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ABSTRACT

Business Cycle Synchronization Since 1880*

This paper studies the international business cycle behaviour across 25 advanced and emerging market economies for which 125 years of annual GDP data are available. The picture that emerges is more fragmented than the one drawn by studies that focused on a narrower set of advanced market economies. The paper offers evidence in favour of a secular increase in international business cycle synchronization within a group of European and a group of English-speaking economies that started during 1950-1973 and accelerated since 1973. Yet, in other regions of the world, country-specific shocks are still the dominant forces of business cycle dynamics.

JEL Classification: C32, E32, F41 and N10
Keywords: business cycles, dynamic factor models, globalization and integration

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1. INTRODUCTION

During the past three decades, the world economy has moved towards closer integration. International trade flows have increased substantially, financial markets in developed and emerging economies have become increasingly integrated, significant parts of the world economy that were hitherto relatively insulated opened up to free trade and capital flows, and continental European countries adopted a single currency. These developments raise the possibility of changes not only in the properties of national business cycles but also in their synchronization.

The large body of research that explored the effects of these structural changes on business cycle behaviour has produced mixed results. One branch of the literature has concluded that evidence from a wide range of industrial and developing economies does not lend strong support to the hypothesis that increasing international trade and financial market integration have led to an increase in the degree of business cycle synchronization (Kose et al, 2003, 2008). Another branch of the literature, focusing specifically on the experience of advanced industrial economies, has detected the emergence of a 'European business cycle' since the early 1980s (Artis and Zhang, 1997, 1999, and Artis, 2004) while more recent evidence suggests that, as the process of international trade and financial market integration deepens, such regional business cycle affiliations are superseded by wider business cycle clubs (Artis, 2008). Yet other studies have found that output correlations among the major industrial countries have even decreased in the recent decades, largely on account of a remarkable cycle of de-synchronization in the late 1980s and early 1990s (Helbling and Bayoumi, 2003, Doyle and Faust, 2005). Overall, and despite a number of significant contributions, it would be fair to say that the state of our knowledge about the effects of integration on cross-national business cycle linkages remains imperfect and largely limited to the very recent period.

The goal of this paper is to contribute towards a better understanding of the effects of globalization on business cycle co-movements by adding to the debate a historical dimension. To this end, the paper studies the behaviour of business cycles in 25 countries for which at least 125 years of annual data are available. In so doing, the paper aims to document some of the salient features of national business cycle behaviour and examine changes in the pattern of cross-national business cycle synchronization over time. We know that in many respects the countries of our sample and the historical periods that we cover have been markedly different. They differ in terms of their institutions, their monetary and fiscal policies, their economic structures, their natural endowments and their growth record. The question is whether, despite these differences, the forces of economic integration that swept the world economy during 1880-1913 and, again,

since the collapse of the Bretton Woods system of fixed exchange rates have led to greater economic interdependence and more synchronization. Seeking an answer to this question is important for several reasons, not least, because greater business cycle synchronization would require closer macroeconomic policy co-ordination during economic downturns if the experience of beggar-thy-neighbour policies of the 1930s were to be avoided.

A variety of data and empirical methodologies suggest that the historical process of trade and capital market integration has followed a distinctive 'U-shape' pattern, with momentum peaking at the beginning and at the end of the twentieth century, but coming to a halt during the years of the two World Wars and the Great Depression (Obstfeld and Taylor, 2003, 2004). These ebbs and flows of integration cover a period of more than a century and cut across a wide range of international monetary regimes. The main question we address is whether the degree of business cycle synchronization across a large number of advanced and emerging market economies follows the same stylized 'U-shape' pattern. In so doing, we also examine whether the effect of financial market integration on the international business cycle, if any, varies with the constraints imposed on domestic macroeconomic policy by the international monetary regime. We do so by splitting the sample in four different sub-periods, each of which corresponds to a distinct international monetary regime (Eichengreen 1996). The period from 1880 to 1913 corresponds to the classical Gold Standard, a period of credible commitment to pegged exchange rates and free trade and capital markets, often referred to as the first era of globalization of the world economy. The period from 1920 to 1939 is characterized by the failed attempt to restore the prewar liberal economic order in the context of a new institutional, social and political environment, the Great Depression, and the reversal of economic integration through the introduction of trade and capital controls. The period from 1950 to 1973 corresponds to the Bretton Woods era of fixed but adjustable exchange rates and limited capital mobility as a means to prevent currency crises and confer some degree of autonomy to domestic monetary policy. Finally, the period from 1973 onwards is an era characterized by an unprecedented rise in trade and capital market integration, the formation of the European Monetary Union, and floating exchange rates among the main world currencies.

In addressing the above question, our study is closely related to earlier work by Backus and Kehoe (1992), Bergman, Bordo, and Jonung (1998), Basu and Taylor (1999), and Bordo and Helbling (2004). These pioneering studies also examine the behaviour of business cycles over the long run and across different exchange rate regimes. Yet, our study departs from theirs in some fundamental ways. First, our study covers a much wider sample of countries. Unlike earlier international comparative studies that limit

themselves to a rather narrow sample of advanced market economies, we use Barro and Ursúa's (2008) dataset and cast our net across 25 advanced and emerging market economies. The benefit from doing so is large as no other study has looked at the effects of financial globalization on the historical properties of the international business cycle of emerging market economies. Second, we use an unobserved component model to estimate the business cycles of the countries of our sample. This method has not been used before by other international and historical studies and has the potential to significantly improve the measurement, and our understanding, of the historical properties of the international business cycle. Third, unlike earlier work, our study explores the channels through which financial market integration may affect the synchronization of national business cycles. In principle, financial market integration may increase business cycle synchronization, either by increasing the relative importance of international shocks, or by strengthening the spillover effects across countries, e.g., through contagion. We use a factor structural vector autoregressive (FSVAR) model (Clark and Shin, 20000, Stock and Watson, 2005) to identify the relative importance of the channels through which trade and financial integration may have historically affected the international business cycle.

The remainder of the paper is organized as follows. Section 2 offers a discussion of the dataset and presents the business cycle definition and measurement method that we use. Section 3 summarizes the changes in business cycle correlations across the four sub-periods of the sample. Section 4 uses a Factor Structural VAR model to identify the changing importance of international shocks, spillovers, and country-specific shocks in driving the international business cycle dynamics during the past 125 years. Section 5 concludes.

2. DATA AND FILTERING

The data are annual values of the logarithm of real GDP per capita and cover 25 advanced and emerging market economies from 1880 to 2006. These economies are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, India, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sri Lanka, Sweden, Switzerland, United Kingdom, United States and Uruguay. The data source is Barro and Ursúa (2008) who updated Maddison's (2003) monumental and widely used dataset by incorporating new information from a series of recent major historical national accounts projects and, in some occasions, provided superior estimates.

Before proceeding, a caveat is in order. We know that the quality of national accounts data prior to World War II (WWII) varies considerably across countries primarily because of differences in the availability of raw data sources. In countries with established annual income tax systems or statistical bureaus, the measurement of national account aggregates tends to be more accurate than is the case elsewhere. As a result, in some cases, the *ex post* reconstruction of historical national accounts is often based on extrapolations from fragmentary raw data that cover only a narrow subset of economic activity raising, thus, the likelihood of measurement error. Christina Romer's (1986, 1989) criticism of prewar US national accounts data illustrates this point very well. Although recent progress in creating historical national accounts has significantly increased the accuracy of the data, we need to bear this caveat in mind when interpreting results.

Our focus is on economic fluctuations over business cycle horizons. It is common to distinguish two types of business cycles – the so-called 'classical' cycle and the 'deviation' cycle. The former is in the spirit of Burns and Mitchell's (1946) National Bureau of Economic Research business cycle project, where peaks are identified by being followed by absolute and sustained declines in output while troughs by absolute increases. Such cycles are, of course, comparatively rare in growth economies and to focus our attention only on these would lead to a paucity of observations, at least, as far as the post-WWII period is concerned. The deviation cycle, by contrast, deals with deviations in output growth from trend growth and it is this concept of the cycle that we will use here. Thus, measuring deviation cycles requires the filtering out of the economy's trend growth rate. One way to do this is to use band-pass-filtered log GDP with a pass band that only admits business cycle frequencies (periods of 1½ to 8 years). The main drawback of this method is that a number of observations have to be 'thrown away' at the two ends of the sample. An alternative method would be to consider simple annual growth rates which use differencing to eliminate the long-term growth rate in the series. Despite the merit of simplicity, the drawback of this method is that the trend growth rate of GDP over the past 125 years cannot be assumed to be constant. Because a low frequency drift can introduce bias into certain statistics used later on, such as cross-country correlations computed over sub-samples, in our analysis, we use a flexible detrending method based on a model with a stochastic drift (Clark 1987, Harvey and Jaeger 1993, Stock and Watson 2005). Define $y_t = 100\Delta \ln(GDP_t)$ as the annual growth rate of GDP. We adopt an unobserved components specification that represents y_t as the sum of two terms, a slowly evolving mean growth rate (trend) and a stationary component (cycle):

$$y_t = \mu_t + u_t \qquad (1)$$

where

$$\mu_t = \mu_{t-1} + \eta_t \qquad (2)$$

and

$$\varphi(L)u_t = \varepsilon_t \qquad (3)$$

Where $\varphi(L)$ is a finite polynomial in the lag operator L and ε_t and η_t are serially and mutually uncorrelated mean zero disturbances. The Kalman smoother can be used to estimate the trend growth rate (μ_t) and the residual (u_t). Obviously, the Kalman smoother estimate of u_t is our estimate of the deviation of GDP growth from its trend. Implementing this detrending procedure requires a value of the ratio $\sigma_\eta^2 / S_{uu}(0)$, where $S_{uu}(0)$ is the spectral density of u_t at frequency zero. This ratio determines the smoothness of trend growth and, in principle, it could be estimated by the maximum likelihood procedure. However, when the true variance of a nonstationary state variable is nonzero but small, as it plausibly is here, its maximum likelihood estimate is downward biased towards zero. To avoid this so-called 'pileup' problem, we estimate $\sigma_\eta^2 / S_{uu}(0)$ on a country-by-country basis using the median unbiased estimator of Stock and Watson (1998) and use the country-specific estimate to detrend GDP growth.

Figure 1 plots the business cycle estimates of the 25 countries of the sample. Naturally, positive values of the estimates correspond to expansions and negative values to recessions. The vertical lines in the United States business cycle graph indicate the business cycle troughs as calculated by the National Bureau of Economic Research. Despite a significantly different definition and measurement of business cycles, our below-trend-growth estimates match the conventional chronologies of the cyclical behaviour of the US economy. Figure 2 plots 'raw' estimates of the volatility of business cycles across the countries of the sample. The segmented line in Figure 2 plots the absolute value of the deviation of each series from its mean while the solid, smoother line is its filtered counterpart (Hodrick-Prescott filter, smoothing parameter=100). The results present a varied picture across countries but a recurrent theme is the considerable decline in volatility following the end of WWII. Table 1 summarizes the changes in the standard deviation of detrended GDP growth across countries and sub-periods and confirms that business cycle volatility declined since 1950 in all the countries of the sample. The last column of Table 1 reports the ratio of the standard deviation of post-WWII business cycles to the standard deviation of the pre-WWI business cycles. The data imply that business cycle volatility since 1950 has been lower than during the

classical Gold Standard for 19 out of the 25 economies of the sample though the shift in volatility is not necessarily statistically significant.

