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**CONFIDENCE INDICATORS AND THEIR RELATIONSHIP TO CHANGES
IN ECONOMIC ACTIVITY**

**by
Teresa Santero and Niels Westerlund**

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CONFIDENCE INDICATORS AND THEIR RELATIONSHIP TO CHANGES IN ECONOMIC ACTIVITY

This paper examines the usefulness of consumer and business surveys in assessing the cyclical position of the economy and for forecasting output movements. To that effect, after a brief review of the nature of sentiment measures, the empirical relationship between confidence indicators and output components is explored. Graphical examination, correlation analysis and Granger causality tests are used to assess that relationship. The paper finds that sentiment measures obtained from business surveys provide valuable information for the assessment of the economic situation and forecasting. However, the relationship between sentiment indicators and output varies considerably across countries and sentiment measures. It is also found that consumer confidence indicators are much less useful than business confidence indicators for economic analysis due to their much looser relationship with output movements.

* * * * *

Ce document examine l'utilité des enquêtes auprès des entreprises et des consommateurs dans les évaluations de la conjoncture et les prévisions des fluctuations de la production. A cette fin, après un bref examen de la nature des indicateurs de confiance, on analyse leur relations empiriques avec les composantes du PIB. Cette note s'appuie sur une étude graphique, corrélations et sur des tests statistiques de causalité (Granger). La principale conclusion de cette étude est que les indicateurs du climat des affaires donnent des informations précieuses sur la situation économique courante et sur les perspectives à court terme. Il faut, cependant, noter que la relation entre ces indicateurs et la production est très différente selon les pays et selon la mesure de la confiance choisie. En outre, il apparaît que les indicateurs de confiance des consommateurs sont généralement moins étroitement liés aux fluctuations de la production que les indicateurs du climat des affaires, ce qui en réduit l'utilité pour l'analyse macro-économique.

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CONFIDENCE INDICATORS AND THEIR RELATIONSHIPS TO CHANGES IN ECONOMIC ACTIVITY

Teresa Santero and Niels Westerlund¹

I. Introduction and summary

1. Confidence factors play a prominent role in assessments by business cycle analysts of conjunctural developments. However, the subjective nature of confidence raises questions about the solidity of such assessments. At a theoretical level, confidence does not play a major role in the analysis of economic behaviour. The most explicit reference to business sentiment in business cycle theory is probably "animal spirits", used to explain the volatility of private business investment spending. However, it is unclear what specifically these animal spirits are, and the shifts in sentiment are largely left unexplained. Neo-classical decision rules for firms and households, derived from microeconomic theory, do not give any particular significance to confidence as such unless the latter is taken as a proxy for forward-looking expectations of economic agents about the key variables which enter behavioural equations.

2. At the practical level, confidence cannot be observed or measured directly. Therefore, any assessment of confidence must rely on indicators which are often partial, qualitative and subject to various interpretations. Since such indicators are often useful from a "storytelling" point of view, as they sometimes appear to offer support for assertions or projections that are not otherwise based on very solid or reliable evidence, there is a risk that, because of their relatively intangible nature, they will be used only selectively, i.e. only when they appear to confirm the story being told. Sentiment measures are obtained from surveys capturing judgements on past, current and expected economic developments. Due to the subjective nature of the answers, the empirical relationship between sentiment indicators and economic variables is not clearly established. Empirically, sentiment indicators may strictly mirror movements in economic variables, they may lead shifts in economic variables, follow them with some delay, or be completely unrelated. In turn, those possibilities reflect different information contained and different uses of confidence indicators for economic analysis. Sentiment indicators are most useful for economic analysis and forecasting when they lead cyclical economic movements. However, even if sentiment indicators merely reflect in a coincidental way cyclical changes, they may still be useful to the extent that they are generally more readily available than hard economic data.

3. This paper assesses the information content of the more widely used confidence indicators. Part II, below, describes the nature of these indicators. Part III considers four issues: How well are confidence indicators correlated with output and the main components of demand over the cycle? To the extent that a good correlation exists, can confidence indicators be considered a reflection of economic developments and therefore of help in assessing the current state of the economy? Do confidence indicators reflect important influences on the economic environment sufficiently well to help in

1. The authors would like to acknowledge numerous comments received from members of the Economics Department and the professional technical assistance provided by Susan Bilotto, Isabelle Duong and Anne Eggimann.

forecasting future developments? In particular, can confidence indicators help to identify business cycle turning points? No attempt, however, is made to explain the behaviour of confidence indicators themselves.

4. The main finding of this exercise, which relies mainly on simple graphical and correlation analysis, is that, business sentiment measures provide valuable information for the assessment of the economic situation and for prediction purposes, although with varying degrees across countries. In particular, it appears to be a widespread phenomenon that large changes in confidence signal a significant concurrent or future change in output growth relative to trend and that a significant change in growth is unlikely to be sustained if not rapidly accompanied by a large change in confidence. A general feature of the statistical examination is also that business indicators tend to perform better than consumer confidence, which may be more easily affected by factors unrelated to near-term business cycle fluctuations. Business sentiment indicators are found to contain relevant information for the prediction of output and real investment in most of the examined countries while consumer sentiment indicators are rarely found to contain any relevant information for the prediction of output or real consumption. The diversified country experiences also suggest that for both economic analysis and forecasting purposes, generalisations or mechanical rules are likely to break down.

II. Measuring confidence

5. As noted above, confidence is an elusive concept, which cannot be defined precisely or measured directly. In practice, business-cycle analysts therefore use information from business and consumer surveys as proxies for confidence. The presumption is then that before a specific business activity is carried out by economic agents -- in the form of revisions of production plans, new employment, an order or a purchase -- a certain opinion-building has taken place which may be measured and may be called "sentiment", "expectations" or "confidence".

6. Business and consumer sentiment measures derive from simple and rapid surveys, containing a small number of questions, generally of a qualitative nature, which can be answered quickly by managers and households. The information requested relates judgement on recent trends, on current situation and on expectations for near term developments (see Box on the kind of information covered in such surveys). Questions are generally formulated as multiple choice, requesting answers of the type "up", "same" or "down", "improve", "unchanged" or "worsen", etc. Survey results for each question involve a figure for each qualitative answer reflecting the frequency distribution of answers expressed by respondents.

7. As sentiment surveys seek to track judgements on tendencies, their usefulness derives from comparing the results of different surveys over time. To simplify the presentation of survey results, survey data are normally compiled as "balances" by subtracting the number answering "no" (or "worse") from the number answering "yes" (or "improve"). This allows the presentation of a single figure as a summary of responses to each question and representation of changes in those responses over time by a single time series. Presentation of the balances together with the percentage of "no change" replies would provide all the information contained in the survey. However, polling institutes rarely publish such data, the preference being to simplify graphing and presenting data over long periods. This implies a loss of information, to the extent that the proportion of the sample representing the answer "unchanged" and/or "normal" could give indications about the degree of uncertainty of economic agents. Other approaches exist, however. In the purchasing manager surveys (compiled in the United States and the United Kingdom) for instance, indexes are centred around 50 rather than zero, computed by adding the percentage

answering "up" to one-half of those saying "no change". The two approaches are similar in effect, the main difference being the unit scale and the break-even point.

Box: Questions in business and consumer surveys

Business and consumer surveys are conducted in different ways across countries and vary in detail, but there are common features. Business surveys typically cover business managers' judgments on the following points:

- Production and employment (past and future)
- Order inflows and stocks (foreign and domestic)
- Levels of inventories of finished goods and raw material
- Expected price developments
- The general economic situation of the country (past and future)
- Limits to production
- Sufficiency of current production capacity
- Export expectations
- Current levels of capacity.

In consumer surveys, households are normally asked about:

- Their financial situation (past and future)
- The general economic situation of the country (past and future)
- Cost of living trends (past and future)
- Major purchase intentions (sometimes specifically related to car purchases; acquisition of real estate and renovation of their residence)
- Unemployment prospects
- Price developments
- Savings intentions.

8. By far the most important advantage of sentiment measures is the speed with which the data are made available. In most countries process time is less than a month, whereas "hard" economic data is often not only released with delays of two to three months or more, but also subject to subsequent revisions². Moreover, sentiment data, precisely because they are "opinion polls" based on qualitative judgements, are more useful in avoiding trend and seasonality problems and are often free of distortions that may plague "real" statistics for months (such as changes in holidays or plant shutdown schedules, or

2. The first release of GDP data occurs in the United States and the United Kingdom towards the end of the first month following the quarter. In Japan, Germany, France and Canada, the lag is around two months, while in most other countries publication delays vary between three and six months. A further problem is the frequent and sometimes substantial data revisions that occur in National Accounts, which effectively lengthens measuring process (see "The Reliability of Quarterly National Accounts in Seven Major Countries. A User's Perspective", mimeo, for recent analysis of this issue).

unusual weather, for instance)³. Table 1 places business and consumer indicators into the hierarchy of short-term conjunctural statistics within a classification based on their presumed timing relative to the evolution of the economic activity. Table 2 gives a synoptic overview of the business survey data available in the OECD Main Economic Indicators database.

9. In some countries forward-looking questions of business and consumer surveys are used to construct composite confidence indicators⁴. However, construction of composite indicators always raises questions about the appropriate weighting and information content of the individual components. For example, judgement on order levels and stocks of finished products may well be reflected in answers concerning current and future production. In this paper, a collection of business sentiment indicators is examined for each country (according to data availability) and those showing a closest relationship with economic variables are used in the analysis in the main text. Leading, coincident and tension-measuring indicators are examined as well as composite indexes (for details, see Annex I). The assessment of the relationship between business sentiment indicators and economic variables is based on analysis of correlation coefficients as well as on causality tests. The indicators selected are the following⁵: composite indices for the United States (the Purchasing Managers index), Germany and Spain (Business Climate for both countries); a general indicator for Japan (Current Business Situation) and Belgium (Perspectives for the Total Economy); the expected trend of orders' inflow for Canada and Denmark; and, for the rest of the countries, judgements about the future tendency of production. Regarding consumer confidence, a composite indicator is used for all countries.

III. Confidence indicators and economic activity

1. The movement of confidence indicators over business cycles

10. As a first step in the analysis of the relationship between sentiment indicators and economic activity, business and consumer confidence indicators have been plotted against real GDP and industrial production growth for eleven OECD countries (Figures 1 to 3, see Figures at the end of text)⁶. A visual examination of these figures suggests that:

-
3. Surveys often provide information on aspects of economic developments where genuine statistics do not exist *e.g.* business inventories and household "big ticket" spending intentions. They may therefore give a more nuanced picture of how changes in the business cycle are transmitted through the economy.
 4. Business confidence is taken to be the average of the replies to questions on the production outlook, total order books, and stocks of finished products (with the sign inverted). Consumer confidence is the average of replies to questions concerning the financial situation of households (past and future), the assessment of the general economic situation of the country (past and future) and the advisability of purchasing major durable consumer goods.
 5. See Annex I for sources and indicators of business sentiment and Annex II for sources of consumer sentiment.
 6. Growth of output is measured over four quarters. The relationship was also examined using quarter on quarter output growth but, possibly due to volatility and "noise" in quarterly data, much lower correlation coefficients were found and often with "unexpected" sign. The figures for Germany do not reflect the jump on the 1991 growth rates due to unification.

Table 1. **Business and consumer sentiment indicators in the hierarchy of short-term business cycle statistics**

Business activity	Business cycle statistics	
	quantitative	qualitative
	Leading indicators	
Sentiments (Expectations)	Equity price index	Business expectations Production expectations Export expectations Employment expectations Consumer expectations
-		
Demand	Order inflow (foreign, domestic) Construction permits	Change in order inflow
-		
	Tension indicators	
Buffer zone Demand/production	Order stock Price index	Change in order stock Assessment of order stock Change in inventories Assessment of inventories Price expectations
-		
	Coincident indicators	
Production, turnover Business failures	Production index Retail sales Foreign trade	Change in capacity utilisation Assessment of spare capacity Change in production
	Lagging indicators	
	Employment Unemployment Number of vacancies Number of short-time workers Number of bankruptcies	Change in employment

Source: Oppenländer, K.H. "Eigenschaften und Einteilung von Konjunkturindikatoren" in Oppenländer, K.H. (Hg.) *Konjunkturindikatoren*, Wien, 1995.

Table 2. **Business survey series available in Main Economic Indicators database**

	General indicator	Production	Orders inflow	Order books	Finished goods stock	Capacity utilisation
United States	X	..	..	L	L	R
Japan	FT	..	..	..	L	A
Germany	X	FT	T	L	L	R
France	F	FT	FT	L	L	R
Italy	F	LF	..	FL	L	R
United Kingdom	F	FT	FT	L	L	U
Canada	..	F	T	L	L	R
Australia	F	FT	FT	FT	T	U
Austria	..	F	..	L	L	U
Belgium	X	T	T	L	L	R
Denmark	..	FT	T	L	L	A
Finland	F	F	FT	L	T	U
Greece	..	FT	..	L	L	R
Ireland	..	FT	T	L	L	R U
Luxembourg	..	F	T	L	L	R
Mexico	FT	F	..	..	L	R
Netherlands	..	FT	T	L	L	AR
New Zealand	F	FT	FT	..	T	U
Norway	F	FT	FT	TL	TL	U
Portugal	..	FT	..	TL	L	AR
Spain	..	FT	..	FL	L	R
Sweden	..	FT	FT	L	TLF	U
Switzerland	X	FT	T	L	L	R

A. Appreciation of present capacity.

F. Future tendency.

L. Present level.

R. Rate of capacity utilisation.

T. Present or past tendency.

U. Operating at full capacity.

X. Composite indicator.

Source: OECD Main Economic Indicators: Inventory (December 1995).

- Whether measured by GDP or industrial production growth, business climate indicators track the main output movements well in all countries examined. However, the correlation between business sentiment and output growth varies considerably among countries, with France, the United Kingdom and Canada showing the closest movement of business confidence with output growth.
- Consumer confidence indicators also vary reasonably closely with the main changes in output in all examined countries, although the correlation appears weaker, and less reliable, than for business confidence. This may be because consumer confidence is more affected by events unrelated to business cycle fluctuations.
- Small swings of output in "intermediate" periods, that is, in between major turning points, show in general little reflection in either business or consumer sentiment indicators. Similarly, small variations in confidence are not generally echoed in output. Large and rapid changes in confidence, on the other hand, whether at turning points or in "intermediate" periods are consistently associated with similarly strong movements in output.
- There is apparently no systematic sequential relationship between confidence indicators and output growth, either across countries or across time within countries. For instance, while business confidence swings mostly precede -- by one or two quarters -- changes in GDP growth in the United States, they mostly lag -- by up to four quarters -- output swings in Japan or coincide with them in Germany. The same variability also stands out in the relationship between consumer confidence and output growth (see below for a more detailed analysis).

11. In summary, confidence indicators appear to provide a good picture of major cyclical movements in output; if available in advance of "hard" output data, they may help detect significant acceleration or deceleration in output growth when large changes in confidence are observed. Confidence indicators should not, however, be used in a mechanical way for short-term forecasting, because they fail to track in a consistent way small output swings and they do not show a consistent sequential behaviour with respect to output movements.

2. The movement of confidence indicators and aggregate demand components

12. Further insight into the information content of confidence indicators can be obtained by examining the relationship between their movement and that of key demand components. Thus, business confidence has been graphed against real business investment growth and consumer confidence against real private consumption growth and household saving rates. Figure 4 shows that business confidence is indeed highly correlated with real business investment, although to a lesser degree than with output measures. This may in part reflect the fact that business surveys are not specifically designed to capture business decisions in this area. Figures 5 and 6 paint a less conclusive picture of the behaviour of consumer confidence indicators as compared to that of real private consumption growth and household saving. Consumer confidence mirrors the major shifts in private consumption with variable leads and lags

among countries⁷. The counterpart to this is found in the relationship between household saving rates and consumer confidence. In periods of low or steeply falling confidence, household saving rates tend to rise, probably reflecting an increasing weight of precautionary savings. However, the relationship in most countries is relatively loose.

13. As with output growth, it appears that confidence indicators, but in particular business confidence, follow major cyclical swings and large changes in their related demand components fairly well, but that they do not track small swings in business investment or private consumption closely. Likewise, there appears to be little evidence of a systematic sequential relationship to these demand components. In particular, consumer confidence exhibits a much more erratic behaviour than real consumption spending, suggesting that this indicator is less reliable than business confidence in the assessment of the economic situation.

3. The correlation of confidence indicators and key economic variables

14. A more precise measure of the relationship between sentiment indicators and economic variables is obtained by:

- examining the time cross-correlation coefficients of consumer and business confidence indicators with selected macroeconomic variables;
- performing tests of Granger causality running from sentiment indicators to changes in economic variables.

15. Tables 3 and 4 present the correlation coefficients of business and consumer confidence indicators with two measures of output -- GDP and industrial production -- and two demand components -- real business investment and real private consumption⁸. The number of quarters lead and lag reported here is limited to three since the highest correlation -- marked by a shaded area -- is invariably found within one to two quarters before or after the observation point in time (though the statistical analysis was carried out over ten quarters). With a view to keeping the analysis simple, sophisticated statistical criteria have not been used as a "benchmark" for the significance of the correlation coefficients; as a rule of thumb, a correlation coefficient exceeding 0.75 is considered as "large" in the assessment below.

7. Empirical research has also examined the usefulness of consumer confidence as an independent variable in economic analysis of private consumption. Here, results have been mixed. In some cases, consumer confidence has been found to add to the overall explanatory power of estimated consumption functions. However, the significance of the confidence variable has often been associated with increased volatility of consumer confidence in periods of exceptional uncertainty (e.g. at the brink of the Gulf war) where the consumer confidence indicator could be interpreted as playing the role of a dummy variable rather than providing any independent information. Overall, the conclusion is that consumer confidence has limited if any explanatory power. See e.g. Carrol, C.D., J.C. Fuhrer, and D.W. Wilcox "Does Consumer Sentiment Forecast Household Spending? If so, Why", *American Economic Review*, December 1994; Parigi, G. and G. Schlitzer "Ökonometrische Modelle und Frühindikatoren" in Oppenländer, K.H (Hg.) *Konjunkturindikatoren*, Wien, 1995.

8. Correlation coefficients reported here for business confidence correspond to the indicators selected as previously mentioned. The full set of coefficients for all business sentiment indicators is reported in Annex I. Moreover, the correlation between consumer confidence and demand indicators like registration of new cars or changes in retail sales was also explored and results are reported in Annex II.

