate owing to expectations regarding the future monetary policy stance. Thus, if a reduction in the key rate is expected, that may affect market rates even before it is implemented. However, the analysis takes no account of this effect.

Subject to that reservation, pass-through within the month seems to be fairly high overall for treasury certificates, although it does tend to decline sharply as the maturity lengthens: it ranges from 0.92 for 1-month

treasury certificates to 0.46 for 12-month treasury certificates. As regards long-term interest rates, the impact within the month is slight in the case of 3-year linear bonds and virtually nil for 5-year bonds.

The long-term pass-through of overnight rate fluctuations to market interest rates is complete or almost complete for maturities of up to one year. For the maturities of more than one year considered, it is 0.7 or more. Although it therefore appears that the central bank interest rate may – at least in part – have a knock-on effect on the longer term interest rate, that effect does not materialise immediately but only after a varying length of time. That is one of the reasons against overestimating the ability of monetary policy to prime the pump of economic growth in the short term by cutting the key rates.

[1] This specification is deliberately simple because the analysis aims to present a general picture of the broad trends in the transmission of changes in the interest rate controlled by the central bank to the risk-free yield curve. It takes no account of the impact of risk and liquidity premiums or of the effect of other economic variables on the determination of the level of interest rates. In the light of the Phillips-Perron and ADF (Augmented Dickey-Fuller) tests, the hypothesis of the non-stationarity of all the series used cannot be rejected. In addition, the hypothesis of the absence of co-integration can be rejected for 1-month, 2-month and 3-month treasury certificates. However, for clarity we have also used the error correction specification in the case of market interest rates for which the hypothesis of the absence of co-integration cannot be rejected in so far as the estimated coefficients for the degree of transmission in the short and long term are statistically no different from those calculated by using the autoregressive distributed lag model, which is more suitable in this case. As regards the number of lags in the market rate and the overnight rate in the short-term dynamics, the Akaike and Schwarz criteria would have suggested richer specifications (up to twelve lags in terms of level). However, the usefulness of this simple specification lies in the fact that the degree of pass-through can be calculated more easily in the medium term. Finally, in order to attenuate the correlation of the residues in the equations for the rate on 12-month treasury certificates and for the yield on 3-year and 5-year linear bonds, the right-hand term also comprises the change in the market interest rate after a lag of one period.

TABLE 1   DEGREE OF TRANSMISSION OF THE OVERNIGHT RATE TO THE LONGER TERM MARKET INTEREST RATES

	Within the month	After 3 months	After 6 months	After 12 months	In the long term
1-month treasury certificates	0.92 (0.05)	0.99	1.00	1.00	1.00 (0.02)
2-month treasury certificates	0.88 (0.06)	0.96	0.99	1.01	1.01 (0.04)
3-month treasury certificates	0.82 (0.07)	0.91	0.96	0.99	1.00 (0.06)
6-month treasury certificates	0.64 (0.08)	0.72	0.78	0.85	0.95 (0.17)
12-month treasury certificates	0.46 (0.09)	0.62	0.80	0.85	0.89 (0.27)
3-year linear bonds	0.18 (0.10)	0.35	0.51	0.63	0.79 (0.43)
5-year linear bonds	0.02 (0.10)	0.13	0.23	0.38	0.70 (0.54)

Source : Own calculations.
Note : The standard deviations are shown in brackets.

Furthermore, the amount of time taken for the actual effect of a change in the central bank rate to be fully reflected in market interest rates increases as the maturity lengthens: in the case of 1-month treasury certificates, the eventual impact is almost fully apparent after three months, whereas it takes roughly a year in the case of 3-month treasury certificates; in the case of 5-year linear bonds, only just over half of the final impact of the change in the overnight rate is observed after twelve months.

Finally, the econometric analysis clearly illustrates the theoretical findings outlined above, particularly the fact that the effect of a change in the central bank rate on market interest rates becomes more uncertain and vague as the maturity lengthens. The more the market rates relate to longer maturities, the steeper the decline in the accuracy with which the pass-through is estimated, so that in the case of 5-year bonds the sign of both the short-term and the long-term pass-through is statistically not determined.

2.2 From market interest rates to bank lending rates

The comparison of the offered rates on standard contracts, obtained from the RIR survey[1], with the corresponding reference rates[2] reveals that there are substantial differences in the size of the adjustments made to lending rates by the Belgian banks.

As regards short-term loans, the changes in the money market rate were reflected promptly and more or less completely in the interest rate on fixed-term advances, a financial instrument designed mainly for large enterprises. The rates offered by the banks on cash credit and discount credit seem to take a little longer to adjust but they were adapted fully up to the end of 2000. Since that date, interest margins on these last two credit categories have widened considerably: cuts in the interest rate on short-term risk-free instruments took longer to be passed on in the interest rates offered, and the reductions were no longer entirely proportionate.

Similarly, it is evident that since the end of 2000 the margins on long-term loans granted to both businesses and individuals have increased. In this connection it is interesting to note that the interest rate offered to companies on investment loans – which until 2002 tallied fairly closely with the yield on euro area corporate bonds with a comparable duration and a BBB rating – deviated from that rate in 2003 and has risen towards the yield on corporate bonds with a lower rating, namely BB. However, it must also be said that the interest rates actually charged – as recorded by the new survey – were considerably lower in

the second half of 2003 than the rate on investment loans according to the RIR survey[3].

It is possible that the increase in the margins on most short-term and long-term loans resulted from an adjustment to the conditions applied in neighbouring countries, owing to cross-border mergers of credit institutions. This is probably also due to the economic gloom, the problems caused by a number of loans granted at the end of the last decade and the prospect of a new Basle Accord.

Over the period January 1994-December 2003 as a whole, the pass-through of market interest rate changes to lending rates is estimated on the basis of aggregate data per product line, using equations with an error correction term in the following form[4]:

$$\Delta br_t = \alpha + \beta * \Delta mr_t - \gamma * (br_{t-1} - \delta * mr_{t-1}) + \varepsilon_t \quad (2)$$

where br is the lending rate and mr the market interest rate for a corresponding maturity. Once again, the coefficients β and δ correspond respectively to the degree of transmission in the short and long term, while ε represents the error term.

It is estimated that transmission within the month is complete in the case of fixed-term advances and in the order of 90 p.c. for investment loans and 80 p.c. for cash credit and discount credit. In contrast, only 40 p.c. of the change in the reference rate is passed on immediately in the rates charged on mortgage loans, and less than 30 p.c. in the case of consumer credit. Over a long period[5] the various lending rates are aligned in full, or almost in full, with the market rate, except in the case of consumer credit. The Belgian credit institutions therefore appear to adjust the rates on loans to businesses more promptly and completely than the rates on personal loans.

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(1) Except for discount credit where the interest rate corresponds to the average of the interest rates offered by the three biggest banks.
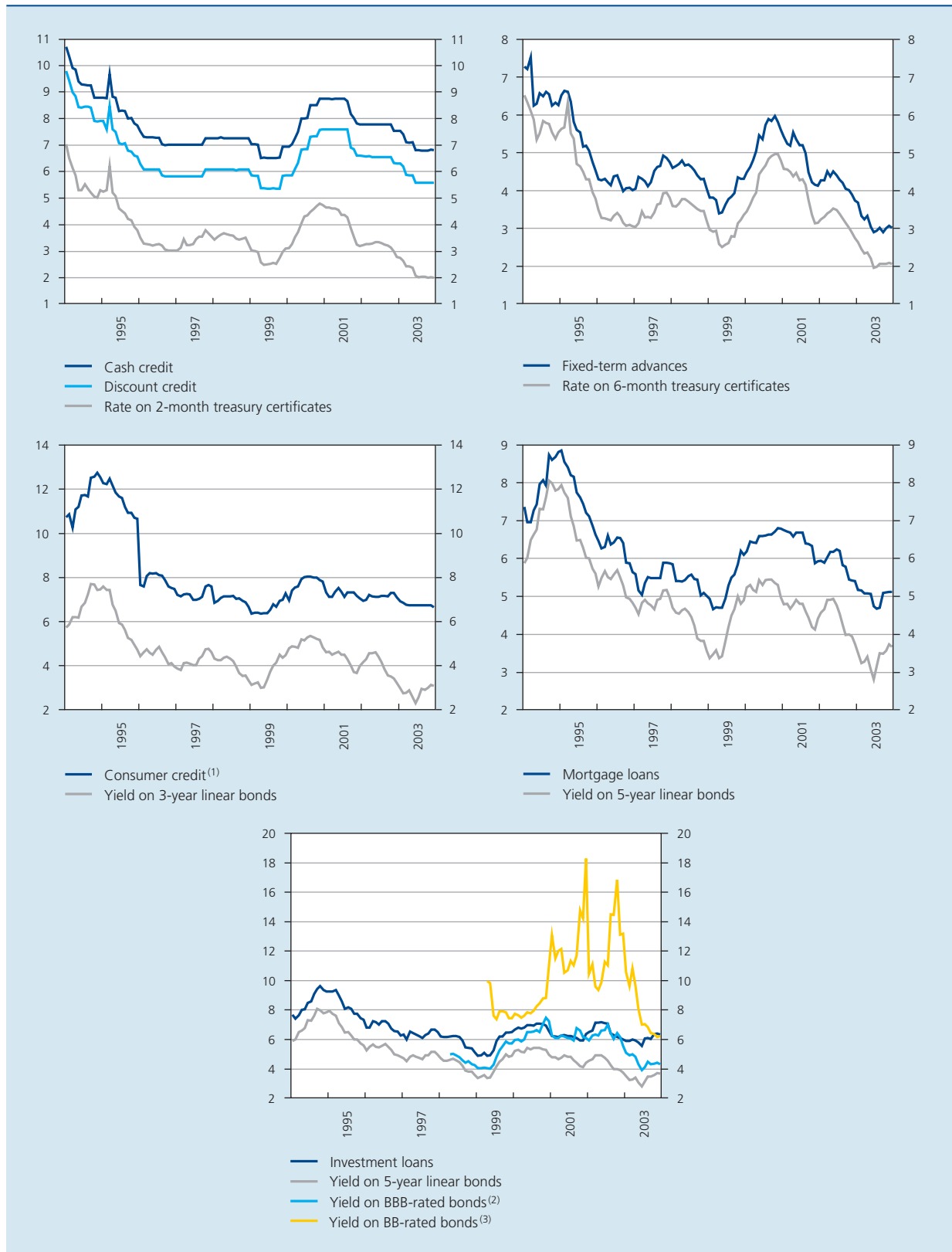
(2) The term of the reference interest rate corresponds to that expressly stated in the various standard contracts, except for cash credit on which the reference rate was selected on the basis of the correlations.

(3) Cf. table 4.

(4) The null hypothesis of non-stationarity cannot be rejected for the various lending rates obtained from the RIR survey at the usual levels of probability. The assumption of the absence of co-integration can be rejected in the case of fixed-term advances, mortgage loans and investment loans. However, we also used the specification with error correction for discount credit, cash credit and consumer credit in so far as the estimated coefficients for the short and long term pass-through are statistically no different from those calculated by using the autoregressive distributed lag model, which is more suitable in this case. Finally, a dummy was introduced into the consumer credit equation, in order to take account of the change of definition, introduced in January 1996.

(5) The hypothesis that the estimated transmission coefficient is equal to 1 in the long term cannot be rejected using standard levels of proability.

CHART 3   LENDING RATES CHARGED BY BELGIAN BANKS AND REFERENCE INTEREST RATES

- Cash credit
- Discount credit
- Rate on 2-month treasury certificates

- Fixed-term advances
- Rate on 6-month treasury certificates

- Consumer credit[1]
- Yield on 3-year linear bonds

- Mortgage loans
- Yield on 5-year linear bonds

- Investment loans
- Yield on 5-year linear bonds
- Yield on BBB-rated bonds[2]
- Yield on BB-rated bonds[3]

Sources : Bloomberg, NBB.
(1) The definition of consumer credit was changed in January 1996.
(2) Yield on euro area corporate bonds with a BBB rating and a term of between three and five years.
(3) Yield on euro area corporate bonds with a BB rating and an average duration of just over four years.

TABLE 2   DEGREE OF TRANSMISSION FROM MARKET INTEREST RATE TO LENDING RATES CHARGED BY BELGIAN BANKS

	Within the month	After 3 months	After 6 months	After 12 months	In the long term
Discount credit (T2)	0.78	0.79	0.80	0.81	0.83
Cash credit (T2)	0.80	0.81	0.81	0.82	0.85
Fixed-term advances (T6)	1.10	0.95	0.95	0.95	0.95
Consumer credit (OLO3)	0.27	0.56	0.59	0.59	0.59
Mortgage loans (OLO5)	0.41	0.64	0.76	0.85	0.88
Investment loans (OLO5)	0.89	0.88	0.87	0.85	0.82

Source : Own calculations.
Note : The reference rate is shown in brackets (T2 corresponds to 2-month treasury certificates, OLO3 to 3-year linear bonds).

A recent study by De Graeve *et al.* (2004), which was also conducted on the basis of the RIR survey data, but taking account of measurement errors and the heterogeneity of the banks, comes to comparable conclusions as regards the scale of the transmission in the short and long term, namely that the adjustment of the rates on loans to individuals appears to be slower and less than proportionate, compared to the rates on loans to companies. Although our estimates on the basis of the aggregate data differ somewhat from the results of the said study, the differences are not statistically significant, except in the case of the short-term coefficient for cash credit and the long-term coefficient for investment loans[1].

As regards the bank characteristics which influence the degree and speed with which bank interest rates are aligned with changes to the market interest rate, De Graeve *et al.* (2004) find that credit institutions with a higher capital ratio and greater liquidity pass on changes in market interest rates more slowly and less than proportionately in their deposit and lending rates. Finally, the degree of pass-through seems to decline with the bank's market share in a particular financial product.

[1] On the basis of the standard deviations calculated by De Graeve *et al.* (2004). In the first case, we slightly overestimate the scale of the adjustment, while in the second case we underestimate it.

TABLE 3   COMPARISON OF THE ESTIMATED DEGREES OF TRANSMISSION

	Within the month		In the long term	
	This article	De Graeve *et al.*	This article	De Graeve *et al.* (2004)
Discount credit	0.78 (0.06)	0.67 (0.06)	0.83 (0.14)	0.85 (0.04)
Cash credit	0.79 (0.05)	0.66 (0.05)	0.84 (0.21)	0.82 (0.03)
Fixed-term advances	1.10 (0.18)	1.01 (0.09)	0.95 (0.02)	0.92 (0.04)
Consumer credit	0.27 (0.12)	0.19 (0.10)	0.59 (0.05)	0.69 (0.09)
Mortgage loans	0.41 (0.08)	0.35 (0.05)	0.88 (0.06)	0.87 (0.06)
Investment loans	0.89 (0.07)	0.79 (0.06)	0.82 (0.20)	1.01 (0.03)

Sources : De Graeve *et al.* (2004) and own calculations.
Note : De Graeve *et al.* (2004) estimate the degree of transmission on the basis of panel data with co-integration where it occurs. The optimum number of lags in the specifications is selected on the basis of the Schwarz criterion, with a maximum of six lags, in levels, for the lending rate and the corresponding market rate. The standard deviations are shown in brackets.

3. The new harmonised interest rate survey

3.1 Features of the new survey

In January 2003, the ECB launched a new survey (MIR survey: MFI Interest Rates) on the interest rates which monetary financial institutions in the euro area apply to their customers. In Belgium, this new survey replaced the RIR survey (Retail Interest Rates), mentioned in the preceding section.

The Belgian part of the MIR survey differs in many respects from the RIR survey[1]. First, while the old survey data were provided voluntarily by the banks, the selection of participants in the MIR survey is based on a *stratified random sample*, which ensures that the survey is far more representative. Second, while the previous survey concerned normalised standard contracts, which were not necessarily representative of the activity of each reporting bank, the *categories* covered by the MIR survey[2] may comprise products which are commercially very divergent, if those products have certain characteristics in common. Third, in the new survey the interest rates are *weighted* on the basis of the amounts of new credit actually granted by each declarant in each category[3], while in the earlier survey the rates notified by the banks were weighted on the basis of the outstanding amounts for the categories in their balance sheet which roughly corresponded to the standard contract. Fourth, the rates recorded via the new survey are the *contractual interest* rates, i.e. the rates actually applied, whereas the earlier survey referred to the advertised rates, without taking account of any commercial negotiation.

These substantial methodological differences cause a break in the series. That is evident from the following table, which compares the average results for the two surveys for the second half of 2003, a period in which, one can assume, the new survey had already got over any "teething troubles", and the old survey was still continuing.

3.2 Preliminary results for Belgium

The MIR survey results have not been available long enough – especially as the observations for the initial months could be less reliable – to conduct a meaningful chronological analysis, such as an analysis of the pass-through of market interest rate changes. Moreover, the movements in the market interest rates have been relatively small in recent months. For those reasons, the

analysis will be confined to the initial conclusions which can be drawn from the average levels of the lending rates charged by Belgian banks during the one-year period ending in May 2004, and their dispersion.