3. CHANGES IN BUSINESS CYCLE SYNCHRONIZATION

This section reports results on the evolution of international business cycle comovements. Tables 2-5 tabulate the correlation of detrended annual GDP growth rates across countries for each of the four subperiods of the sample. Coefficients that are statistically significant at the 10 percent level are highlighted in bold. A cursory inspection of the four tables suggests that the number, size and distribution of the statistically significant bilateral correlation coefficients differ considerably across subperiods. The number of positive and statistically significant correlation coefficients tripled between 1880-1913 and 1919-1939, fell by one-third during the Bretton Woods era and increased by two and a half times during 1973-2006. More particularly, the average change of these 'raw' correlations between the classical Gold Standard and the interwar period is 0.18 (from 0.02 to 0.20), the average change between the interwar years and the Bretton Woods period is -0.06 (from 0.20 to 0.14) while the average change between Bretton Woods and the post-1973 period is 0.10 (from 0.14 to 0.24). Are these changes over time statistically significant? This question is very relevant since, given the relatively few observations per era, the confidence intervals of the correlation coefficients can be relatively wide. Tables 6 and 7 report standard mean equality and non-parametric Wilcoxon Rank Sum tests suggesting that these changes are statistically significant at the 1 percent level. The overall picture that emerges from tables 2-5 does not lend support to the view that periods of high trade and capital market integration are associated with increased international business cycle comovements. During the classical Gold Standard, a period of free trade and capital mobility, the degree of business cycle synchronization across countries is not statistically different from zero whereas during the post-1973 period of trade and capital market integration, the mean correlation coefficient of detrended output growth is positive but moderate. We think that this result merits closer examination. Without precluding the likelihood of measurement error in the prewar data, this result may point to an interpretation of the classical Gold Standard as a system that conferred some degree of domestic policy independence and as a period where country-specific shocks were dominant. We will return to this in section 4 when we discuss the changing significance of international and country-specific shocks in driving business cycle dynamics.

To the extent that the distribution of bilateral correlation coefficients within subperiods is not uniform, as it is not, the size and direction of changes in average correlation coefficients across subperiods for the

country sample *as a whole* may hide information about patterns of international business cycle comovements within and between country subsamples. Tables 6 and 7 report the evolution of mean correlation coefficients for a number of country groups while Tables 8 and 9 report mean correlation coefficients across these groups. Two aspects bear emphasis. First, there is compelling evidence in favour of the historical emergence of two cyclically coherent groups. A European group that includes Austria, Belgium, France, Germany, Italy, Netherlands and Switzerland exhibits a secular rise in its mean correlation coefficients from a statistically insignificant value during the classical Gold Standard, to 0.24 during the interwar period, to 0.35 during the Bretton Woods years, and to 0.63 since 1973 (as the equality tests of Tables 6 and 7 suggest, under the entry 'Core and Western European Countries', the mean correlation coefficient changes from the Classical Gold Standard to the interwar period and from Bretton Woods to the post-1973 period are statistically significant at the 1 percent level). Similarly, an Anglo-Saxon group that includes Australia, Canada, the UK and the USA, exhibits a secular rise in its mean correlation coefficients from a statistically insignificant 0.17 during the Classical Gold Standard to 0.25 during Bretton Woods and to 0.61 since 1973 (see the entry 'Anglo-Saxon Countries' in Tables 6 and 7). While the mean correlation coefficients within each group have risen sharply, the average cross-group correlation (i.e. the average correlation of each member of the two groups with the members of the other) has fallen from 0.23 to 0.17 between the interwar years and the Bretton Woods period (although the change is not statistically significant) and has risen only mildly to 0.32 since 1973. The secular increase in within-group average correlation of the order of 0.3-0.4 for both groups since 1950, coupled with a rise in cross-group correlation of just 0.15 during the same period, points towards the emergence of two distinct groups. The origins of the two groups lie in the mid-twentieth century but their formation process accelerated after 1973. Second, Tables 6-9 document well that no other country group exhibits a similar secular increase in within-group or cross-group cyclical coherence indicating that business cycle synchronization has not increased over time universally and is not a natural consequence of closer trade and capital market integration. Our findings lend support to earlier results by Doyle and Faust (2005), Heathcote and Perri (2004) Kose, Prasad, and Terrones (2003), Kose, Otrok, and Prasad (2008) and Stock and Watson (2005) which found little evidence in favour of increased overall synchronization during the past forty years. We now turn to examine the proximate causes of changes in business cycle synchronization by analyzing changes in the structure of shocks in the context of an FSVAR model.

4. CHANGES IN THE IMPORTANCE OF INTERNATIONAL VS IDIOSYNCRATIC SHOCKS

A convenient dichotomy that facilitates the study of changes in business cycle dynamics is the dichotomy between shocks and propagation (Frisch, 1933). According to this dichotomy, changes in the dynamics of the international business cycle can be the result of changes in the nature of shocks, changes in the transmission mechanism of shocks across countries, or a combination of the two. Increased business cycle synchronization will then be reflected in the rising importance of international vis-à-vis country-specific shocks or the strengthening of the propagation mechanisms of country-specific shocks across countries. Identifying, thus, changes in the nature of shocks and in transmission mechanisms will cast new light in the behaviour of the international business cycle and contribute to a better grasp of its proximate causes. The aim of this section is to serve this purpose. In particular, this section aims to measure the changes in the fractions of a country's cyclical variance that is due to international shocks, cross-country transmission of country-specific shocks, and idiosyncratic shocks. We do so by means of a FSVAR model (Clark and Shin 2000, Stock and Watson 2005). The underlying idea of the model is that cross-national business cycle co-movements are driven by a small number of latent factors that represent a wide range of common international shocks such as technology or monetary policy shocks. International shocks are here defined as shocks that affect output in multiple countries contemporaneously and are identified by imposing the appropriate factor structure on the reduced form VAR innovations. We are aware that, given the annual frequency of our data, idiosyncratic shocks that spread to other parts of the world in less than a year may be treated here as international shocks and we will bear this caveat in mind when we interpret our results.

More specifically, let Y_t be the vector of detrended annual GDP per capita growth. The structure of the FSVAR model consists of the following VAR model:

$$Y_t = A(L)Y_{t-1} + v_t, \tag{4}$$

where the error vector is determined by the following factor structure:

$$v_t = G\varsigma_t + \eta_t, \tag{5}$$

where ς_t are the common international factors, G is a (25x k) matrix of factor loadings, and η_i are the country-specific, or idiosyncratic, shocks. $E\left(\varsigma_t\varsigma_t^{'}\right)$ and $E\left(\eta_t\eta_t^{'}\right)$ are diagonal. We estimate the model using Gaussian maximum likelihood.

Before proceeding, we need to deal with two specification issues: the lag structure of the VAR model and the choice of the number of common international factors (k). A VAR(p) model with 25 countries, as ours, would have $25p$ coefficients in each equation where p is the number of lags. With a relatively small annual dataset in our disposal, so many coefficients would induce significant sampling uncertainty. One way to deal with this dimensionality problem is to impose restrictions on the VAR coefficients, e.g., specify a different lag structure on domestic and foreign detrended output growth but, given the frequency of our data, this is not meaningful. One other promising way, the one we adopt here, is to estimate successive waves of VAR models, each one specified in terms of a subgroup of countries. More particularly, we bundle together countries of the same region and estimate our model using one regional group at a time together with two groups that, with the benefit of historical hindsight, could be safely classified as core market economies. The core market economies include Canada, the UK and the USA (the Anglo-Saxon group) and Belgium, France, Germany and the Netherlands (the Core European group). The rest of the sample is organized in six regional groups. These are the Latin American (Argentina, Brazil, Uruguay), the Nordic (Denmark, Norway, and Sweden), the Western European (Austria, Italy, and Switzerland), the Southern European (Greece, Portugal and Spain), the Asian group (India, Japan, and Sri Lanka), and Australia. We estimate the FSVAR model using the Nordic, Core European and Anglo-Saxon countries of the sample, but excluding the rest, and then we repeat by replacing successively the Nordic group with the Latin American, the Western European, the Southern European, the Asian group and Australia. We are aware that, by so doing, we limit the international spillovers and common shocks that can be studied in a single model but we are confident that, by including the core market economies in every estimation wave, we minimize the drawbacks of this choice while we deal effectively with the dimensionality problem.

The other specification issue pertains to the choice of the number of common factors (k). As our focus is on the estimation of the common international shock that underpins cross-national output co-movements and as it is widely accepted in the literature, we restrict our attention to the first common factor[2]. Our FSVAR model allows us to decompose the 4-year-ahead forecast error variances of each country's cycle into three sources: international shocks, idiosyncratic shocks, and spillover effects. The share of forecast error cyclical variance explained by each component, allows us to assess the relative importance of international shocks and spillover effects versus country-specific shocks in explaining international business cycle co-movements within our subgroups and across the four historical periods of our sample.

[2] Ideally, formal statistical tests should be used to determine k. yet often these tests are not too reliable in front of low dimension panel datasets (see Bai and Ng, 2002).

Tables 10-15 summarize these variance decompositions for detrended GDP growth for the six sets of results. At the one-year horizon, international spillovers account for none of the business cycle forecast error variance: this is the assumption used to identify the international shock. At longer horizons, spillovers typically account for between 10 and 40 percent of business cycle variance, depending on the country group and the sub-period. The relative importance of international sources of fluctuations, either common shocks or spillovers, can be measured as one minus the share of the forecast error variance attributed to domestic shocks. A small domestic share corresponds to a relatively larger role for international rather than domestic disturbances. Consequently, in the context of our model, examining the hypothesis that closer trade and capital market integration increase the degree of business cycle co-movement is tantamount to examining whether the fraction of the forecast error variance of detrended GDP growth attributed to county-specific shocks falls when integration rises. The results reported in Tables 10-15 do not offer support to this hypothesis as, for most of the country groups of our sample, country-specific shocks do not follow the 'U-shaped' pattern that is characteristic of the evolution of the trade and capital market integration of the world economy. In particular, the relative contribution of idiosyncratic shocks in explaining the forecast error variance of our business cycle measure during the classical Gold Standard period is invariably high across country groups and confirms our result in section 3 above that the average correlation coefficient across the whole country sample during this period is not statistically significantly different from zero. This result should be interpreted with caution as the likelihood of measurement error in the national accounts data of this period is not trivial and, to our view, this could constitute a potential problem that needs addressing in future research. Yet, to the extent that the data problem does not contaminate our result, this result points towards an interpretation of the classical Gold Standard as an international monetary regime that conferred some degree of autonomy to domestic monetary policy in the core countries, e.g., a target zone, and as a period during which the economies of the periphery were dominated mainly by national-specific shocks[3].

Four salient features emerge from the historical record of business cycle synchronization as summarized in Tables 10-15. First, the fraction of the forecast error variance of detrended GDP growth that is due to country-specific shocks in the European Core (Belgium, France, Germany and Netherlands) declines steadily over time. At the two-year horizon, the average Core European fraction of cyclical variance attributed to domestic shocks declines from a typical value of 70 percent during the Classical Gold

[3] On the behaviour of business cycles during the classical Gold Standard, see Flandreau et al (2010).