Table 3. Correlation between business confidence and economic variables ^a

<i>Business confidence (t) and GDP</i>							
	GDP _{t-3}	GDP _{t-2}	GDP _{t-1}	GDP _t	GDP _{t+1}	GDP _{t+2}	GDP _{t+3}
United States	-0.04	0.16	0.45	0.73	0.84	0.74	0.53
Japan	0.74	0.79	0.81	0.78	0.71	0.63	0.54
Germany	0.24	0.39	0.51	0.60	0.63	0.61	0.56
France	0.34	0.54	0.76	0.87	0.84	0.65	0.42
Italy	0.21	0.34	0.43	0.55	0.59	0.55	0.46
United Kingdom	0.53	0.66	0.79	0.86	0.87	0.76	0.62
Canada	0.15	0.41	0.66	0.85	0.86	0.81	0.47
Belgium	0.19	0.28	0.42	0.60	0.71	0.73	0.64
Denmark	0.19	0.30	0.55	0.65	0.59	0.53	0.33
Netherlands	0.38	0.24	0.27	0.42	0.44	0.54	0.50
Spain	0.29	0.50	0.70	0.84	0.85	0.80	0.70
<i>Business confidence (t) and industrial production (IP)</i>							
	IP _{t-3}	IP _{t-2}	IP _{t-1}	IP _t	IP _{t+1}	IP _{t+2}	IP _{t+3}
United States	-0.02	0.17	0.47	0.79	0.89	0.80	0.59
Japan	0.77	0.79	0.75	0.63	0.42	0.02	0.00
Germany	0.50	0.67	0.81	0.89	0.80	0.66	0.46
France	0.34	0.49	0.71	0.82	0.75	0.56	0.33
Italy	0.32	0.43	0.54	0.63	0.67	0.58	0.46
United Kingdom	0.40	0.54	0.71	0.85	0.90	0.83	0.67
Canada	0.25	0.49	0.72	0.87	0.82	0.63	0.34
Belgium	0.39	0.50	0.64	0.73	0.67	0.50	0.33
Denmark	-0.04	0.12	0.31	0.67	0.70	0.63	0.45
Netherlands	0.26	0.36	0.49	0.57	0.62	0.52	0.35
Spain	0.33	0.57	0.79	0.91	0.87	0.71	0.49
<i>Business confidence (t) and business investment (BI)</i>							
	BI _{t-3}	BI _{t-2}	BI _{t-1}	BI _t	BI _{t+1}	BI _{t+2}	BI _{t+3}
United States	-0.33	-0.21	0.03	0.35	0.60	0.75	0.74
Japan	0.78	0.85	0.88	0.86	0.79	0.67	0.51
Germany	0.29	0.45	0.58	0.66	0.67	0.67	0.62
France	0.44	0.55	0.68	0.79	0.83	0.77	0.64
Italy	0.23	0.33	0.43	0.56	0.62	0.62	0.54
United Kingdom	0.39	0.48	0.58	0.68	0.72	0.71	0.62
Canada	-0.13	0.07	0.25	0.43	0.51	0.45	0.39
Belgium	0.61	0.68	0.75	0.80	0.81	0.75	0.63
Denmark	0.04	0.12	0.25	0.34	0.46	0.54	0.50
Netherlands	0.21	0.18	0.31	0.31	0.37	0.28	0.22
Spain	0.22	0.44	0.68	0.88	0.87	0.79	0.65

a) Quarterly data, year on year growth. The highlighted figures indicate the timing relationship for which the correlation is the highest for each indicator in every country.

Table 4. Correlation between consumer confidence and economic variables ^a

<i>Consumer confidence (t) and GDP</i>							
	GDP _{t-3}	GDP _{t-2}	GDP _{t-1}	GDP _t	GDP _{t+1}	GDP _{t+2}	GDP _{t+3}
United States	0.48	0.58	0.66	0.72	0.70	0.56	0.36
Japan	0.43	0.51	0.55	0.58	0.59	0.53	0.47
Germany	0.14	0.21	0.31	0.37	0.38	0.43	0.45
France	0.35	0.51	0.58	0.57	0.42	0.26	0.01
Italy	0.53	0.59	0.61	0.55	0.51	0.43	0.34
United Kingdom	0.51	0.60	0.67	0.69	0.70	0.66	0.62
Canada	0.27	0.38	0.51	0.66	0.76	0.75	0.67
Belgium	0.50	0.57	0.61	0.62	0.58	0.51	0.42
Denmark	0.42	0.53	0.59	0.63	0.61	0.59	0.42
Netherlands	0.50	0.54	0.53	0.54	0.53	0.46	0.40
Spain	0.87	0.89	0.87	0.81	0.72	0.58	0.42

<i>Consumer confidence (t) and industrial production (IP)</i>							
	IP _{t-3}	IP _{t-2}	IP _{t-1}	IP _t	IP _{t+1}	IP _{t+2}	IP _{t+3}
United States	0.43	0.48	0.54	0.60	0.58	0.46	0.30
Japan	0.45	0.51	0.56	0.55	0.53	0.42	0.41
Germany	0.58	0.64	0.69	0.70	0.61	0.52	0.43
France	0.32	0.38	0.39	0.36	0.15	0.02	-0.10
Italy	0.35	0.39	0.43	0.39	0.32	0.23	0.11
United Kingdom	0.28	0.38	0.47	0.55	0.62	0.65	0.66
Canada	0.21	0.29	0.40	0.53	0.60	0.57	0.44
Belgium	0.46	0.48	0.47	0.41	0.33	0.21	0.10
Denmark	0.29	0.43	0.49	0.54	0.58	0.52	0.39
Netherlands	0.51	0.53	0.51	0.46	0.39	0.29	0.17
Spain	0.62	0.61	0.57	0.50	0.38	0.20	-0.02

<i>Consumer confidence (t) and private consumption (PC)</i>							
	PC _{t-3}	PC _{t-2}	PC _{t-1}	PC _t	PC _{t+1}	PC _{t+2}	PC _{t+3}
United States	0.67	0.69	0.73	0.75	0.65	0.51	0.32
Japan	0.52	0.50	0.46	0.47	0.49	0.45	0.39
Germany	0.01	0.06	0.17	0.25	0.31	0.41	0.47
France	0.36	0.47	0.58	0.56	0.43	0.38	0.20
Italy	0.53	0.61	0.66	0.65	0.63	0.58	0.51
United Kingdom	0.42	0.50	0.59	0.65	0.71	0.70	0.69
Canada	0.39	0.52	0.67	0.80	0.86	0.82	0.72
Belgium	0.65	0.73	0.78	0.78	0.74	0.69	0.58
Denmark	0.48	0.60	0.73	0.81	0.77	0.65	0.50
Netherlands	0.62	0.67	0.72	0.74	0.74	0.70	0.66
Spain	0.75	0.83	0.87	0.89	0.86	0.77	0.64

a) Quarterly data, year on year growth. The highlighted figures indicate the timing relationship for which the correlation is the highest for each indicator in every country.

16. Tables 5 and 6 present the results of the tests for Granger causality running from business and consumer sentiment to GDP, industrial production, real business investment and real private consumption. The results of the tests do not imply any strict "causality" or "determination". They should rather be interpreted as follows: rejecting the hypothesis that a sentiment indicator does not Granger cause an economic variable implies that past values of the sentiment indicator provide significant information in the estimation of the economic variable in addition to that contained in the variable's own history. Since causality may run both ways, Granger causality tests were run and are reported in both directions⁹. However, as previously stated, it is beyond the purpose of this paper to explain empirically the behaviour of sentiment indicators, and therefore no attempt is made to assess the results of the tests of causality running from economic variables to confidence indicators.

17. The main results derived from the tables are:

- The correlation between indicators of business sentiment and economic variables varies widely across countries: the United States, Japan, France, Spain and, to a certain extent, Belgium show high correlations of business confidence with both output, whether measured by GDP or industrial production, and investment; in the United Kingdom and Canada business sentiment is well correlated with the two measures of output, but it does not show any "large" correlation with investment; in Germany, business sentiment seems to be closely related mainly with industrial production, and less so with GDP and investment; and finally, in Italy, Denmark and the Netherlands, no strong correlation has been found for business confidence indicators and any of the examined macroeconomic variables.
- Consumer confidence indicators do not generally show strong correlation, according to the significance criterion used here, irrespective of the variable examined in most of the countries. It is only in Canada and Spain that there seems to be correlation of consumer confidence and output. In the case of Spain, particularly high correlation coefficients with lagged GDP point more to a link from output growth to consumer sentiment. As regards private consumption, some correlation with consumer confidence is found in Canada, Belgium, Denmark, Spain and, marginally, in the United States and the Netherlands.
- The results of the Granger tests suggest that, business sentiment indicators in most countries contain relevant information for the prediction of output, in particular when measured by industrial production, even in those countries where correlation coefficients are low like Italy, Denmark or the Netherlands. Conversely, in countries like Spain where correlation between business confidence and output is strong sentiment indicators do not seem to provide relevant additional information to that contained in past output values. Likewise, business confidence indicators contribute useful information in the prediction of business real investment in all countries examined but the Netherlands and Spain, even though in the latter correlation between business sentiment and investment is quite strong.

9. Granger tests were also run for causality from consumer confidence to demand indicators and results are reported together with the corresponding correlation coefficients in Annex II.

Table 5. Granger causality tests of business confidence and economic variables ^a

	Probability	Reject null	Opposite test ^b
<i>Null hypothesis: business confidence does not Granger cause GDP</i>			
United States	0.0001	yes	no
Japan	0.3390	no	yes
Germany	0.1710	no	no
France	0.0002	yes	no
Italy	0.1700	no	no
United Kingdom	0.0170	yes	yes
Canada	0.0320	yes	no
Belgium	0.0290	yes	no
Denmark	0.2920	no	no
Netherlands	0.0200	yes	no
Spain	0.0710	no	yes
<i>Null hypothesis: business confidence does not Granger cause industrial production</i>			
United States	0.0000	yes	no
Japan	0.0070	yes	no
Germany	0.0002	yes	no
France	0.0264	yes	no
Italy	0.0003	yes	no
United Kingdom	0.0004	yes	no
Canada	0.2380	no	no
Belgium	0.0010	yes	no
Denmark	0.0160	yes	no
Netherlands	0.0170	yes	no
Spain	0.7020	no	yes
<i>Null hypothesis: business confidence does not Granger cause real investment</i>			
United States	0.0000	yes	no
Japan	0.0050	yes	yes
Germany	0.0420	yes	no
France	0.0010	yes	yes
Italy	0.0483	yes	no
United Kingdom	0.0150	yes	no
Canada	0.0210	yes	yes
Belgium	0.0020	yes	no
Denmark	0.0450	yes	no
Netherlands	0.6200	no	no
Spain	0.1850	no	no

a) X "Granger causes" Y when past values of X add significant information in the prediction of Y over that contained in Y's own past values, four lags are used in the regressions. Significance is set at the 95 per cent confidence level.

b) Null hypothesis: the corresponding economic variable (i.e. GDP, industrial production, real investment) does not Granger cause business confidence

Table 6. Granger causality tests of consumer confidence and economic variables ^a

	Probability	Reject null	Opposite test ^b
<i>Null hypothesis: consumer confidence does not Granger cause GDP</i>			
United States	0.0120	yes	no
Japan	0.6030	no	no
Germany	0.2240	no	yes
France	0.6540	no	yes
Italy	0.3290	no	yes
United Kingdom	0.1230	no	no
Canada	0.0000	yes	no
Belgium	0.1090	no	no
Denmark	0.1030	no	no
Netherlands	0.5660	no	no
Spain	0.0360	yes	yes
<i>Null hypothesis: consumer confidence does not Granger cause industrial production</i>			
United States	0.0002	yes	no
Japan	0.2370	no	no
Germany	0.1500	no	no
France	0.9920	no	no
Italy	0.3390	no	no
United Kingdom	0.0010	yes	no
Canada	0.0000	yes	no
Belgium	0.2680	no	no
Denmark	0.0220	yes	yes
Netherlands	0.9700	no	no
Spain	0.0450	yes	no
<i>Null hypothesis: consumer confidence does not Granger cause real private consumption</i>			
United States	0.3130	no	no
Japan	0.3240	no	no
Germany	0.2550	no	yes
France	0.0670	no	no
Italy	0.1590	no	yes
United Kingdom	0.0850	no	no
Canada	0.0000	yes	no
Belgium	0.1570	no	no
Denmark	0.0220	yes	no
Netherlands	0.0280	yes	no
Spain	0.0290	yes	no

a) X "Granger causes" Y when past values of X add significant information in the prediction of Y over that contained in Y's own past values, four lags are used in the regressions. Significance is set at the 95 per cent confidence level.

b) Null hypothesis: the corresponding economic variable (i.e. GDP, industrial production, private consumption) does not Granger cause consumer confidence

- Consistent with the correlation analysis, confidence indicators are rarely found to contribute to the prediction of output or private consumption. In only five of the eleven examined countries (United States, United Kingdom, Canada, Denmark and Spain) consumer confidence is found to Granger cause industrial production, and only in three countries (United States, Canada and Spain) it is found to contribute significantly to the prediction of GDP. Consumer sentiment is found to contribute to the prediction of private consumption in only four of the eleven countries examined.

18. The main result from this exercise is that individual country experience with the use of confidence indicators in business cycle analysis can hardly be generalised, since indicators convey different information and have a different time-relationship with economic variables in each country¹⁰. It has also been found that business confidence indicators contain useful information to help predict output and investment in most examined countries and that in some, although few, countries consumer sentiment indicators may also help predict output and consumption movements. Accordingly it is worth exploring on a country by country basis the information contained on their respective confidence indicators to make the most appropriate use of them for economic analysis.

IV. Confidence indicators, cyclical turning points and the current situation

19. For forecasting purposes it is of considerable interest to assess whether sentiment indicators behave in a systematic way around cyclical turning points i.e. whether they systematically lead, are coincident with, or lag peaks and troughs of cycles. The definition and dating of business-cycle phases (upturns and downturns) used here to do this follow the same methodology as used in the Secretariat's previous comparative business-cycle analysis¹¹. Hence, business cycles represent fluctuations in the level of economic activity around its long-term trend¹². This method of business cycle dating has two advantages. First, it corresponds, at least conceptually, to business managers' perceptions of what constitutes normal business conditions (trend growth of output) and deviations from such normal business conditions (deviations from trend output). Second, the use of this ratio instead of the more simple cyclical indicator of variations in real GDP enables comparisons to be made across countries which have different

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- 10. See Schreyer, P. and C. Emery (1996) "Short-term indicators: Using qualitative indicators to update production indices", OECD Working paper, Vol. IV, No. 10. They arrive at a similar conclusion when they attempt to assess the usefulness of short-term qualitative indicators in forecasting activity in different industrial sectors. While they find that qualitative variables are useful in forecasting production, they also find that they are not sufficient to estimate production indices and, moreover, that predictive capacity varies significantly between countries.
 - 11. Peaks and troughs are taken to be the quarters in which the ratio of real GDP to its long-term trend level reaches a maximum or minimum, using OECD Secretariat estimates of trend GDP. See page 31, *OECD Economic Outlook 52*, Paris 1993.
 - 12. A higher number of turning points is identified for the United States, Canada and Japan than for the European countries, though the balance is more even when minor cycles are excluded. There is asymmetry between upturn and downturn phases: the average duration of an upturn phase is longer than that of the downturn phase in every country. The United States, for example, has an upturn duration, on average, of two years and an average duration of downturn phases of 1½ years. But there is considerable variance both over time and between countries. See Artis, H.J, R.C. Bladen-Hovel, and W. Zang, "Turning Points in the International Business Cycle: An Analysis of the OECD Leading Indicators for the G7 Countries", *OECD Economic Studies No. 24*, 1995/I, pages 125-45.

trend rates of growth. It tends, however, to "delay" cyclical turning points relative to a dating based on simple growth rates.

20. Figures 7 and 8 show the behaviour of confidence indicators over time covering the observation from eight quarters before to eight quarters after the cyclical turning points. During the period under review, there have been two major cycles -- 1979/83 and 1988/93 -- and one minor cycle -- 1984/87. The major turning points are indeed tracked by both indicators, but the lead patterns vary over time and across countries. The clearest and most systematic leads in major upturn and downturn phases are found for the United States, Japan, Germany and the United Kingdom, while the indicators appear mostly coincident or showing little systematic behaviour around turning points in the rest of Europe and Canada. It also appears that upper turning points are better determined by survey than lower turning points. The turning points of minor cycles are not well reflected in confidence data in any of the countries surveyed.