The structure of the lending rates per type of loan clearly shows the effects of the amount, duration and risk of the loan. The contractual rates for loans to corporations vary in inverse proportion to the size of the loan. That is because of the fixed costs, but it may also indicate a negative correlation between the size of the borrower firms and the assessment of the risk. The rates charged increase with the term of the loan. That reflects the positive slope of the risk-free yield curve over the period considered (the difference between five-year and three-month rates averaged 1.4 percentage points), but may also point to an increase in the spreads according to the duration, on account of the higher risk of long-term loans. Since the data on the lending rates are calculated on the basis of maturity intervals, however, it is difficult to compare them with the risk-free yield curve[4]. Finally, the rates on loans for house purchase, which are systematically backed by a mortgage in Belgium, are relatively low. The statistics do not make any other distinctions on the basis of the credit risk.

Lending rates applied to households are usually higher than those applied to corporations, perhaps mainly because of the amounts being borrowed.

As a yardstick of the rate dispersion, the interquartile interval[5] also provides some interesting information. The rate dispersion may be due to the heterogeneity of the credit characteristics, particularly the risks. It may also indicate a lack of competition, since competition would cause prices to converge. However, such an interpretation must be treated with due caution, since cartels could also lead to a reduction in the rate dispersion.

There is a positive correlation between the dispersion of the rates and their level. It is greatest in the case of overdrafts, followed by consumer credit, and is lowest for house purchase loans. The heterogeneity of the risks appears to be the dominant factor, since there is

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(1) A more detailed account of the method may be found on the Bank's website: www.nbb.be/DQ/MIR/N/method_1.htm or www.nnb.be/DQ/MIR/F/method_1.htm.

(2) The new MIR survey covers ten instruments relating to new contracts for deposits and loans to households and non-financial corporations, for varying terms. Altogether, there are 31 rates, including 18 lending rates and 2 annual percentages rates of charge on loans to households.

(3) In the case of overdrafts, on the basis of the outstanding amounts.

(4) The weighting on the basis of the amounts of the new contracts makes this even more difficult; this is because shorter term loans tend to be given a higher weighting since they are renewed more often.

(5) The interquartile interval is defined as the difference between the first quartile and the third quartile; it comprises 50 p.c. of the data and is not sensitive to extreme observations.

TABLE 4 COMPARISON OF THE RESULTS OF THE SURVEYS OF LENDING RATES CHARGED BY BELGIAN BANKS

(Average level in the second half of 2003)

| MIR survey			RIR survey		
Instruments	Initial determination of interest rate	Interest rate	Instruments	Initial determination of interest rate	Interest rate
Loans to non-financial corporations					
Overdrafts		7.37	Cash credit (basic rate)		6.81
Loans ≤ € 1 million	≤ 1 year	3.78	Fixed-term advance € 250,000 to 375,000 (most solvent customers)	6 month	2.99
	> 1 year ≤ 5 year	4.01	Investment loan € 125,000 to 250,000 (lowest rate)	5 year	6.34
	> 5 year	5.00			
Loans > € 1 million	≤ 1 year	2.90			
	> 1 year ≤ 5 year	3.24			
	> 5 year	4.37			
Loans to households					
Overdrafts		10.45			
Consumer credit	≤ 1 year	6.65			
	> 1 year ≤ 5 year	7.76	Loan subject to flat-rate charges, purchase of a new car, € 7,500 (basic rate)	3 year	6.73
	> 5 year	9.28			
Lending for house purchase	≤ 1 year	3.57			
	> 1 year ≤ 5 year	4.32	20-year mortgage loan (lowest advertised rate)	5 year	4.97
	> 5 year ≤ 10 year	4.64			
	> 10 year	4.74			
Other lending	≤ 1 year	3.95			
	> 1 year ≤ 5 year	4.43			
	> 5 year	5.09			

Source : NBB.

apparently no correlation between the degree of concentration in the various markets and the rate dispersion. Thus, the concentration is below average in the home loan market, where the rates applied fall within a narrow margin, but also in the case of overdrafts, where there is a wide rate dispersion.

A brief examination of the impact of some individual characteristics of the reporting banks on their lending rates confirms a number of the findings made by Bruggeman A. and Wouters R. (2001) on the basis of the RIR survey data.

There is a positive correlation between the banks' capital ratio, measured on the basis of the capital and reserves as a percentage of the balance sheet total, and the lending rates they charge[1]. The explanatory variable is the credit risk : a higher capital ratio requires the granting of loans generating higher returns, and thus representing higher risks, in order to achieve a particular return on the equity. Conversely, relative specialisation in higher risk lending requires better solvency.

(1) The results of the simple linear regression (on the basis of the individual data) show the positive influence of the capital ratio on the level of interest rates for virtually all eighteen products; the coefficient is significant (at 90 p.c.) for six of these products.

CHART 4   LENDING RATES CHARGED BY BELGIAN BANKS AND CONCENTRATION INDICES PER LOAN TYPE

(Average June 2003-May 2004)
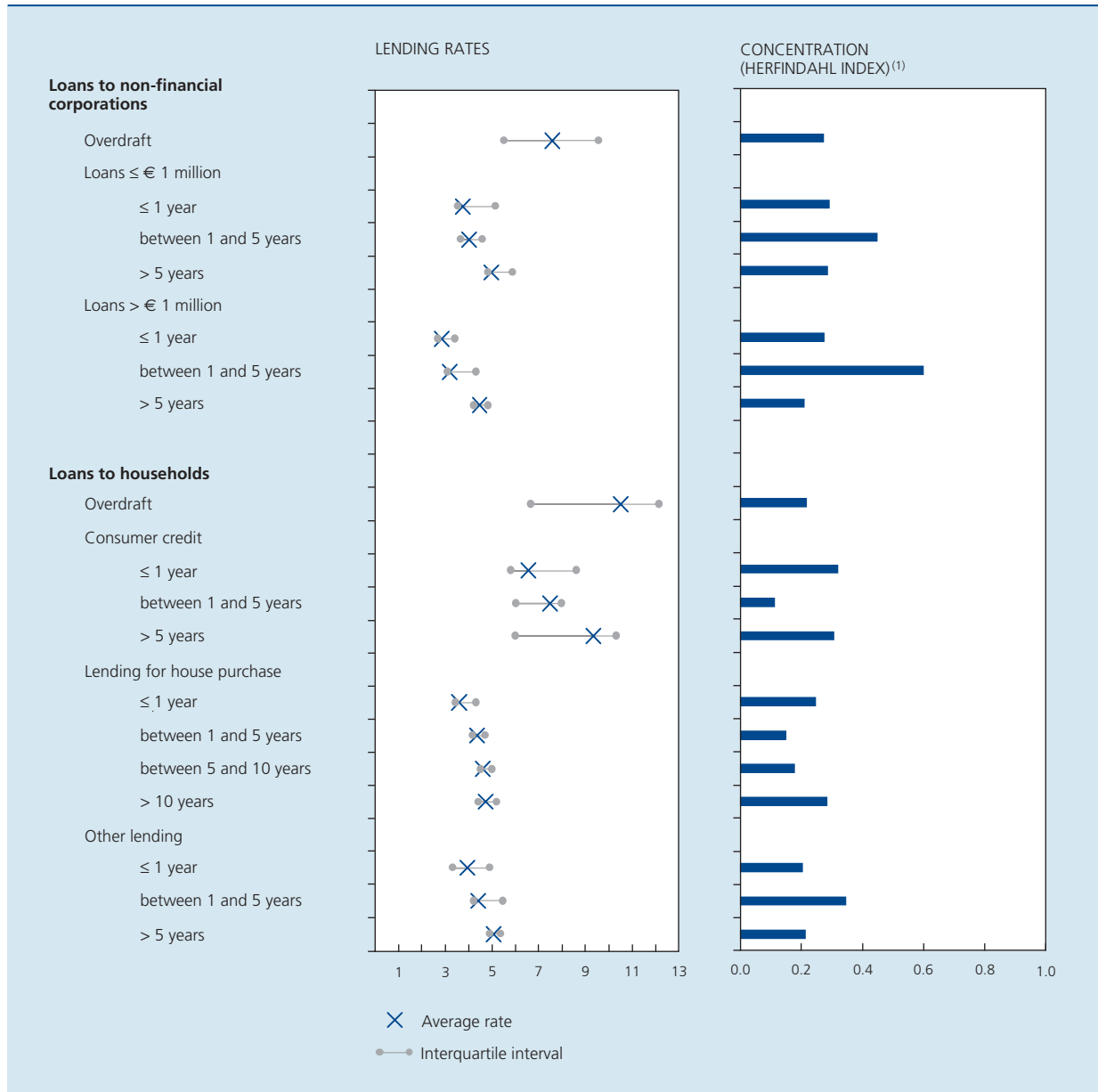
Source : NBB.

(1) Sum of the squares of market shares, calculated on the basis of new contracts (outstanding amounts for overdrafts). The higher the index, the greater the concentration on the market segment.

In contrast, the more liquid banks, i.e. those with a higher proportion of cash, interbank loans and other short-term assets in their balance sheet total, seem to charge lower rates[1]. The availability of a stock of liquid assets creates scope for granting loans which are generally claims with relatively low liquidity.

Finally, the size of the banks measured on the basis of their balance sheet total usually has a negative influence on the interest rate level[2]. Various interpretations are possible. The banks could tend to pass on in their rates the scale advantages gained in terms of access to cheaper sources

(1) The coefficient is estimated as negative for all products, significant (at 90 p.c.) for five products.

(2) The coefficient is estimated as negative for most products, significant (at 90 p.c.) for nine products.

of finance and risk diversification (law of large numbers), rather than exploiting a dominant position to push up the average level of their margins – the correlation between market share per type of loan and the rates applied is also usually negative [1]. In addition, there is a negative correlation between the size and the degree of capitalisation, which may indicate that smaller banks specialise in riskier loans. Furthermore, large corporations whose average risk is probably assessed as lower and which have access to means of funding other than bank loans, deal mainly with the big banks.

(1) The coefficient is estimated as negative for most products, significant (at 90 p.c.) for six products.

These initial indications can be supplemented by a more detailed analysis once longer statistical series are available.

3.3 International comparison

The harmonised statistics of the MIR survey offer the first opportunity to make a valid comparison between Belgium and the euro area. With occasional exceptions, the differences during the period June 2000-May 2004 were minimal.

CHART 5   LENDING RATES IN BELGIUM AND IN THE EURO AREA
(Average June 2003-May 2004)

Sources : ECB, NBB.

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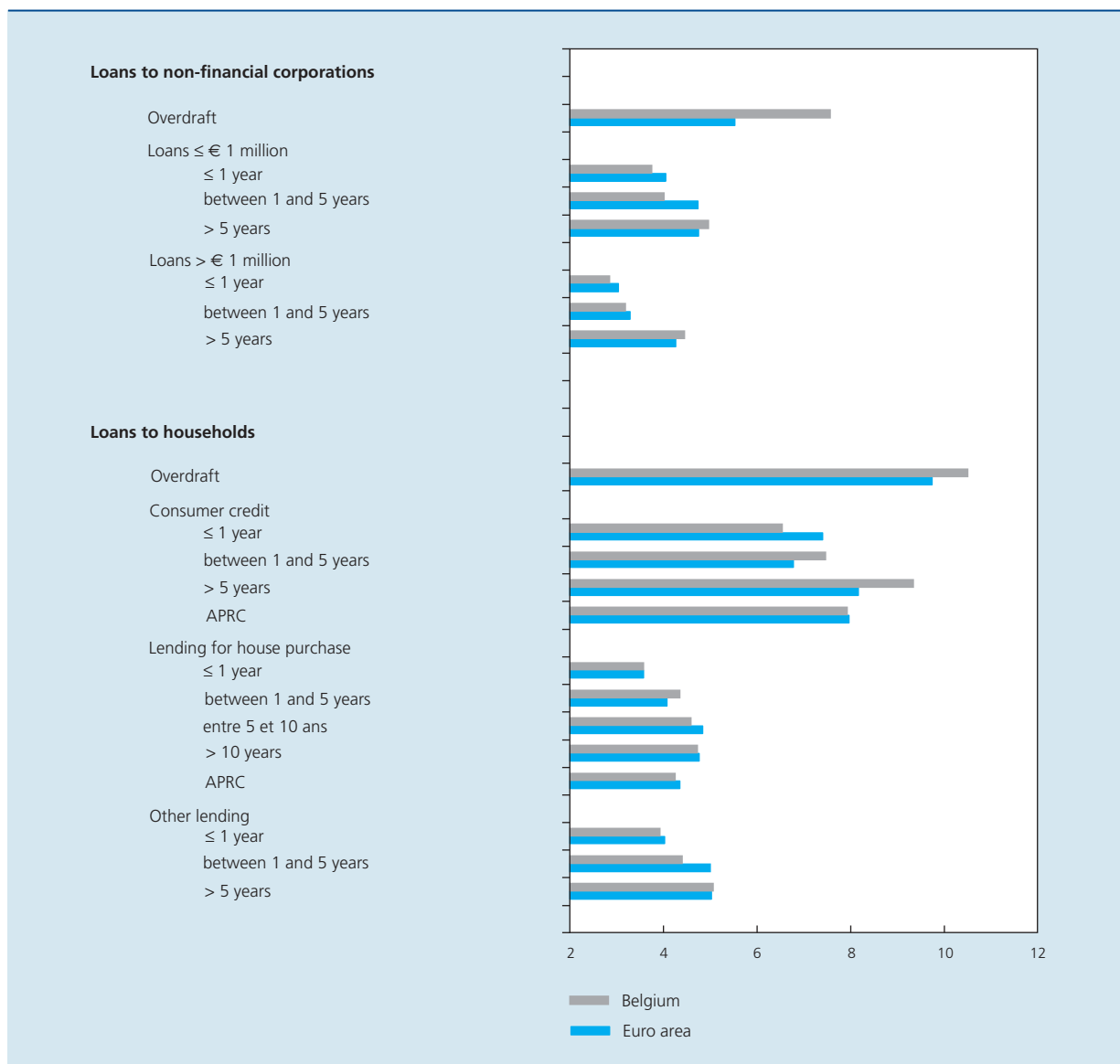
As regards loans to non-financial corporations, the Belgian rates are below the euro area average for the majority of the loans, i.e. loans up to 1 million euro, on which the rates are fixed for the short or medium term. In contrast, interest rates on overdrafts are significantly higher. The difference between the rates for small amounts as opposed to large amounts is less in Belgium than in the euro area, regardless of the period for which the interest rate is initially fixed. It should be remembered that this difference may be due to the fixed costs entailed in granting loans, but it may also reflect some differentiation between large enterprises and other firms.

As regards loans to households, the interest rates for mortgage loans in Belgium are very close to the average European rates, but overdrafts are more expensive. Where consumer credit is concerned, various deviations occur. However, the annual percentage rate of charge, which represents an average of all rates applied, weighted on the basis of new business, taking account of the costs of taking up the loan, is close to the European average.

Conclusion

The way in which credit institutions adjust their lending rates is one of the parameters determining the efficiency of the monetary policy transmission process. By studying the banks' behaviour it is therefore possible to arrive at a better assessment of the presumed effects of monetary policy decisions on the real economy. This article shows that the central bank exerts an influence over lending rates, but to varying degrees, as other factors also play a role.

The central bank only has tight control over very short-term interest rates on the money market. Changes in these rates influence the other, longer term market rates which in turn form the basis for determining the bank interest rates. In accordance with economic theory, it seems that the pass-through of the overnight rate to the risk-free market interest rates becomes weaker, slower and more uncertain the longer the term considered. The pass-through of the market rates to lending rates, studied on the basis of the results of the earlier survey of bank interest rates, presents a mixed picture.

The Belgian credit institutions seem to adjust rates on business loans more promptly and fully than rates on loans to individuals. In the case of consumer credit, the transmission is only partial, even over a long period. Also, the data from the earlier survey indicate a widening of the spreads between most lending rates and the market rate for comparable maturity during the period 2001-2003.

One of the reasons for these wider spreads could be alignment with conditions in neighbouring countries, as a result of cross-border mergers of credit institutions. Be that as it may, the new harmonised survey of bank interest rates shows that the lending rates charged by Belgian credit institutions are currently very close to the euro area, average with a few exceptions: they are lower for short and medium-term corporate lending, but significantly higher for overdrafts.

The results of the new survey reveal that the average lending rates vary according to the amount, duration and risk of the loan. There are particularly wide dispersions in the case of rates on overdrafts and consumer credit. There appears to be a positive correlation between a bank's capital ratio and the level of its lending rates, while the size and liquidity of the banks exert the opposite effect.

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Economic cycles in the United States and in the euro area: determinants, scale and linkages

R. Wouters

Introduction

This article analyses the business cycles recorded in the US and in the euro area over recent decades on the basis of the estimated results of a general equilibrium model. The analysis is in line with the recent economic literature on cyclical movements which ascribes those movements to various types of exogenous shocks, such as changes in productivity, the labour supply, consumer preferences or economic policy. This type of decomposition of the cyclical movements in the main macroeconomic aggregates is discussed on the basis of the models estimated for the US and the euro area. The results broadly correspond with those published elsewhere in the literature. Such an analysis can be conducted for the average of the period under review, but is even more informative if it is carried out for specific periods to identify the key factors triggering the principal recessions or recoveries. If it is applied to the most recent period, such an analysis can provide useful information not only for the policy to be pursued, but also for prediction exercises.