Standard to 40 percent during the interwar years to 35 percent during the Bretton Woods years and finally to below 30 percent since 1973. This result holds across sub-samples and reflects mostly the increasing importance of international shocks, and to a lesser extent stronger transmission, in shaping the business cycle behaviour of the European core. Second, the declining significance of country-specific shocks is also evident in the average Western European fraction of cyclical variance explained by domestic shocks. Indeed, the experience of Western Europe (Italy, Austria, Switzerland) is very similar to this of the European core suggesting that the business cycle behaviour of these seven economies is shaped to a good extent by common international shocks. Third, the Anglo-Saxon group (Canada, UK, USA) allows a far larger role to idiosyncratic shocks and exhibits no secular change over time. The same is true for all four other groups, the Latin American, the Asian, the Nordic group and Australia. Fourth, Table 12 shows that although the Anglo-Saxon group historically shared a common factor with Europe, this hasn't been the case since 1973 pointing towards a weakening of comovements between the two country groups during the past forty years. Indeed, this is one of the main findings of section 3 too. On the basis of the above evidence, one can safely argue that there is no secular change in the degree of synchronization since 1880 as many parts of the world economy do not share a common factor and their business cycles are driven by idiosyncratic shocks. The exception to this is a group of European countries where international shocks have played an increasingly significant role in shaping the behaviour of the business cycle. This result is very much in line with the results of section 3 but is at odds with the results of Bordo and Helbling (2004, 2011) whose study is based on a smaller sample of countries.

5. CONCLUSIONS

This paper studies the behaviour of the international business cycle across 25 advanced and emerging market economies for which 125 years of annual GDP data are available. The picture that emerges is far more fragmented than the one drawn by studies that focused on a narrower set of advanced market economies. The main results, and some directions for future research, can be summarized as follows. First, there is compelling evidence in favour of a secular increase in international business cycle synchronization within a group of European and a group of English-speaking economies that started off during 1950-1973 and accelerated since 1973. Based on the results of the Factor Structural VAR model, it is hard to avoid the conclusion that gradual trade integration since the 1960s diminished the relative significance of idiosyncratic shocks within a group of European countries and offered the springboard for the formation of the European Monetary Union. Second, the secular increase in the cyclical coherence within these two groups far outweighs the small rise in the cyclical coherence between the two groups, thus, it would be fair

to describe these two cyclical groups as distinct. Future research should explicitly take into account the possibility of regional common factors to allow for the emergence of distinct cyclical groups. Third, the observed secular rise in business cycle synchronization does not extend to country groups outside this subset of advanced market economies. In other regions of the world, country-specific shocks are still the dominant forces of business cycle dynamics. Fourth, the lack of international business cycle comovements during the Classical Gold Standard, i.e. a period of fixed exchange rates and free trade and capital mobility, merits our attention and should act as a trigger for future research, not least, in the direction of double-checking and improving the quality of historical national accounts data. In this respect, very recent work in extracting information on business cycle behaviour from less noisy economic aggregates than national accounts data is in the right track[4].

[4] See Ritschl et al (2008).

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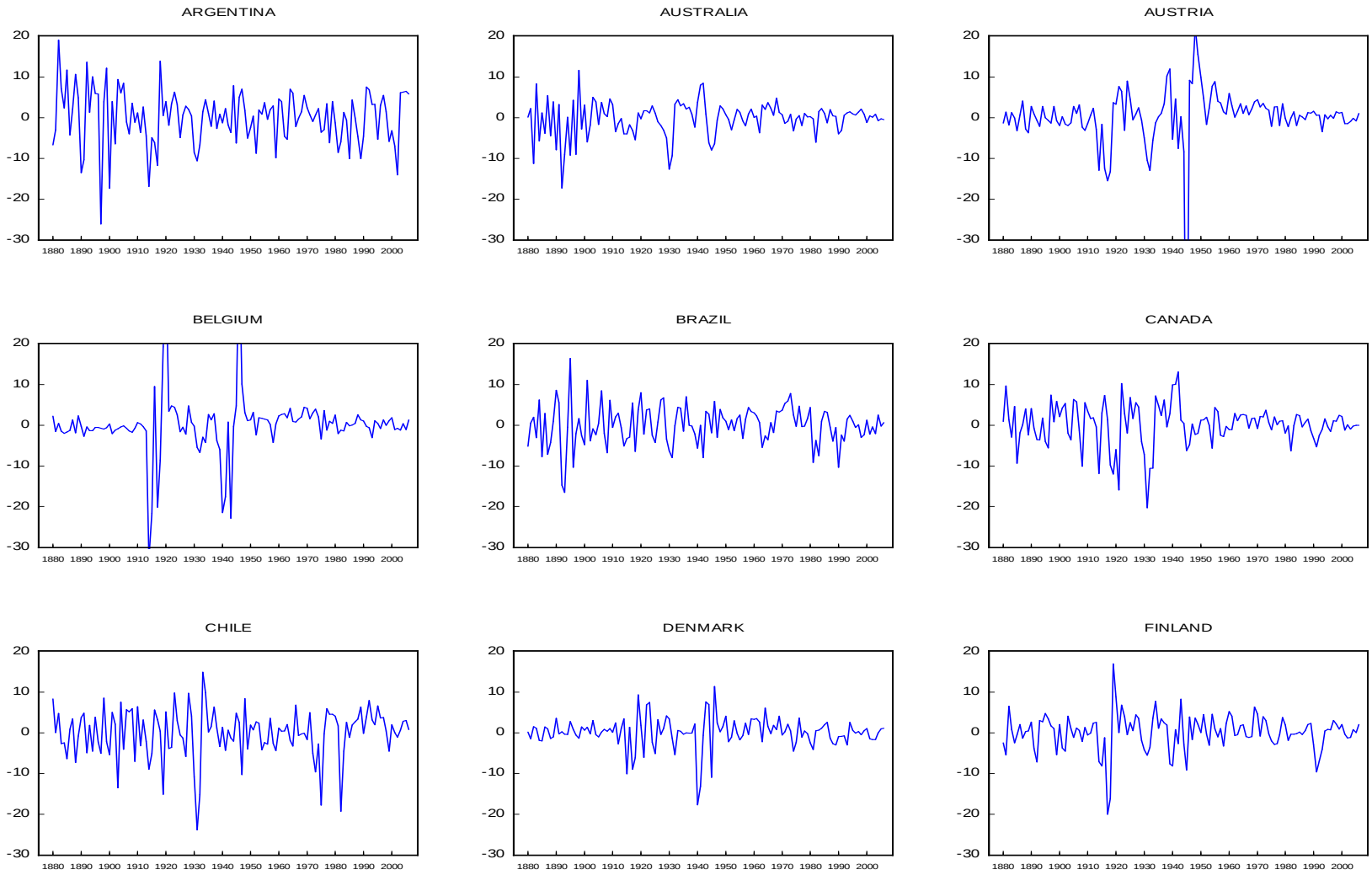

FIG. 1 NATIONAL BUSINESS CYCLES (UNOBSERVED COMPONENTS METHOD)

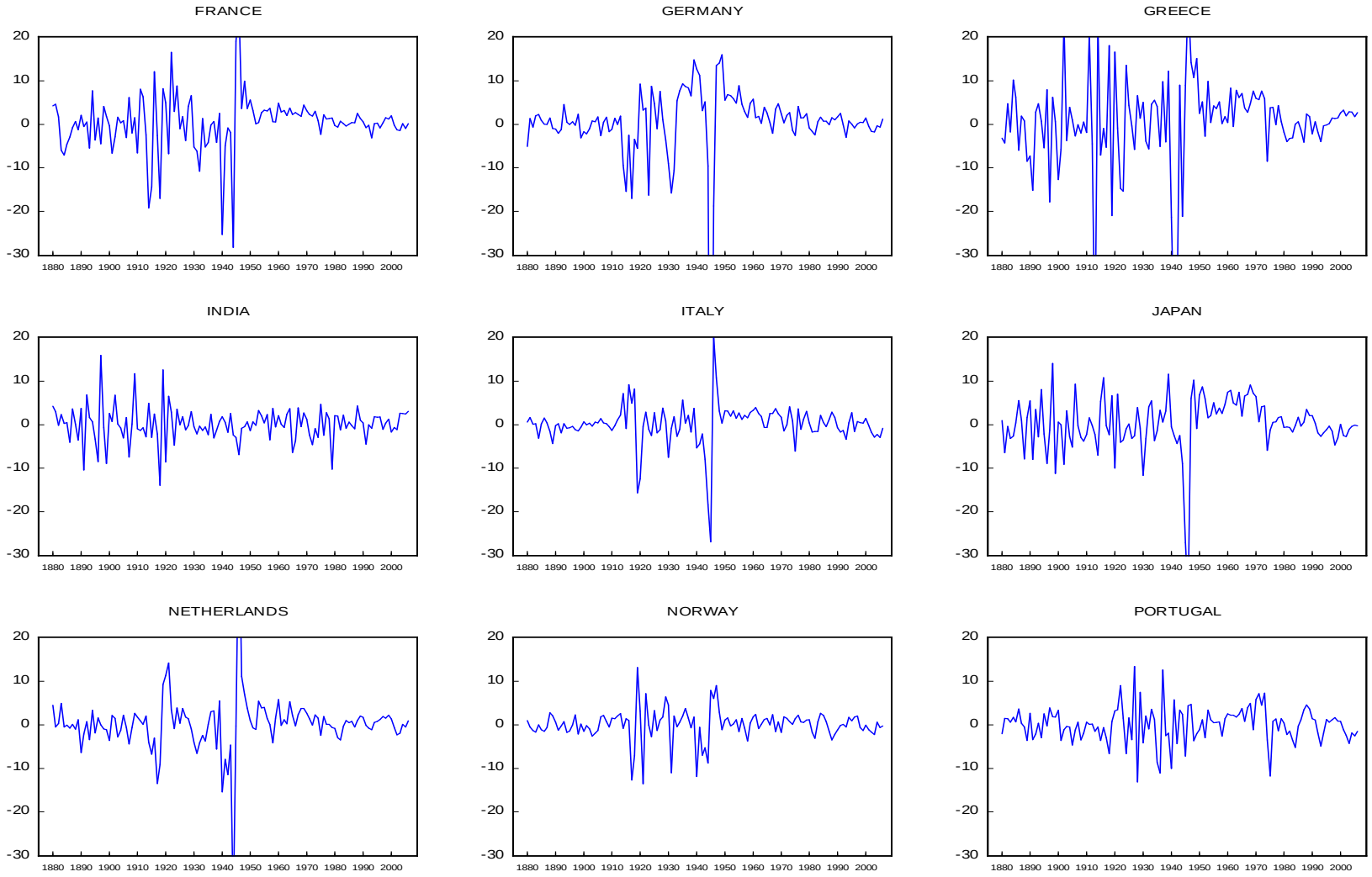

FIG. 1 NATIONAL BUSINESS CYCLES (UNOBSERVED COMPONENTS METHOD)