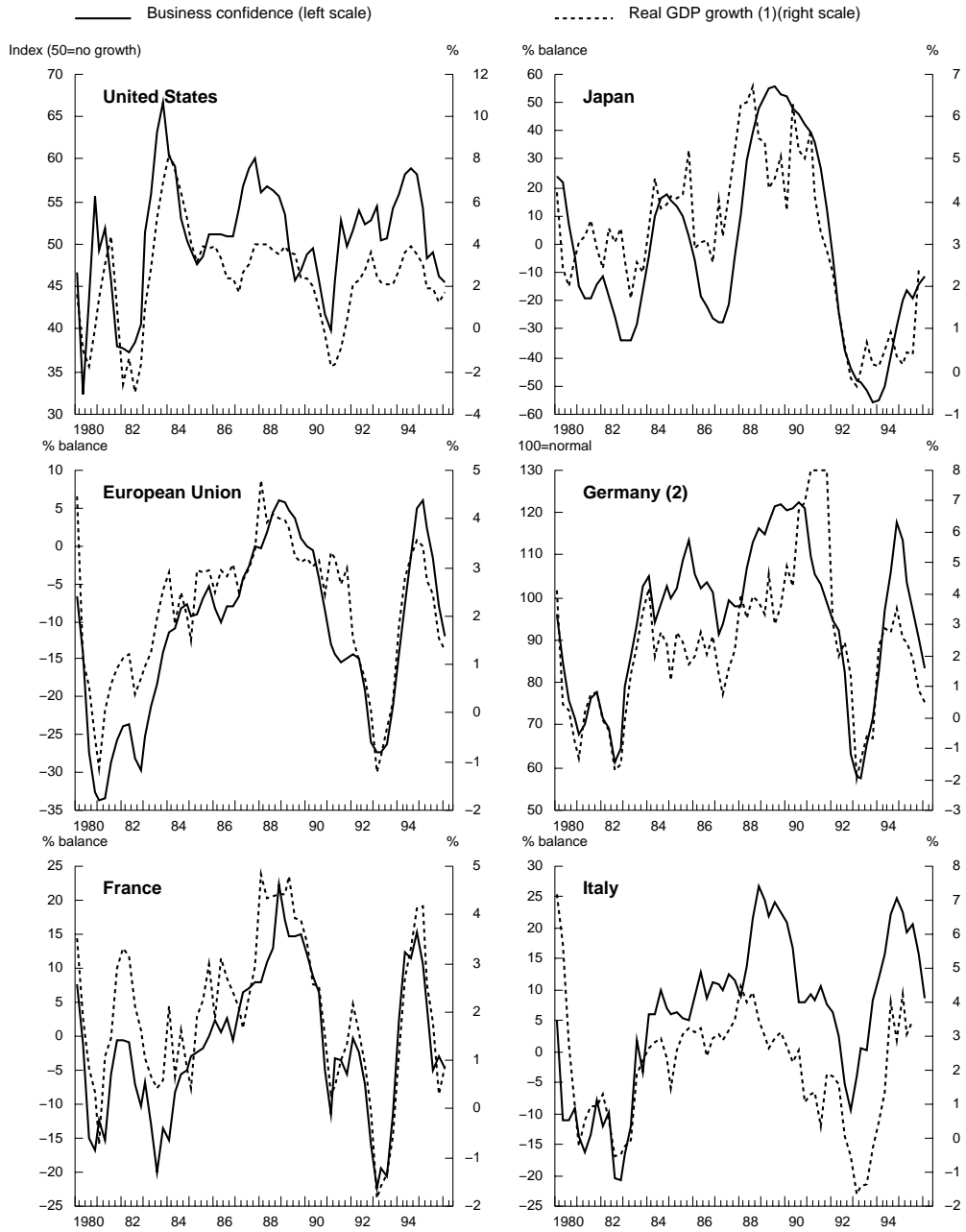
21. With the major exception of Japan, all the countries surveyed here have experienced a slowdown of economic growth over the past year or so¹³. This has been particularly pronounced in Continental Europe, where a number of countries, notably Germany, France and Italy as well as some smaller countries, have reported actual declines of output in the last quarter of 1995. In contrast, in Japan growth of economic activity -- after being much more sluggish than expected earlier -- accelerated towards the end of the year. In both cases, a strengthening of activity is projected to take place during 1996. Assessing this projection in the light of the analysis above and the recent behaviour of confidence indicators (Figure 9) suggests that:

- While having fallen to levels which in the past have prevailed in periods with growth below trend, confidence in Europe has not reached the absolute low-points of past recessions¹⁴. However, unless a rapid turnaround is registered the evidence presented in this note would suggest that the hoped-for recovery in the latter part of the year may well prove elusive.
- Though a strengthening has taken place in the course of the last year, business confidence in Japan has recovered only at a slowly pace and has just recently come back to the recession levels of the 1980's. Hence, if business confidence in small- and medium-sized enterprises does not improve more decisively, the recovery could be more fragile than recent GDP data would suggest.

13. See *OECD Economic Outlook 59*, Paris, 1996.

14. In France, consumer confidence fell in December 1995 to the lowest level in ten years, but special factors such as the transport strike clearly played a role here.

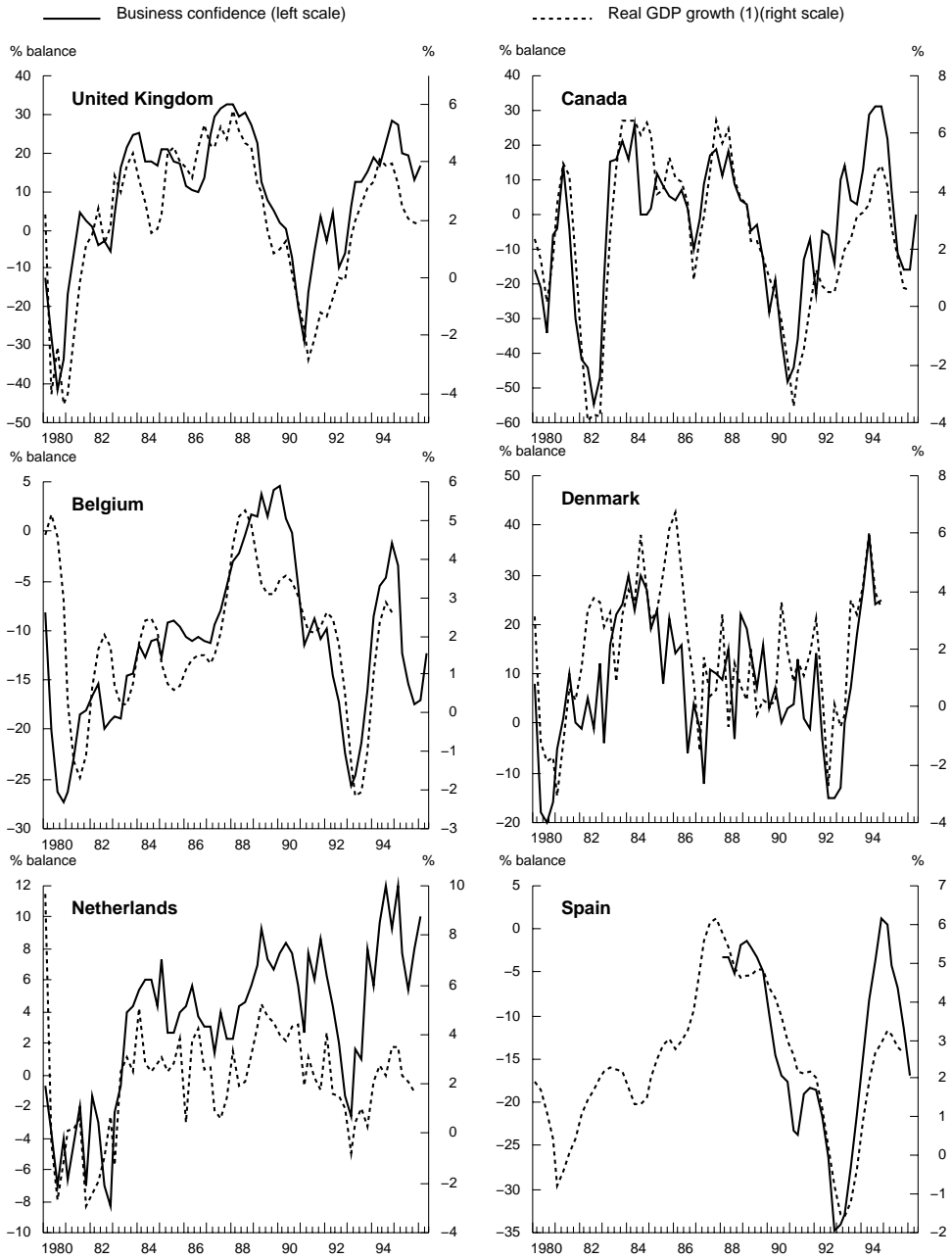
Figure 1. Business confidence and real GDP



1. Year-on-year percentage change.
2. Western Germany data for the business confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

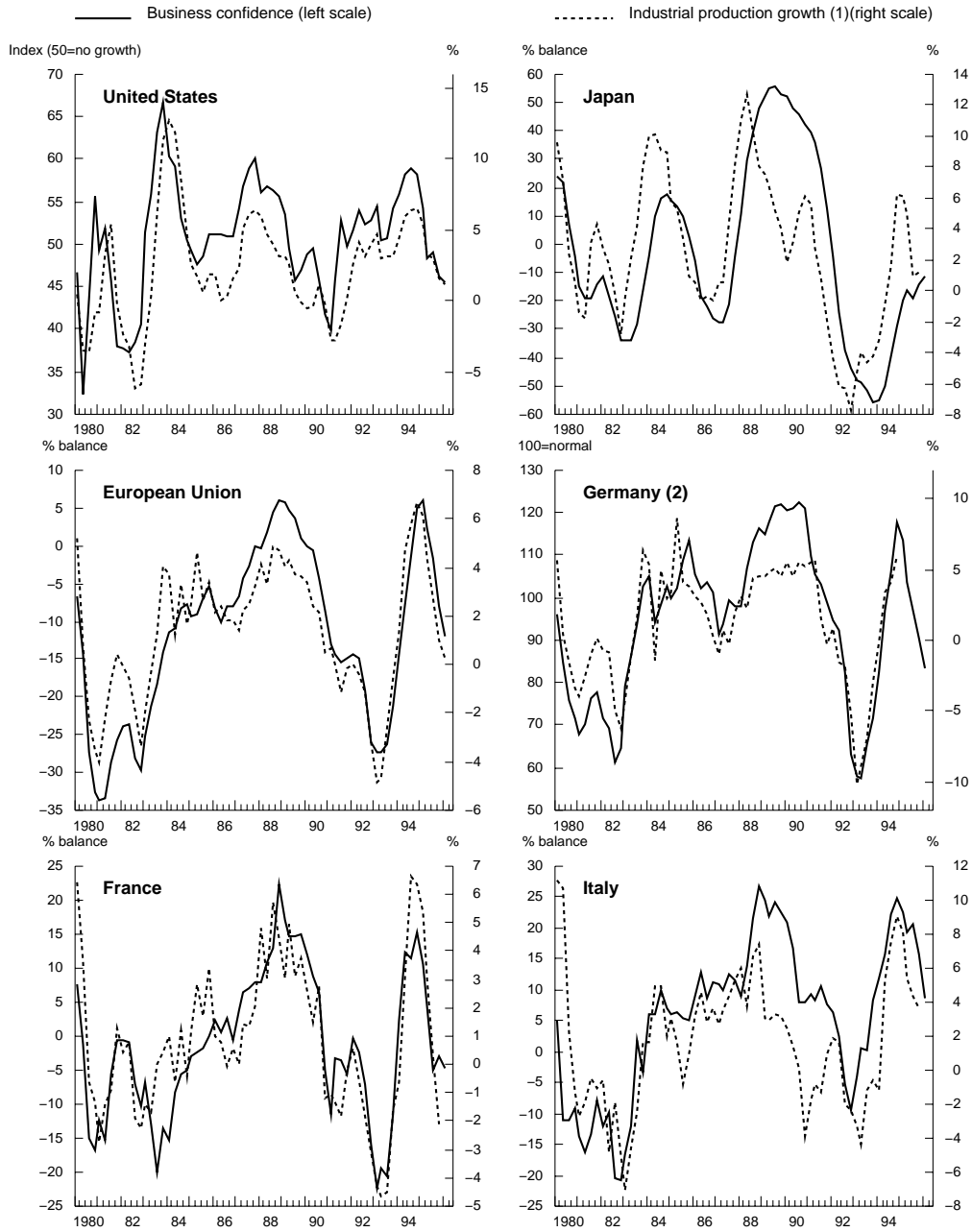
Figure 1. (cont'd) Business confidence and real GDP



1. Year-on-year percentage change.
 2. Western Germany data for the business confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

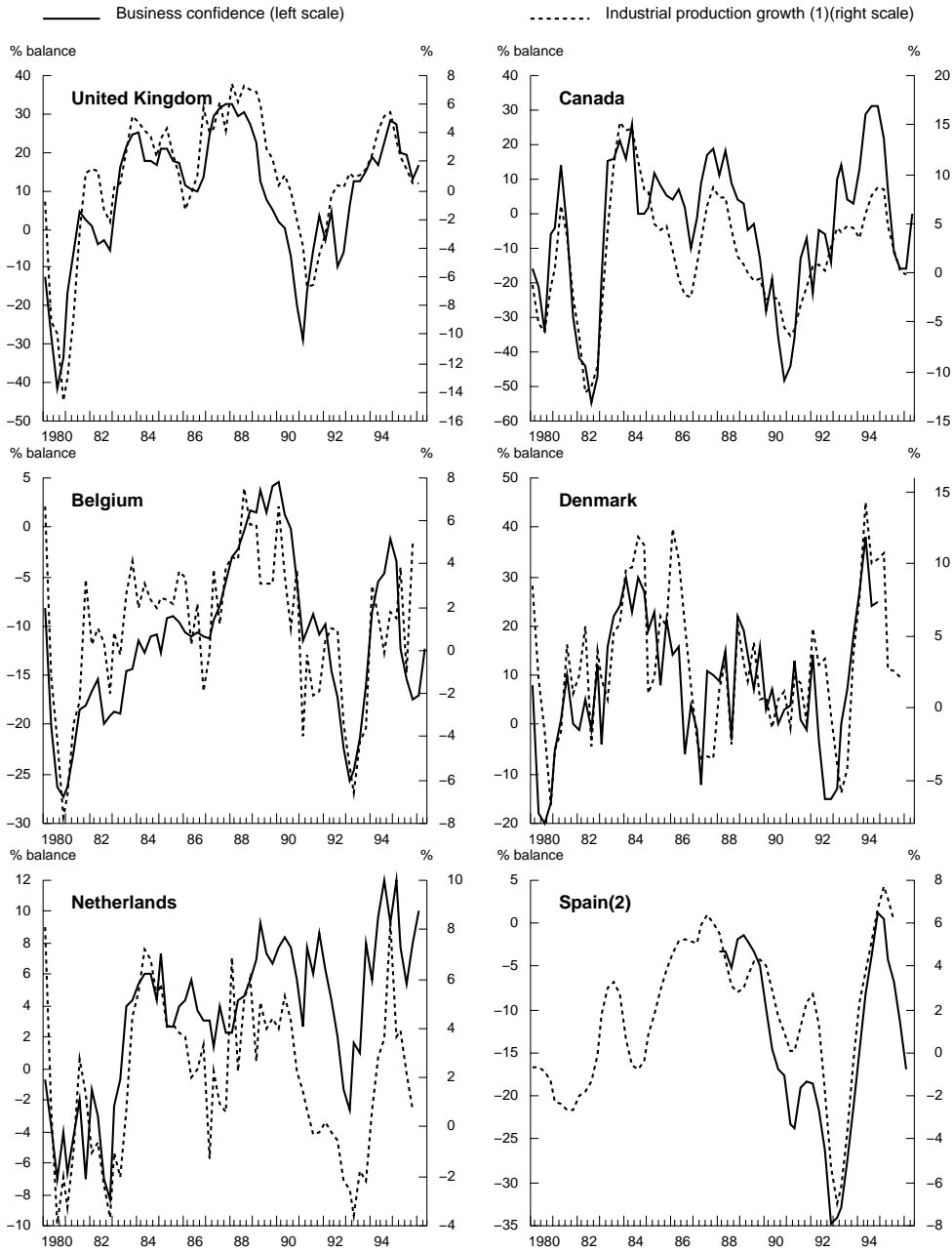
Figure 2. Business confidence and industrial production



1. Year-on-year percentage change.
2. Western Germany data for the business confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

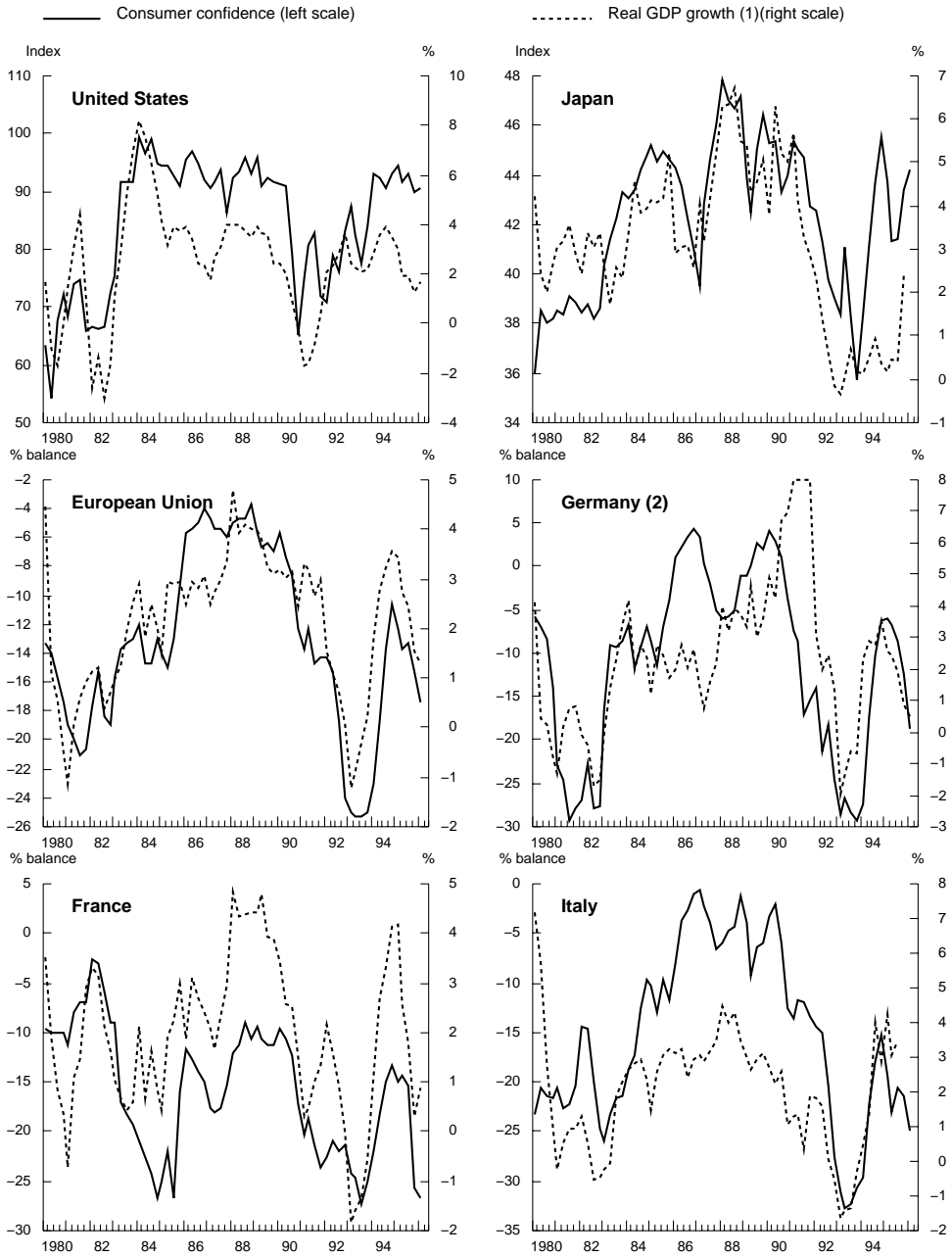
Figure 2. (cont'd) **Business confidence and industrial production**