Apart from the origin of the cyclical movements, the downward trend in the volatility of the economic aggregates is also discussed. The reduction in the standard deviation of growth, or in other words, the amplitude of the cycle for most economic aggregates, is clearly discernible in the developed economies, especially since the mid 1980s, and has recently been the subject of much attention in the economic literature. However, it is hard to investigate precisely whether that lower volatility is due to random circumstances in the form of relatively small exogenous shocks, or to more efficient to monetary and fiscal stabilisation policies or to a change in the economic structure (e.g. a shift in favour of the services sector, more efficient stock management, or better access to financial instruments).

Finally, this article examines the close connection between the cycles in the various economies, particularly that of the US and the euro area: has globalisation of the real and financial economy also led to greater synchronisation? As well as offering a possible interpretation of these trends, the article also explores the policy implications.

1. Economic theory and general equilibrium models

In recent decades, research on economic cycles has intensified. Traditionally, the analysis of the business cycle was primarily statistical and descriptive, but the approach nowadays is far more theoretical.

The modern theory of the economic cycle assumes that the economic system is inherently stable. The cycles are generated by exogenous shocks, but after each shock the internal dynamics of the system will constantly tend to revert to the system's equilibrium growth path. This approach is in line with current economic theory which assumes rational behaviour on the part of the individual economic agents: households maximise their well-being and companies optimise shareholder value. In the process, both households and businesses form rational expectations regarding future changes in budget restrictions and technological constraints, which means that they use all

available information to predict future developments as accurately as possible. Within this theoretical framework, the individual decisions will be automatically coordinated by market pricing. The result is a stable economic model in which the cycles are driven by external shocks in regard to preferences, technological progress or government interventions.

This approach to the economic cycle is fundamentally different from the traditional, mainly Keynesian view of the economy. The traditional approach was more critical as regards the stability and dynamic efficiency of the market economy. According to that approach, the uncoordinated behaviour of consumers and investors regularly disrupted the balance in the form of either under-consumption or excess accumulation of capital goods, triggering a recession. The cause of the cycles was therefore attributed to the internal dynamics of the market economy. However, this analysis remained mostly descriptive and lacked any genuine empirical testing of the underlying model. In the modern literature, this approach is viewed as a dissenting opinion which deviates somewhat from the mainstream models, with rational expectations and markets which are almost perfectly efficient.

In the recent models, great progress has been made in combining theoretical insights with the empirical regularities. The general equilibrium models succeed in describing the rational decisions of the various economic agents in a consistent system of equations. That system explains the consumption behaviour and the labour supply of households as well as the investment, employment and pricing behaviour of businesses. It also describes the behaviour of the monetary and fiscal authorities via systematic rules. All those decisions are influenced by both past decisions – the "delayed" effects due to all kinds of adjustment costs or information lags – and expectations about future movements in exogenous and endogenous variables. Yet these systems are relatively easy to solve and can also be estimated empirically.

The Bank uses a general equilibrium model of this type as a research instrument for analysis and research on the economy and the optimum monetary policy (Smets and Wouters 2003). This article begins with a summary of the main findings on the subject. The same model was estimated for the euro area and for the US. On the basis of this exercise, it is possible to identify and quantify the causes of the economic cycles in the two economies, in the form of the underlying exogenous shocks. Naturally, such an exercise is always based on a whole series of assumptions. Other models or model specifications may produce different conclusions regarding the role of the various shocks.

1.1 Theoretical assumptions underlying general equilibrium models

The main characteristics of these models can be summarised as follows:
– The goods and labour market are modelled as markets with imperfect or monopolistic competition. This means that the goods offered and labour performed are imperfect substitutes and that the parties offering them can to some extent determine their price themselves, in contrast to a perfect competition situation in which the price for the individual sellers is fixed and is equal to the market price. In the case of imperfect competition, the price will therefore be determined as a mark-up on top of the marginal production costs. The size of the mark-up will depend on the price elasticity of demand: if the elasticity is very large, i.e. if there is very little difference between the various goods, and variations in price give rise to large substitution effects, the mark-up will be very small. Greater differentiation or lower price elasticity, on the other hand, will lead to a larger mark-up. Obviously, positive mark-ups in prices and wages result in less economic activity than in a competitive economy with no mark-ups. In these models, the mark-up is an exogenously determined structural characteristic of the economy. The degree of monopolistic competition determines the equilibrium level of economic activity.
– In these models, price and wage fixing is also subject to nominal rigidity in one form or another. Prices and wages are not revised in each period to the optimum level in line with changes in costs or demand. In those circumstances, a rational price setter will take account of the fact that his price will remain unchanged for a number of periods. The price will then be determined as a mark-up on a weighted average of present and future marginal costs. The same will happen to wage fixing. Empirical estimates based on macroeconomic data show that prices and wages are typically fixed for relatively long periods.
– Apart from some form of nominal rigidity, these models also feature real rigidities. These mechanisms explain in the first instance why the various components of demand respond only slowly to the various types of economic shocks. Consumption demand is characterised by habit formation households will be slow to adapt their consumption in line with a change in income level. Changes in the level of investment are typically associated with adjustment costs: if the profitability of the capital stock increases, businesses will only slowly step up their investments. This can be explained both by the simple fact that it takes time to carry out business investment, and by the argument that major investments also entail time-consuming additional

training and implementation costs which may be at the expense of the existing activity.

– Another mechanism causing some real rigidity is the variable use of the existing production capacity. This means that, if demand increases, production can increase without any significant rise in marginal costs. In the short term, variations in the degree of existing capacity utilisation may inhibit the sensitivity of the marginal costs, and hence prices, to fluctuations in output.

– Finally, the model is closed with a systematic behaviour response by the monetary and fiscal authorities. The monetary policy response typically takes the form of a reaction to inflation – more specifically, the deviation between the inflation rate and the central bank's inflation target – and a reaction to the output gap. Later on, this article will examine in some detail the specific concept of the output gap used in these models.

– One of the important weaknesses of the model used here is that the economies are seen as closed economies and the fiscal policy is not modelled as yet, or only in a very primitive way as an exogenous process with no response to developments elsewhere in the economy.

On the basis of these fairly simple theoretical insights, the behaviour of households and businesses is derived as totally rational, resulting in a mathematical system of equations. There are two features which typify the difference between these general equilibrium models and the traditional macroeconomic models:

– In the modern general equilibrium models, both long-term and short-term relationships between the different economic variables are derived from optimising behaviour. This implies that the models are totally consistent from a theoretical pont of view. Both demand and supply and price and wage formation are at all times fully coordinated and based on the same information about current and future trends in the exogenous processes.

– General equilibrium models are typically viewed as a system of equations that can be estimated simultaneously. This implies that the rational behaviour and the expectations regarding the future movement in the different variables are based on predictions consistent with the model.

An example may make this clear. When the total exogenous productivity of the factors of production increases, the supply of goods offered by businesses will increase while prices fall, but on the other hand the expected wealth of households will increase, bolstering consumption and at the same time leading to higher wage demands. Such consistency between the response of the various sectors to an exogenous shock is not guaranteed

in the traditional models which are built up sector by sector or equation by equation.

According to this same principle, all macroeconomic variables will respond systematically to the various exogenous shocks affecting the economy during the economic cycle. All variables will therefore supply information identifying the various shocks. By regarding the system of equations as a whole when estimating the model, one can make optimum use of all information available on the different variables. This "full-information" estimation procedure is theoretically a major advantage, but it also has its risks: if particular sectors or equations are incorrectly specified, this may distort all the results of the estimation.

The Bayesian estimation method may offer a solution here, as it is based on a "prior" assumption regarding the various parameters of the model. That prior information may originate from other estimation results in the literature, be based on data from other countries, other periods or other types of data, e.g. microeconomic studies. The more robust and accurate this prior information, the greater the weight that can be assigned to it in the estimation procedure. The information in the economic time series on which the model estimation is based is then used to supplement the prior information and in that way to arrive at a "posterior" distribution for the various model parameters. In contrast to the classic estimation methods aimed at estimating the "real" parameters as efficiently as possible, the Bayesian method aims at estimating the whole distribution and thus the probability of the various parameters. This estimation method therefore results in a full description of the parameter distribution, which is very useful for determining the margin of uncertainty in prediction exercises or all other deductions based on the model.

1.2 Empirical implementation of the general equilibrium models

This standard general equilibrium model was estimated for the US and for the euro area, taking seven macroeconomic variables into account: GDP, consumption, investment, employment, wages, inflation in the price deflator of GDP and the short-term interest rate. In this exercise, which intends to compare the two economies, the model was estimated for the two economies over the same base period: 1974.1-2002.4. The estimation concerns both the behaviour parameters of households, firms and public authorities and the parameters which describe the exogenous processes: the variance and persistence of the exogenous shocks. Together, these parameters determine the entire behaviour of the economic system and make it

possible, for example, to ascribe the total variance of the system to the various underlying exogenous shocks.

Ten exogenous shocks were identified in the course of the estimation. Six of them were modelled as persistent processes which typically have a fairly protracted influence on the economy:

– shocks in the total factor productivity (TFP) of the economy;
– productivity shocks specific to capital goods;
– shocks in the labour supply of households: these shocks specifically take the form of a more or less persistent shift in the relative value placed on labour effort in the utility function of the households, so that the households are inclined to do more or less work at a particular wage rate. Changes in the participation rate, standard of education, etc. and institutional reforms on the labour market will also be covered by this shock in so far as they influence the economy primarily via the labour supply;
– shocks in the intertemporal preferences of households: such shocks typically lead to a temporary postponement of household spending but without any change in households' overall budgets or wealth;
– shocks in exogenous demand and/or government spending;
– shocks in the monetary policy inflation target: this shock determines the long-term level of inflation and hence the nominal interest rate.

In addition, there are four shocks which were modelled as being relatively short-lived:

– temporary changes in the mark-up for price-setting;
– temporary changes in the mark-up for wage-setting;
– temporary changes in the cost of financing investment;
– temporary changes in the interest rate: these are interest rate changes which are not generated endogenously by the response of monetary authorities to fluctuations in inflation or output.

Each of these shocks has its specific influence on the seven macroeconomic variables used for the historical estimation. The effect of the shocks on the economic system is typically reflected in the impulse-response functions of the shock on the different variables. The impulse-response effects for some of the shocks are shown in chart 1.

An average positive shock affecting total factor productivity causes an increase in output and in the various components of demand, while inflation falls. Employment declines, primarily in the short term, since demand and production respond only slowly to the positive wealth effects of this shock. The short-term interest rate falls

owing to the decline in inflation, but also because – in the short term – output lags behind the expansion in production capacity. Other supply shocks with comparable effects are the shock to the labour supply and the shock affecting the specific technology of capital goods.
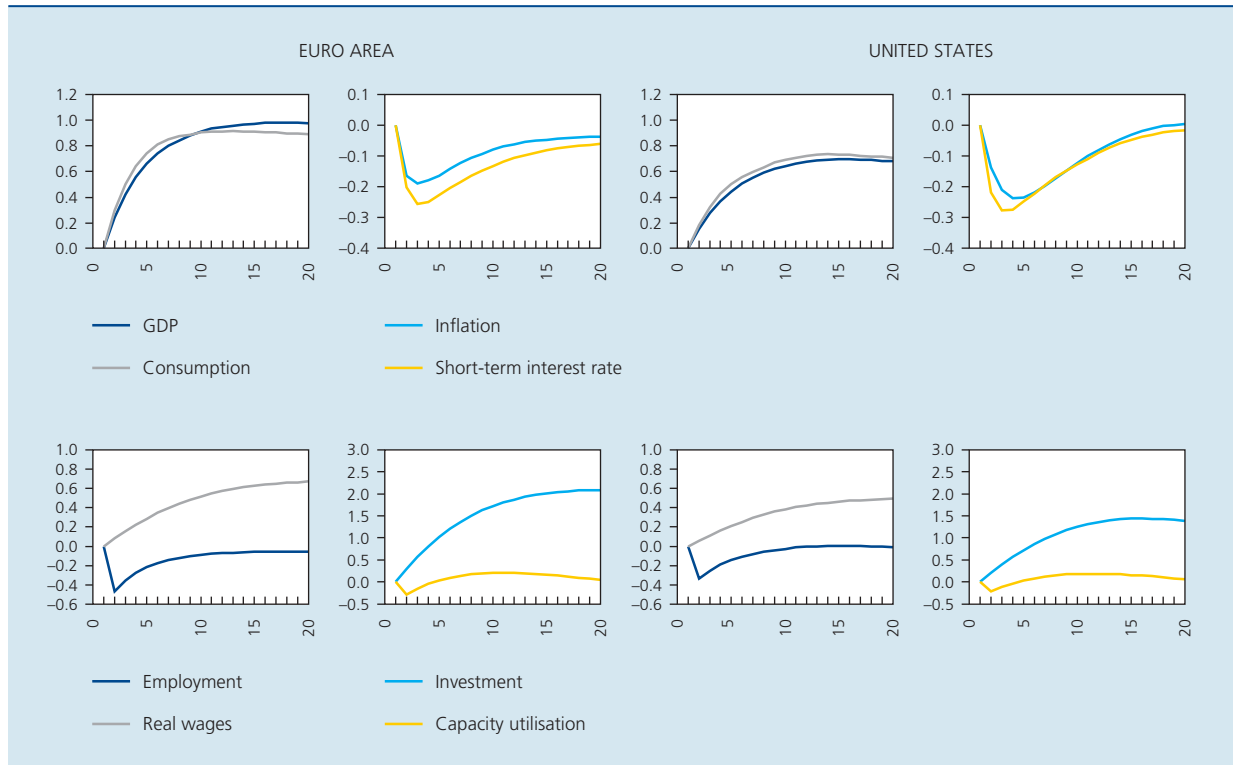
A positive shock affecting the intertemporal preferences of households encourages the propensity to consume in the short term and is a typical example of a demand shock. Such a shock causes a rise in output and prices with an increase in the short-term interest rate, causing a crowding out in investment spending. Another demand shock is the shock affecting exogenous expenditure (e.g. in government spending) which has the effect of crowding out the two private demand components.

A shock affecting the price mark-up has a positive impact on inflation in the short term but produces a negative wealth effect, causing a fall in demand and hence in output. Monetary policy responds relatively weakly to such a temporary surge in inflation, since the curbing of short-term inflation has to be weighed against the negative output gap. The impulse-response function of this shock shows a strong similarity with the effects of an oil price shock.
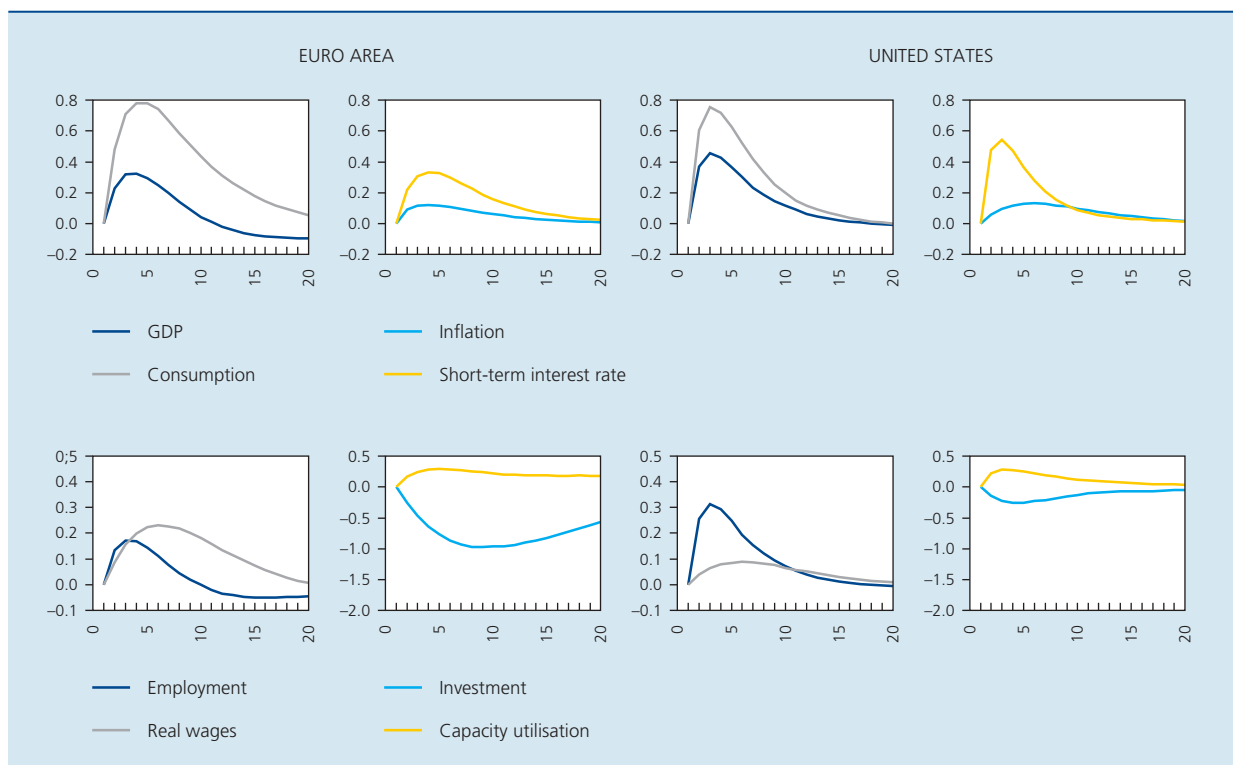
Finally, the impulse-response function for a monetary shock affecting the short-term interest rate is explained. An interest rate hike has negative repercussions on the demand components – and even more so on investment, which is relatively sensitive to interest rates – and also leads to a fall in inflation, which is fairly persistent on account of price and wage rigidities.