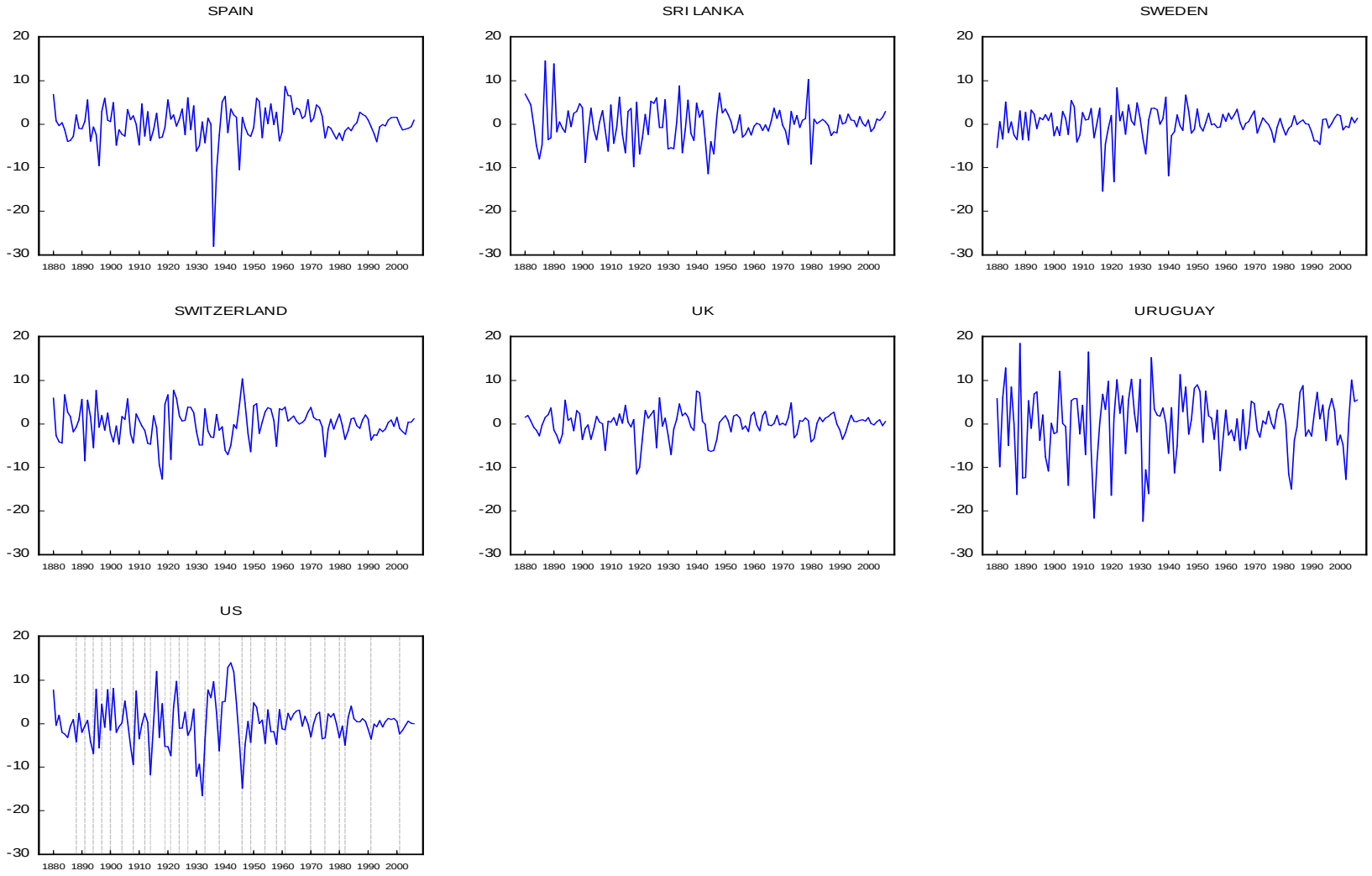

FIG. 1 NATIONAL BUSINESS CYCLES (UNOBSERVED COMPONENTS METHOD)

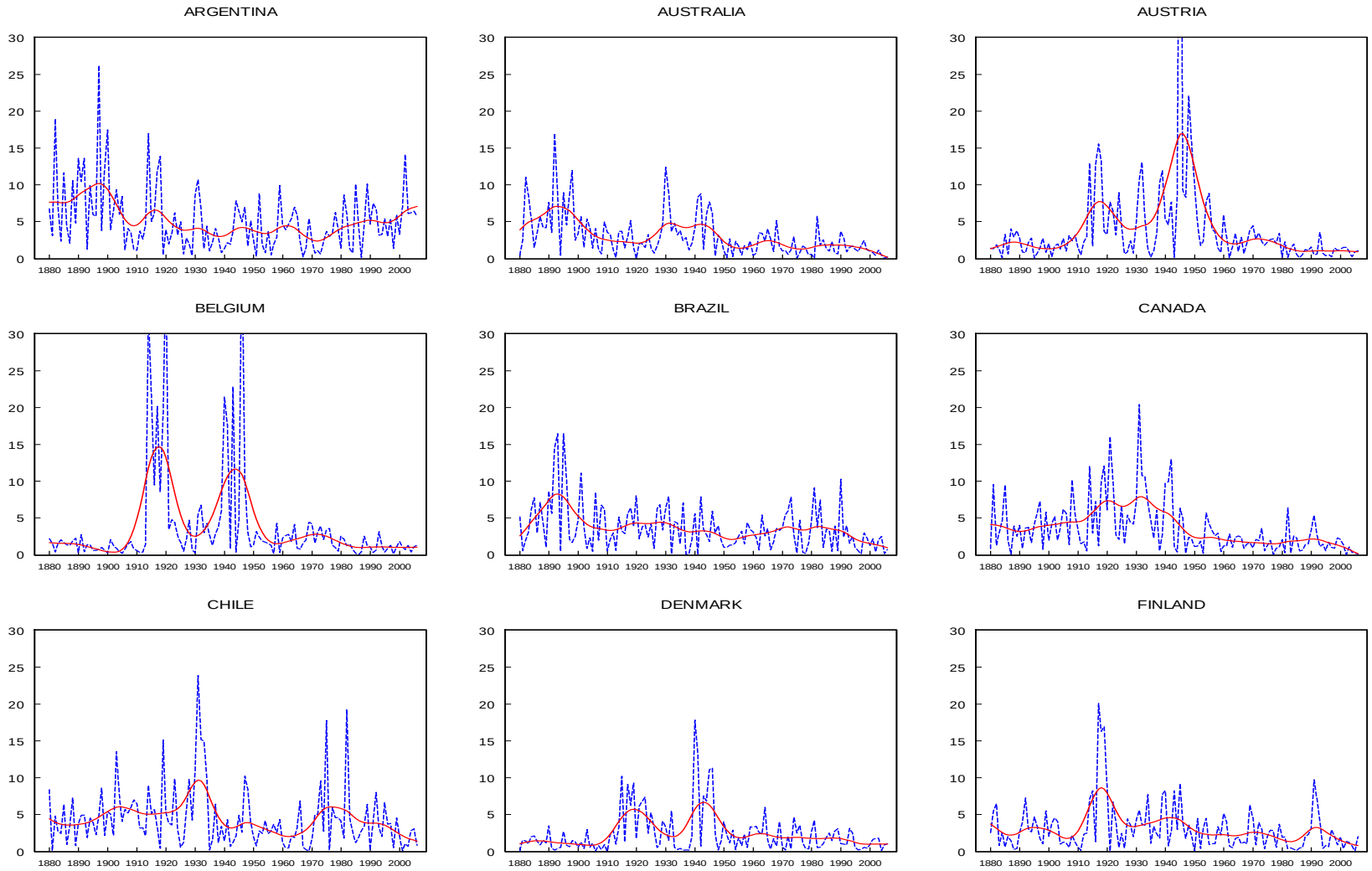

FIG. 2 BUSINESS CYCLE VOLATILITY (ABSOLUTE VALUE OF DEVIATION FROM MEAN)

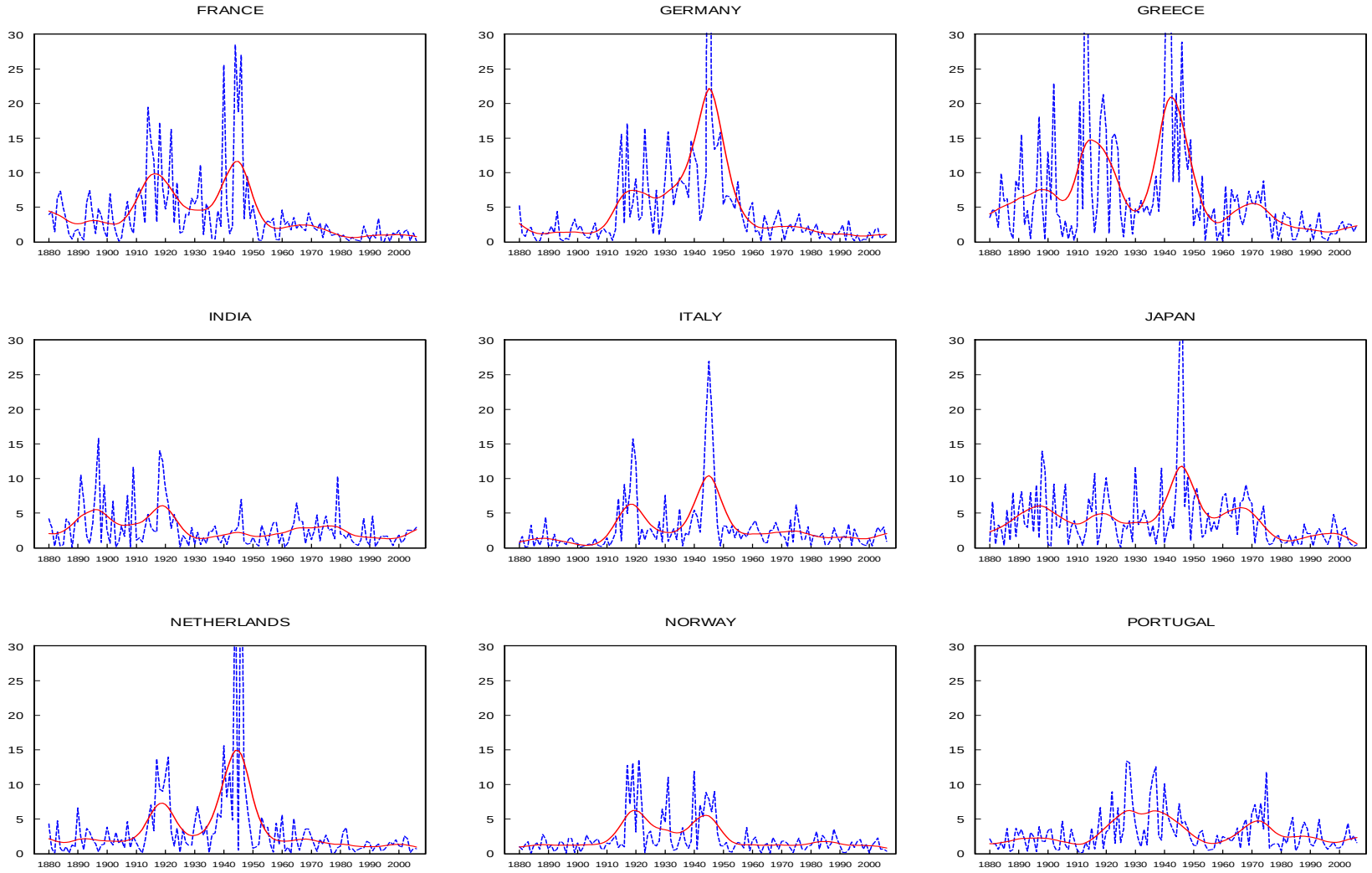

FIG. 2 BUSINESS CYCLE VOLATILITY (ABSOLUTE VALUE OF DEVIATION FROM MEAN)