1. Year-on-year percentage change.
2. Production tendency is used to lengthen the period available.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

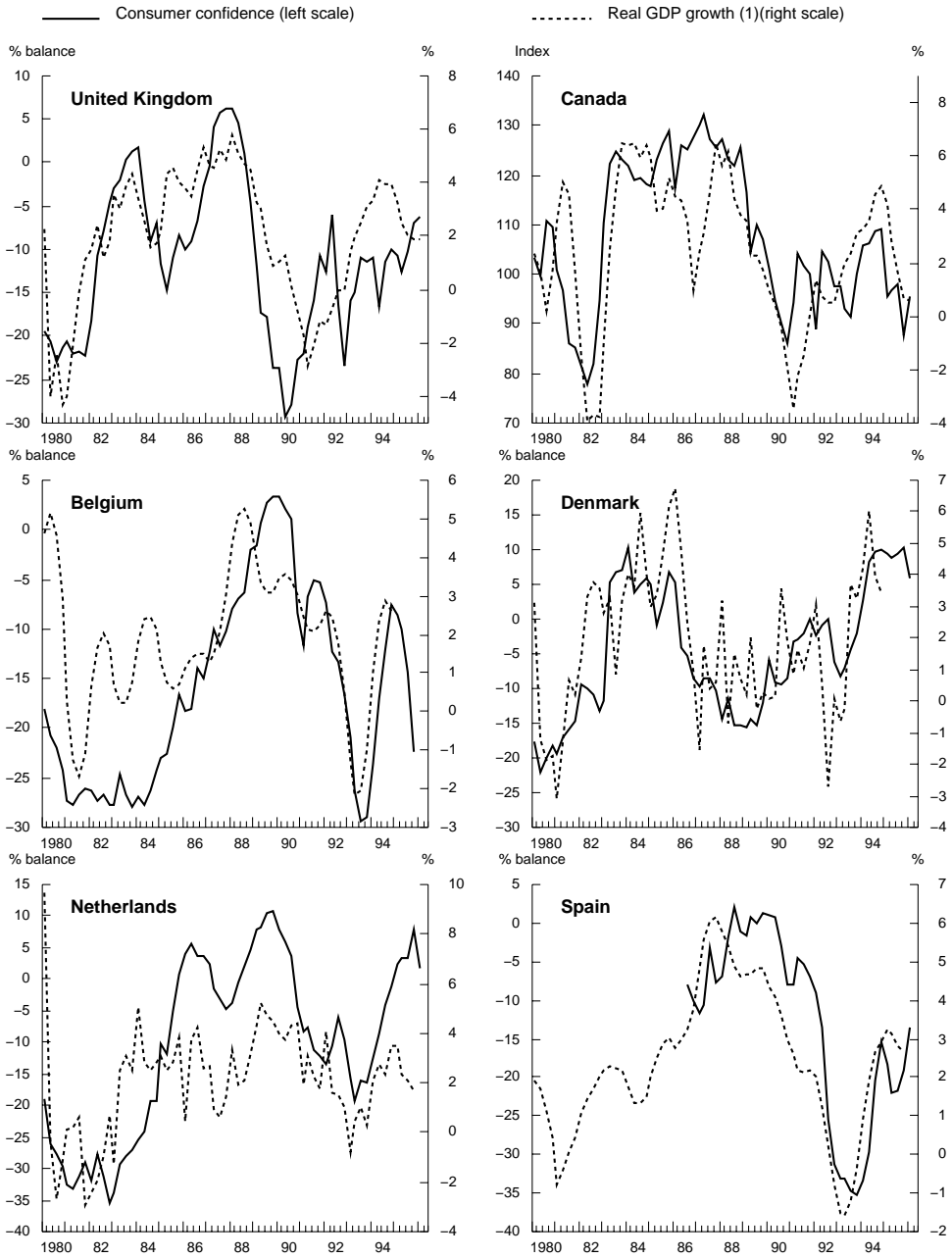
Figure 3. Consumer confidence and real GDP



1. Year-on-year percentage change.
2. Western Germany data for the consumer confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

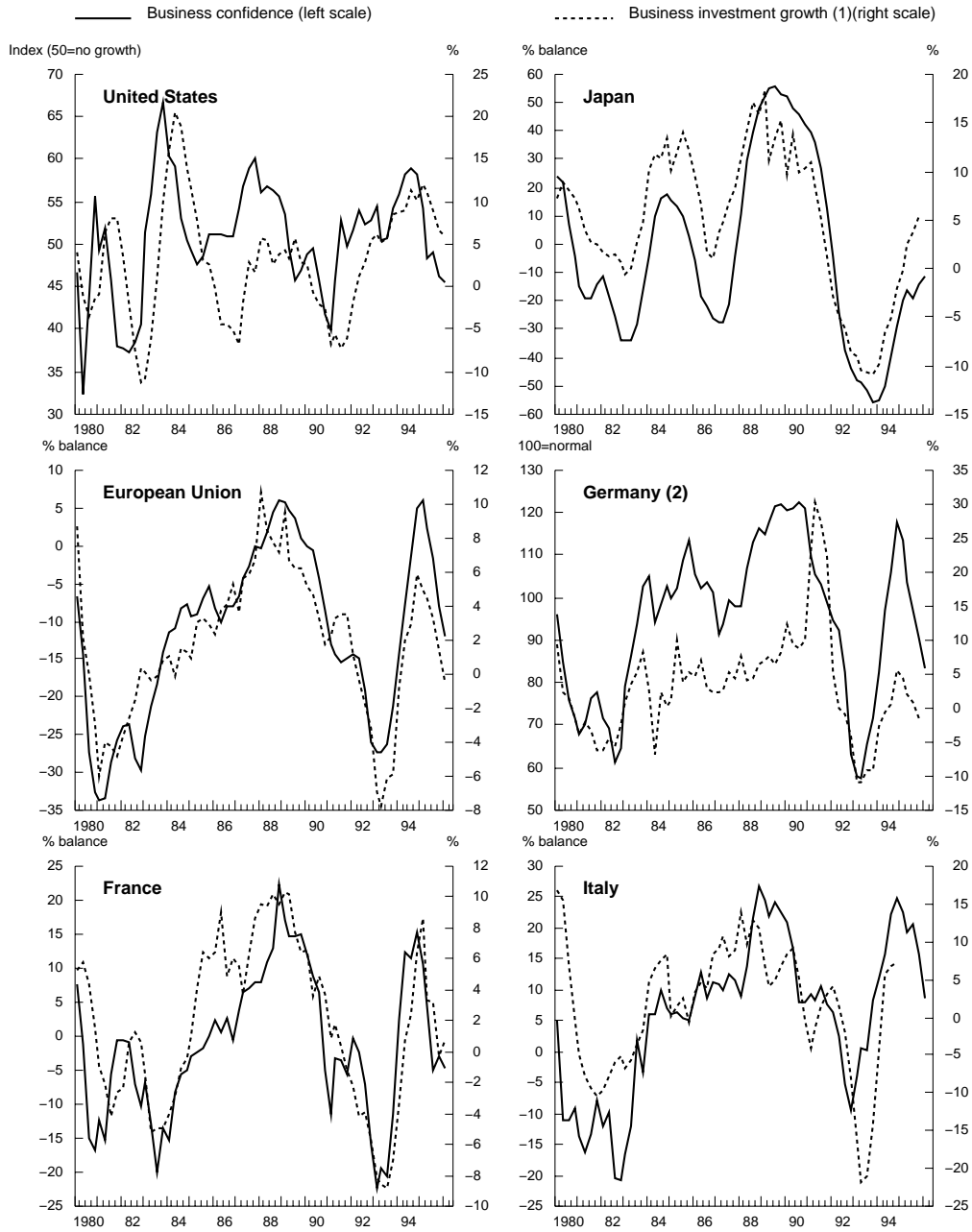
Figure 3. (cont'd) **Consumer confidence and real GDP**



1. Year-on-year percentage change.
 2. Western Germany data for the consumer confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

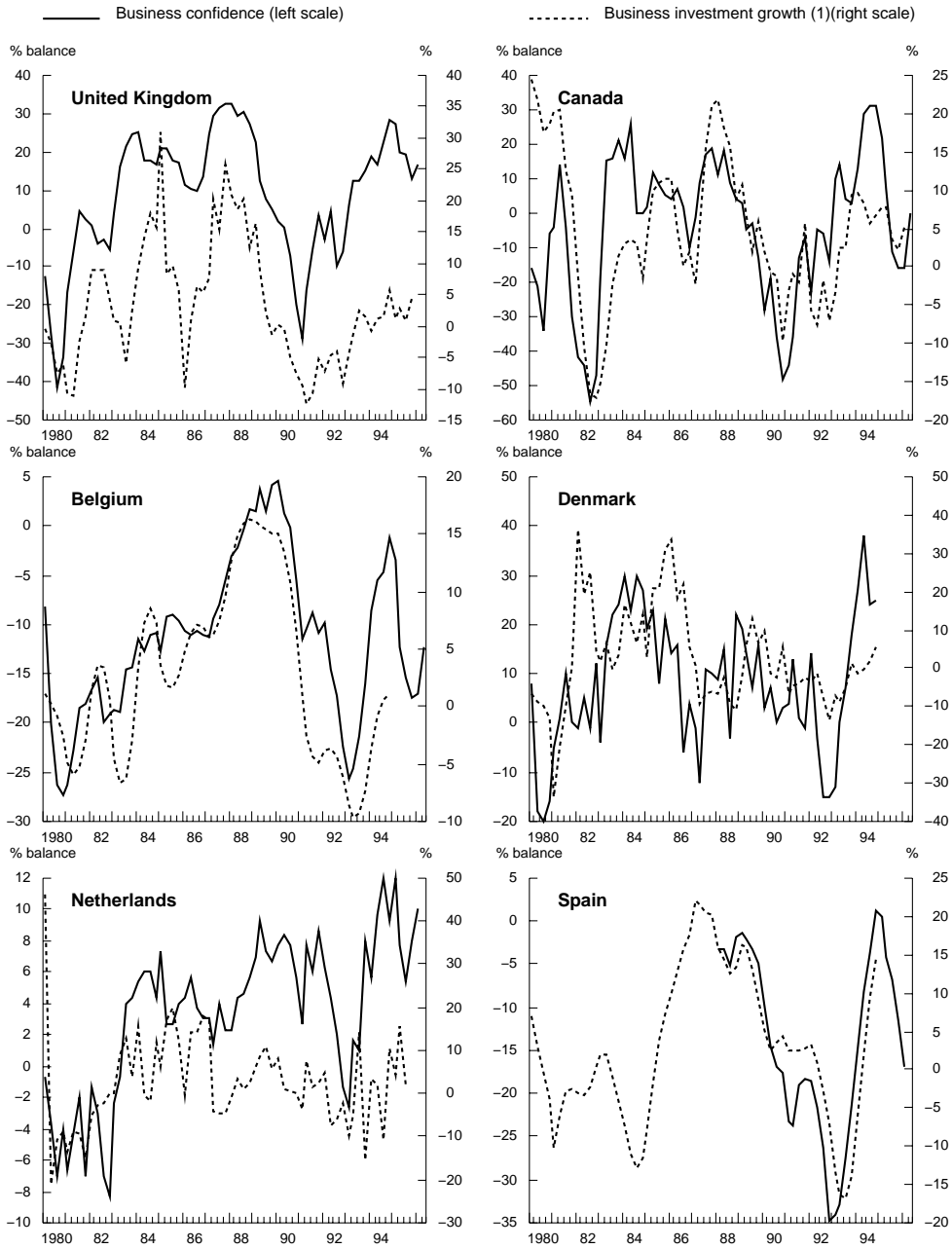
Figure 4. Business confidence and real business investment



1. Year-on-year percentage change; total investment for the European Union.
 2. Western Germany data for the business confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

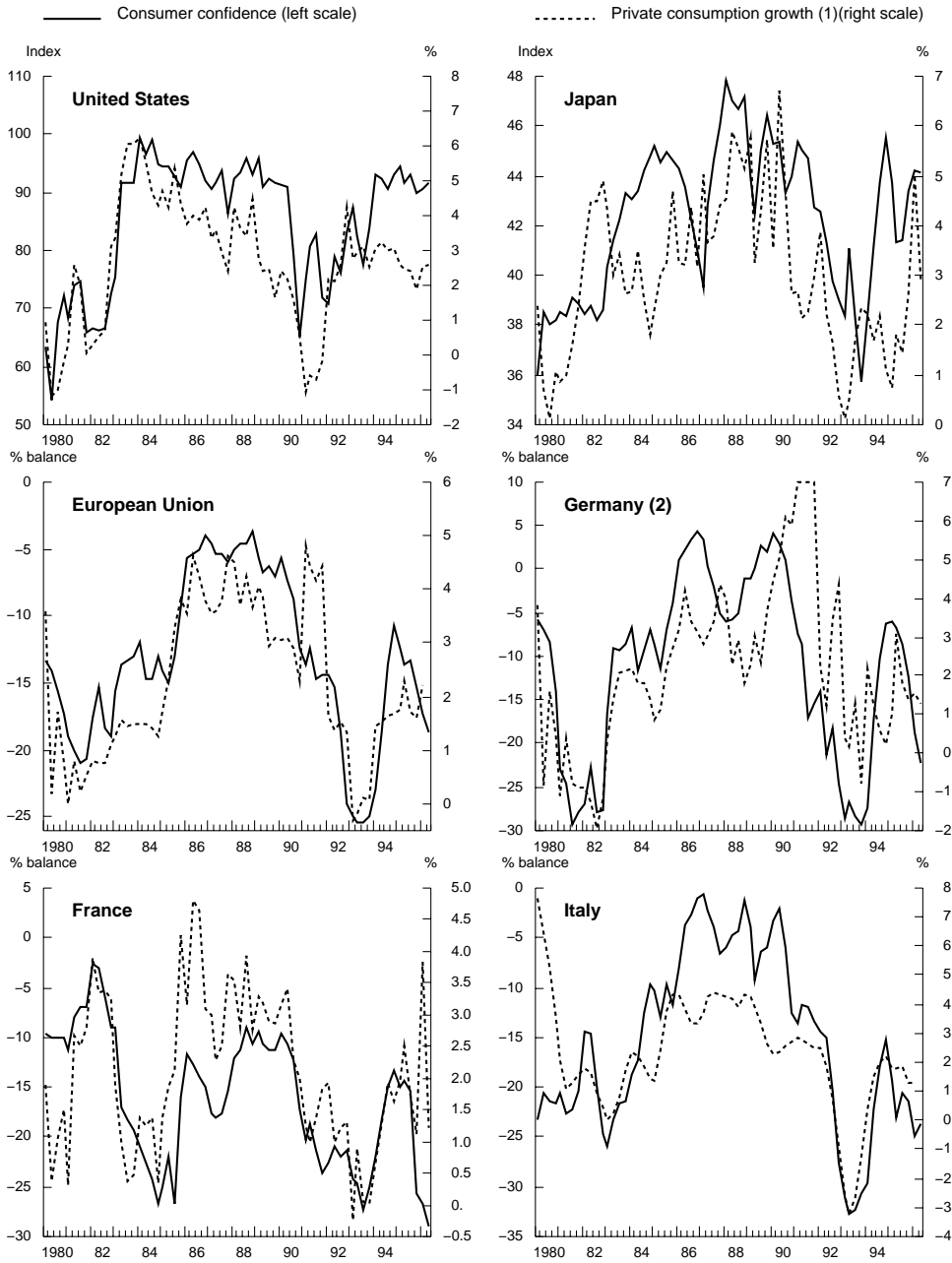
Figure 4. (cont'd) **Business confidence and real business investment**



1. Year-on-year percentage change; total investment for the European Union.
 2. Western Germany data for the business confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

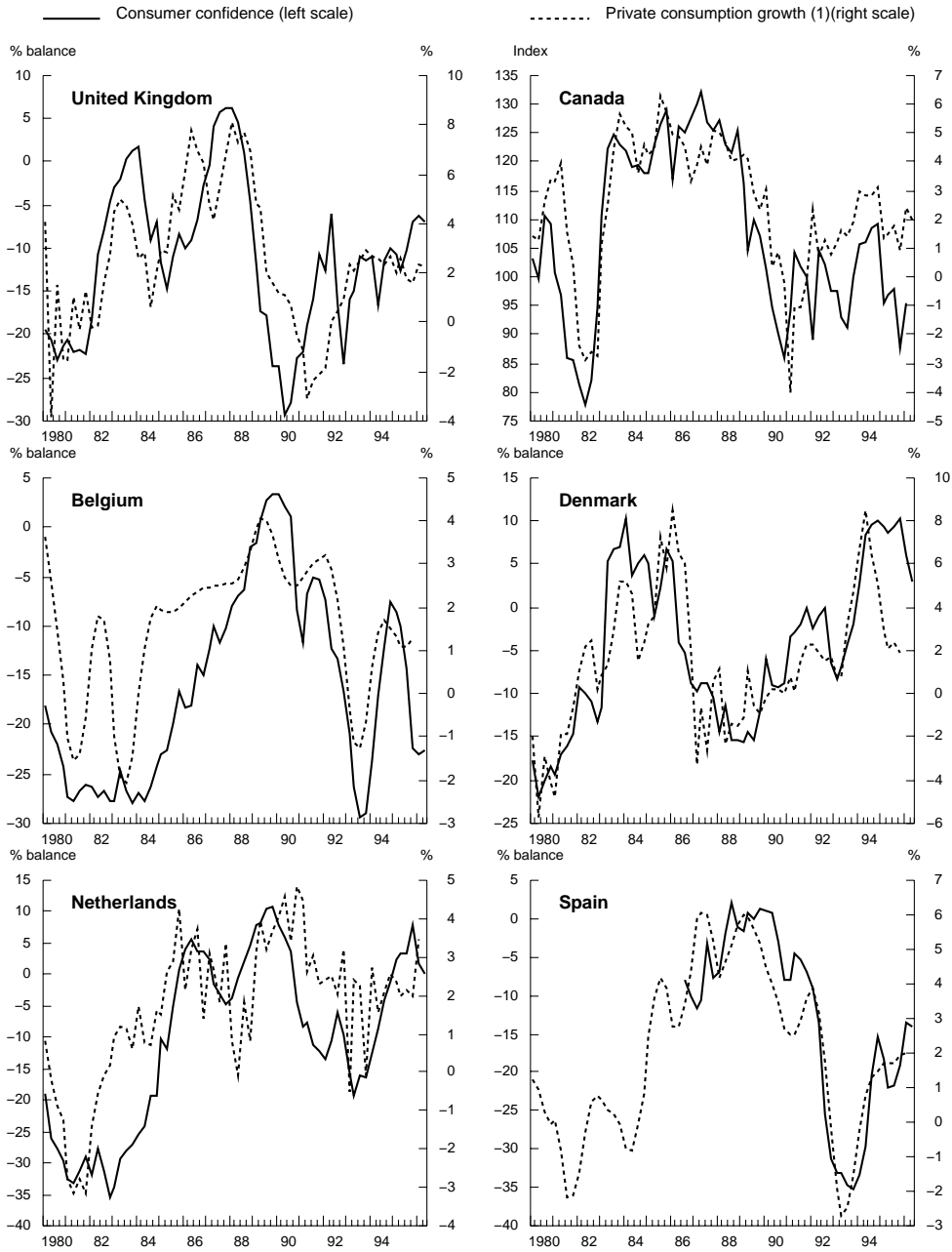
Figure 5. Consumer confidence and real private consumption