Without going into the estimation results in detail, it must be said the results for the US are very similar to those for the euro area, both for the behaviour parameters of firms and households and the parameters which determine the systematic behaviour of monetary policy, and for the variance and persistence of the different structural shocks. The fact that the results for the systematic monetary policy of the two economies are comparable is particularly surprising since there was no single European monetary policy during the period considered, and the estimations were therefore based on a highly abstract representation of the real situation. Yet the congruity of the results for the two economies is not so surprising in view of the other results in the literature, which also indicate a close similarity. On the basis of a descriptive comparison of the economic cycle in the euro area and the US, Mojon and Agresti (2001) also deduced that the cyclical behaviour of the two economies was very similar: the variance and the correlation of a whole series of macroeconomic variables tally very closely. Studies focusing on specific behavioural

CHART 1A   IMPULSE-RESPONSE FUNCTION FOR A SHOCK AFFECTING TOTAL FACTOR PRODUCTIVITY

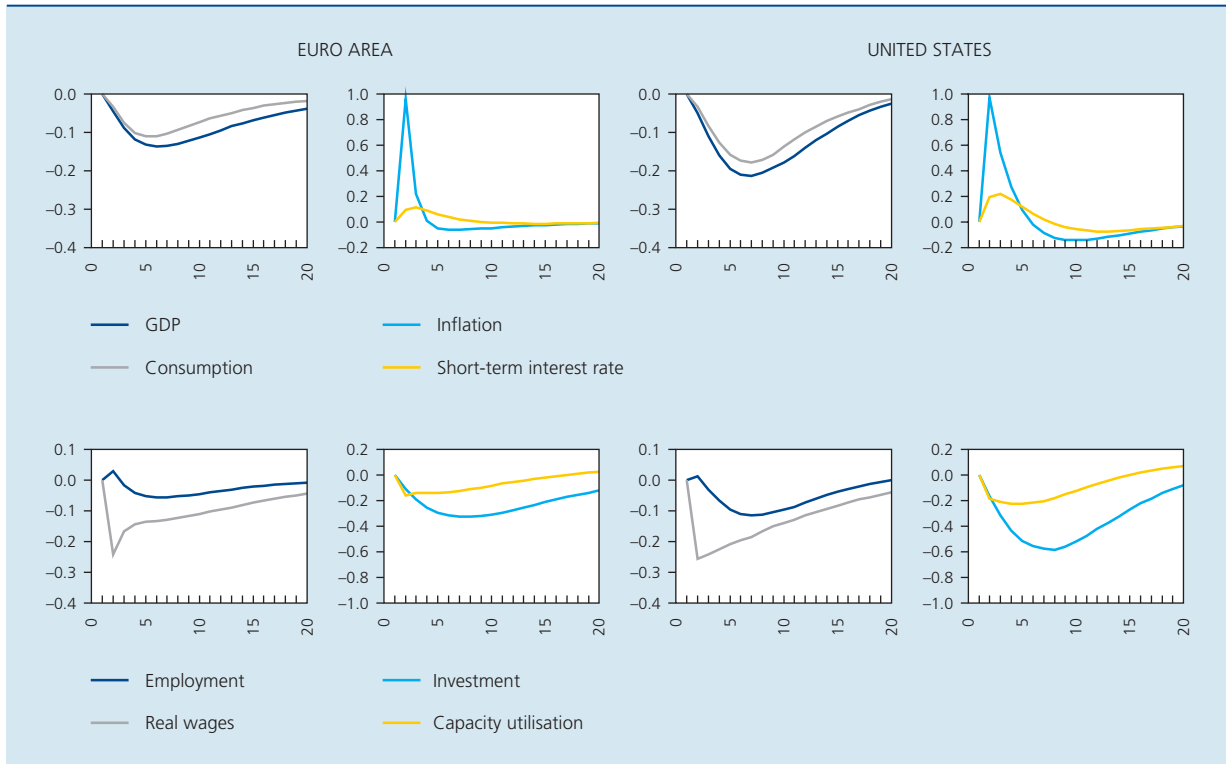(Deviation relative to base, in percentage points)

EURO AREA   UNITED STATES

GDP   Inflation

Consumption   Short-term interest rate

Employment   Investment

Real wages   Capacity utilisation

CHART 1B   IMPULSE-RESPONSE FUNCTION FOR A SHOCK AFFECTING CONSUMPTION PREFERENCES

(Deviation relative to base, in percentage points)

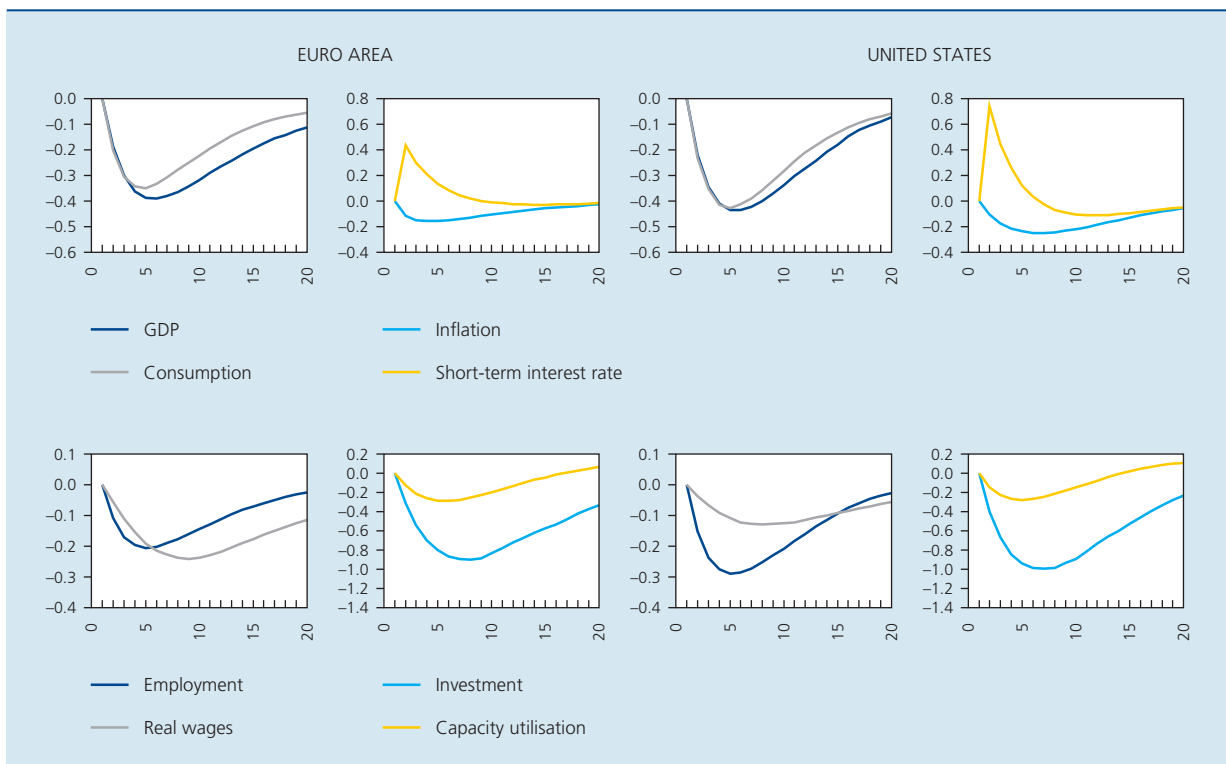EURO AREA   UNITED STATES

GDP   Inflation

Consumption   Short-term interest rate

Employment   Investment

Real wages   Capacity utilisation

IMPULSE-RESPONSE FUNCTION FOR A SHOCK AFFECTING THE PRICE MARK-UP

(Deviation relative to base, in percentage points)

EURO AREA

UNITED STATES

GDP — Consumption — Inflation — Short-term interest rate

Employment — Real wages — Investment — Capacity utilisation

CHART 1D   IMPULSE-RESPONSE FUNCTION FOR A MONETARY SHOCK AFFECTING THE SHORT-TERM INTEREST RATE

(Deviation relative to base, in percentage points)

EURO AREA

UNITED STATES

GDP — Consumption — Inflation — Short-term interest rate

Employment — Real wages — Investment — Capacity utilisation

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relationships also frequently produce very comparable estimation results for the two economies: for instance, Gali and Gertler (1999) and Gali et. al. (2001) estimate the same nominal rigidity for price-fixing in the US and in the euro area. Our estimation results relating to nominal rigidities also tally closely with those results.

2. Decomposing the business cycle into the underlying shocks

The cycle or, in other words, the volatility of the economies considered, can be decomposed in two ways. First, it is possible to arrive at an average split of the cyclical volatility of each of the variables considered. Here, "average" means the average contributions made by the shocks over the period considered, namely 1974-2002. This exercise can be performed for various prediction horizons: what is the expected average variation of output, employment, inflation or the interest rate in a prediction exercise over one quarter, four quarters, ten quarters or thirty quarters. For each of these horizons, the variance recorded in the variables can be broken down into the various shocks, revealing the extent to which the shocks have contributed to the expected average variance of the variables over that horizon. Since thirty quarters – or about eight years – corresponds to the average length of the cycle, a breakdown over that horizon will indicate which shocks determine the long-term economic picture.

A second way of effecting the decomposition is to consider the values recorded for the different variables during specific observation periods and ascribe them to the historically specific shocks which gave rise to them. Such an exercise may give some idea, for example, of the shocks which have occurred during the last four recession periods (1974-1975, 1981-1982, 1990-1992-1993, 2000-2002) or during the intervening economic expansion phases.

2.1 Average decomposition of the cycle in the euro area and in the US

If we consider the decomposition of output, measured on the basis of GDP, then it is apparent that the volatility or variance of output over a short prediction horizon of between one quarter and one year is determined mainly by the various demand shocks (Chart 2). Shocks in government spending or in other exogenous components of demand, preference shocks in consumption or monetary stimuli are dominant here; they determine over half of the total variance in the output of the euro area and more than 70 p.c. of the variance in US output. However, the influence of these shocks is short-lived and over a longer horizon it is the "supply" shocks that are dominant. Here, supply shocks means mainly TFP shocks and labour supply shocks. Over a 10-quarter horizon, these two shocks account for roughly 70 and 50 p.c. of the variance in the euro area and the US respectively. Over an eight-year horizon, those figures increase to 87 and 74 p.c. This decomposition of the trend in output ties in closely with other results in the literature. A SVAR model for the US-based study by Shapiro and Watson (1988) also showed that, taken over a longer horizon, shocks in the labour supply and productivity are the predominant factors dictating the pattern of the cycle, while demand shocks are more important in the short term.

In consumption, too, the supply shocks mentioned above (TFP shocks and labour supply shocks) appear to be the main driving force behind the long-term trend. Demand shocks once again play a key role in short-term consumption trends. Here it is the shock of intertemporal preferences – i.e. exogenous changes in consumer spending patterns, causing people to postpone or accelerate their consumption – that predominates. Monetary policy also influences consumption over shorter horizons, precisely because it has an impact, via the interest rate, on the consumer's intertemporal decisions. The importance of these two demand shocks for short-term consumption trends is evidently rather greater in the US than in the euro area.

Apart from the two supply shocks which affect GDP and consumption (namely TFP shocks and labour supply shocks), the long-term investment trend is also influenced by the productivity shock specific to capital goods. Together with the more volatile shock in the cost of financing investments, this more persistent shock also largely explains the short-term volatility of investment.

As regards the movement in real wages, the shock in the wage mark-up plays a key role in the short term. This concerns short-term variations in the influence of labour as a production factor on wage-setting. The labour supply has hardly any influence on real wages. In the long term, the TFP shock is the principal fundamental economic determinant of wages. Technological progress is thus reflected in an increase in production together with an increase in purchasing power, generating the demand to absorb the greater production capacity.

The labour supply is the only important factor in the long-term employment picture. In contrast, the productivity shock plays little if any part in employment in the long term. On the other hand, the short-term employment trend is greatly influenced by the TFP shock, as well as by the demand shocks which also affect output.

Overall, it is evident that the monetary policy shock plays only a relatively minor role in the decomposition of the real variables. However, this must not be interpreted as meaning that monetary policy is unimportant for what actually happens in the economy. The influence of the various shocks on the real decisions is largely determined by the central bank's systematic policy. A typical example is the impact of a productivity shock. The short-term

CHART 2   DECOMPOSITION OF OUTPUT AND DEMAND COMPONENTS IN THE EURO AREA AND IN THE UNITED STATES [1]

(Percentage contributions of the various shocks to the variance)

(1) The decomposition of the average variance of the prediction error for an horizon of between 1 quarter and 30 quarters, calculated on the basis of the estimated models.

CHART 3   DECOMPOSITION OF REAL WAGES AND EMPLOYMENT IN THE EURO AREA AND IN THE UNITED STATES

(Percentage contributions of the various shocks to the variance)
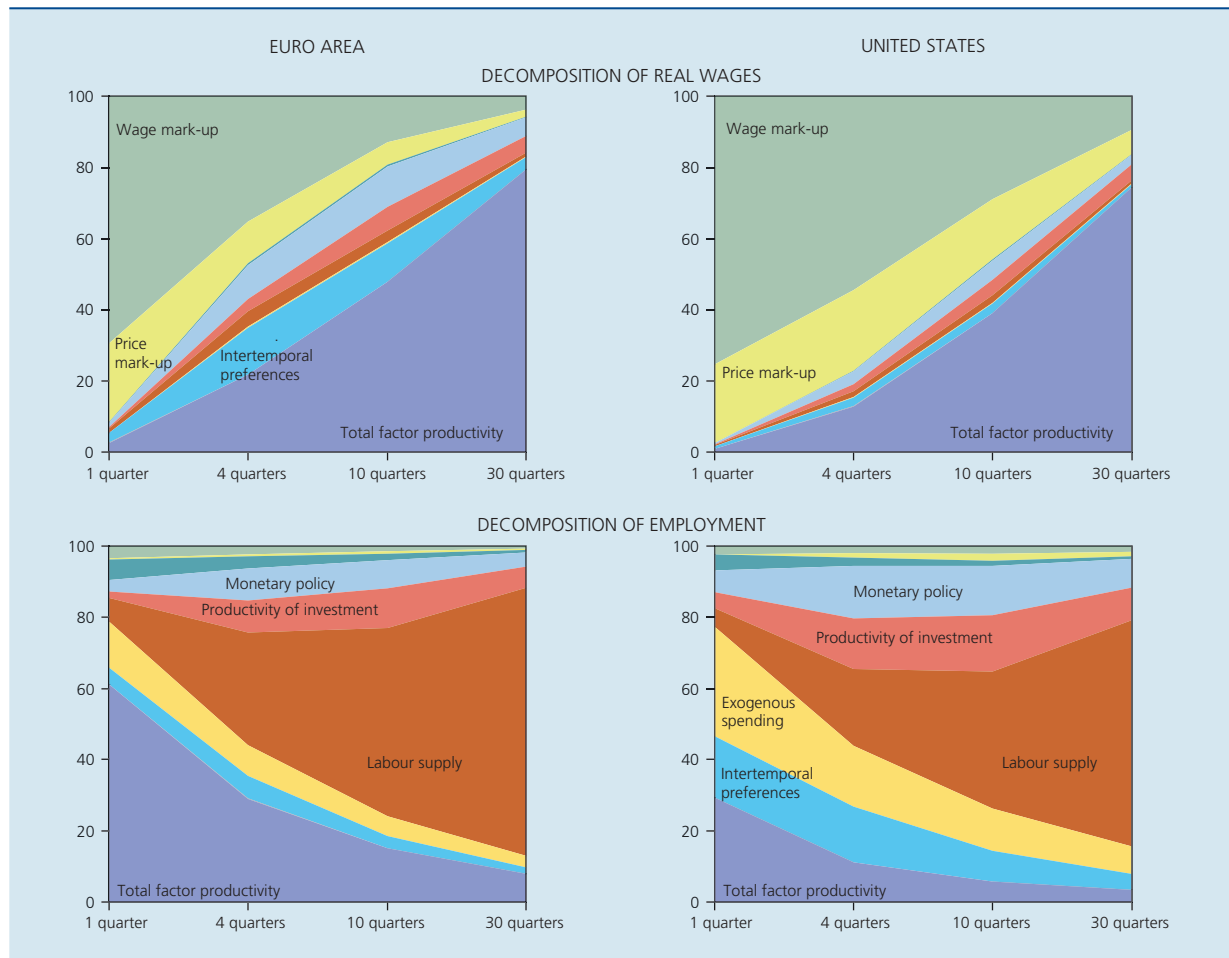
expansionary effect of a productivity shock depends very much on how accommodating monetary policy is in its response to such a shock. If the nominal interest rate remains unchanged in the event of an exogenous positive shock in productivity, the real interest rate will rise as a result of the fall in marginal costs, prices and inflation expectations. Such an increase in the real interest rate will have a negative influence on the demand components which may largely offset the positive wealth effect of the shock. In that situation, employment will contract and the negative pressure on costs and prices will consequently be further exacerbated. Given such a restrictive monetary response to productivity shocks, demand and output will show only a modest increase while employment will contract. Under those circumstances, one can hardly expect the productivity shocks to provide the main explanation for the cycles, as a key feature of the economic cycle is that output and employment show a positive correlation throughout the cycle. A productivity shock has a totally different effect in the case of a highly accommodating
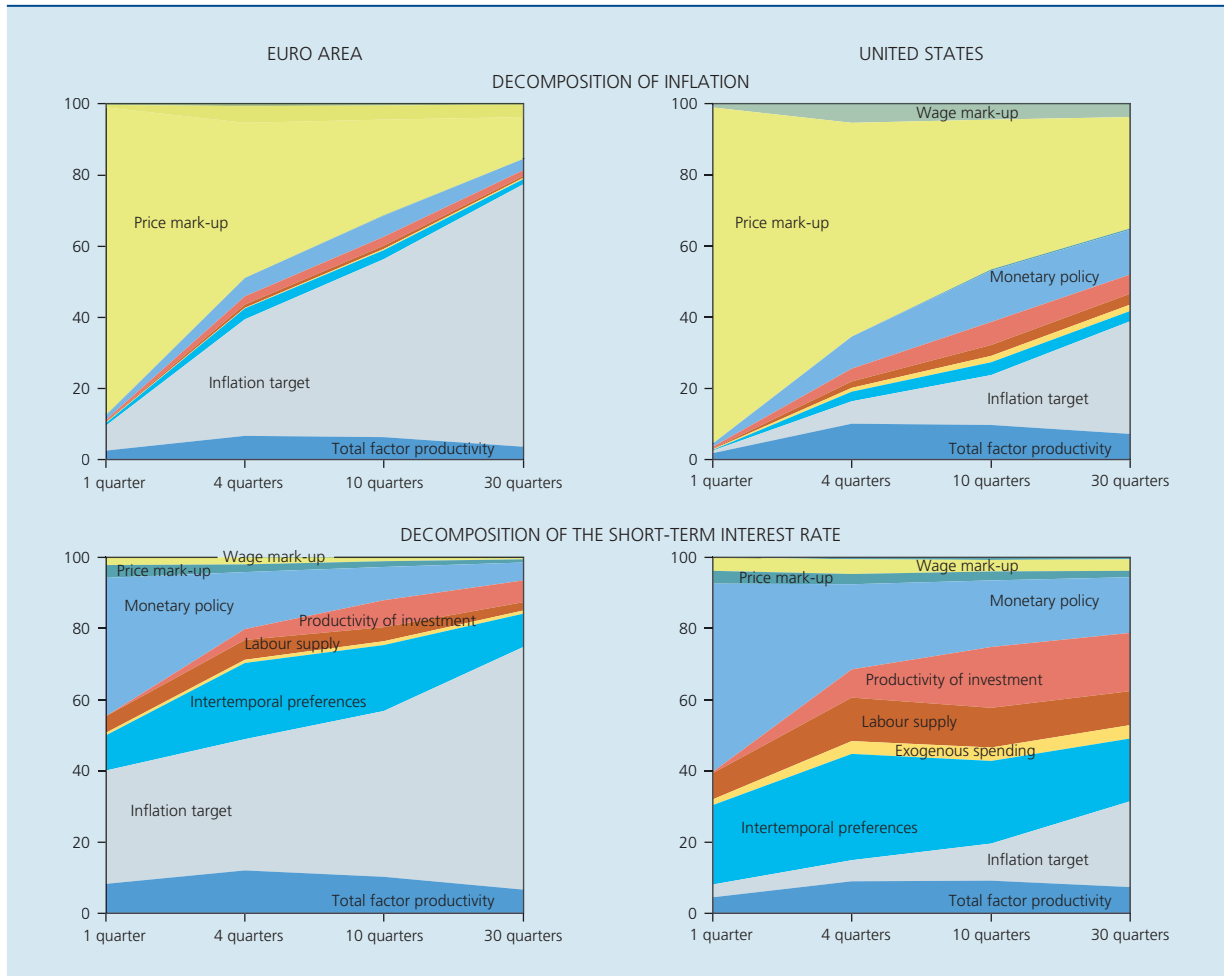
monetary policy that supports demand as much as possible in order to take advantage of the increased production capacity of the economy. Such a response by monetary policy is more probable if, on the one hand, the interest rate systematically produces a sharper response to inflation and if, on the other hand, the output gap – to which monetary policy may respond – is correctly estimated, which means that the estimated production potential and hence the output target is in fact adjusted upwards as a result of increased productivity.