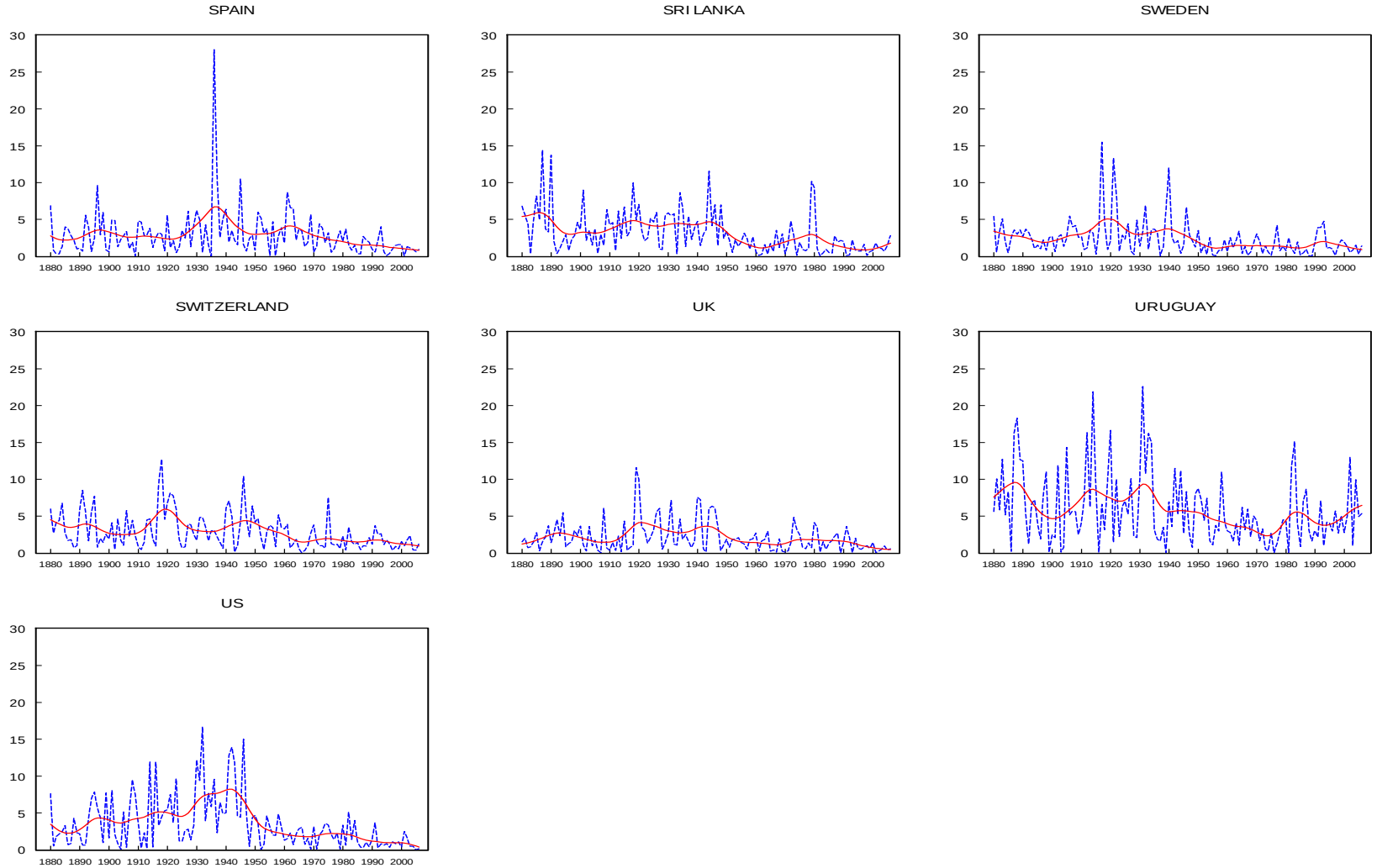

FIG. 2 BUSINESS CYCLE VOLATILITY (ABSOLUTE VALUE OF DEVIATION FROM MEAN)

TABLE 1

STANDARD DEVIATION OF DETRENDED GDP GROWTH

Country Groups		1880-1913	1920-1939	1950-1973	1973-2006	$\frac{sd_{1920-1939}}{sd_{1880-1913}}$	$\frac{sd_{1950-1973}}{sd_{1920-1939}}$	$\frac{sd_{1973-2006}}{sd_{1950-1973}}$	$\frac{sd_{1950-2006}}{sd_{1880-1913}}$
Core European	Belgium	1.13	9.62	1.95	1.68	8.54	0.20	0.86	1.58
	France	4.16	6.32	1.39	1.30	1.52	0.22	0.93	0.32
	Germany	1.87	8.82	2.59	1.63	4.71	0.29	0.63	1.08
	Netherlands	2.42	5.26	2.41	1.51	2.17	0.46	0.63	0.78
Southern European	Greece	12.29	8.59	3.25	3.00	0.70	0.38	0.92	0.25
	Portugal	2.24	7.14	2.52	3.36	3.19	0.35	1.34	1.35
	Spain	3.58	7.57	3.26	1.88	2.12	0.43	0.58	0.68
Western European	Austria	2.12	6.51	2.77	1.59	3.07	0.43	0.57	0.98
	Italy	1.30	4.07	1.45	2.20	3.13	0.36	1.52	1.46
	Switzerland	3.94	4.18	2.25	1.98	1.06	0.54	0.88	0.53
Anglo-Saxon	Australia	6.09	4.42	2.06	1.81	0.72	0.47	0.88	0.31
	Canada	4.59	8.31	2.32	2.12	1.81	0.28	0.91	0.48
	UK	2.45	3.99	1.46	1.90	1.63	0.37	1.31	0.70
	US	4.41	7.22	2.63	1.97	1.64	0.36	0.75	0.51
Nordic	Denmark	1.47	3.60	2.28	1.89	2.45	0.63	0.83	1.39
	Finland	3.15	4.35	2.75	2.76	1.38	0.63	1.01	0.87
	Norway	1.54	5.01	1.53	1.56	3.25	0.31	1.02	1.01
	Sweden	2.95	4.77	1.63	1.84	1.62	0.34	1.12	0.59
Asian	India	5.32	3.25	2.85	2.75	0.61	0.87	0.97	0.52
	Japan	5.42	5.50	2.44	2.11	1.01	0.44	0.86	0.41
	Sri Lanka	5.32	4.89	2.17	2.74	0.92	0.44	1.26	0.47
Latin American	Argentina	9.28	4.59	4.39	5.75	0.49	0.96	1.31	0.56
	Brazil	6.81	4.62	3.00	3.75	0.68	0.65	1.25	0.51
	Chile	5.35	9.19	3.07	5.97	1.72	0.33	1.95	0.89
	Uruguay	8.70	9.88	5.00	5.77	1.14	0.51	1.15	0.63

TABLE 2

BILATERAL BUSINESS CYCLE CORRELATIONS

1880-1913

Sample Mean (Standard Error): 0.02 (0.01)

	BEL	FRA	GER	NETH	AUST	ITA	SWITZ	GRE	POR	SPA	DEN	FIN	NOR	SWE	IND	JAP	SLK	ARG	BRA	CHL	URU	AUSL	CAN	UK	US
BEL	1.00																								
FRA	0.23	1.00																							
GER	**-0.40**	-0.09	1.00																						
NETH	0.19	-0.06	-0.14	1.00																					
AUST	-0.06	**0.37**	0.07	-0.12	1.00																				
ITA	-0.21	0.14	-0.02	-0.04	0.21	1.00																			
SWITZ	**0.32**	-0.20	-0.21	-0.11	-0.09	-0.27	1.00																		
GRE	0.06	0.16	0.09	0.04	0.15	-0.27	0.22	1.00																	
POR	0.00	-0.09	0.13	**-0.46**	0.10	0.07	**0.29**	0.02	1.00																
SPA	0.02	0.22	-0.26	0.10	0.04	-0.03	-0.01	-0.23	-0.15	1.00															
DEN	0.14	0.03	-0.22	-0.22	0.05	0.16	0.01	-0.10	0.18	0.05	1.00														
FIN	0.14	0.07	**0.28**	-0.19	-0.06	0.09	-0.06	-0.18	**0.33**	**-0.31**	**0.29**	1.00													
NOR	0.16	0.00	-0.07	-0.01	-0.18	-0.10	0.18	**-0.28**	-0.07	0.22	-0.17	-0.05	1.00												
SWE	**-0.28**	-0.07	0.26	-0.22	0.10	0.08	0.13	-0.14	**0.28**	0.06	0.15	0.16	0.27	1.00											
IND	0.13	-0.15	-0.07	0.19	-0.17	-0.06	0.26	0.05	0.14	0.25	-0.07	-0.05	0.05	-0.03	1.00										
JAP	0.21	0.19	0.00	-0.11	**0.33**	-0.06	0.13	-0.04	0.12	**0.36**	0.09	**0.31**	-0.12	0.09	0.19	1.00									
SLK	**0.42**	0.21	-0.17	**-0.30**	**0.32**	0.20	0.05	**-0.29**	**0.36**	0.06	**0.37**	0.12	0.07	0.12	0.07	0.13	1.00								
ARG	-0.02	0.06	0.20	0.26	-0.07	-0.22	-0.05	**0.34**	**-0.31**	-0.15	-0.08	0.01	-0.28	0.08	**-0.33**	-0.03	-0.24	1.00							
BRA	-0.11	-0.02	-0.26	-0.08	0.26	-0.01	0.11	-0.17	0.07	0.14	0.25	0.19	-0.06	-0.03	-0.11	0.19	-0.07	-0.14	1.00						
CHL	0.15	-0.02	-0.22	-0.08	**0.32**	0.20	0.06	0.05	-0.02	0.11	-0.04	-0.07	0.10	-0.17	-0.21	0.16	0.26	-0.12	0.22	1.00					
URU	**-0.33**	-0.04	-0.04	0.14	-0.24	0.17	-0.20	0.19	-0.10	-0.12	-0.23	0.06	0.11	0.17	-0.09	-0.24	**-0.33**	0.24	-0.22	0.01	1.00				
AUSL	0.06	0.13	0.03	0.18	0.13	0.14	**-0.38**	-0.03	-0.14	-0.11	-0.16	0.06	-0.21	-0.06	-0.21	0.09	0.04	-0.05	0.02	0.08	-0.03	1.00			
CAN	0.04	0.14	-0.28	0.07	0.25	0.02	0.10	-0.02	0.13	0.22	-0.09	-0.22	0.18	0.04	**0.32**	-0.09	0.15	**-0.33**	**0.39**	-0.06	-0.23	-0.07	1.00		
UK	**0.30**	**0.39**	-0.04	**0.38**	0.25	-0.11	-0.02	-0.01	-0.08	0.00	-0.11	0.14	0.14	-0.02	-0.20	0.07	0.11	0.17	0.24	0.07	-0.19	0.24	**0.39**	1.00	
US	**0.34**	-0.03	**-0.53**	0.24	-0.03	0.00	**0.34**	-0.17	-0.02	**0.30**	0.17	-0.12	-0.03	-0.14	0.17	-0.08	0.03	-0.04	**0.43**	0.04	**-0.33**	-0.19	**0.40**	0.22	1.00

Note: Figures in bold indicate statistical significance at the 10 percent level.