1. Year-on-year percentage change.
 2. Western Germany data for the consumer confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

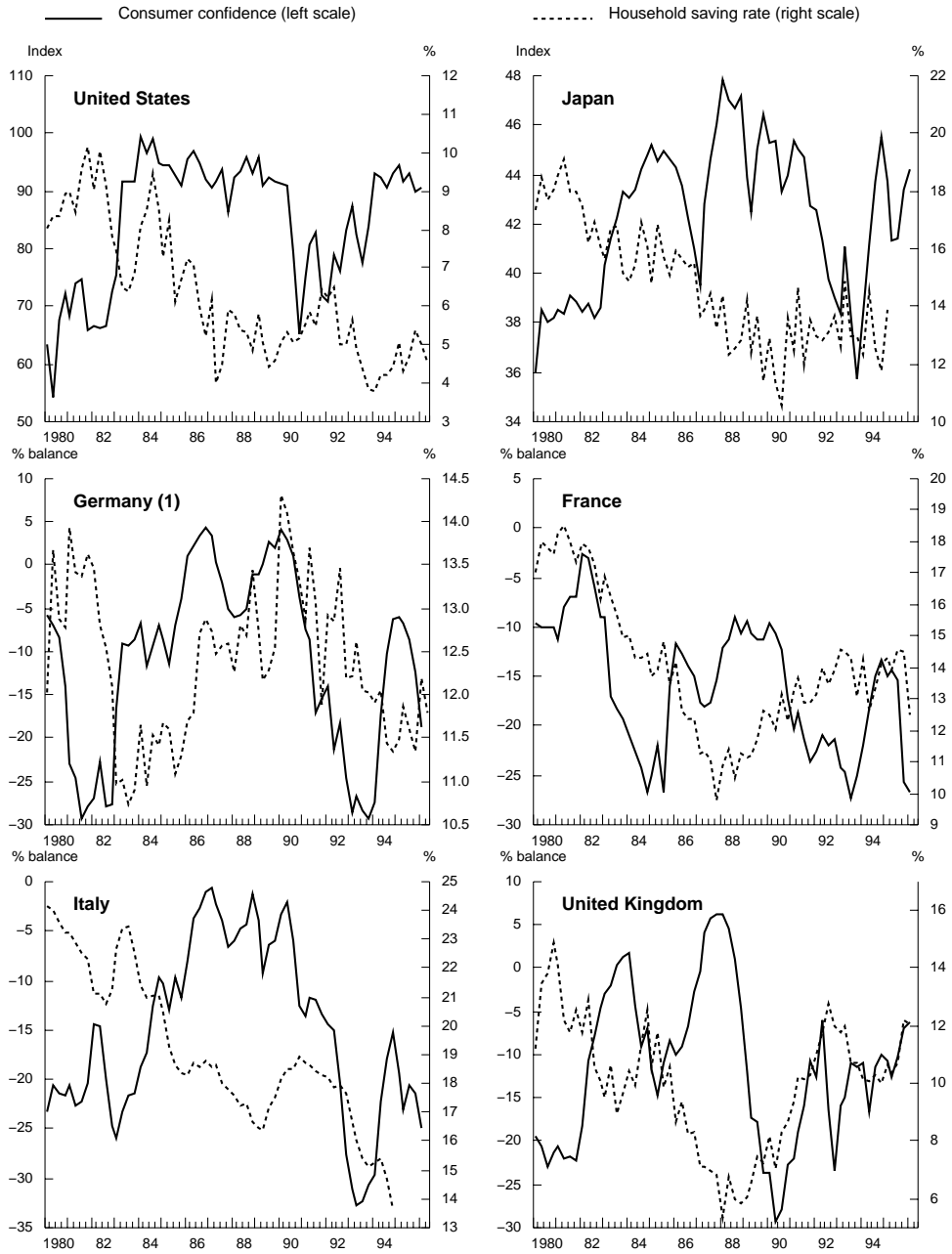
Figure 5. (cont'd) **Consumer confidence and real private consumption**



1. Year-on-year percentage change.
 2. Western Germany data for the consumer confidence series.

Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

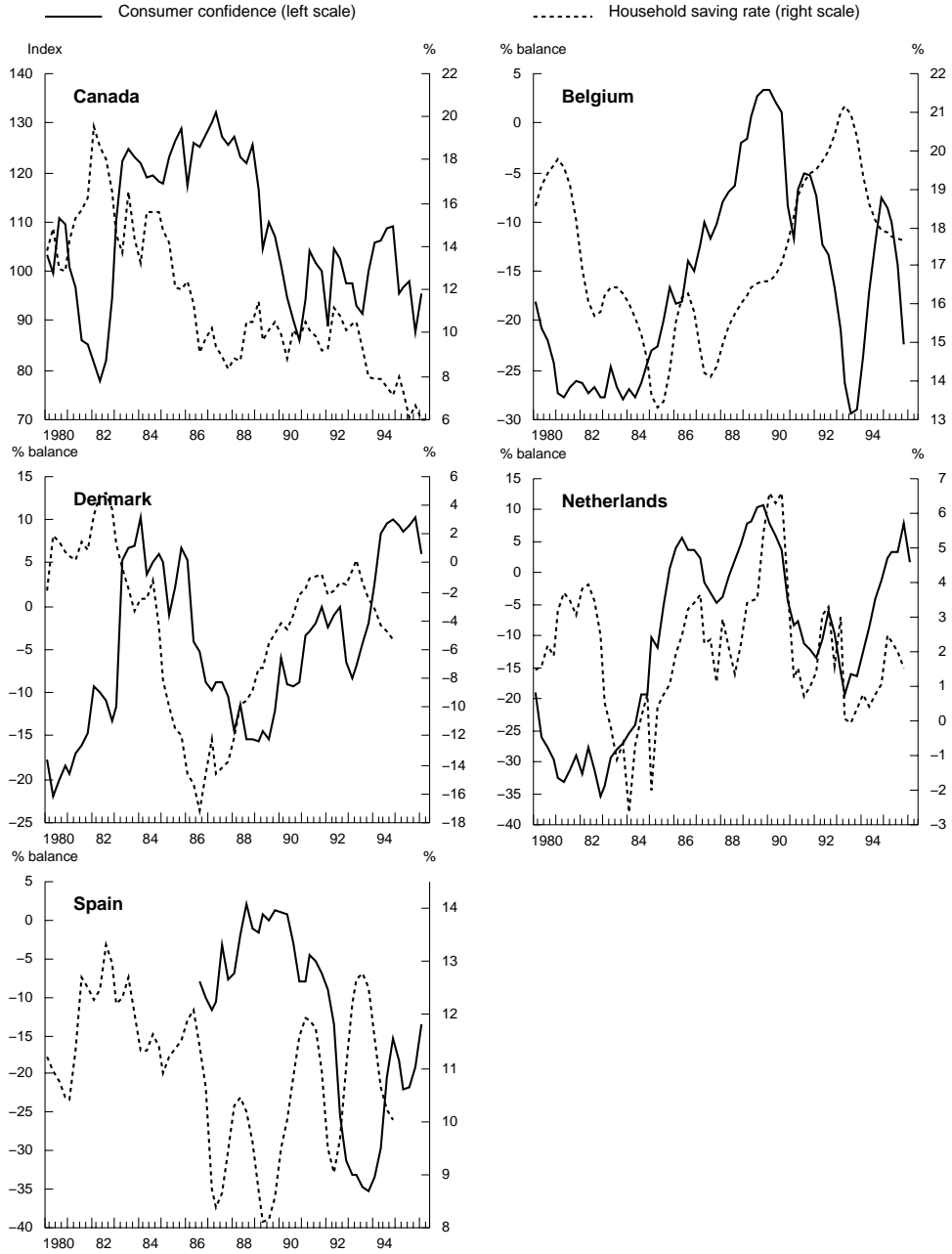
Figure 6. Consumer confidence and household saving rate



1. Western Germany data for the consumer confidence series.

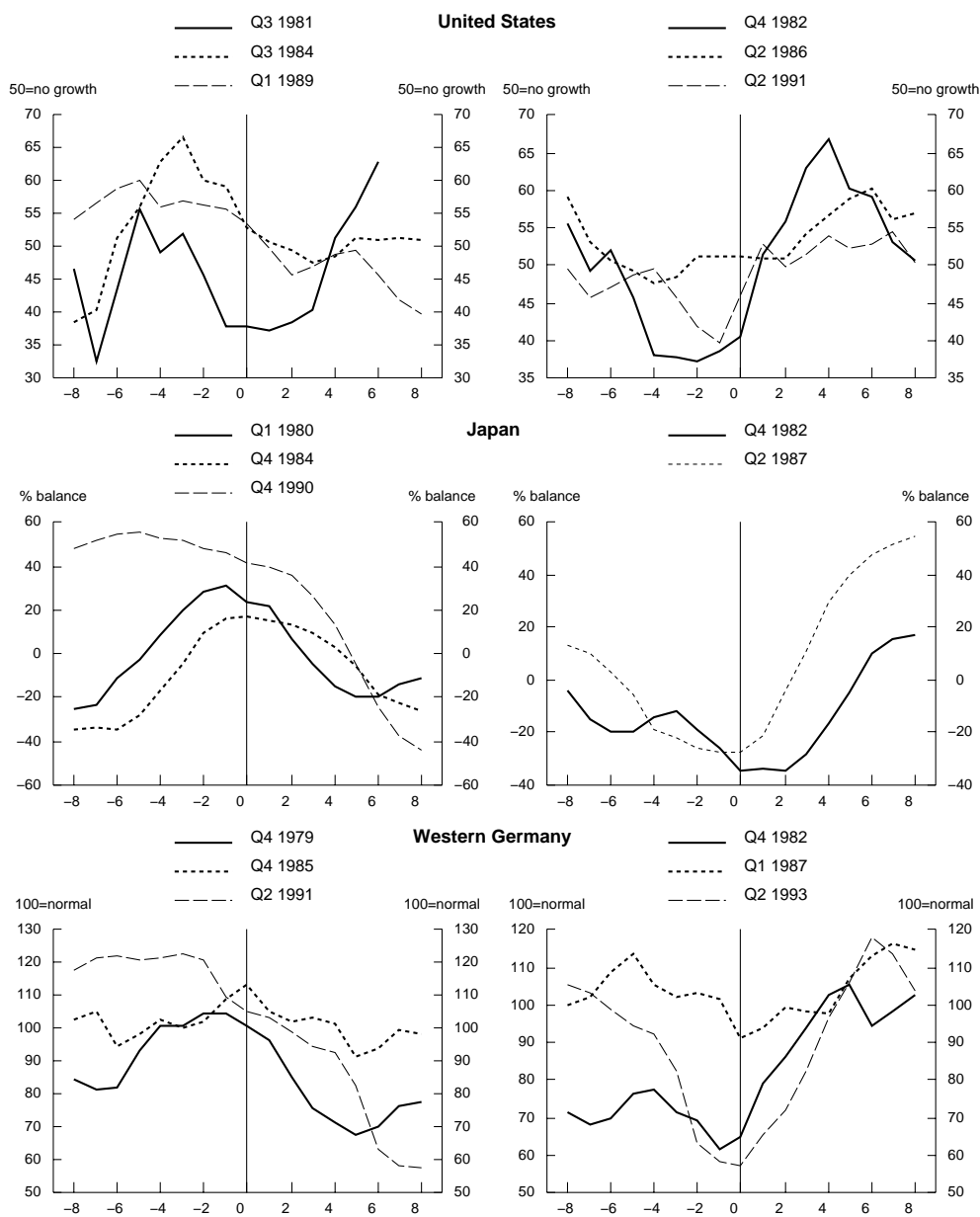
Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

Figure 6. (cont'd) **Consumer confidence and household saving rate**



Sources: OECD, Main Economic Indicators and Analytical Data Bank; EUROSTAT.

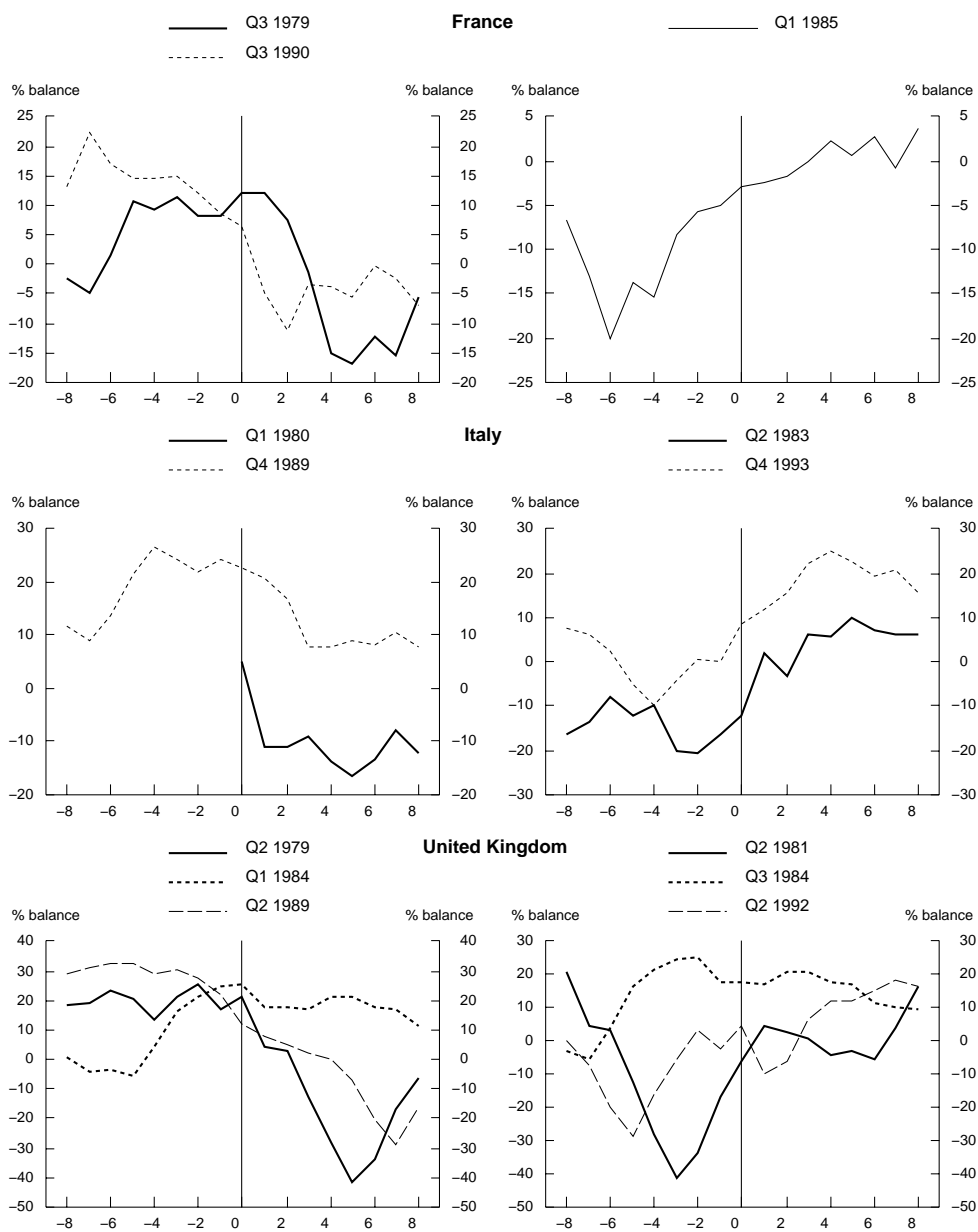
Figure 7. Business confidence and cyclical turning points (1)
Peaks **Troughs**



1. The number of peaks and troughs shown varies in each country according to the availability of the business confidence series.

Sources: OECD, Main Economic Indicators and EUROSTAT.