However, monetary policy plays a far more visible role in the nominal course of the economy. Thus, monetary policy – certainly in Europe – is by far the most important determinant of inflation in the long term. A shock in the inflation target plays a particularly important role. That also explains the importance of announcing an explicit inflation target which, if credible, forms an anchor point for inflation expectations and thus becomes an important factor determining long-term inflation. In the short term,

CHART 4

(Percentage contributions of the various shocks to the variance)

EURO AREA

UNITED STATES

DECOMPOSITION OF INFLATION

Price mark-up

Inflation target

Total factor productivity

Wage mark-up

Price mark-up

Monetary policy

Inflation target

Total factor productivity

DECOMPOSITION OF THE SHORT-TERM INTEREST RATE

Wage mark-up

Price mark-up

Monetary policy

Productivity of investment

Labour supply

Intertemporal preferences

Inflation target

Total factor productivity

Wage mark-up

Price mark-up

Monetary policy

Productivity of investment

Labour supply

Exogenous spending

Intertemporal preferences

Inflation target

Total factor productivity

inflation is determined to a large degree by what is called the mark-up shock which – by definition – is exogenous so that the monetary authority has no control over it. For the intermediate horizons (4 and particularly 10 quarters), monetary policy gradually acquires more control over inflation. That also explains why the definition of price stability applicable to the Eurosystem is explicitly geared to the medium term.

The upward trend in inflation during the 1970s and the downward trend since the early 1980s are thus largely attributed to changes in the systematic behaviour of the central bank and more particularly to the inflation target applied. In the model, such systematic disinflation is indeed associated with a fairly modest influence on the real economy. The model may perhaps underestimate the "sacrifice ratio" of such disinflation, because the estimation implicitly assumes that all economic agents immediately adjust their inflation expectations in line with the modified monetary policy. Presumably this takes

much longer to happen in reality, and only results from the negative output and employment effects which such a tightening of policy entails in the short term.

The inflation target shock also plays an essential role in the other nominal variable, namely the short-term interest rate. In the euro area, the inflation target is manifestly the main factor determining the long-term trend in the short-term interest rate. In addition, the monetary policy shock itself is a driving force behind short-term interest rates, and in the United States the same holds true for intermediate and even long-term horizons. The monetary policy shock must therefore be interpreted as an exogenous deviation in the interest movements generated (endogenously) by the reaction function of the monetary authorities. The reaction function comprises the systematic component of monetary policy, whereas the monetary policy shock reflects the discretionary component, e.g. if the monetary policy response to the output gap, or to an inflation level that deviates from the target, is more (or less) marked

than usual, or if monetary policy reacts to economic developments which are not modelled in the reaction function. The fact that, for all horizons considered, the monetary policy shock is greater in the United States than in the euro area indicates that monetary policy there has been conducted less systematically in the past.

2.2 Decomposition of output during specific periods of recession and economic expansion

The analysis of the specific periods of expansion and recession in terms of underlying shocks is more informative than their average decomposition. In this respect, it is necessary to draw attention to the diversity of the shocks which occurred during the four recession periods

considered, even though the shocks affecting demand generally played a very important role. Table 1 contains the estimates, based on the general equilibrium models, of the contribution of the various types of shocks to the growth of GDP in the euro area and in the United States during those specific periods. The table presents the contributions which the various shocks made to growth during certain sub-periods.

During the 1974-1975 recession, a series of negative shocks affected the determinants of investment and the intertemporal preferences underlying consumption expenditure (in the United States only). In the euro area, a significant fall in exogenous demand was also recorded, probably as a result of the decline in world trade following the oil shock. The increased price mark-up, probably also

TABLE 1 DECOMPOSITION OF GDP DURING SPECIFIC PERIODS OF RECESSION AND EXPANSION

(Percentage contributions to the growth of GDP during the period in question)

	Decomposition of the four recessions in the euro area and in the US							
	Euro area	US	Euro area	US	Euro area	US	Euro area	US
	74:1 − 75:1		80:1 − 82:4		92:1 − 93:2	90:1 − 91:4	00:2 − 02:2	
TFP shock	−0.27	−0.57	−0.27	−0.38	1.08	0.96	−2.79	2.49
Labour supply shock	−1.66	−1.45	0.65	−1.06	−0.74	−0.42	2.44	0.11
Investment shock	−1.04	−0.98	1.61	0.42	−1.59	−2.20	−0.90	−2.64
Intertemp. pref. shock	0.12	−1.33	−1.71	0.01	−1.29	−1.76	−0.15	−1.68
Exog. spending shock	−1.59	−0.38	0.33	−0.66	0.68	0.72	0.89	0.17
Monetary policy shock	1.28	0.02	−3.02	−5.16	−0.77	0.06	1.00	−0.47
Iinflation target shock	−0.05	0.00	0.07	−0.01	0.02	0.01	0.00	−0.01
Financing shock	−0.47	−0.33	−0.27	−0.42	−0.46	−0.47	−0.31	−0.39
Price mark-up shock	−0.37	−1.07	0.13	−0.72	0.21	−1.09	−0.10	0.93
Wage mark-up shock	0.03	0.07	0.00	−0.25	−0.12	0.36	0.06	−1.06

	Decomposition of the three expansion periods in the euro area and in the US					
	Euro area	US	Euro area	US	Euro area	US
	75:1 − 80:1		82:4 − 92:1	82:4 − 90:1	95:1 − 00:2	
TFP shock	4.87	−1.72	4.96	−2.03	0.60	1.34
Labour supply shock	−0.42	0.49	9.53	11.05	7.33	1.52
Investment shock	2.26	3.61	2.57	−2.15	−2.33	1.31
Intertemp. pref. shock	2.76	2.67	0.08	0.46	1.58	1.17
Exog. spending shock	1.15	−0.91	−0.06	2.47	−0.28	−0.18
Monetary policy shock	1.53	−0.68	−1.73	1.66	1.10	1.21
Inflation target shock	−0.03	−0.08	0.01	−0.06	−0.03	−0.04
Financing shock	0.42	0.90	0.42	0.29	−0.11	0.07
Price mark-up shock	0.55	1.41	−0.03	0.82	−0.31	0.78
Wage mark-up shock	−0.36	−0.39	0.30	0.63	0.14	1.11

due to the oil shocks, had a negative impact on output, especially in the United States. Moreover, a negative shock affecting the labour supply led to increased pressure on labour costs and exerted a negative influence on activity in both economies. That shock could also be linked with the oil shock, which caused labour costs to rise owing to wage rigidity.

In both Europe and the United States, the 1980-1982 recession was determined to a large extent by the reversal of monetary policy. As pointed out earlier, a perfectly credible change to the inflation targets in the context of monetary policy has only a minor negative effect on output. That is why the model first considers the tightening of monetary policy applied in the early 1980s as a series of short-term changes in interest rates. Such interest rate shocks have a greater negative impact on demand. The change in monetary policy is only gradually reflected in a permanent shift in the inflation target. That interpretation of the recession in the US in the early 1980s conforms overall to the one given in the literature concerning the turn of on the monetary policy pursued by the Federal Reserve System while Paul Volcker was chairman, following the more accommodating stance which had characterised the 1970s. In Europe, too, those years coincided with the first phase of adjustment on the road to greater monetary stability within the EMS. The long period of negative real interest rates in the 1970s was thus succeeded by a period of high real interest rates in the 1980s.

The fact that the recession which occurred in the early 1990s was not synchronous between the US and the euro area was due mainly to German reunification. Despite the different timing, the two recessions were caused mainly by the shocks affecting the propensity to consume and invest. Although it is debatable whether the shock affecting investment is a demand shock or a supply shock, the decline in demand during that period seems to have been considerable (the temporary rise in the cost of financing investment is another reason for that recession).

The latest recession in the US presents exactly the same profile. For the euro area, the situation is less clear. Although a number of negative shocks affecting demand did occur in mid 2001, influencing consumption, investment and exogenous or public spending, their overall impact during the period in question was relatively neutral. However, what is striking is the large difference in the contribution of productivity to economic growth in the euro area and in the US during this recent period: while the increase in productivity made a positive contribution to economic activity in the US, in the euro area the contribution of productivity appears to have been decidedly

negative. The latest recession therefore did show a different profile in the two economies.

It is also noticeable that the exogenous demand shock during each of the recession periods considered did not make any really negative contribution to growth. Since, in a closed economic model, this is the only channel through which external demand can influence the economy, that may well mean that the traditional channel for the transmission of a decline in economic activity via the trade flows did not play a crucial role during these recessions. It is more a question of general shocks which had a more or less simultaneous negative impact on activity. However, the specific character of those general shocks varied over time: oil prices and the labour supply during the 1974-1975 recession, monetary policy in 1980-1982, asynchronous demand shocks in the early 1990s. It is only the demand shocks affecting consumption and the negative investment shocks that apparently recurred during the various recessions.

As already stated, the longer periods of economic recovery are supported mainly by positive developments concerning productivity and the labour market. The fact that the euro area in the 1970s and 1980s featured strong growth of productivity may be attributable largely to the radical sectoral restructuring during that period. In the 1980s and – for the euro area – during the whole of the last decade of the 20th century, there were significant positive developments affecting labour supply. During the expansion period of the 1980s, the growth of real wages remained relatively modest, despite the strong expansion in employment and consumption. The model therefore interprets that as an exogenous increase in the labour supply affecting the trend in wages and consumption. It should be noted that, for the US, all variables are expressed per capita (population over the age of 16), so that fluctuations in immigration should not have any direct effect on the results.

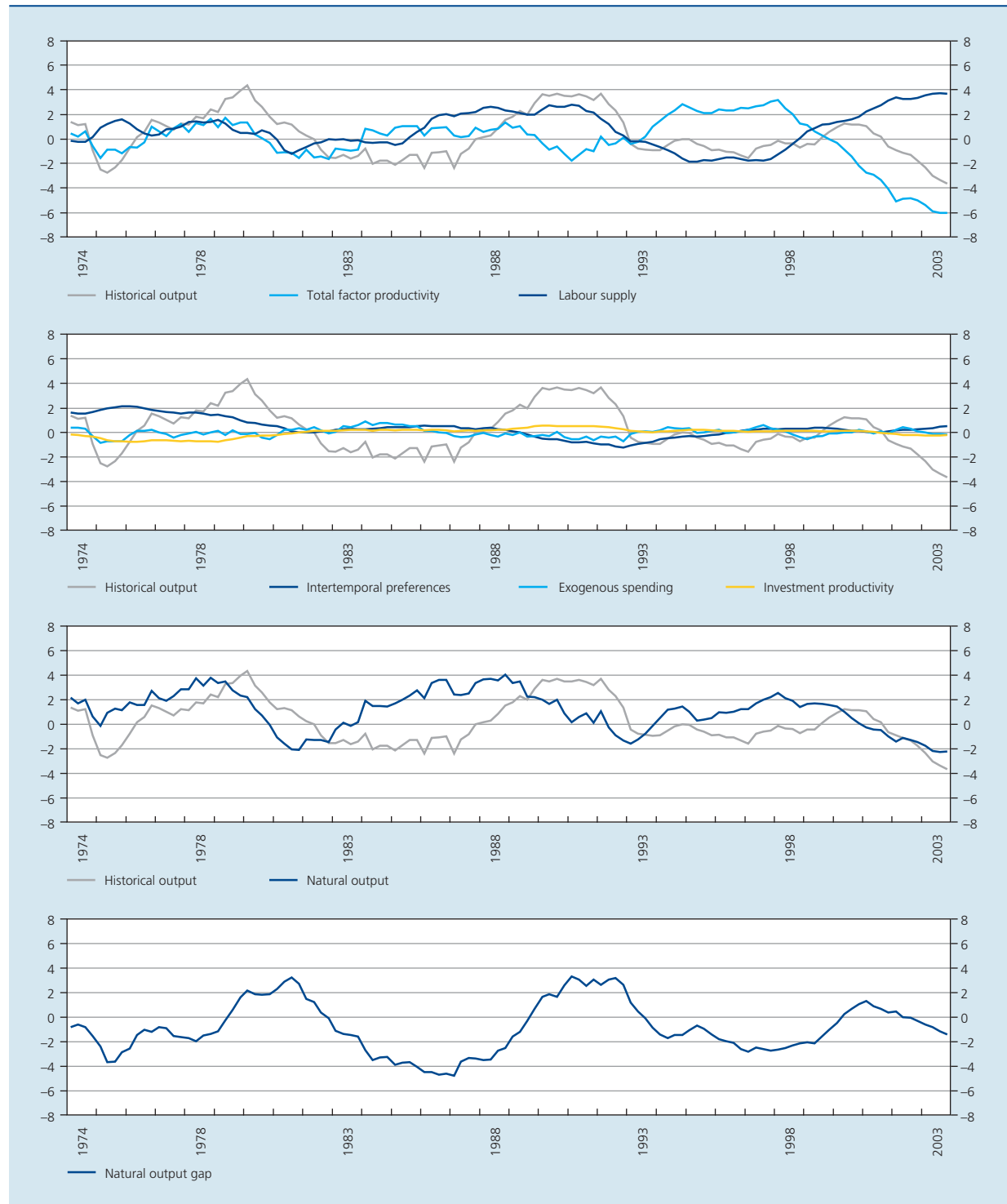## 2.3 The output gap concept in these general equilibrium models

Unlike the traditional Keynesian view on recession periods, general equilibrium models do not necessarily see a recession as an undertilisation of capacity and a period of negative output gap, because in these models the production potential is determined by the whole of the structural or fundamental shocks to which households and firms react in a totally rational and efficient way.