TABLE 3

BILATERAL BUSINESS CYCLE CORRELATIONS

1920-1939

Sample Mean (Standard Error): 0.20 (0.02)

	BEL	FRA	GER	NETH	AUST	ITA	SWITZ	GRE	POR	SPA	DEN	FIN	NOR	SWE	IND	JAP	SLK	ARG	BRA	CHL	URU	AUSL	CAN	UK	US
BEL	1.00																								
FRA	**0.38**	1.00																							
GER	0.19	0.24	1.00																						
NETH	**0.59**	0.32	**0.47**	1.00																					
AUST	0.20	**0.45**	**0.72**	**0.57**	1.00																				
ITA	**-0.60**	0.01	0.11	-0.15	0.12	1.00																			
SWITZ	**0.47**	**0.78**	0.12	0.12	0.19	-0.20	1.00																		
GRE	0.34	0.04	**0.53**	0.30	0.29	-0.26	0.00	1.00																	
POR	0.05	0.11	-0.02	0.10	-0.02	-0.10	0.32	-0.19	1.00																
SPA	0.15	0.14	0.03	0.15	0.18	-0.04	0.28	0.15	0.35	1.00															
DEN	0.21	**0.61**	-0.17	-0.10	0.03	-0.15	**0.66**	-0.26	0.11	0.01	1.00														
FIN	**0.52**	0.33	0.32	0.23	0.16	-0.22	**0.56**	-0.09	0.19	0.01	0.21	1.00													
NOR	0.16	**0.43**	0.21	-0.17	0.04	0.06	**0.56**	0.03	0.01	-0.01	**0.49**	0.27	1.00												
SWE	0.09	**0.64**	0.33	-0.15	0.25	0.02	**0.58**	0.08	-0.06	-0.01	**0.73**	0.20	**0.68**	1.00											
IND	**-0.49**	0.10	0.10	0.19	0.28	**0.40**	**-0.39**	-0.17	-0.13	-0.09	-0.24	-0.31	-0.20	-0.13	1.00										
JAP	**-0.46**	-0.13	0.32	0.14	0.30	**0.60**	-0.35	0.03	-0.16	-0.08	**-0.40**	-0.32	-0.25	-0.26	**0.43**	1.00									
SLK	-0.24	**0.37**	0.23	-0.04	0.22	0.20	0.27	0.09	0.24	0.02	0.09	0.29	0.18	0.31	0.35	0.01	1.00								
ARG	**0.38**	**0.57**	**0.46**	**0.41**	**0.42**	0.02	**0.66**	0.12	0.21	0.23	**0.44**	**0.64**	0.27	**0.44**	-0.17	-0.01	**0.40**	1.00							
BRA	**0.44**	0.29	0.34	0.28	0.10	-0.15	**0.53**	-0.10	0.00	-0.11	0.27	**0.78**	0.33	0.24	-0.29	0.00	0.06	**0.66**	1.00						
CHL	0.29	**0.42**	**0.43**	0.20	0.33	-0.03	**0.52**	0.26	-0.05	-0.01	0.30	**0.62**	0.30	0.32	-0.15	0.11	**0.45**	**0.78**	**0.59**	1.00					
URU	-0.22	0.16	0.27	0.06	**0.41**	0.19	0.09	-0.15	-0.07	0.00	0.29	0.21	0.28	0.35	**0.38**	-0.13	**0.40**	**0.39**	0.15	0.22	1.00				
AUSL	0.06	0.12	**0.48**	0.26	0.25	0.28	0.09	-0.03	0.03	-0.02	-0.25	**0.50**	0.03	-0.03	0.04	**0.40**	0.28	**0.54**	**0.47**	**0.52**	0.07	1.00			
CAN	0.00	**0.43**	**0.47**	0.04	**0.45**	**0.39**	**0.50**	-0.04	0.01	0.03	0.37	**0.48**	**0.64**	**0.62**	-0.05	-0.06	**0.47**	**0.60**	**0.42**	**0.46**	**0.65**	0.33	1.00		
UK	**-0.47**	0.12	0.28	-0.25	0.15	**0.52**	0.17	-0.26	0.15	-0.05	0.02	0.27	**0.39**	0.26	0.28	0.19	**0.49**	0.35	0.20	0.34	**0.57**	**0.40**	**0.63**	1.00	
US	0.02	**0.47**	0.35	0.16	0.35	0.36	0.34	-0.08	-0.07	-0.18	**0.49**	**0.37**	0.32	**0.61**	0.04	0.07	**0.46**	**0.66**	0.36	**0.57**	**0.43**	0.34	**0.70**	**0.46**	1.00

Note: Figures in bold indicate statistical significance at the 10 percent level.

TABLE 4

BILATERAL BUSINESS CYCLE CORRELATIONS

1950-1973

Sample Mean (Standard Error): 0.14 (0.01)

	BEL	FRA	GER	NETH	AUST	ITA	SWITZ	GRE	POR	SPA	DEN	FIN	NOR	SWE	IND	JAP	SLK	ARG	BRA	CHL	URU	AUSL	CAN	UK	US
BEL	1.00																								
FRA	**0.55**	1.00																							
GER	0.02	0.14	1.00																						
NETH	**0.60**	0.33	0.33	1.00																					
AUST	0.32	**0.69**	**0.47**	0.34	1.00																				
ITA	0.00	0.11	0.28	0.04	0.16	1.00																			
SWITZ	**0.71**	**0.60**	**0.37**	**0.46**	**0.62**	0.23	1.00																		
GRE	**0.54**	0.07	-0.16	0.23	0.08	-0.15	0.29	1.00																	
POR	**0.53**	-0.02	**-0.41**	**0.39**	-0.08	-0.32	0.25	**0.47**	1.00																
SPA	0.13	0.03	-0.27	**-0.43**	-0.25	-0.09	-0.09	0.08	-0.17	1.00															
DEN	0.33	0.34	-0.03	**0.40**	0.03	0.02	0.14	0.16	0.07	-0.27	1.00														
FIN	**0.59**	**0.47**	0.27	0.27	**0.37**	0.04	**0.62**	0.16	0.08	0.17	0.21	1.00													
NOR	**0.44**	0.29	-0.09	0.27	0.11	-0.16	**0.49**	0.25	0.28	0.14	0.33	**0.38**	1.00												
SWE	**0.49**	**0.39**	0.08	**0.37**	0.34	0.18	**0.50**	0.16	0.01	-0.03	**0.46**	**0.40**	0.12	1.00											
IND	0.06	-0.02	0.12	0.27	0.05	0.28	0.00	-0.11	-0.22	-0.05	0.01	-0.07	-0.10	0.32	1.00										
JAP	**0.37**	**0.39**	0.10	0.10	0.10	**0.56**	0.31	-0.05	-0.10	0.16	0.19	**0.36**	0.07	0.31	0.17	1.00									
SLK	0.14	**0.40**	0.12	0.10	0.25	**0.47**	0.17	-0.16	-0.27	0.08	0.02	0.06	0.00	0.16	0.28	**0.66**	1.00								
ARG	**0.35**	**0.43**	0.04	**0.42**	**0.36**	-0.18	0.12	**0.45**	0.23	0.00	0.26	0.29	0.07	0.11	0.13	0.05	0.13	1.00							
BRA	-0.08	-0.04	0.07	-0.11	0.15	0.04	-0.04	-0.18	0.10	-0.21	0.10	0.25	-0.27	-0.18	-0.20	0.04	-0.06	0.02	1.00						
CHL	-0.09	0.12	-0.18	-0.13	-0.11	0.19	-0.14	0.04	-0.04	0.00	-0.08	-0.32	0.03	**-0.37**	-0.15	0.13	0.26	-0.14	-0.08	1.00					
URU	**0.54**	**0.57**	**0.46**	**0.43**	**0.61**	0.33	**0.58**	0.25	0.01	-0.27	0.20	**0.34**	0.16	0.26	0.03	0.29	0.32	0.19	0.01	**0.37**	1.00				
AUSL	0.11	0.01	-0.08	0.27	0.16	0.03	0.11	0.30	0.14	-0.10	-0.02	0.09	-0.05	**0.37**	0.03	0.19	0.16	0.27	-0.18	-0.26	-0.09	1.00			
CAN	0.23	0.10	0.14	0.07	-0.10	-0.20	0.12	0.19	0.08	0.18	-0.06	-0.18	0.07	-0.22	-0.28	0.13	0.13	-0.07	-0.21	0.13	0.01	-0.04	1.00		
UK	**0.45**	0.25	0.30	**0.64**	**0.49**	0.10	**0.49**	0.27	0.28	**-0.45**	0.30	0.30	0.27	**0.50**	0.17	0.22	0.00	0.16	-0.06	-0.21	**0.40**	**0.50**	-0.11	1.00	
US	0.25	0.14	0.22	0.09	0.06	0.07	0.28	0.17	0.05	-0.09	0.17	-0.05	0.20	0.02	**-0.43**	0.30	0.25	-0.24	-0.20	0.15	0.28	0.14	**0.70**	0.30	1.00

Note: Figures in bold indicate statistical significance at the 10 percent level.

TABLE 5

BILATERAL BUSINESS CYCLE CORRELATIONS

1973-2006

Sample Mean (Standard Error):0.24 (0.01)

	BEL	FRA	GER	NETH	AUST	ITA	SWITZ	GRE	POR	SPA	DEN	FIN	NOR	SWE	IND	JAP	SLK	ARG	BRA	CHL	URU	AUSL	CAN	UK	US
BEL	1.00																								
FRA	**0.77**	1.00																							
GER	**0.67**	**0.72**	1.00																						
NETH	**0.70**	**0.61**	**0.66**	1.00																					
AUST	**0.57**	**0.74**	**0.66**	**0.56**	1.00																				
ITA	**0.82**	**0.81**	**0.70**	**0.62**	**0.52**	1.00																			
SWITZ	**0.59**	**0.54**	**0.46**	**0.56**	**0.42**	**0.58**	1.00																		
GRE	0.24	0.25	**0.40**	0.22	0.06	0.15	0.06	1.00																	
POR	**0.65**	**0.74**	**0.59**	**0.56**	**0.59**	**0.71**	**0.60**	0.16	1.00																
SPA	**0.63**	**0.62**	**0.39**	**0.70**	**0.48**	**0.50**	**0.43**	0.15	**0.66**	1.00															
DEN	0.28	**0.29**	**0.52**	**0.34**	**0.28**	**0.28**	0.12	**0.38**	0.16	0.13	1.00														
FIN	**0.42**	**0.45**	0.07	**0.32**	0.23	**0.46**	**0.55**	0.23	0.33	**0.40**	0.13	1.00													
NOR	0.16	-0.04	**0.31**	**0.33**	0.12	0.16	0.05	0.12	-0.16	-0.19	**0.50**	0.04	1.00												
SWE	**0.46**	**0.40**	0.18	**0.39**	0.20	**0.42**	**0.34**	0.27	0.15	**0.49**	**0.34**	**0.78**	0.13	1.00											
IND	-0.19	-0.20	**-0.32**	-0.06	**-0.31**	**-0.39**	-0.04	0.17	-0.23	0.06	-0.09	0.06	-0.15	0.00	1.00										
JAP	**0.34**	**0.41**	**0.55**	0.16	0.25	**0.38**	**0.32**	**0.42**	**0.50**	0.16	0.20	0.14	-0.01	0.01	0.00	1.00									
SLK	-0.19	0.04	0.19	0.00	0.19	0.00	-0.11	0.14	-0.12	-0.21	0.20	0.06	0.16	0.10	**-0.41**	0.15	1.00								
ARG	-0.04	-0.14	0.08	0.12	0.19	-0.19	-0.05	-0.09	-0.06	-0.03	0.16	-0.16	**0.30**	-0.08	-0.10	-0.13	0.26	1.00							
BRA	**0.44**	0.16	0.20	**0.30**	0.13	**0.35**	0.17	**0.30**	0.14	0.15	**0.33**	**0.32**	**0.53**	**0.33**	-0.20	0.10	-0.03	0.17	1.00						
CHL	0.17	0.03	**0.30**	**0.31**	0.06	0.28	**0.48**	-0.04	**0.32**	-0.02	-0.03	-0.06	0.14	-0.16	-0.09	0.08	-0.08	0.25	0.03	1.00					
URU	0.13	-0.07	0.09	0.17	0.00	-0.03	0.11	0.09	0.09	-0.01	0.05	0.02	**0.31**	0.05	-0.01	0.11	0.08	**0.60**	**0.36**	**0.40**	1.00				
AUSL	0.06	-0.05	0.10	0.21	-0.20	0.25	0.16	**0.30**	0.02	0.01	0.15	**0.31**	**0.32**	0.28	0.16	-0.04	-0.04	0.00	0.23	**0.36**	0.19	1.00			
CAN	**0.45**	**0.42**	**0.38**	**0.50**	0.20	**0.53**	**0.44**	**0.32**	0.19	**0.33**	**0.29**	**0.53**	**0.36**	**0.56**	0.00	0.11	0.19	-0.09	0.45	0.14	0.09	**0.63**	1.00		
UK	**0.32**	**0.50**	**0.38**	**0.39**	0.25	**0.46**	0.28	**0.43**	**0.45**	**0.47**	**0.53**	**0.51**	0.05	**0.46**	0.04	**0.38**	0.25	0.00	0.32	-0.03	-0.04	**0.40**	**0.58**	1.00	
US	**0.33**	**0.40**	**0.56**	**0.55**	0.19	**0.47**	**0.47**	**0.38**	**0.29**	0.23	**0.47**	**0.30**	**0.35**	**0.30**	0.11	**0.34**	0.21	0.07	0.20	**0.36**	0.13	**0.65**	**0.76**	**0.67**	1.00

Note: Figures in bold indicate statistical significance at the 10 percent level.