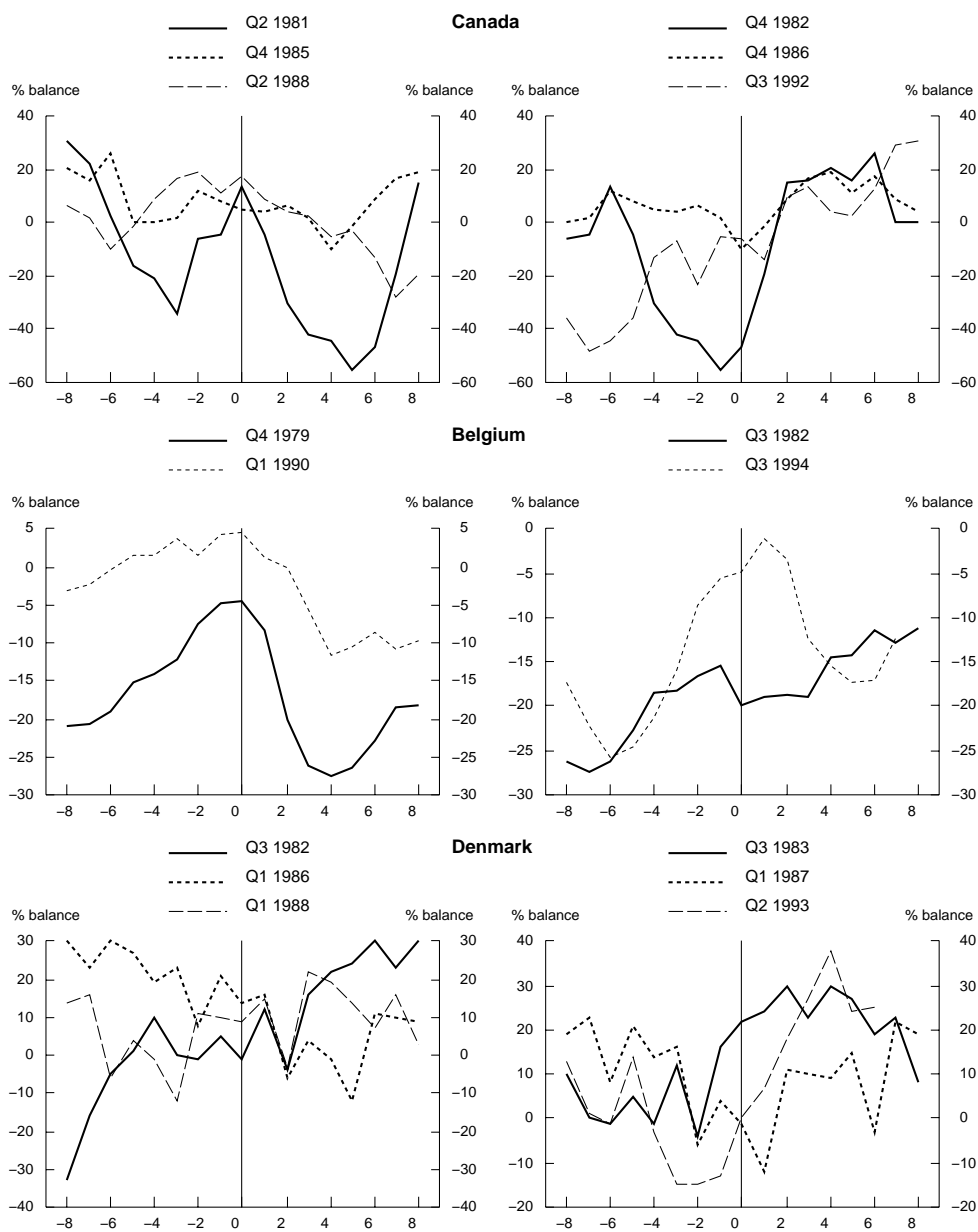
Figure 7.(cont'd) **Business confidence and cyclical turning points (1)**
Peaks **Troughs**



1. The number of peaks and troughs shown varies in each country according to the availability of the business confidence series.

Sources: OECD, Main Economic Indicators and EUROSTAT.

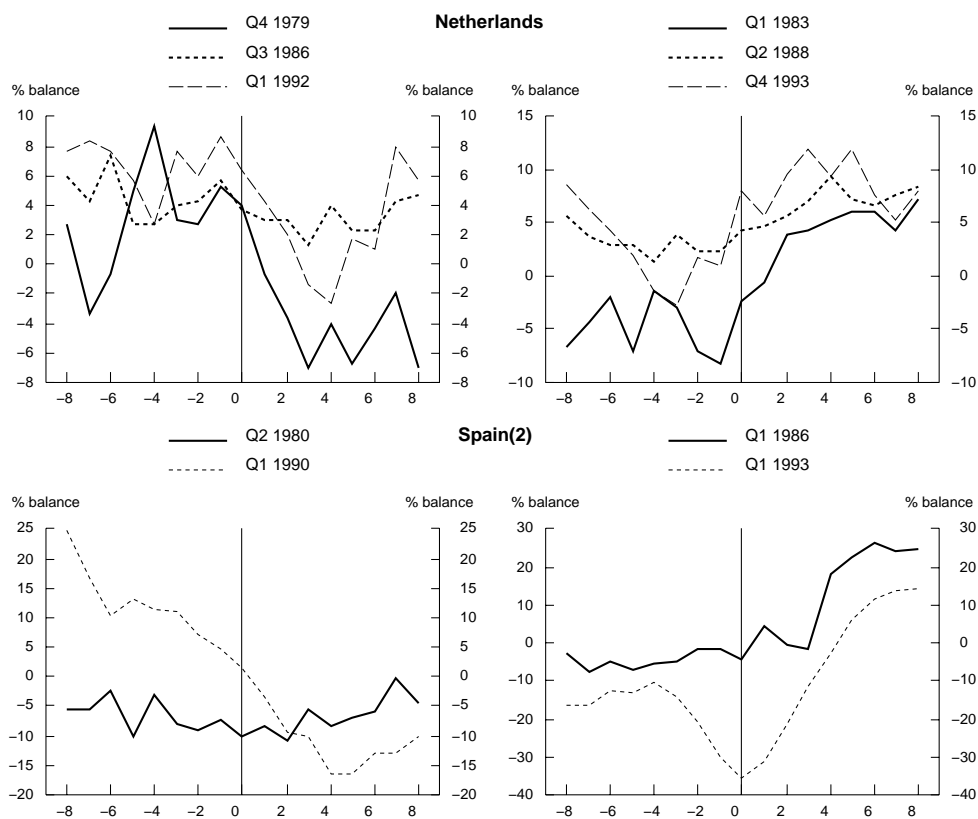
Figure 7.(cont'd) **Business confidence and cyclical turning points (1)**
Peaks **Troughs**



1. The number of peaks and troughs shown varies in each according to the availability of the business confidence series.

Sources: OECD, Main Economic Indicators and EUROSTAT.

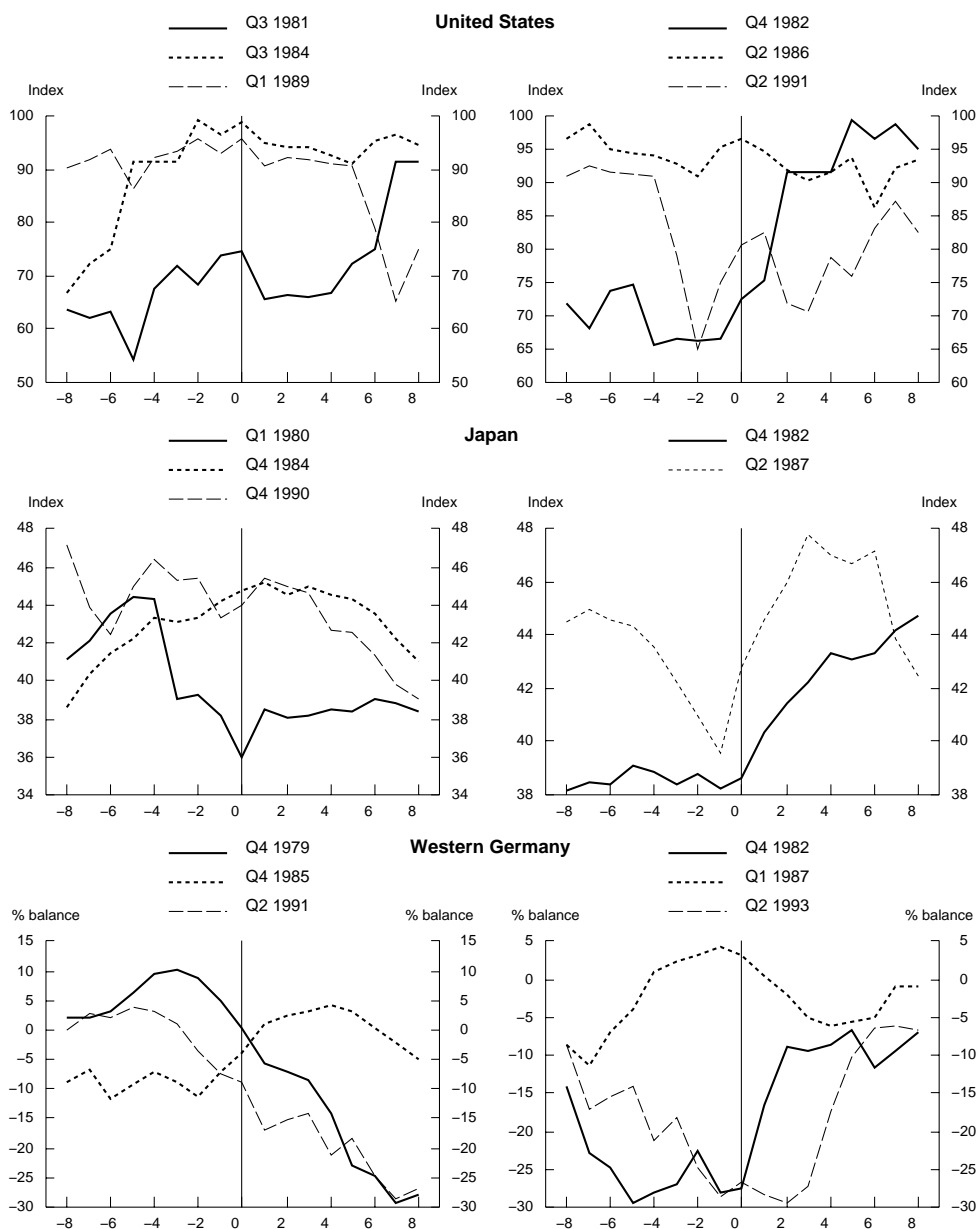
Figure 7.(cont'd) **Business confidence and cyclical turning points (1)**
Peaks **Troughs**



1. The number of peaks and troughs shown varies in each country, according to the availability of the business confidence series.
 2. Production tendency is used to lengthen the period available.

Sources: OECD, Main Economic Indicators and EUROSTAT.

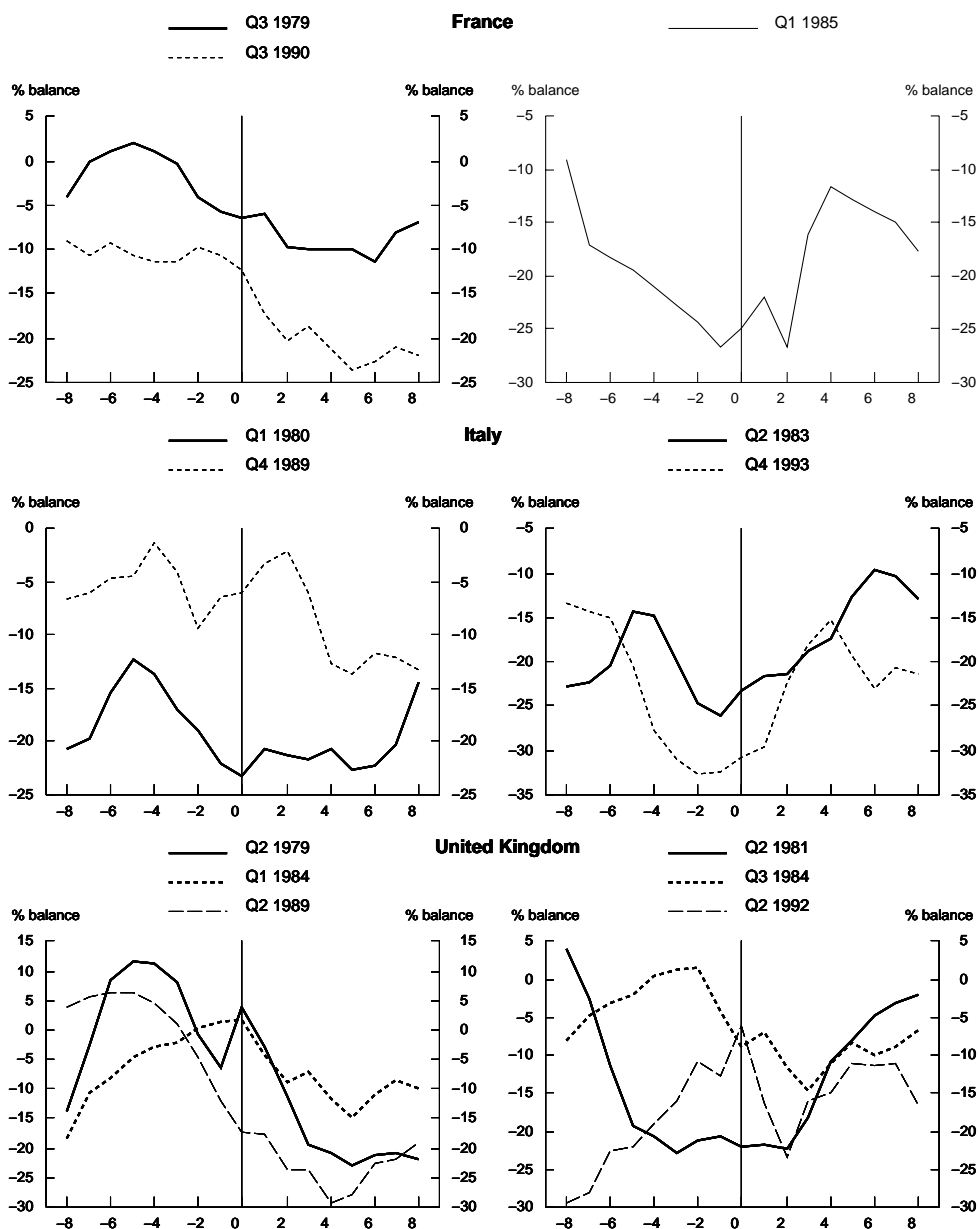
Figure 8. Consumer confidence and cyclical turning points (1)
Peaks **Troughs**



1. The number of peaks and troughs shown varies in each country according to the availability of the consumer confidence series.

Sources: OECD, Main Economic Indicators and EUROSTAT.

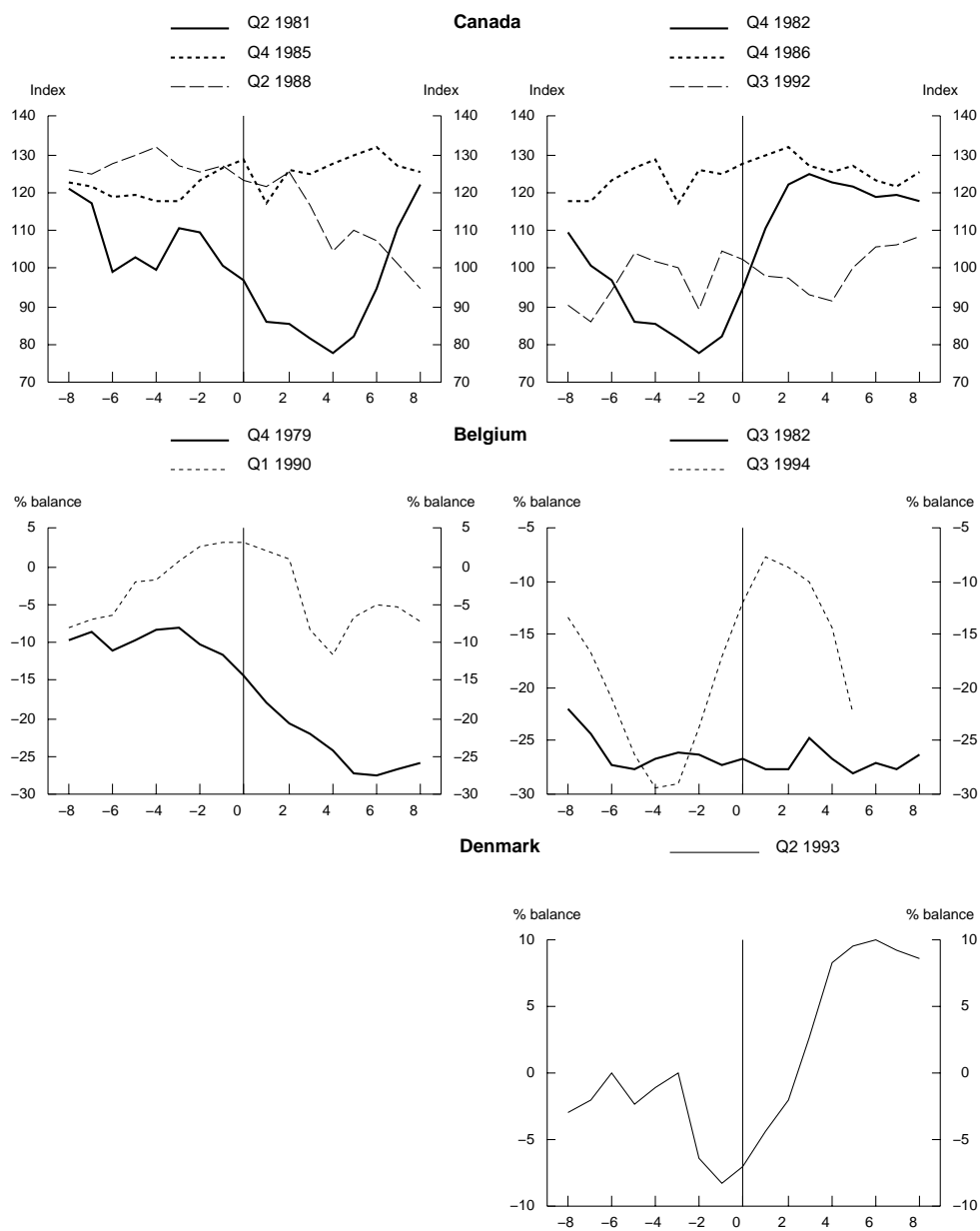
Figure 8.(cont'd) Consumer confidence and cyclical turning points (1)
Peaks Troughs



1. The number of peaks and troughs shown varies in each country according to the availability of the consumer confidence series.

Sources: OECD, Main Economic Indicators and EUROSTAT.