The output gap concept in these models is typically calculated as the difference in output that results from the fundamental shocks in technology and preferences in the model "with" nominal rigidities on the one hand, and in the model "without" nominal rigidities on the other. In the model, the nominal rigidities form the main reason why the economic agents do not adapt their real decisions immediately to the altered circumstances. The difference between the outcome in the economy "with" and "without" nominal rigidities therefore reflects the inefficiency of the economy. An economic policy and in particular a monetary policy geared to the stability of (rigid) prices

CHART 5A   THE NATURAL OUTPUT GAP AND ITS DETERMINANTS IN THE EURO AREA

(Deviation from a linear trend, in percentage points)

Historical output — Total factor productivity — Labour supply

Historical output — Intertemporal preferences — Exogenous spending — Investment productivity

Historical output — Natural output

Natural output gap

THE NATURAL OUTPUT GAP AND ITS DETERMINANTS IN THE UNITED STATES

(Deviation from the linear trend, in percentage points)

Historical output — Total factor productivity — Labour supply

Historical output — Intertemporal preferences — Exogenous spending — Investment productivity

Historical output — Natural output

Natural output gap
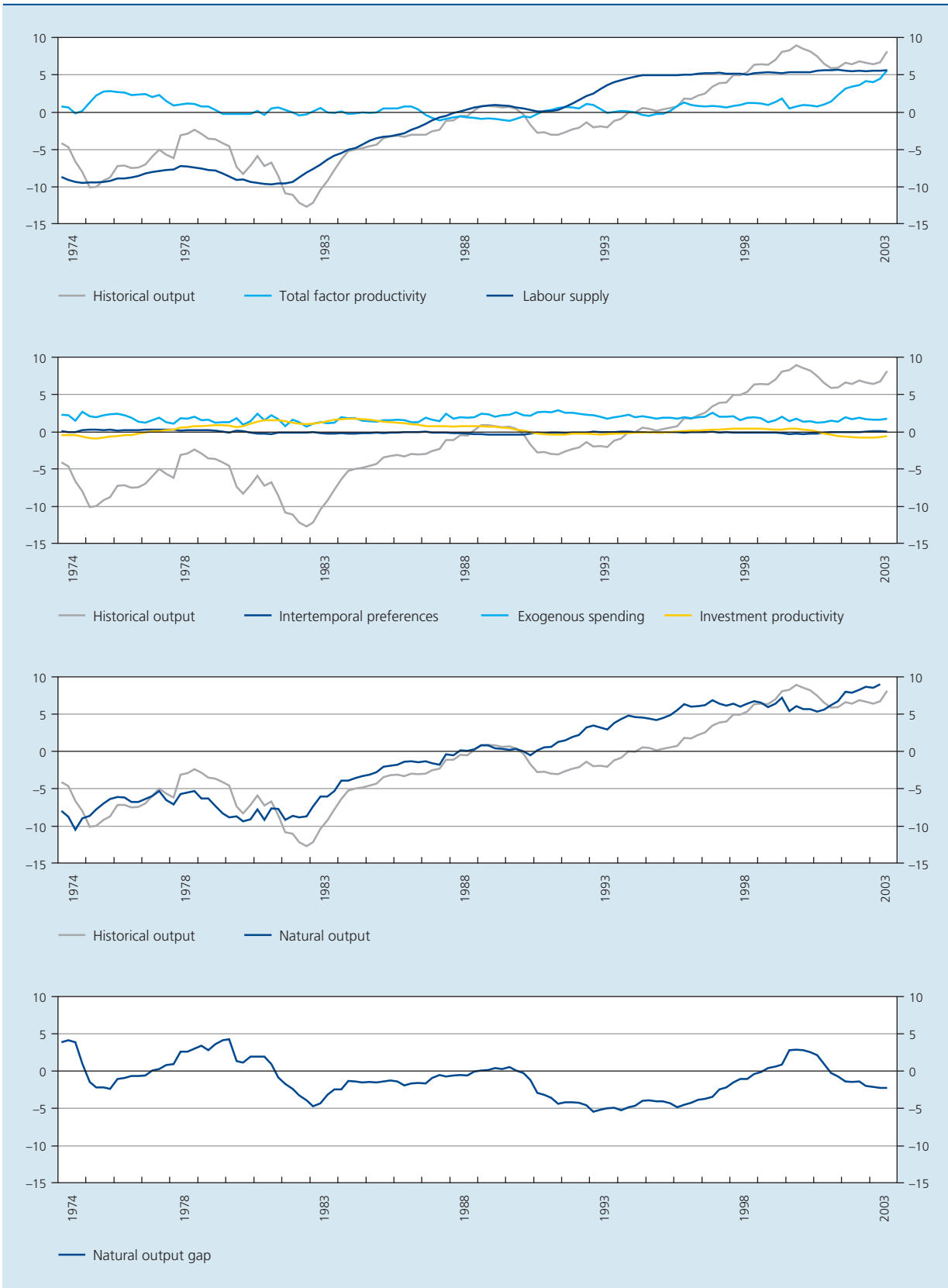
and wages, will therefore lead to a smaller output gap and to more efficient adjustment of the economy to the underlying fundamental shocks. In the charts, the output gap is estimated for the two economies: the top two charts show the contributions to potential output made by persistent fundamental shocks. The third chart shows the actual output and the natural or efficient output (calculated as the sum of the contributions of the various fundamental shocks), with a linear trend growth removed from both series. Finally, the fourth chart shows the natural output gap.

In these models, recession periods therefore do not necessarily coincide with negative output gaps, since the underlying shocks may also cause a sharp reduction in production potential. The natural output in the model does indeed decline sharply during each recession period, which explains why recessions do not automatically coincide with periods of weaker inflationary pressure. This concept of the output gap therefore largely avoids the potential conflict between the two monetary policy objectives, namely stable inflation and a stable output gap.

2.4 Predictions based on the model for the euro area

The model can generate a prediction on the basis of the interpretation of recent economic developments. By way of example, chart 7 shows the results of such a prediction exercise together with the outcome of the macroeconomic projection produced by the Eurosystem (Broad Macroeconomic Projection Exercise – BMPE). The prediction runs from the last quarter of 2003 through 2004 and 2005. While the BMPE indicates only the central scenario on the assumption that the short-term interest rate remains constant (the continuous line in the charts), the model offers not only a central prediction but also a margin of uncertainty for that prediction (dotted lines for the 5 p.c. and 25 p.c. upper and lower bounds). Moreover, the model prediction can also be based on an alternative assumption regarding monetary policy.

CHART 6   PREDICTION BASED ON THE MODEL FOR THE EURO AREA COMPARED WITH THE BMPE PREDICTION FOR 2004-2005 [1] [2]
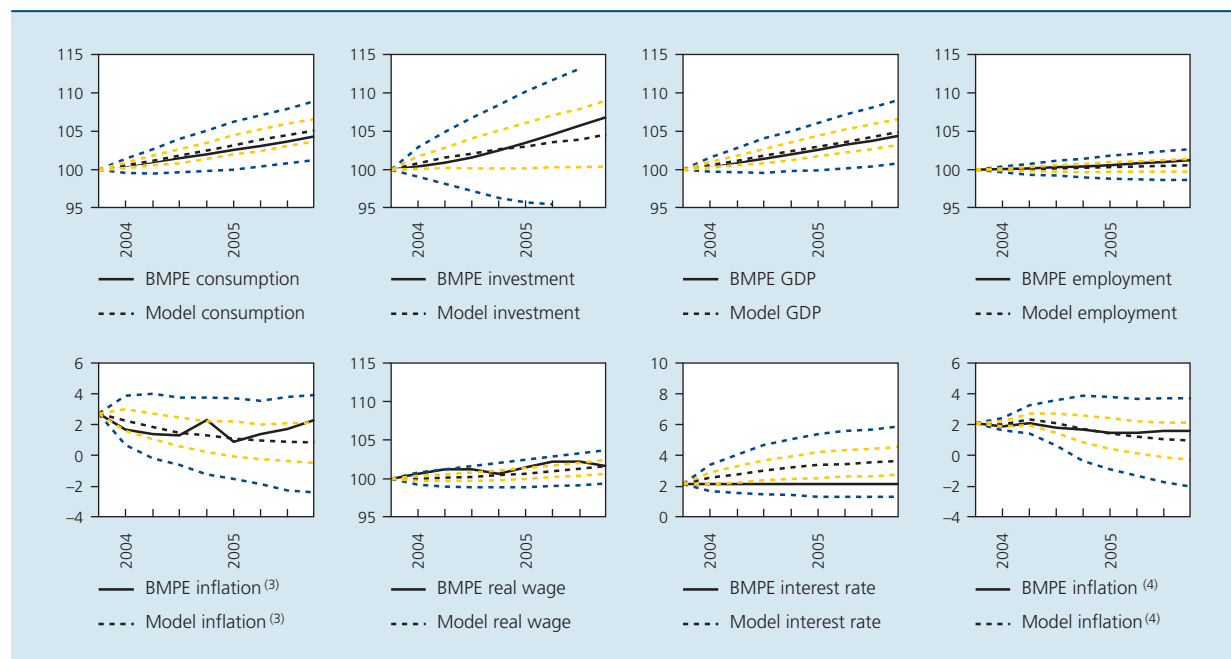
Source: ECB Monthly Bulletin, December 2003, and own calculations
(1) The blue (yellow) dotted lines indicate the 25% (5%) upper and lower bounds of the predictions.
(2) Compared to the fourth quarter of 2003 (base = 100).
(3) Percentage change compared to the preceding quarter (on an annual basis).
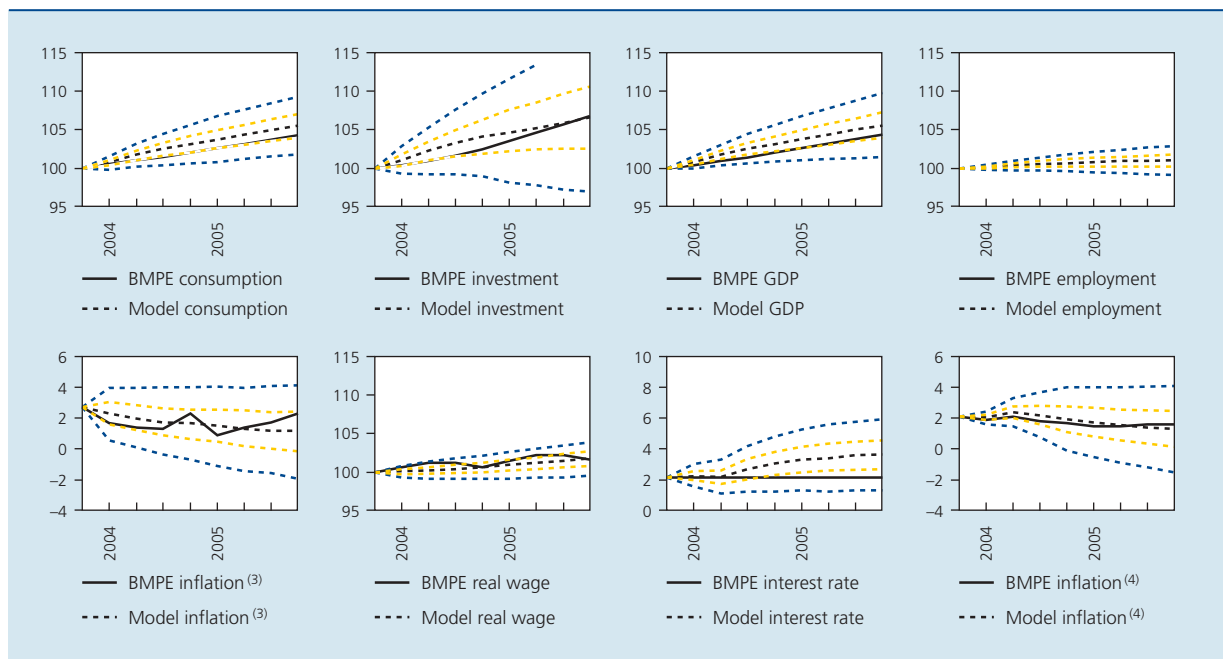(4) Percentage change compared to the previous year.

The central model prediction is very similar to the BMPE prediction for the components of demand, GDP and employment. The model produces a slightly lower estimate than the BMPE for the movement in real wages and inflation during 2005. According to the model, the short-term interest rate will gradually move back up to its historical average level.

Chart 7 below repeats the prediction for an interest rate scenario in which the interest rate does not begin to rise until the second half of 2004. These additional negative interest rate shocks lead to more buoyant demand and increased output in the second half of 2004 and 2005. According to this scenario, inflation will therefore accelerate during 2005. In the second half of 2004, the interest rate rises more steeply to its normal level as a result of the more dynamic economic activity and less favourable inflation outcomes. According to this interest rate scenario, growth will speed up slightly during 2004, though the effect is offset by a deceleration in 2005.

The margins of uncertainty around the central prediction are due to two components: the uncertainty concerning the model parameters and that concerning the future occurrence of the exogenous shocks. The uncertainty
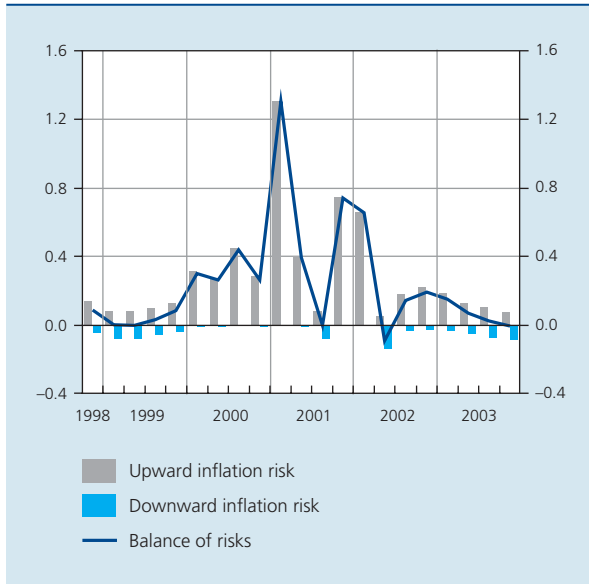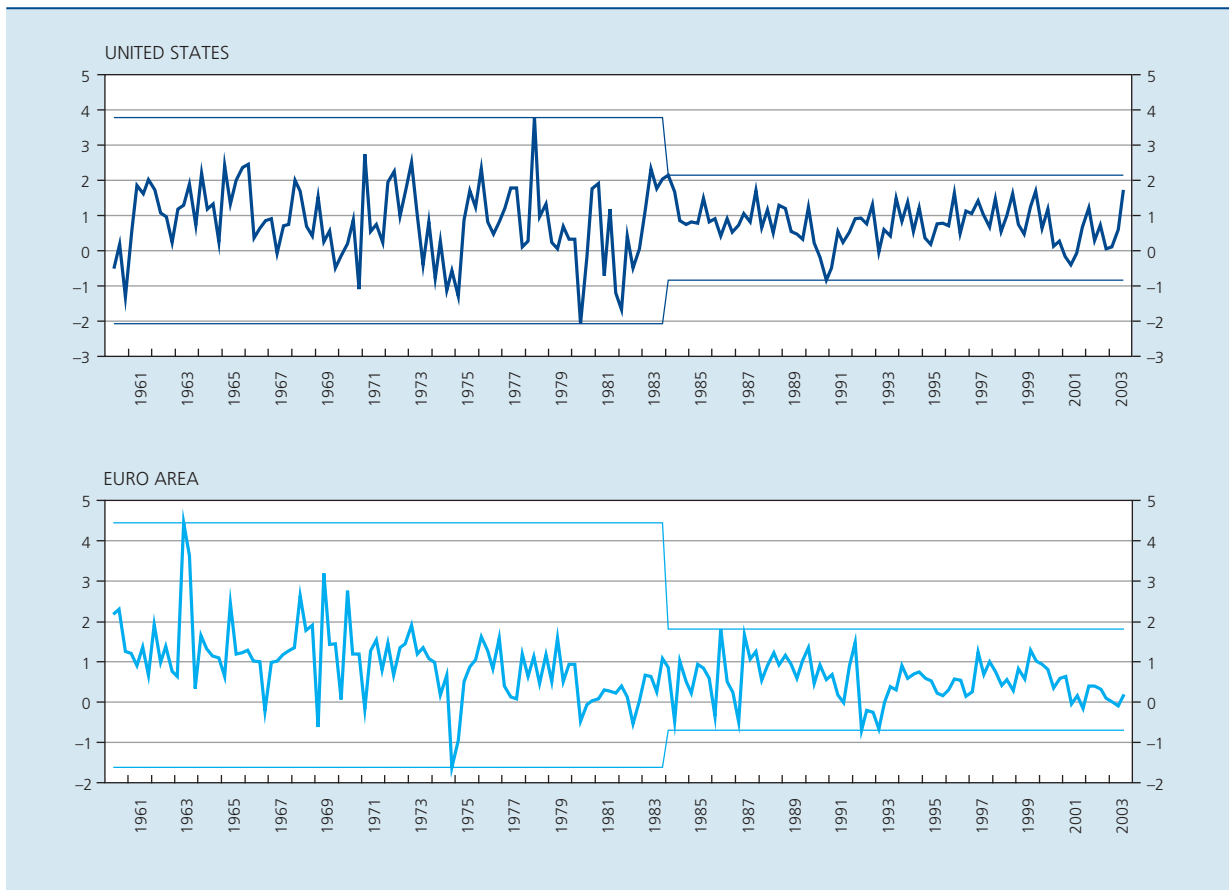
is generated mainly by the possible future shocks in the exogenous processes for technology, preferences and government intervention. In order to estimate that uncertainty, the model simulation is supplemented with stochastic shocks which, in terms of their average size, correspond to the estimated standard deviations. The margins of uncertainty are then calculated as the highest and lowest 5 p.c. and 25 p.c. of the predictions for a large number of simulations. These margins can also be used to calculate the probability of certain scenarios. Monetary policy makers attach great importance to risk scenarios in which inflation is too high (risk of inflation running at over the 2 p.c. target during the ensuing year) or in which there is a risk of deflation (risk of inflation averaging less than zero during the ensuing year). The difference between the two, namely the risk of rising inflation and the risk of deflation, is called the balance of risks. These risks were calculated on the basis of the predictions formulated quarterly since 1999 and are then combined in a chart. The balance of risks equalled zero for the first time during 1999, a period that coincided with the uncertainty about the impact on the real economy of the financial crises which occurred during 1998. In 2002 the risk balance became negative: during that period, the risk of deflation was estimated to exceed the risk of

CHART 7   PREDICTION BASED ON THE MODEL FOR THE EURO AREA WITH THE SHORT-TERM INTEREST RATE CONSTANT FOR THE
FIRST HALF OF 2004, COMPARED TO THE BMPE PREDICTION FOR 2004-2005 [1] [2]

inflation. These relatively low inflation predictions reflect the impact of the sluggish growth on inflation expectations. In the course of 2003, the equilibrium in the inflation risk was restored.