TABLE 6

EQUALITY TESTS OF AVERAGE WITHIN-GROUP CORRELATION COEFFICIENTS ACROSS SUBPERIODS

	Mean Correlation Coefficients				Difference of Means across Sub-periods		
	1880-1913	1920-1939	1950-1973	1973-2006	1880-1913 vs. 1920-1939	1920-1939 vs. 1950-1973	1950-1973 vs. 1973-2006
All Countries	0.02	0.20	0.14	0.24	0.18	-0.06	0.10
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Core European	-0.04	0.37	0.33	0.69	0.41	-0.04	0.36
	(0.09)	(0.06)	(0.09)	(0.02)	(0.11)	(0.11)	(0.09)
Core & Western European	-0.02	0.24	0.35	0.63	0.27	0.11	0.28
	(0.04)	(0.07)	(0.05)	(0.02)	(0.08)	(0.09)	(0.05)
Core, Western & Southern	-0.01	0.18	0.18	0.53	0.18	0.00	0.35
European	(0.03)	(0.04)	(0.05)	(0.03)	(0.05)	(0.06)	(0.05)
Core, Western & Southern	-0.01	0.19	0.18	0.61	0.20	-0.01	0.43
European (ex. Greece)	(0.03)	(0.04)	(0.05)	(0.02)	(0.06)	(0.07)	(0.06)
Nordic	0.11	0.43	0.31	0.32	0.32	-0.12	0.01
	(0.07)	(0.10)	(0.05)	(0.12)	(0.12)	(0.11)	(0.13)
Anglo-Saxon	0.17	0.48	0.25	0.61	0.31	-0.23	0.37
	(0.10)	(0.06)	(0.13)	(0.05)	(0.12)	(0.14)	(0.14)
Latin American	0.00	0.47	0.06	0.30	0.47	-0.40	0.24
	(0.08)	(0.10)	(0.08)	(0.08)	(0.13)	(0.13)	(0.11)
Asian	0.13	0.26	0.37	-0.09	0.13	0.10	-0.45
	(0.03)	(0.13)	(0.15)	(0.17)	(0.13)	(0.20)	(0.23)

Note: Standard errors are reported in parentheses.

TABLE 7

NON-PARAMETRIC EQUALITY TESTS OF AVERAGE WITHIN-GROUP CORRELATION COEFFICIENTS

ACROSS SUBPERIODS

	Median Correlation Coefficients				Difference of Medians across Sub-periods		
	1880-1913	1920-1939	1950-1973	1973-2006	1880-1913 vs. 1920-1939	1920-1939 vs. 1950-1973	1950-1973 vs. 1973-2006
All Countries	0.02	0.21	0.13	0.23	0.19	-0.08	0.10
					[0.00]	[0.00]	[0.00]
Core European	-0.08	0.35	0.33	0.69	0.43	-0.02	0.35
					[0.01]	[0.94]	[0.01]
Core & Western European	-0.06	0.20	0.33	0.62	0.26	0.14	0.29
					[0.00]	[0.30]	[0.00]
Core, Western & Southern European	0.00	0.15	0.16	0.59	0.15	0.01	0.43
					[0.00]	[0.97]	[0.00]
Core, Western & Southern European (ex. Greece)	-0.03	0.15	0.19	0.61	0.17	0.04	0.42
					[0.00]	[0.97]	[0.00]
Nordic	0.15	0.38	0.35	0.24	0.23	-0.03	-0.11
					[0.07]	[0.47]	[0.94]
Anglo-Saxon	0.23	0.43	0.22	0.64	0.20	-0.21	0.42
					[0.05]	[0.23]	[0.07]
Latin American	-0.05	0.49	0.02	0.30	0.54	-0.47	0.29
					[0.02]	[0.02]	[0.07]
Asian	0.13	0.35	0.28	0.00	0.22	-0.08	-0.28
					[0.66]	[1.00]	[0.08]

Note: *p*-values based on the Wilcoxon rank-sum test are reported in brackets.

TABLE 8

EQUALITY TESTS OF AVERAGE CROSS-GROUP CORRELATION COEFFICIENTS ACROSS SUBPERIODS

	Mean Correlation Coefficients				Difference of Means across Sub-periods		
	1880-1913	1920-1939	1950-1973	1973-2006	1880-1913 vs. 1920-1939	1920-1939 vs. 1950-1973	1950-1973 vs. 1973-2006
Core and Western	0.08	0.23	0.17	0.32	0.15	-0.06	0.15
with Anglo-Saxon	(0.04)	(0.04)	(0.03)	(0.04)	(0.06)	(0.05)	(0.05)
Core and Western	0.03	0.12	0.01	0.46	0.09	-0.11	0.44
with Southern European	(0.04)	(0.04)	(0.06)	(0.05)	(0.05)	(0.07)	(0.08)
Core and Western	0.01	0.09	-0.04	0.59	0.09	-0.14	0.63
with Southern European (ex. Greece)	(0.05)	(0.03)	(0.08)	(0.03)	(0.06)	(0.08)	(0.08)
Core and Western	0.01	0.22	0.27	0.29	0.21	0.05	0.02
with Nordic	(0.03)	(0.05)	(0.04)	(0.03)	(0.06)	(0.07)	(0.05)
Core and Western	0.00	0.28	0.17	0.13	0.28	-0.11	-0.03
with Latin American	(0.03)	(0.04)	(0.05)	(0.03)	(0.05)	(0.06)	(0.06)
Core and Western	0.07	0.08	0.21	0.05	0.00	0.13	-0.16
with Asian	(0.04)	(0.07)	(0.04)	(0.06)	(0.08)	(0.08)	(0.07)
Anglo-Saxon	-0.03	0.32	0.11	0.36	0.34	-0.21	0.25
with Nordic	(0.03)	(0.06)	(0.05)	(0.04)	(0.07)	(0.08)	(0.06)
Anglo-Saxon	0.01	0.45	-0.01	0.15	0.44	-0.46	0.16
with Latin American	(0.06)	(0.04)	(0.05)	(0.04)	(0.07)	(0.07)	(0.07)
Anglo-Saxon	0.03	0.22	0.07	0.14	0.18	-0.14	0.07
with Asian	(0.04)	(0.06)	(0.06)	(0.04)	(0.07)	(0.09)	(0.07)

Note: Standard errors are reported in parentheses.

TABLE 9

NON-PARAMETRIC EQUALITY TESTS OF AVERAGE CROSS-GROUP CORRELATION COEFFICIENTS

ACROSS SUBPERIODS

	Median Correlation Coefficients				Difference of Medians across Sub-periods		
	1880-1913	1920-1939	1950-1973	1973-2006	1880-1913 vs. 1920-1939	1920-1939 vs. 1950-1973	1950-1973 vs. 1973-2006
Core and Western	0.08	0.27	0.13	0.38	0.19	-0.14	0.25
with Anglo-Saxon					[0.00]	[0.11]	[0.00]
Core and Western	0.06	0.11	-0.02	0.50	0.04	-0.13	0.52
with Southern European					[0.17]	[0.11]	[0.00]
Core and Western	0.03	0.10	-0.08	0.60	0.07	-0.19	0.68
with Southern European (ex. Greece)					[0.26]	[0.07]	[0.00]
Core and Western	0.02	0.21	0.29	0.30	0.18	0.09	0.01
with Nordic					[0.00]	[0.38]	[0.81]
Core and Western	-0.02	0.31	0.09	0.13	0.34	-0.22	0.04
with Latin American					[0.00]	[0.13]	[0.99]
Core and Western	0.13	0.19	0.14	0.00	0.06	-0.04	-0.14
with Asian					[0.63]	[0.38]	[0.05]
Anglo-Saxon	-0.05	0.37	0.08	0.34	0.41	-0.29	0.26
with Nordic					[0.00]	[0.02]	[0.00]
Anglo-Saxon	-0.01	0.47	-0.07	0.13	0.48	-0.53	0.20
with Latin American					[0.00]	[0.00]	[0.04]
Anglo-Saxon	0.06	0.23	0.14	0.14	0.17	-0.09	-0.01
with Asian					[0.06]	[0.21]	[0.75]

Note: *p*-values based on the Wilcoxon rank-sum test are reported in brackets.

TABLE 10

VARIANCE DECOMPOSITIONS BASED ON THE ONE-FACTOR FSVAR:
INTERNATIONAL SHOCKS, SPILLOVERS, AND IDIOSYNCRATIC SHOCKS

Country Groups	Horizon	1880-1913			1920-1939			1950-1973			1973-2006		
		Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:		
		Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks
Nordic	1	0.03	0.00	0.97	0.03	0.00	0.97	0.39	0.00	0.61	0.17	0.00	0.83
	2	0.03	0.17	0.80	0.05	0.40	0.56	0.33	0.38	0.29	0.07	0.13	0.80
	3	0.03	0.23	0.74	0.09	0.42	0.49	0.32	0.44	0.23	0.04	0.27	0.69
	4	0.02	0.26	0.71	0.10	0.44	0.45	0.36	0.43	0.22	0.03	0.36	0.61
Core European	1	0.16	0.00	0.84	0.41	0.00	0.59	0.56	0.00	0.44	0.71	0.00	0.30
	2	0.16	0.14	0.71	0.33	0.36	0.32	0.59	0.13	0.29	0.65	0.10	0.26
	3	0.14	0.19	0.68	0.31	0.44	0.26	0.59	0.18	0.24	0.57	0.16	0.26
	4	0.14	0.21	0.65	0.28	0.50	0.22	0.59	0.19	0.22	0.50	0.23	0.26
Anglo-Saxon	1	0.49	0.00	0.51	0.51	0.00	0.49	0.24	0.00	0.76	0.29	0.00	0.71
	2	0.43	0.12	0.45	0.41	0.30	0.29	0.26	0.13	0.62	0.18	0.15	0.66
	3	0.42	0.17	0.40	0.40	0.34	0.25	0.28	0.18	0.54	0.11	0.29	0.61
	4	0.41	0.22	0.37	0.39	0.38	0.23	0.30	0.21	0.50	0.09	0.37	0.55

Notes: The Nordic country group includes Denmark, Norway and Sweden. The European Core includes Belgium, France, Germany and the Netherlands. The Anglo-Saxon group includes Canada, the UK and the US. Results refer to simple averages over country groups.