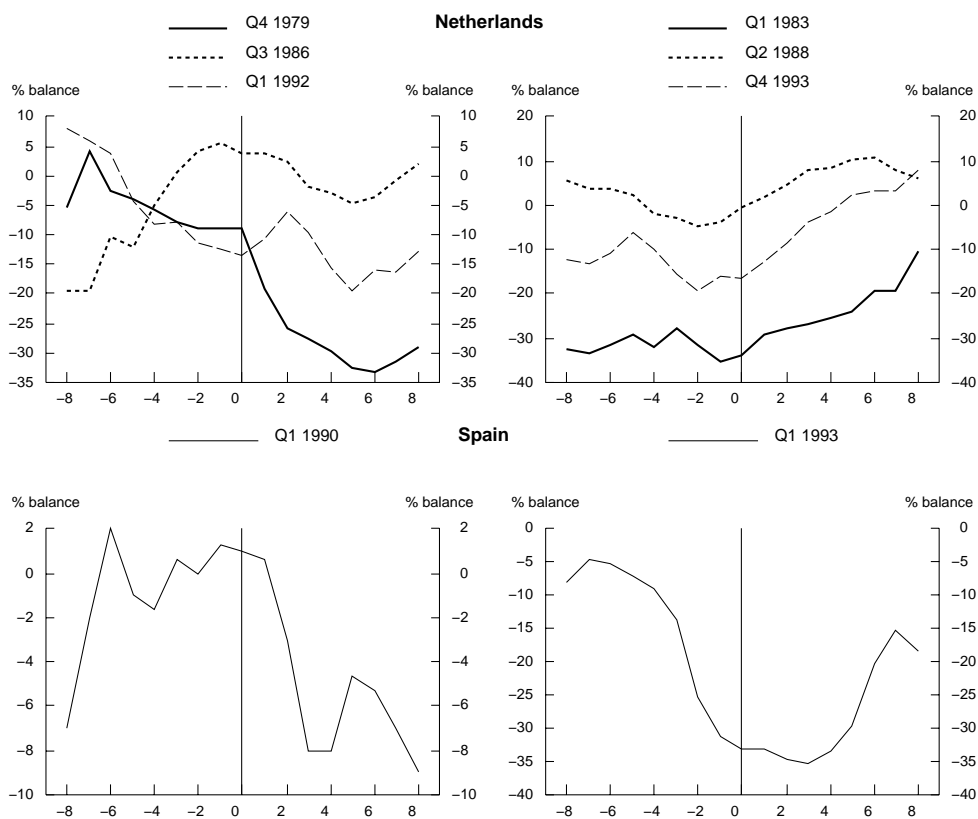
Figure 8.(cont'd) **Consumer confidence and cyclical turning points (1)**
Peaks **Troughs**



1. The number of peaks and troughs shown varies in each country according to the availability of the consumer confidence series.

Sources: OECD, Main Economic Indicators and EUROSTAT.

Figure 8.(cont'd) **Consumer confidence and cyclical turning points (1)**
Peaks **Troughs**



1. The number of peaks and troughs shown varies in each country according to the availability of the consumer confidence series.

Sources: OECD, Main Economic Indicators and EUROSTAT.

Figure 9. Business climate and consumer confidence

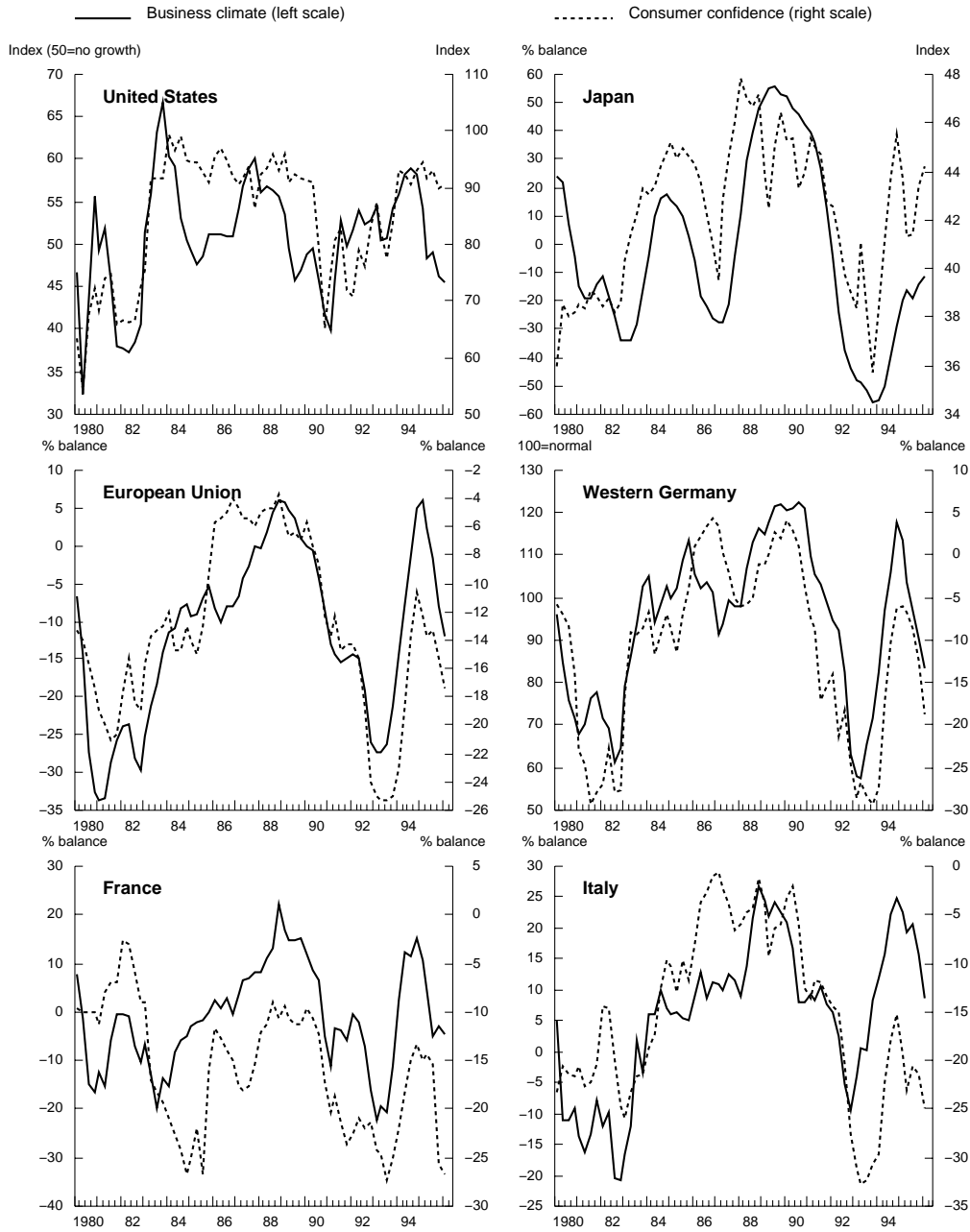
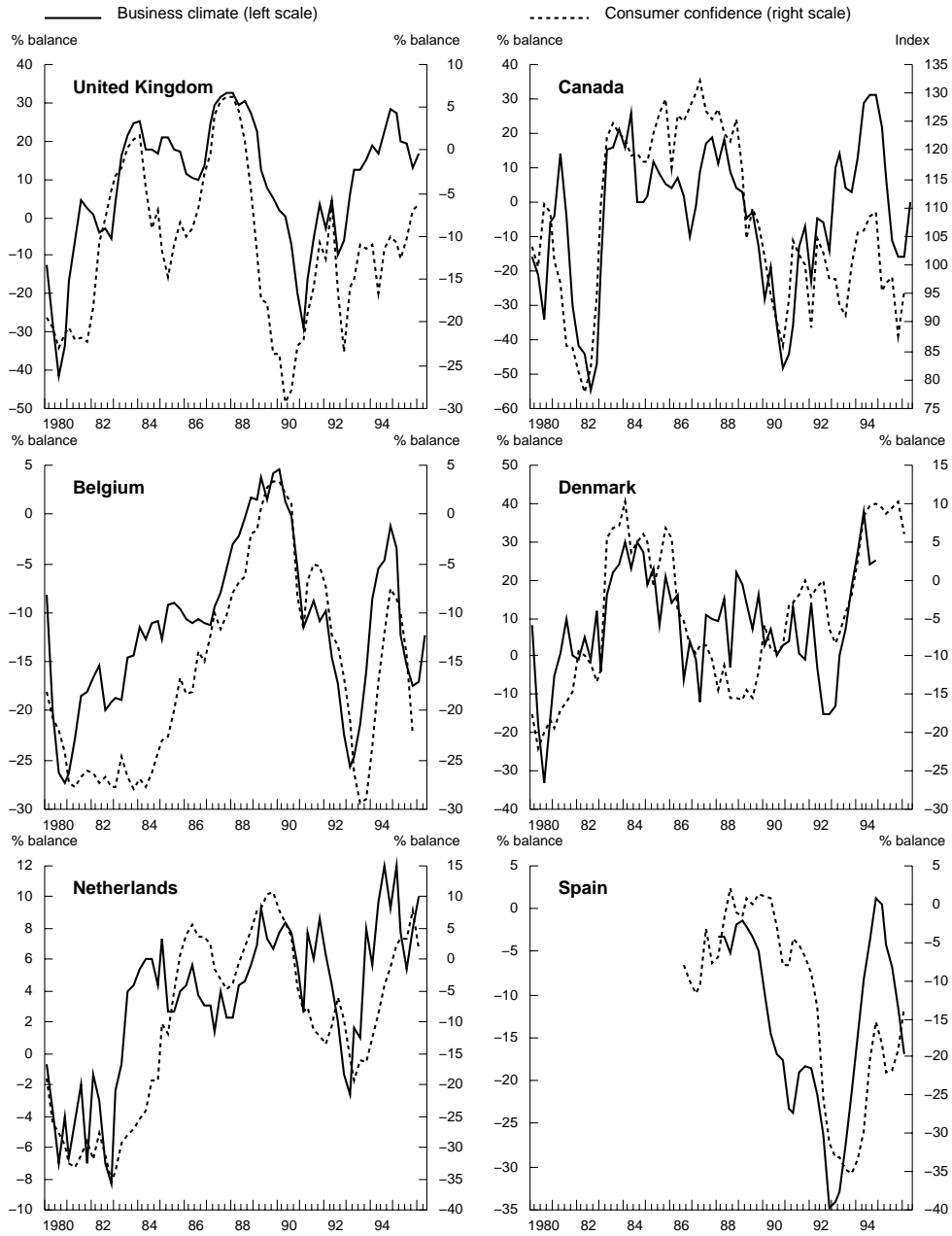


Figure 9. (cont'd) **Business climate and consumer confidence**



Annex 1

Selection of business confidence indicators on the basis of their relationship with economic variables

This annex presents the correlation coefficients between a set of business confidence indicators and the following economic variables: GDP, industrial production and real business investment. Business sentiment indicators are mainly those available in the OECD's MEI database. Tables and figures presented in the main text contain, for each country, the indicator found to have a closest overall relationship with economic variables on the basis of these correlation coefficients and on the results of the Granger causality tests reported in the main text. When very similar results are found for several indicators, one is arbitrarily chosen among them.

The correlation analysis reinforces the view that confidence indicators exhibit a large degree of country specific behaviour. While in some countries, like Italy, Denmark and, to certain extent, Netherlands most sentiment indicators show low correlation with output and investment, in others, like Japan, France, United Kingdom and Spain most indicators are highly correlated with those variables. Similar indicators show a different degree of correlation and a different time pattern in each country.

The sentiment indicators used in the main text and the corresponding original source are the following: composite confidence indicators for United States (National Purchasing Managers Survey), Germany (IFO Institute for Economic Research) and Spain (Industry and Energy Ministry); a general climate indicator for Japan (Bank of Japan, Tankan Survey) and Belgium (National Bank of Belgium); the expected future tendency in production for France (National Institute of Statistics and Economic Studies, INSEE), Italy (National Institute for Short-Term Studies, ISCO), United Kingdom (Confederation of British Industry), and the Netherlands (Central Bureau of Statistics); and the trend of orders' inflow for Canada (Statistics Canada) and Denmark (Statistics Denmark).

Table A1. Business confidence (t) and GDP ^a

Confidence indicators	GDP _{t-3}	GDP _{t-2}	GDP _{t-1}	GDP _t	GDP _{t+1}	GDP _{t+2}	GDP _{t+3}
United States							
Current business climate	-0.04	0.16	0.45	0.73	0.84	0.74	0.53
Capacity utilisation rate	0.44	0.51	0.53	0.46	0.27	0.04	-0.18
Japan							
Current business climate	0.74	0.79	0.81	0.78	0.71	0.63	0.54
Future business climate	0.72	0.77	0.80	0.79	0.73	0.65	0.56
Capacity utilisation index	0.79	0.84	0.85	0.81	0.71	0.61	0.50
Finished goods stocks: level	-0.47	-0.56	-0.63	-0.64	-0.64	-0.61	-0.59
Finished goods stocks: trend	-0.53	-0.62	-0.68	-0.68	-0.66	-0.63	-0.59
Germany							
Business climate	0.24	0.39	0.51	0.60	0.63	0.61	0.56
Production: tendency	0.00	0.15	0.30	0.47	0.53	0.55	0.49
Capacity utilisation rate	0.47	0.56	0.61	0.66	0.63	0.59	0.53
Finished goods stocks: level	-0.30	-0.45	-0.59	-0.69	-0.70	-0.68	-0.60
Order books: level	0.36	0.49	0.59	0.64	0.64	0.61	0.56
Orders inflow: trend	-0.11	0.03	0.20	0.36	0.45	0.52	0.50
Production: future tendency	0.07	0.23	0.37	0.51	0.57	0.56	0.51
France							
Production: tendency	0.40	0.65	0.95	0.91	0.77	0.55	0.33
Capacity utilisation rate	0.68	0.71	0.69	0.59	0.42	0.23	0.11
Finished goods stocks: level	-0.34	-0.59	-0.77	-0.84	-0.74	-0.52	-0.32
Order books: level	0.57	0.75	0.88	0.90	0.75	0.54	0.33
Orders inflow: trend	0.44	0.69	0.86	0.86	0.81	0.46	0.25
Production: future tendency	0.34	0.54	0.76	0.87	0.84	0.65	0.42
Prospects industrial sector	0.26	0.50	0.70	0.81	0.75	0.58	0.37
Italy							
Production: tendency	0.27	0.35	0.48	0.62	0.34	0.57	0.47
Prospects for total economy	0.21	0.34	0.45	0.56	0.62	0.62	0.56
Capacity utilisation rate	0.41	0.40	0.46	0.49	0.41	0.28	0.15
Finished goods stocks: level	-0.22	-0.35	-0.48	-0.63	-0.61	-0.52	-0.43
Order books: level	0.35	0.49	0.60	0.71	0.67	0.55	0.42
Order books: tendency	0.09	0.17	0.27	0.41	0.52	0.53	0.45
Orders inflow: trend	0.10	0.16	0.25	0.44	0.55	0.59	0.57
Production: future tendency	0.21	0.34	0.43	0.55	0.59	0.55	0.46
United Kingdom							
Production: tendency	0.70	0.81	0.88	0.86	0.75	0.59	0.45
Business climate	0.24	0.41	0.61	0.74	0.82	0.77	0.69
Capacity utilisation (full)	0.77	0.75	0.70	0.60	0.47	0.31	0.16
Finished goods stocks: level	-0.65	-0.73	-0.83	-0.83	-0.73	-0.60	-0.44
Finished goods stocks: tendency	0.74	0.72	0.57	0.39	0.21	0.09	0.00
Order books: level	0.80	0.84	0.83	0.77	0.66	0.51	0.37
Orders inflow: trend	0.64	0.76	0.87	0.88	0.82	0.69	0.54
Production: future tendency	0.53	0.66	0.79	0.86	0.87	0.76	0.62

a) Quarterly data, year on year growth of GDP. The highlighted figures indicate the timing relationship for which the correlation is highest for each indicator in every country.

Table A1. **Business confidence (t) and GDP** ^a (continued)

Confidence indicators	GDP _{t-3}	GDP _{t-2}	GDP _{t-1}	GDP _t	GDP _{t+1}	GDP _{t+2}	GDP _{t+3}
Canada							
Capacity utilisation rate	0.58	0.67	0.72	0.69	0.55	0.33	0.10
Finished goods stocks: level	-0.24	-0.47	-0.68	-0.82	-0.80	-0.62	-0.38
Order books: level	0.44	0.65	0.81	0.88	0.79	0.59	0.34
Orders inflow: trend	0.15	0.41	0.66	0.85	0.86	0.81	0.47
Production: future tendency	0.09	0.29	0.50	0.71	0.73	0.58	0.33
Belgium							
Production: tendency	-0.02	0.07	0.26	0.49	0.64	0.68	0.58
Capacity utilisation rate	0.29	0.37	0.47	0.57	0.62	0.60	0.51
Finished goods stocks: level	0.07	0.02	-0.14	-0.37	-0.56	-0.67	-0.64
Prospects for manufacturing	0.10	0.21	0.37	0.57	0.69	0.71	0.63
Perspectives total economy	0.19	0.28	0.42	0.60	0.71	0.73	0.64
Order books: level	0.27	0.39	0.54	0.68	0.72	0.68	0.56
Orders inflow : trend	0.06	0.19	0.34	0.54	0.64	0.67	0.59
Production: future tendency	0.02	0.12	0.28	0.47	0.61	0.66	0.60
Denmark							
Production: tendency	0.36	0.39	0.57	0.63	0.46	0.38	0.30
Capacity utilisation rate	0.43	0.53	0.52	0.47	0.39	0.20	0.08
Finished goods stocks: level	-0.23	-0.29	-0.28	-0.47	-0.42	-0.41	-0.39
Order books: level	0.37	0.52	0.62	0.67	0.55	0.40	0.27
Orders inflow: trend	0.19	0.30	0.55	0.65	0.59	0.53	0.33
Production: future tendency	0.24	0.39	0.47	0.57	0.62	0.56	0.45
Netherlands							
Production: tendency	0.21	0.35	0.50	0.60	0.61	0.56	0.49
Capacity utilisation rate	0.53	0.62	0.69	0.71	0.65	0.54	0.44
Finished goods stocks: level	-0.43	-0.54	-0.63	-0.65	-0.59	-0.54	-0.49
Order books: level	0.53	0.62	0.70	0.71	0.59	0.49	0.42
Orders inflow: trend	0.25	0.22	0.35	0.64	0.61	0.49	0.45
Production: future tendency	0.38	0.44	0.53	0.63	0.65	0.56	0.44
Spain							
Production: tendency	0.41	0.58	0.73	0.83	0.86	0.83	0.76
Business climate	0.29	0.50	0.70	0.84	0.85	0.80	0.70
Capacity utilisation rate	0.50	0.56	0.60	0.59	0.55	0.49	0.41
Finished goods stocks: level	-0.31	-0.47	-0.63	-0.74	-0.80	-0.81	-0.78
Order books: level	0.52	0.66	0.77	0.83	0.83	0.78	0.69
Order books: trend	0.50	0.59	0.69	0.77	0.81	0.80	0.75
Production: future tendency	0.43	0.57	0.71	0.82	0.86	0.83	0.76

a) Quarterly data, year on year growth of GDP. The highlighted figures indicate the timing relationship for which the correlation is highest for each indicator in every country.