Risk analyses like these can provide additional information which cannot be deduced directly from the traditional central prediction results. For the policy makers, during periods of increased, uncertainty, they can offer an idea of the risks of certain extreme outcomes. Policy cannot be geared to the optimum outcome according to the average scenario alone, but must also endeavour to avoid extreme situations as far as possible. That type of consideration is attracting increasing attention in the central bank terminology. Alan Greenspan, chairman of the Federal Reserve Board (2003), recently therefore described monetary policy as a risk management exercise, since the economic environment is changing faster and becoming harder to predict than before.

CHART 8 RISK ANALYSIS BASED ON THE MODEL PREDICTIONS

Upward inflation risk

Downward inflation risk

Balance of risks

(1) Inflation predictions above and below the margin, multiplied by their respective probability.

CHART 9 DECLINE IN THE VOLATILITY OF ECONOMIC GROWTH

(Percentage growth of GDP, quarter on quarter)

UNITED STATES

EURO AREA

TABLE 2   DOWNWARD TREND IN THE VOLATILITY OF THE REAL ECONOMY

	Variance of real growth in the euro area			Variance of real growth in the US		
	1960-2003	1960-1983	1984-2003	1960-2003	1960-1983	1984-2003
GDP growth	0.77	1.16	0.29	0.61	0.80	0.25
	1974-2003	1974-1983	1984-2003	1974-2003	1974-1983	1984-2003
GDP growth	0.35	0.47	0.29	0.73	1.53	0.30
Consumption growth	0.30	0.35	0.28	0.50	0.90	0.27
Investment growth	2.07	2.11	1.94	5.42	10.51	2.94
Employment growth	0.09	0.47	0.10	0.51	0.97	0.28
Growth of real wages	0.29	0.38	0.22	0.31	0.22	0.36
Change in inflation	0.10	0.16	0.08	0.08	0.15	0.05
Change in short-term interest rate	0.03	0.05	0.01	0.08	0.20	0.02

3. Decline in the volatility of economic growth in recent decades

During the past thirty years, economic activity has become less volatile. From 1984 to the present day, the variance in GDP growth (quarter on quarter) in both the euro area and the US has more than halved compared to the period 1960-1983. That lower volatility is reflected very generally in a range of macroeconomic aggregates and economic sectors, but also in various countries. However, this trend does differ from sector to sector and from country to country: in the US, for example, a sudden break clearly occurred in 1984. In a recent report on structural shifts within the European economy (5th Structural Issues Report, MPC 2003), the ECB also discusses this trend in detail. According to some sources, volatility has actually declined more sharply in Europe than in the US.

Table 2 offers a summary of this trend in volatility for the various aggregates in both economies.

There are three main theories put forward to explain this increased stability in economic growth, and they can be verified on the basis of simulations using the general equilibrium model.

3.1 A more efficient monetary policy

A first theory is that the real stability is a by-product of greater nominal stability or more stable inflation due to a more efficient monetary policy. This debate focuses mainly on monetary policy because there are clear signs of a change in that policy, e.g. in terms of inflation stability.

However, a more efficient monetary policy will not necessarily result in greater real stability. The effect produced by monetary policy on both real and nominal volatility is summarised in chart 10. The two monetary policy objectives, namely output volatility (σ_y) and inflation volatility (σ_π), are shown on the two axes. For a particular variance

CHART 10   POTENTIAL IMPACT OF MONETARY POLICY ON REAL VERSUS NOMINAL VOLATILITY OF THE ECONOMY
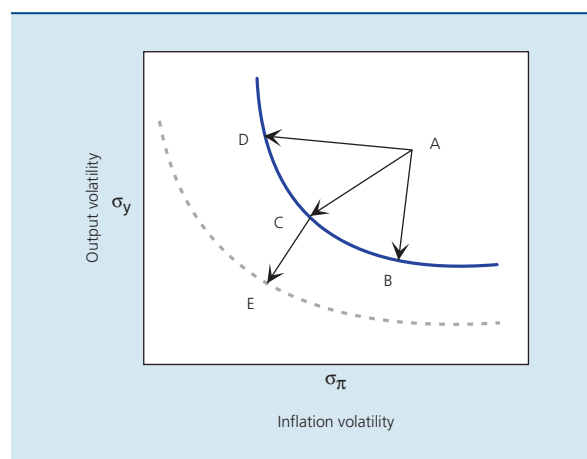
in the exogenous shocks and a particular economic structure, an efficient monetary policy will have an "efficiency frontier" shown by the curve DCB. Each of the points on that curve indicates the outcome of an efficient policy, but for different central bank preferences as regards the relative importance attached to inflation stability and output stability respectively. In contrast, under these conditions point A indicates a monetary policy that does not produce the optimum response to the various shocks. Many writers have described the experience of the 1970s, when inflation was accelerating, as the result of such an inefficient policy that produces too weak a response to inflationary pressure. On the assumption that monetary policy in the 1970s was not implemented efficiently and was therefore typically at point A, a more efficient policy can cause a shift to each of the three points D, C or B. Furthermore, if the shocks become smaller or if the economic structure evolves towards a more stable economy, the whole "frontier" will move farther out, making result E achievable.

The general equilibrium model can be used to investigate which of the three movements – AD, AC or AB – is the most likely outcome of a more efficient monetary policy. The impact of various monetary policy rules on the combination of real/nominal volatility can then be examined for a particular size of exogenous shocks. Stock and Watson (2003) duly carried out this exercise on the basis of four macroeconomic models (including our models for the US and the euro area). A switch from a relatively accommodating monetary policy towards a stricter anti-inflation policy always produced an internal movement that was closer to the shift AC (or even AD) than to the shift AB. In other words, σ_π (inflation volatility) becomes smaller, but that does not necessarily hold true for σ_y (output volatility). A more efficient monetary policy therefore did indeed contribute towards greater real stability in the economy, but that is not a sufficient explanation in itself.

3.2 Shifts or changes in the economic structure

In this context, three different structural changes in the economy are often mentioned.

First, there is the long-term **shift in the sectoral production structure** away from industry in favour of the services sector. In this context, it is pointed out that the more volatile sectors – e.g., those which produce durable goods – are becoming smaller in relative terms in favour of services sectors, which are more stable. A simple exercise in which the sectoral production structure is kept constant both before and after the mid 1980s but retaining the sectoral growth which occurred during the more recent period shows that

this shift made only a small contribution to the increased stability.[1] Furthermore, these sectoral shifts are typical long-term phenomena which can hardly explain a sudden break in volatility, such as that seen in the US.

A second explanation for the increased stability is based on the hypothesis **that firms are managing their stocks more efficiently**, perhaps with the aid of increasing computerisation and better communication facilities, so that the same fluctuations in demand now make output less volatile. Two findings support this assertion: output volatility is indeed falling more sharply than volatility in sales, especially in the highly cyclical sectors. In addition, before the mid 1980s stocks tended to make a pro-cyclical contribution in the sectors producing durable goods, whereas more recently stocks have tended to follow an a-cyclical pattern. However, more detailed studies at both sectoral and macroeconomic level have shown that, although it is important at the level of the individual firm, more efficient stock management cannot make a significant contribution towards maintaining more stable output during the economic cycle.

Finally, there is the hypothesis that **financial deregulation** has increased the probability of a more stable development in demand. Both the development of interest-bearing liquid assets and easier access to all kinds of credit should enable households to increase the stability of their spending over time, making it more closely aligned with their permanent income and less dependent on temporary shocks affecting current income. The main argument in favour of this is the greater stability in the US housing construction sector. On the other hand, household consumption in the US has become less stable, if anything, over the period considered.

3.3 Random decline in the variance of the fundamental shocks

Since the above hypotheses do not jointly offer any really convincing explanation for the increased stability, the only remaining possibility is that the world economy has been spared any serious exogenous shocks over the past twenty years. That implies that the reduced volatility cannot be guaranteed in the future.

Although our model estimations are based on the assumption that the volatility of the shocks remained constant over the entire period considered (1974-2003), the shocks which actually occurred can nevertheless provide

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[1] The 5th Structural Issues Report (MPC 2003) also arrives at the same conclusion for the euro area.

TABLE 3   DOWNWARD TREND IN THE VOLATILITY OF THE ESTIMATED SHOCKS

	Variance of the shocks in the euro area			Variance of the shocks in the US		
	1974-2003	1974-1983	1984-2003	1974-2003	1974-1983	1984-2003
TFP shock	0.29	0.42	0.23	0.21	0.27	0.18
Labour supply shock	1.63	1.61	1.51	0.81	1.39	0.47
Investment shock	0.00	0.00	0.00	0.03	0.04	0.01
Intertemp. pref. shock	0.03	0.03	0.03	1.72	3.17	1.02
Exog. spending shock	0.12	0.17	0.09	0.29	0.51	0.18
Monetary policy shock	0.01	0.01	0.01	0.05	0.11	0.02
Inflation target shock	0.00	0.01	0.00	0.00	0.00	0.00
Financing shock	0.22	0.28	0.19	0.31	0.63	0.15
Price mark-up shock	0.03	0.05	0.02	0.03	0.04	0.02
Wage mark-up shock	0.06	0.07	0.05	0.08	0.04	0.09

an indication of whether shocks were indeed smaller in the more recent period. Quite a few of the shocks identified in the model do in fact present a variance which is declining over time. The table shows that the variance of the shocks in the euro area has fallen most sharply in the case of total factor productivity, exogenous demand shocks, the cost of financing investment and price mark-up shocks. In the US, too, the variance declined in the case of exogenous demand shocks, financing costs and price mark-up shocks, but it was also lower in interest rate shocks and intertemporal preferences regarding consumption. Hardly any of the shocks presented an increase in variance between the two periods.

The conclusion is that probably half of the decline in the recorded volatility is due to the absence of major shocks. Adjustments in the economy may perhaps account for a quarter to a half at most. In addition, the more efficient monetary policy has also contributed towards the real stability of economic growth. Being geared more towards stability, the monetary policy has also led to a more stable nominal inflation and interest rate, which in the long term may indirectly reduce uncertainty and thus create the framework for stable and sustained economic growth.

4. Synchronisation of the international business cycle and globalisation

Most studies unequivocally indicate a close connection between the business cycles of the various large economies, so that a global cycle clearly exists. This close link between the cycles in the various economic blocs is evident both from the chart showing the movement in

GDP and from a simple yardstick such as the correlation between the various economies in terms of GDP growth.

This correlation is usually stronger for the growth of output (measured by GDP) and investment than for consumption growth. The latter is still affected by country-specific shocks, indicating that household incomes are still heavily dependent on domestic activity with little international diversification. The international correlation also appears to be stronger during periods of recession than during periods of economic revival, which are often slower and less synchronised. One possible interpretation is that recessions are generated mainly by global shocks while their duration and the recovery tend to be more dependent on the specific structure and policy response of each individual country.

Has the globalisation of the economy in the form of increasing trade and financial flows led to greater synchronisation in recent times? No theoretical or empirical evidence has yet been offered for that assertion. In theory, the increased integration of the economies could lead to greater specialisation, with countries or regions potentially becoming more sensitive to sectoral shocks. Increased integration and diversification of the resources should nevertheless lead to a closer correlation in terms of consumption, but not necessarily as regards output.

Various empirical studies show that there has been no particular increase in this international correlation in economic activity during the recent period. The asymmetric shocks triggered by German reunification and the economic malaise in Japan tended to reduce rather than increase synchronisation during the 1990s.

CHART 11 SYNCHRONISATION OF GDP BETWEEN THE UNITED STATES AND THE EURO AREA

(Percentage deviation from the quadratic trend, vertical lines show the official recession periods according to NBER and CEPR)
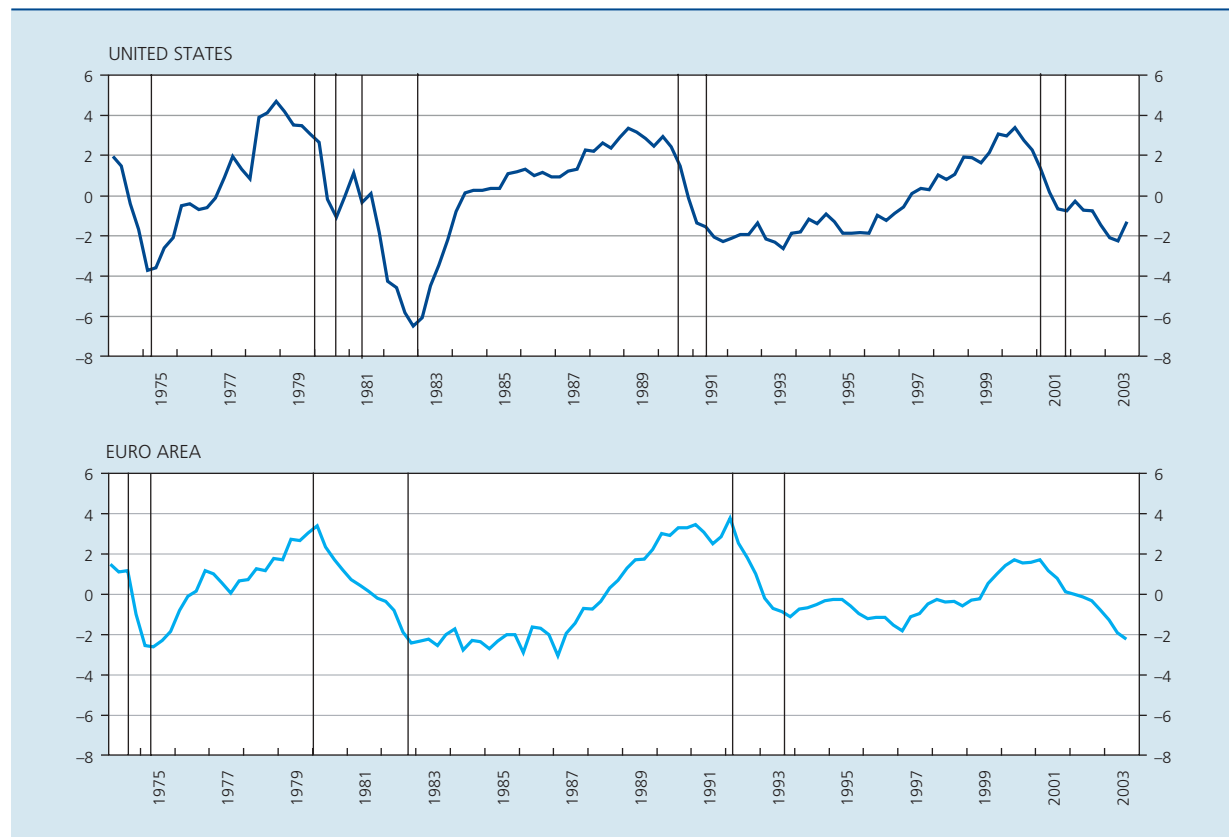
Our models were estimated separately for the two economies, and the two blocs are regarded as closed economies. That is not exactly the best way of studying the question of synchronisation and spill-over effects. In our models, the correlation in the business cycle can only originate from the correlation between the various types of shocks in the two separately estimated models. The correlation between the various shocks over the period as a whole is not particularly high : the only significant correlation is between monetary policy shocks measured on the basis of temporary interest rate shocks. If the two sub-periods are considered separately, then a clearly higher correlation becomes apparent between the shocks for the first period, 1974-1984. The correlation during the first period is positive and significant for the shocks affecting interest rates, investment, the labour supply, the price mark-up and financing costs.