TABLE 11

VARIANCE DECOMPOSITIONS BASED ON THE ONE-FACTOR FSVAR: INTERNATIONAL SHOCKS, SPILLOVERS, AND IDIOSYNCRATIC SHOCKS

Country Groups	Horizon	1880-1913			1920-1939			1950-1973			1973-2006		
		Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:		
		Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks
Latin American	1	0.19	0.00	0.81	0.26	0.00	0.74	0.16	0.00	0.84	0.01	0.00	0.99
	2	0.18	0.15	0.68	0.34	0.28	0.38	0.14	0.24	0.62	0.02	0.16	0.82
	3	0.17	0.21	0.62	0.33	0.39	0.28	0.14	0.30	0.55	0.01	0.26	0.72
	4	0.17	0.24	0.59	0.30	0.47	0.23	0.13	0.32	0.55	0.01	0.34	0.65
Core European	1	0.16	0.00	0.84	0.44	0.00	0.56	0.43	0.00	0.57	0.70	0.00	0.31
	2	0.15	0.16	0.70	0.42	0.18	0.40	0.37	0.21	0.42	0.63	0.10	0.27
	3	0.13	0.23	0.64	0.43	0.24	0.33	0.30	0.38	0.32	0.57	0.18	0.25
	4	0.12	0.26	0.62	0.43	0.27	0.30	0.25	0.49	0.27	0.53	0.24	0.24
Anglo-Saxon	1	0.49	0.00	0.51	0.44	0.00	0.56	0.16	0.00	0.84	0.34	0.00	0.66
	2	0.42	0.17	0.40	0.37	0.34	0.30	0.12	0.21	0.68	0.19	0.20	0.61
	3	0.41	0.23	0.36	0.32	0.51	0.17	0.10	0.33	0.58	0.11	0.35	0.54
	4	0.41	0.27	0.32	0.26	0.63	0.11	0.09	0.38	0.53	0.08	0.42	0.50

Notes: The Latin American group includes Argentina, Brazil and Uruguay. See Table 10 for definitions of the European Core and Anglo-Saxon groups. Results refer to simple averages over country groups.

TABLE 12

VARIANCE DECOMPOSITIONS BASED ON THE ONE-FACTOR FSVAR: INTERNATIONAL SHOCKS, SPILLOVERS, AND IDIOSYNCRATIC SHOCKS

Country Groups	Horizon	1880-1913			1920-1939			1950-1973			1973-2006		
		Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:		
		Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks
Western European	1	0.06	0.00	0.94	0.26	0.00	0.74	0.47	0.00	0.53	0.51	0.00	0.49
	2	0.04	0.25	0.71	0.13	0.24	0.63	0.45	0.18	0.37	0.53	0.13	0.33
	3	0.05	0.29	0.66	0.13	0.34	0.53	0.43	0.27	0.30	0.47	0.25	0.28
	4	0.04	0.33	0.63	0.12	0.42	0.45	0.39	0.37	0.24	0.44	0.30	0.26
Western European (excluding Switzerland)	1	0.02	0.00	0.99	0.05	0.00	0.96	0.48	0.00	0.52	0.60	0.00	0.40
	2	0.04	0.14	0.82	0.07	0.09	0.84	0.41	0.19	0.41	0.63	0.14	0.23
	3	0.05	0.18	0.78	0.10	0.21	0.70	0.37	0.31	0.33	0.57	0.24	0.20
	4	0.05	0.22	0.74	0.09	0.33	0.58	0.32	0.42	0.27	0.54	0.28	0.18
Core European	1	0.11	0.00	0.90	0.52	0.00	0.48	0.55	0.00	0.45	0.71	0.00	0.29
	2	0.10	0.21	0.69	0.39	0.29	0.32	0.58	0.16	0.27	0.56	0.15	0.29
	3	0.10	0.27	0.63	0.40	0.33	0.28	0.56	0.21	0.23	0.45	0.28	0.28
	4	0.10	0.30	0.60	0.38	0.37	0.25	0.53	0.26	0.21	0.39	0.34	0.27
Anglo-Saxon	1	0.45	0.00	0.55	0.39	0.00	0.61	0.44	0.00	0.56	0.12	0.00	0.88
	2	0.40	0.13	0.48	0.39	0.33	0.28	0.44	0.09	0.47	0.05	0.13	0.82
	3	0.37	0.21	0.42	0.33	0.43	0.24	0.44	0.13	0.43	0.04	0.24	0.73
	4	0.35	0.26	0.38	0.28	0.54	0.18	0.44	0.16	0.40	0.04	0.28	0.68

Notes: The Western European group includes Austria, Italy and Switzerland. See Table 10 for definitions of the European Core and Anglo-Saxon groups. Results refer to simple averages over country groups.

TABLE 13

VARIANCE DECOMPOSITIONS BASED ON THE ONE-FACTOR FSVAR: INTERNATIONAL SHOCKS, SPILLOVERS, AND IDIOSYNCRATIC SHOCKS

Country Groups	Horizon	1880-1913			1920-1939			1950-1973			1973-2006		
		Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:		
		Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks
Southern European	1	0.01	0.00	0.99	0.18	0.00	0.82	0.54	0.00	0.46	0.31	0.00	0.69
	2	0.01	0.31	0.68	0.15	0.33	0.52	0.45	0.23	0.31	0.23	0.11	0.67
	3	0.02	0.39	0.59	0.14	0.37	0.49	0.53	0.23	0.24	0.19	0.20	0.61
	4	0.02	0.40	0.58	0.12	0.38	0.50	0.56	0.25	0.20	0.17	0.26	0.57
Southern European (excluding Greece)	1	0.01	0.00	0.99	0.24	0.00	0.77	0.53	0.00	0.47	0.44	0.00	0.57
	2	0.01	0.32	0.68	0.20	0.37	0.44	0.45	0.16	0.39	0.33	0.10	0.58
	3	0.03	0.39	0.59	0.19	0.40	0.41	0.49	0.20	0.32	0.27	0.18	0.55
	4	0.03	0.41	0.57	0.17	0.42	0.42	0.53	0.21	0.27	0.24	0.24	0.53
Core European	1	0.17	0.00	0.83	0.27	0.00	0.74	0.52	0.00	0.49	0.67	0.00	0.33
	2	0.15	0.15	0.70	0.18	0.39	0.44	0.55	0.14	0.31	0.54	0.19	0.27
	3	0.13	0.25	0.63	0.19	0.47	0.35	0.54	0.26	0.20	0.41	0.37	0.22
	4	0.12	0.28	0.61	0.18	0.53	0.30	0.52	0.33	0.15	0.33	0.48	0.19
Anglo-Saxon	1	0.43	0.00	0.57	0.51	0.00	0.49	0.22	0.00	0.78	0.13	0.00	0.87
	2	0.36	0.17	0.48	0.51	0.23	0.26	0.21	0.15	0.64	0.05	0.18	0.77
	3	0.33	0.29	0.38	0.51	0.27	0.23	0.23	0.21	0.57	0.03	0.30	0.66
	4	0.32	0.33	0.35	0.48	0.33	0.19	0.24	0.24	0.51	0.03	0.35	0.62

Notes: The South European group includes Greece, Portugal and Spain. See Table 10 for definitions of the European Core and Anglo-Saxon groups. Results refer to simple averages over country groups.

TABLE 14

VARIANCE DECOMPOSITIONS BASED ON THE ONE-FACTOR FSVAR: INTERNATIONAL SHOCKS, SPILLOVERS, AND IDIOSYNCRATIC SHOCKS

Country Groups	Horizon	1880-1913			1920-1939			1950-1973			1973-2006		
		Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:		
		Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks
Asian	1	0.02	0.00	0.98	0.06	0.00	0.94	0.21	0.00	0.79	0.07	0.00	0.93
	2	0.04	0.33	0.63	0.13	0.20	0.67	0.23	0.14	0.64	0.07	0.17	0.76
	3	0.04	0.42	0.54	0.15	0.29	0.57	0.23	0.22	0.55	0.07	0.25	0.69
	4	0.03	0.44	0.52	0.14	0.32	0.54	0.21	0.29	0.50	0.07	0.30	0.64
Core European	1	0.16	0.00	0.84	0.46	0.00	0.54	0.59	0.00	0.41	0.64	0.00	0.36
	2	0.15	0.12	0.74	0.42	0.23	0.35	0.59	0.16	0.25	0.55	0.17	0.29
	3	0.14	0.15	0.70	0.41	0.29	0.31	0.55	0.27	0.18	0.47	0.27	0.26
	4	0.14	0.17	0.69	0.40	0.33	0.28	0.51	0.35	0.14	0.42	0.34	0.24
Anglo-Saxon	1	0.48	0.00	0.52	0.51	0.00	0.49	0.40	0.00	0.60	0.37	0.00	0.63
	2	0.41	0.11	0.47	0.52	0.24	0.24	0.41	0.22	0.37	0.19	0.25	0.55
	3	0.39	0.16	0.44	0.50	0.34	0.17	0.39	0.30	0.31	0.12	0.44	0.45
	4	0.39	0.19	0.42	0.43	0.43	0.13	0.36	0.38	0.26	0.09	0.50	0.40

Notes: The Asian group includes India, Japan and Sri Lanka. See Table 10 for definitions of the European Core and Anglo-Saxon groups. Results refer to simple averages over country groups.

TABLE 15

VARIANCE DECOMPOSITIONS BASED ON THE ONE-FACTOR FSVAR:
INTERNATIONAL SHOCKS, SPILLOVERS, AND IDIOSYNCRATIC SHOCKS

Country Groups	Horizon	1880-1913			1920-1939			1950-1973			1973-2006		
		Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:			Fraction of Forecast Error variance due to:		
		Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks	Int'l shocks	Spillo-vers	Own shocks
Australia	1	0.00	0.00	1.00	0.05	0.00	0.95	0.22	0.00	0.78	0.02	0.00	0.98
	2	0.01	0.10	0.89	0.10	0.02	0.88	0.18	0.26	0.56	0.01	0.06	0.93
	3	0.02	0.09	0.89	0.13	0.05	0.83	0.16	0.31	0.53	0.01	0.08	0.91
	4	0.02	0.10	0.88	0.14	0.06	0.80	0.14	0.37	0.49	0.01	0.09	0.90
Core European	1	0.15	0.00	0.85	0.39	0.00	0.61	0.56	0.00	0.44	0.69	0.00	0.31
	2	0.14	0.11	0.75	0.27	0.30	0.45	0.64	0.06	0.30	0.63	0.09	0.27
	3	0.14	0.15	0.72	0.25	0.41	0.34	0.65	0.10	0.26	0.56	0.19	0.25
	4	0.14	0.16	0.70	0.24	0.48	0.29	0.64	0.13	0.23	0.50	0.26	0.25
Anglo-Saxon	1	0.44	0.00	0.56	0.23	0.00	0.77	0.32	0.00	0.68	0.27	0.00	0.73
	2	0.39	0.14	0.47	0.16	0.34	0.49	0.34	0.08	0.58	0.18	0.10	0.72
	3	0.38	0.19	0.43	0.11	0.48	0.42	0.35	0.10	0.54	0.13	0.18	0.69
	4	0.37	0.23	0.40	0.08	0.59	0.33	0.37	0.13	0.51	0.10	0.23	0.67

Notes: See Table 10 for definitions of the European Core and Anglo-Saxon groups. Results refer to simple averages over country groups.