Table A2. **Business confidence (t) and industrial production (IP)** ^a

Confidence indicators	IP _{t-3}	IP _{t-2}	IP _{t-1}	IP _t	IP _{t+1}	IP _{t+2}	IP _{t+3}
United States							
Current business climate	-0.02	0.17	0.47	0.79	0.89	0.80	0.59
Capacity utilisation rate	0.49	0.55	0.59	0.53	0.33	0.09	-0.16
Japan							
Current business climate	0.77	0.79	0.75	0.63	0.42	0.20	0.00
Future business climate	0.74	0.77	0.75	0.66	0.49	0.28	0.08
Capacity utilisation index	0.68	0.67	0.66	0.59	0.39	0.17	-0.04
Finished goods stocks: level	-0.47	-0.60	-0.73	-0.74	-0.63	-0.47	-0.28
Finished goods stocks: trend	-0.56	-0.67	-0.78	-0.78	-0.64	-0.43	-0.21
Germany							
Business climate	0.50	0.67	0.81	0.89	0.80	0.66	0.46
Production: tendency	0.26	0.43	0.63	0.88	0.86	0.79	0.61
Capacity utilisation rate	0.61	0.66	0.70	0.72	0.56	0.41	0.23
Finished goods stocks: level	-0.57	-0.71	-0.82	-0.86	-0.77	-0.61	-0.41
Order books: level	0.67	0.78	0.84	0.84	0.70	0.54	0.35
Orders inflow: trend	0.04	0.23	0.47	0.75	0.83	0.81	0.68
Production: future tendency	0.27	0.47	0.65	0.86	0.88	0.76	0.59
France							
Production: tendency	0.41	0.65	0.85	0.90	0.74	0.51	0.27
Capacity utilisation rate	0.65	0.69	0.66	0.56	0.37	0.16	0.00
Finished goods stocks: level	-0.28	-0.53	-0.71	-0.80	-0.68	-0.49	-0.32
Order books: level	0.52	0.69	0.81	0.82	0.65	0.44	0.23
Orders inflow: trend	0.43	0.69	0.86	0.86	0.68	0.43	0.22
Production: future tendency	0.34	0.49	0.71	0.82	0.75	0.56	0.33
Prospects industrial sector	0.34	0.55	0.72	0.80	0.71	0.54	0.33
Italy							
Production: tendency	0.38	0.50	0.57	0.66	0.65	0.58	0.43
Prospects for total economy	0.28	0.39	0.51	0.61	0.66	0.61	0.51
Capacity utilisation rate	0.50	0.49	0.51	0.53	0.44	0.27	0.14
Finished goods stocks: level	-0.35	-0.49	-0.61	-0.73	-0.72	-0.60	-0.49
Order books: level	0.47	0.61	0.70	0.77	0.70	0.55	0.39
Order books: tendency	0.22	0.30	0.39	0.53	0.62	0.60	0.49
Orders inflow: trend	0.20	0.30	0.37	0.52	0.67	0.68	0.60
Production: future tendency	0.32	0.43	0.54	0.63	0.67	0.58	0.46
United Kingdom							
Production: tendency	0.57	0.74	0.87	0.89	0.80	0.62	0.44
Business climate	0.08	0.27	0.51	0.70	0.83	0.81	0.71
Capacity utilisation (full)	0.76	0.78	0.76	0.69	0.57	0.41	0.25
Finished goods stocks: level	-0.53	-0.67	-0.83	-0.88	-0.82	-0.69	-0.49
Finished goods stocks: tendency	0.78	0.79	0.65	0.42	0.16	-0.02	-0.11
Order books: level	0.76	0.83	0.86	0.82	0.71	0.57	0.41
Orders inflow: trend	0.50	0.68	0.84	0.90	0.86	0.71	0.53
Production: future tendency	0.40	0.54	0.71	0.85	0.90	0.83	0.67

a) Quarterly data, year on year growth of industrial production. The highlighted figures indicate the timing relationship for which the correlation is highest for each indicator in every country.

Table A2. **Business confidence (t) and industrial production (IP)** ^a (continued)

Confidence indicators	IP _{t-3}	IP _{t-2}	IP _{t-1}	IP _t	IP _{t+1}	IP _{t+2}	IP _{t+3}
Canada							
Capacity utilisation rate	0.57	0.62	0.62	0.54	0.35	0.09	-0.16
Finished goods stocks: level	-0.29	-0.51	-0.71	-0.80	-0.72	-0.50	-0.21
Order books: level	0.47	0.64	0.77	0.78	0.63	0.41	0.13
Orders inflow: trend	0.25	0.49	0.72	0.87	0.82	0.63	0.34
Production: future tendency	0.11	0.33	0.53	0.72	0.70	0.52	0.21
Belgium							
Production: tendency	0.21	0.32	0.57	0.73	0.69	0.57	0.43
Capacity utilisation rate	0.50	0.53	0.57	0.60	0.51	0.35	0.20
Finished goods stocks: level	-0.07	-0.16	-0.38	-0.51	-0.56	-0.44	-0.35
Prospects for manufacturing	0.35	0.47	0.65	0.77	0.73	0.57	0.40
Perspectives total economy	0.39	0.50	0.64	0.73	0.67	0.50	0.33
Order books: level	0.52	0.60	0.71	0.74	0.63	0.46	0.29
Orders inflow: trend	0.39	0.48	0.63	0.77	0.70	0.59	0.41
Production: future tendency	0.30	0.44	0.59	0.72	0.75	0.61	0.44
Denmark							
Production: tendency	0.11	0.36	0.49	0.71	0.54	0.44	0.30
Capacity utilisation rate	0.42	0.52	0.59	0.56	0.43	0.24	0.05
Finished goods stocks: level	-0.10	-0.17	-0.19	-0.40	-0.46	-0.36	-0.35
Order books: level	0.19	0.37	0.58	0.74	0.72	0.56	0.34
Orders inflow: trend	-0.04	0.12	0.31	0.67	0.70	0.63	0.45
Production: future tendency	0.16	0.28	0.41	0.49	0.65	0.54	0.47
Netherlands							
Production: tendency	0.15	0.35	0.50	0.63	0.71	0.62	0.44
Capacity utilisation rate	0.50	0.55	0.60	0.59	0.54	0.43	0.28
Finished goods stocks: level	-0.36	-0.43	-0.49	-0.52	-0.48	-0.42	-0.35
Order books: level	0.50	0.62	0.69	0.70	0.57	0.42	0.27
Orders inflow: trend	0.24	0.27	0.41	0.70	0.70	0.61	0.50
Production: future tendency	0.26	0.36	0.49	0.57	0.62	0.52	0.35
Spain							
Production: tendency	0.45	0.61	0.74	0.81	0.78	0.66	0.50
Business climate	0.33	0.57	0.79	0.91	0.87	0.71	0.49
Capacity utilisation rate	0.38	0.43	0.45	0.41	0.33	0.22	0.10
Finished goods stocks: level	-0.38	-0.56	-0.74	-0.85	-0.85	-0.78	-0.67
Order books: level	0.55	0.69	0.79	0.83	0.77	0.65	0.49
Order books: trend	0.46	0.56	0.66	0.74	0.74	0.67	0.55
Production: future tendency	0.43	0.57	0.71	0.82	0.80	0.70	0.53

a) Quarterly data, year on year growth of the industrial production. The highlighted figures indicate the timing relationship for which the correlation is highest for each indicator in every country.

Table A3. **Business confidence (t) and business investment (BI)** ^a

Confidence indicators	BI _{t-3}	BI _{t-2}	BI _{t-1}	BI _t	BI _{t+1}	BI _{t+2}	BI _{t+3}
United States							
Current business climate	-0.33	-0.21	0.03	0.35	0.60	0.75	0.74
Capacity utilisation rate	0.21	0.34	0.47	0.54	0.49	0.36	0.16
Japan							
Current business climate	0.78	0.85	0.88	0.86	0.79	0.67	0.51
Future business climate	0.74	0.81	0.86	0.85	0.79	0.69	0.55
Capacity utilisation index	0.82	0.86	0.86	0.83	0.74	0.61	0.45
Finished goods stocks: level	-0.42	-0.53	-0.64	-0.71	-0.75	-0.73	-0.67
Finished goods stocks: trend	-0.50	-0.61	-0.71	-0.77	-0.78	-0.75	-0.66
Germany							
Business climate	0.29	0.45	0.58	0.66	0.67	0.67	0.62
Production: tendency	0.05	0.20	0.35	0.53	0.56	0.63	0.59
Capacity utilisation rate	0.50	0.59	0.66	0.71	0.65	0.61	0.54
Finished goods stocks: level	-0.36	-0.52	-0.64	-0.73	-0.75	-0.73	-0.66
Order books: level	0.42	0.57	0.67	0.72	0.70	0.68	0.62
Orders inflow: trend	-0.11	0.06	0.23	0.39	0.45	0.53	0.55
Production: future tendency	0.09	0.27	0.41	0.55	0.60	0.61	0.57
France							
Production: tendency	0.42	0.58	0.73	0.83	0.83	0.75	0.61
Capacity utilisation rate	0.72	0.77	0.80	0.76	0.66	0.52	0.37
Finished goods stocks: level	-0.30	-0.45	-0.61	-0.73	-0.75	-0.69	-0.57
Order books: level	0.57	0.70	0.90	0.85	0.81	0.70	0.54
Orders inflow: trend	0.42	0.58	0.74	0.81	0.79	0.68	0.52
Production: future tendency	0.44	0.55	0.68	0.79	0.83	0.77	0.64
Prospects industrial sector	0.35	0.50	0.63	0.75	0.78	0.74	0.63
Italy							
Production: tendency	0.26	0.34	0.45	0.58	0.64	0.62	0.54
Prospects for total economy	0.13	0.24	0.40	0.56	0.66	0.70	0.66
Capacity utilisation rate	0.46	0.48	0.52	0.54	0.47	0.37	0.26
Finished goods stocks: level	-0.22	-0.34	-0.47	-0.60	-0.60	-0.53	-0.43
Order books: level	0.35	0.48	0.61	0.72	0.70	0.61	0.49
Order books: tendency	0.10	0.17	0.28	0.43	0.53	0.56	0.51
Orders inflow: trend	0.06	0.14	0.26	0.44	0.57	0.62	0.58
Production: future tendency	0.23	0.33	0.43	0.56	0.62	0.62	0.54
United Kingdom							
Production: tendency	0.54	0.64	0.71	0.74	0.70	0.62	0.51
Business climate	0.08	0.20	0.34	0.51	0.62	0.68	0.66
Capacity utilisation (full)	0.64	0.64	0.61	0.55	0.44	0.32	0.19
Finished goods stocks: level	-0.52	-0.63	-0.73	-0.76	-0.74	-0.67	-0.52
Finished goods stocks: tendency	0.61	0.63	0.57	0.50	0.33	0.15	0.02
Order books: level	0.69	0.73	0.76	0.73	0.65	0.55	0.40
Orders inflow: trend	0.46	0.56	0.66	0.73	0.72	0.68	0.58
Production: future tendency	0.39	0.48	0.58	0.68	0.72	0.71	0.62

a) Quarterly data, year on year growth in investment. The highlighted figures indicate the timing relationship for which the correlation is highest for each indicator in every country.

Table A3. **Business confidence (t) and business investment (BI)** ^a (continued)

Confidence indicators	BI _{t-3}	BI _{t-2}	BI _{t-1}	BI _t	BI _{t+1}	BI _{t+2}	BI _{t+3}
Canada							
Capacity utilisation rate	0.30	0.48	0.61	0.70	0.69	0.60	0.47
Finished goods stocks: level	0.03	-0.16	-0.34	-0.53	-0.58	-0.52	-0.47
Order books: level	0.15	0.35	0.48	0.64	0.63	0.54	0.45
Orders inflow: trend	-0.13	0.07	0.25	0.43	0.51	0.45	0.39
Production: future tendency	-0.01	0.13	0.24	0.43	0.50	0.40	0.32
Belgium							
Production: tendency	0.34	0.45	0.58	0.69	0.75	0.74	0.66
Capacity utilisation rate	0.73	0.75	0.76	0.73	0.67	0.58	0.46
Finished goods stocks: level	-0.34	-0.40	-0.48	-0.55	-0.60	-0.60	-0.53
Prospects for manufacturing	0.52	0.61	0.71	0.78	0.81	0.78	0.67
Perspectives total economy	0.61	0.68	0.75	0.80	0.81	0.75	0.63
Order books: level	0.66	0.73	0.80	0.84	0.82	0.74	0.61
Orders inflow: trend	0.51	0.63	0.73	0.79	0.79	0.75	0.66
Production: future tendency	0.39	0.49	0.61	0.72	0.79	0.78	0.69
Denmark							
Production: tendency	0.17	0.26	0.32	0.42	0.45	0.41	0.34
Capacity utilisation rate	0.30	0.36	0.38	0.43	0.43	0.37	0.27
Finished goods stocks: level	-0.06	-0.03	-0.04	-0.13	-0.27	-0.37	-0.40
Order books: level	0.16	0.28	0.37	0.48	0.54	0.53	0.44
Orders inflow: trend	0.04	0.12	0.25	0.34	0.46	0.54	0.50
Production: future tendency	0.08	0.24	0.27	0.42	0.44	0.48	0.46
Netherlands							
Production: tendency	0.13	0.19	0.29	0.38	0.34	0.37	0.29
Capacity utilisation rate	0.32	0.38	0.39	0.39	0.33	0.27	0.19
Finished goods stocks: level	-0.32	-0.38	-0.42	-0.41	-0.33	-0.28	-0.21
Order books: level	0.29	0.34	0.39	0.41	0.30	0.28	0.21
Orders inflow: trend	0.20	0.03	0.16	0.40	0.32	0.32	0.28
Production: future tendency	0.21	0.18	0.31	0.31	0.37	0.28	0.22
Spain							
Production: tendency	0.45	0.58	0.69	0.78	0.78	0.73	0.64
Business climate	0.22	0.44	0.68	0.88	0.87	0.79	0.65
Capacity utilisation rate	0.40	0.45	0.48	0.48	0.43	0.37	0.28
Finished goods stocks: level	-0.25	-0.39	-0.55	-0.70	-0.75	-0.76	-0.70
Order books: level	0.52	0.63	0.73	0.81	0.78	0.70	0.59
Order books: trend	0.45	0.54	0.62	0.71	0.75	0.75	0.70
Production: future tendency	0.40	0.51	0.61	0.68	0.68	0.64	0.58

a) Quarterly data, year on year growth in investment. The highlighted figures indicate the timing relationship for which the correlation is highest for each indicator in every country.

Annex 2

Relationship between consumer confidence and demand indicators

Original sources for consumer confidence indicators are the following: the Conference Board for the United States and Canada, the Economic Planning Agency for Japan, and the Commission of the European Communities for the EU countries.

Table A4. Correlation between consumer confidence and economic variables ^a

<i>Consumer confidence (t) and new car registrations (NC)</i>							
	NC _{t-3}	NC _{t-2}	NC _{t-1}	NC _t	NC _{t+1}	NC _{t+2}	NC _{t+3}
United States	0.46	0.45	0.39	0.35	0.22	0.14	0.03
Japan	0.33	0.38	0.46	0.41	0.35	0.28	0.18
Germany	0.11	0.19	0.27	0.37	0.37	0.31	0.31
France	0.28	0.43	0.52	0.45	0.31	0.23	0.07
Italy	0.23	0.34	0.47	0.53	0.49	0.39	0.23
United Kingdom	0.34	0.39	0.45	0.50	0.51	0.52	0.47
Canada	0.38	0.47	0.56	0.62	0.55	0.40	0.22
Belgium	0.41	0.42	0.35	0.31	0.23	0.14	0.11
Denmark	0.55	0.56	0.56	0.51	0.39	0.24	0.04
Netherlands	0.00	0.00	0.02	0.04	0.04	0.00	-0.07
Spain	0.26	0.29	0.29	0.26	0.16	0.06	-0.09

<i>Consumer confidence (t) and retail sales (RS)</i>							
	RS _{t-3}	RS _{t-2}	RS _{t-1}	RS _t	RS _{t+1}	RS _{t+2}	RS _{t+3}
United States	0.33	0.41	0.48	0.44	0.38	0.33	0.22
Japan	0.37	0.49	0.58	0.62	0.59	0.51	0.47
Germany	..	..	..	..	..	..	..
France	0.48	0.55	0.61	0.60	0.49	0.43	0.35
Italy	0.10	0.08	0.07	0.06	0.07	0.06	0.01
United Kingdom	0.23	0.31	0.36	0.39	0.42	0.47	0.48
Canada	0.05	0.09	0.19	0.29	0.36	0.38	0.35
Belgium	0.12	0.20	0.23	0.26	0.18	0.11	0.05
Denmark	0.23	0.25	0.24	0.17	0.18	0.10	0.00
Netherlands	0.20	0.28	0.36	0.44	0.50	0.55	0.56
Spain	0.80	0.82	0.81	0.78	0.76	0.72	0.66

a) Quarterly data, year on year growth. The highlighted figures indicate the timing relationship for which the correlation is highest for each indicator in every country.

Table A5. **Granger causality tests of consumer confidence and demand indicators^a**

	F-statistic	Probability	Reject null	Opposite test
<i>Null hypothesis: business confidence does not Granger cause new car registrations</i>				
United States	1.55	0.2030	no	no
Japan	0.15	0.9636	no	yes
Germany	2.14	0.0900	no	no
France	1.52	0.2113	no	no
Italy	3.26	0.0186	yes	no
United Kingdom	1.14	0.3480	no	no
Canada	3.19	0.0204	yes	no
Belgium	1.11	0.3611	no	no
Denmark	2.68	0.0417	yes	no
Netherlands	1.37	0.2564	no	no
Spain	1.03	0.4112	no	no
<i>Null hypothesis: consumer confidence does not Granger cause retail sales</i>				
United States	1.10	0.3684	no	yes
Japan	2.61	0.0470	yes	no
Germany	0.45	0.7700	no	no
France	1.31	0.2815	no	no
Italy	0.80	0.5345	no	no
United Kingdom	0.81	0.5244	no	no
Canada	4.62	0.0031	yes	no
Belgium	0.74	0.5668	no	no
Denmark	2.35	0.0680	no	no
Netherlands	1.21	0.3206	no	no
Spain	2.61	0.0612	no	yes

a) X "Granger causes" Y when past values of X add significant information in the prediction of Y over that contained in Y's own past values, four lags are used in the regressions. Significance is set at the 95 per cent confidence level.

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