If we look at the correlation between the shocks during the three synchronised recession periods (1974.1-1975.1, 1980.1-1982.4, 2000.2-2002.2), we find a very strong positive correlation in the case of six shocks : those concerning interest rates, investment, preferences, the labour supply, financing costs and the price mark-up. During the

recession period there is therefore in fact a very close correlation which occurs mainly in shocks affecting demand. The international recessions are therefore evidently due mainly to common shocks affecting the economy principally on the demand side, so that a globally synchronised recession, such as that in 2001, appears to be the rule rather than the exception. Consequently, the lower correlation during the 1990s is due more to the relatively small size of the simultaneous shocks which occurred during that period, as already stated in the preceding section. However, this is not very promising for the future, since there remains a real risk of larger, simultaneous shocks. Over-optimistic predictions concerning the stability of the real economy and the more efficient stabilisation policy are then perhaps premature.

TABLE 4

TABLE 4   INTERNATIONAL CORRELATION BETWEEN GROWTH IN THE EURO AREA AND IN THE UNITED STATES

	Correlation between the euro area and the US							
	Changes quarter-on-quarter				Average changes year-on-year			
	1960-2003	1960-1983	1984-2003	Recessions	1960-2003	1960-1983	1984-2003	Recessions
GDP growth	0.20	0.21	0.15	0.24	0.43	0.50	0.27	0.40
	1974-2003	1974-1983	1984-2003	Recessions	1974-2003	1974-1983	1984-2003	recessions
GDP growth	0.31	0.40	0.20	0.26	0.39	0.51	0.23	0.34
Consumption growth	0.25	0.45	0.08	0.57	0.21	0.42	0.04	0.29
Investment growth	0.31	0.40	0.20	0.26	0.20	0.51	–0.07	0.36
Employment growth	0.05	0.26	–0.14	0.25	0.07	0.43	–0.21	0.50
Growth of real wages	0.00	–0.05	0.05	–0.22	0.04	0.35	0.01	–0.23
Change in inflation	–0.07	–0.12	–0.02	0.21	0.17	0.35	–0.18	0.21
Change in short-term interest rate	0.40	4.47	0.19	0.59	0.56	0.71	0.23	0.84

	Correlation between shocks in the euro area and in the US							
	Quarter-on-quarter				Average over four quarters			
	1974-2003	1974-1983	1984-2003	Recessions	1974-2003	1974-1983	1984-2003	Recessions
TFP productivity shock	0.03	–0.01	0.07	–0.47	–0.12	–0.10	–0.14	–0.36
Labour supply shock	0.09	0.29	–0.20	0.56	0.20	0.50	–0.41	0.79
Investment shock	0.09	0.29	–0.20	0.56	0.20	0.50	–0.41	0.79
Intertemp. pref. shock	0.18	0.36	0.02	0.53	0.45	0.54	0.37	0.69
Exog. spending shock	0.02	0.01	0.03	0.12	0.01	–0.01	0.06	0.16
Monetary policy shock	0.46	0.56	0.28	0.65	0.67	0.80	0.44	0.77
Inflation target shock	0.07	0.23	0.06	0.13	0.01	0.31	0.11	–0.01
Financing shock	0.15	0.19	0.12	0.50	0.29	0.30	0.27	0.39
Price mark-up shock	–0.07	–0.17	0.04	0.22	0.10	0.30	0.00	0.38
Wage mark-up shock	0.06	–0.03	0.07	0.05	0.19	0.09	0.11	0.09

Conclusion

This article describes the pattern of economic activity in the euro area and in the US on the basis of a general equilibrium model. Such a model makes it possible to analyse the empirical data in a strictly theoretical framework. That may produce some interesting findings, though other theoretical models could perhaps produce different conclusions. The explanatory and forecasting capability of the various models therefore needs to be tested using the latest estimation methods.

Comparison of the pattern of economic activity in the euro area and in the US revealed that the two economies have strong similarities: there are no significant divergences in the behavioural parameters of either the private sector or the monetary authority, and the various exogenous shocks which are the driving force behind the economic cycles in these models appear comparable in terms of size and persistence. In the future, by expanding the model (e.g. with a more detailed labour market, public sector and an open economy dimension) it should be possible to reconcile the interpretation of these exogenous shocks with institutional, structural or discretionary changes to economic policy.

In the short term, the economic cycles seem to be generated mainly by demand shocks (shocks affecting preferences and investment, exogenous demand shocks and monetary shocks). During recession periods, in particular, simultaneous demand shocks affecting consumption and investment spending evidently play a key role. In

the longer term, shocks affecting the labour supply and productivity are the driving force. As regards inflation, the main factors in the short term are temporary mark-up shocks, although in the long term inflation is primarily a monetary phenomenon, influenced by the central bank's inflation target. The limited impact of monetary shocks on the real economy does not imply that monetary policy is of no significance. The systematic behaviour of the central bank is important in order to understand how the other shocks affect the economy. It is here that an efficient monetary policy can contribute to more stable and efficient economic growth.

The reduction in the volatility of real growth in both the euro area and the United States, especially since the mid 1980s, is due mainly to the fact that the exogenous shocks were smaller. Changes in the economic structure or dynamics and a more efficient monetary policy are not in themselves sufficient to explain the sharp reduction in real volatility. These same findings can also help to explain the synchronisation of the business cycles between the two economic blocs. Despite the globalisation of the economy, there is no clear trend towards a closer correlation in economic growth. The small scale of the simultaneous – predominantly demand-related – shocks occurring in the recent period may provide some explanation. In the absence of severe synchronised shocks, shocks specific to particular countries or sectors remain relatively important for the pattern of economic activity. As far as the future is concerned, this implies that it would be wrong to be over-optimistic about the dynamic stability of the economy or the efficiency of the stabilisation policy.

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Summaries of articles

Characteristics and development of Belgium's foreign trade

During the past quarter century, the globalisation of the economy has caused international trade to become remarkably dynamic. Over the same period international trade also experienced fundamental changes: intra-industry trade in manufacturing products has dramatically increased and new markets and competing countries have emerged.

Belgium has long been integrated into this global framework, and its economic development and prosperity have been largely based on close trading links with other countries. Its degree of openness is among the highest of the euro area countries, due in particular to intense trade with these countries. Since 1980, Belgium has been relatively successful in maintaining its position in international trade. The trade balance has initially improved and has subsequently remained positive at around 3 p.c. of GDP. Global market shares have remained relatively stable in value terms.

However, using harmonized foreign trade statistics, a more detailed analysis of Belgium's export volume over the period 1995-2002 reveals that Belgium has lost 5.8 p.c. of its market share, while the three neighbouring countries have on average increased their share by 3.8 p.c. This negative result can be attributed in part to an unfavourable export product specialisation, in particular the large share of basic chemicals, metal products and textiles in total trade and the under-representation of machinery and data-processing hardware, electronic and telecommunication equipment.

JEL codes: F00, F10, F14.
Key words: Belgium, Foreign trade, Globalisation, Intra-industry trade, Trade balance, Market share.

Inflation differentials in the euro area: size, causes, policy implications and relative position of Belgium

Both the size and the persistence of inflation differentials in the euro area have been the subject of a large number of studies in recent years. These studies have tried to determine the causes of these differentials as well as their implications not only for the implementation of the common monetary policy but also in terms of the macroeconomic policies needed at the country level. Indeed, since the start of Stage Three of the EMU, countries can no longer correct country-specific imbalances or idiosyncratic shocks through changing their national monetary policy stance. As a consequence, it may be deemed fit, in some cases, to take appropriate policy measures aimed at reducing inflation differentials.

The article tackles the case of Belgium, in which country the inflation differentials vis-à-vis the euro area appear to be relatively small and do not seem to show any persistence or any systematic upward or downward bias. However, empirical studies based on the "Balassa-Samuelson" theory have concluded that Belgium should be prone to a relatively high inflation rate. This theory holds that, on restrictive assumptions, a real appreciation (or positive inflation differential) is generated in countries showing the most rapid growth of the productivity differential between the traded and non-traded goods sectors. The article goes into those rather surprising results.

The authors observed a pronounced increase of relative productivity in Belgium and a strong positive correlation between relative productivity and relative prices, measured by the value added deflator, which proves to be consistent with the theory and the results of previous studies. These studies have typically assumed that the tradable sector showed purchasing power parity. In that case, the pronounced increase in relative prices has strong implications for the real exchange rate (or inflation differentials). However, the authors found empirical evidence against this hypothesis in the Belgian case. Indeed, the real exchange rate in the tradable sector depreciated strongly in the seventies and the early eighties. This depreciation in the tradable sector offset the impact of the positive relative price differential, causing the real exchange rate for the economy as a whole to be relatively stable. Belgium should therefore not be an economy prone to high inflation.

As the HICP is the main indicator monitored by the European monetary authorities, it was important to examine whether such conclusions could also be drawn for the consumer price index. The authors found similar results, namely a stable real exchange rate for the Belgian economy as a whole during the period under review and, therefore, the absence of any structural reason for inflation to be systematically higher in Belgium.

It may thus be concluded that significant and persistent inflation differentials between Belgium and the euro area or a systematic bias in any particular direction are unlikely and, therefore, that the European monetary policy is appropriate for the Belgian economy in the current environment.

Determinants of Belgian bank lending interest rates

This article first reviews the main determinants of bank loans' interest rates and offers a brief discussion of the impact of capital requirements on interest rate margins. Next, it presents some empirical evidence, first, on the pass-through of the central bank rate to market rates and, subsequently, on the pass-through of market rates to retail interest rates using survey data for Belgian credit institutions. As predicted by economic theory, the size and significance of the pass-through of monetary policy impulses to market rates falls quickly with maturity. However, the long-run pass-through remains almost complete for maturities lower or equal to one year. Belgian banks seem to adjust more quickly and more fully their retail interest rates on credit to enterprises than those on credit to households. With the exception of consumer loans, the long-term pass-through proves to be above 80 percent. Finally, this article goes into the first results of the new interest rates survey. Banks with a relatively high degree of capital coverage are found to ask higher lending rates and are probably granting riskier loans. Liquid banks and large banks generally set lower lending rates. Belgian firms and households are facing lending conditions broadly similar to those prevailing in the euro area.

Economic cycles in the United States and in the euro area: determinants, scale and linkages

This article analyses the business cycles observed in the euro area and in the United States on the basis of the estimated results of a general equilibrium model. In the first place it is shown that the cyclical movements in both economies show strong similarities: there are no significant divergences in the behavioural parameters of either the private sector or the monetary authorities, while also the various exogenous shocks, being the driving force behind the business cycles in this model, prove to be comparable in terms of scale and persistence. On the basis of the estimated models, the observed cyclical movements may be ascribed to various types of exogenous shocks, such as innovations in productivity, the labour supply, consumer preferences or economic policy. In the short term, the business cycles appear mainly to have been generated by demand shocks (preference and investment shocks, exogenous demand shocks and monetary shocks). During recession periods simultaneous demand shocks in consumption and investment spending appear to play an important part. In the long term, shocks affecting the the labour supply and productivity are the driving forces. As to the inflation developments, especially temporary mark-up shocks prevail in the short term, although in the long term inflation is primarily a monetary phenomenon and is being guided by the inflation target of the central bank. The limited effect of monetary shocks on the real economy does not imply that monetary policy is insignificant. The systematic behaviour of the central bank is important in order to understand how the other shocks affect the economy. It is here that monetary policy can contribute to a more stable and efficient economic growth.

In addition to the causes of the cyclical movements, the downward trend in the volatility of the economic aggregates is being discussed. The reduction of the volatility in real growth of both the euro area and the United States, especially since the mid 1980s, is mainly related to the fact that the size of the exogenous shocks has been smaller. Changes in the economic structure or dynamics and a more efficient monetary policy in themselves do not account for the sharp reduction of real volatility. The same findings may also help to explain the synchronisation of the business cycles between the two economic blocks. Despite the globalisation of the economy, there is no clear trend towards more correlation in economic growth. The relatively small scale of the simultaneous – predominantly demand-related – shocks having occurred recently, may provide some explanation. In the absence of severe synchronised shocks, country- or sector-specific shocks remained relatively important to the pattern of economic activity. As to the future, this implies that it would be wrong to be too optimistic about the dynamic stability of the economy or the efficiency of stabilisation policies.

JEL codes: E1, E3.
Key words: DSGE models, Business cycle fluctuations.

Abstracts of the Working Papers Series

56. "Economic importance of the Flemish maritime ports: report 2002", by F. Lagneaux, Document series, June 2004

The paper provides an extensive overview of the economic importance and development of the Flemish maritime ports, over the period 1995-2002. Focusing on the three major variables of value added, employment and investment, it also provides some information about the financial situation of a few vital segments in each port. In addition, it includes figures with respect to the ongoing growth of several cargo traffic segments and attempts to establish a link between these and the progress of the production in the industries at stake.

The breakthrough of this research – compared to its previous editions – consists of evaluating the indirect effects of the sectors in question in terms of value added and employment. A few refinements have also been made, such as the routine geographical and functional selection of companies according to the cluster they belong to (NACE-Bel code approach), the limitation of administrative work incurred, the review of the company-size analysis, etc. Annual reports data from the Central Balance Sheet have been computed for the calculation of direct effects, the study of financial ratios and the analysis of the social balance sheet. For the estimation of indirect effects, Supply and Use Tables from the National Accounts Institute have been resorted to.

The developments in the maritime ports sector are numerous nowadays, namely in the Hamburg-Le Havre range: concentration of capital, privatization of ports logistics services, expansion and dispersion of foreign trade, the internationalization of the production and consumption patterns (e.g. increase in containerized shipments), the latest requirements of world trade concerning transport and distribution. The increase in scale and specialization of the vessels inevitably impact on the operation of the ports.

Production, trade and transport are not longer considered as individual, isolated activities, but are integrated in a single system. Therefore, ports have to evolve from mere centres of transport (discharging and loading of vessels) to logistics centres. Moreover, ports able to add value to the goods passing through the port area, have a major asset in a climate of increasing international competition. These developments are also mentioned in this report, since no Flemish port is an exception to this rule.

57. "Determinants of Euro Term Structure of Credit Spreads", by A. Van Landschoot, Research series, July 2004

The paper analyzes whether the sensitivity of credit spread changes to financial and macroeconomic variables depends on bond characteristics such as rating and maturity. First, the author estimates the term structure of credit spreads for different rating categories by applying an extension of the Nelson-Siegel method. Then, the determinants of credit spread changes are analysed. According to the structural models and empirical evidence on credit spreads, the results indicate that changes in the level and the slope of the default-free term structure, the market return, implied volatility, and liquidity risk significantly influence credit spread changes. The effect of these factors strongly depends on bond characteristics, especially the rating and to a lesser extent the maturity.

58. "Macroeconomic and Monetary Policy-Making at the European Commission, from the Rome Treaties to the Hague Summit", by I. Maes, Research series, August 2004

The paper discusses macroeconomic and monetary policy-making at the European Commission, covering the period from the Rome Treaties to the Hague Summit. It is based on an analysis of public documents, archival research and interviews with former policy-makers. The paper starts with an overview of the economic philosophy of the Rome Treaties and senior macroeconomic policy-makers at the Commission, followed by an analysis of economic developments in the 1960s. Thereafter, the focus is on three crucial macroeconomic policy documents of the period: the European Reserve Fund project in 1958, the Commission's Action Programme for the Second Stage of the EEC of October 1962 and the Barre Memorandum of October 1969. The Commission's objectives tended to be both defensive, preserving the "acquis communautaire", especially avoiding recourse to the safeguard clauses, and pro-active, stimulating the process of European integration. From an analytical point of view, the Commission focussed on the compatibility of policies between the Member States. Gradually, a typical Commission analysis developed, based on a blending of German convergence ideas with the French medium-term approach. The paper further illustrates the ascent of the Commission as an actor in the monetary area, notwithstanding the relatively limited provisions of the EEC Treaty.

Conventional signs

–	the datum does not exist or is meaningless
e	estimate by the Bank
n.	not available
p.c.	percent
p.m.	pro memoria

Abbreviations

BLS	Bureau of Labor Statistics
BMPE	Broad Macroeconomic Projection Exercise
CEPR	Centre for Economic Policy Research
CPI	Consumer Price Index
EC	European Commission
ECB	European Central Bank
EMS	European Monetary System
EMU	Economic and Monetary Union
EU	European Union
GDP	Gross domestic product
HICP	Harmonised Index of Consumer Prices
IMF	International Monetary Fund
MFI	Monetary Financial Institutions
MIR	MFI Interest Rates
MPC	Monetary Policy Committee

NAI	National Accounts Institute
NBB	National Bank of Belgium
NBER	National Bureau of Economic Research
OECD	Organisation for Economic Co-operation and Development
RIR	Retail Interest Rates
SITC	Standard International Trade Classification
SME	Small and medium-sized enterprises
SVAR	Structural Vector Autoregression
TFP	Total Factor Productivity
UNCTAD	United Nations Conference on Trade and Development
US	United States
WTO	World Trade Organisation