

CYCLICAL PATTERNS OF THE SPANISH ECONOMY IN EUROPE

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Luis J. Álvarez, M.^a Dolores Gadea
and Ana Gómez Loscos

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Luis J. Álvarez

BANCO DE ESPAÑA

M.^a Dolores Gadea

UNIVERSITY OF ZARAGOZA

Ana Gómez Loscos

BANCO DE ESPAÑA

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Abstract

The main aim of this paper is to provide a set of stylised facts on the regularities of cyclical patterns in Spain compared with those of the major European countries and to analyse the synchronisation of the main real variables of these economies, which have close trading and financial relationships. A sectoral approach is used to take into account the heterogeneous behaviour of the different supply and demand components.

Keywords: synchronisation, business cycle, heterogeneity.

JEL classification: E32, O52, C22.

Resumen

El objetivo principal de este trabajo es, por un lado, proporcionar un conjunto de *hechos estilizados* sobre las regularidades de los patrones cíclicos en España en relación con los de los principales países europeos y, por otro, analizar la sincronización de la evolución de las principales variables reales de estas economías, que mantienen entre sí estrechas relaciones comerciales y financieras. Se emplea un enfoque sectorial para poder tener en cuenta la heterogeneidad de comportamiento de los diferentes componentes de la oferta y de la demanda.

Palabras clave: sincronización, ciclo económico, heterogeneidad.

Códigos JEL: E32, O52, C22.

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1 Introduction

The economic recession caused by COVID-19 in a large number of the world's economies is prompting a renewal of the interest in business cycle analysis that arose in the wake of the global financial crisis. In the face of this common shock, most governments have imposed lockdown and social distancing measures, causing many sectors to appreciably slow down or even shut down their activity. There has also been a decline in the confidence of households and firms, which are limiting their spending decisions. Chart 1 shows the changes in per capita GDP in the main European economies from 1950 to 2020. As can be seen, the contraction of GDP in 2020 is simultaneously affecting all the major European economies with unprecedented force.¹

In any event, and aside from the current recession, academic interest in the business cycle follows a countercyclical pattern, increasing strongly during recessions and decreasing during booms (Kufenko and Geiger (2016)). In Europe, the resurgence of studies on the business cycle arose recently during the global financial crisis and during the sovereign debt crisis. This interest in cyclical patterns and in the degree of cross-country economic synchronisation has also been particularly significant in the case of the Economic and Monetary Union (EMU) since its launch, because the adoption of a single currency initially raised concerns among some economists about the capacity of common policies to appropriately respond to country-specific shocks. The importance of business cycle synchronisation for the adequate functioning of a common currency area is well known in the literature on optimum currency areas.² The intuition is simple: if the member countries' business cycles are closely related to the business cycle of the monetary union as a whole, the shift from individual monetary policies for each country to a common monetary policy does not entail costs deriving from the loss of monetary autonomy. However, if asymmetric shocks predominate and, therefore, the business cycles of the different countries differ substantially, then a common monetary policy could have a destabilising role in certain economies.

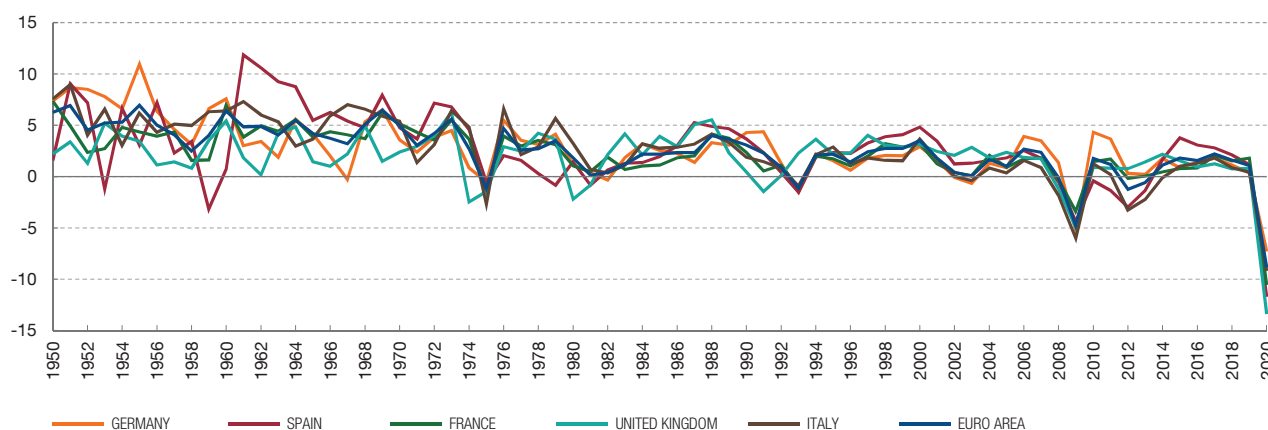
Since Frankel and Rose's (1998) pioneering paper, the literature has questioned the exogenous nature of business cycle synchronisation for monetary unions. In reality, business cycle synchronisation is endogenous to the extent that the formation of a monetary union gives rise to greater synchronisation of its members' business cycles. This greater synchronisation would be the result of adopting a common monetary policy, but also of closer international trade with the rest of the members of the monetary union, fostered by the elimination of exchange rate uncertainty among them. In this connection, Gächter and Riedl (2014) find not only that the increase in bilateral trade leads to greater cyclical synchronisation, but that euro area membership itself leads to greater business cycle convergence. This would in part be linked to the existence of a single market and a broad common legal corpus. Also,

¹ Excluding the two World Wars and the Spanish Civil War, the 2020 contraction is the biggest since 1890, the first year of the Bergeaud et al. series (2014), available at <http://www.longtermproductivity.com/download.html>. For 2020 we have used the growth forecasts of the different countries' central banks.

² See seminal contributions by Mundell (1961), McKinnon (1963) and Kenen (1969).

Chart 1

HISTORICAL TRENDS PER CAPITA GDP



SOURCES: Bergeaud et al. (2016), national central banks and own calculations.

certain authors have developed behavioural macroeconomic models³ which could explain the synchronisation of the cyclical fluctuations of these economies, as a result of common movements in households' and firms' expectations in different countries.

From an empirical viewpoint, there is ample literature addressing the characteristics of these business cycles in European countries and their degree of synchronisation, as described in Section 2 of this paper. Three types of findings are common to practically all studies. First, the convergence process preceding the adoption of the single currency led to an increase in the degree of synchronisation. Second, synchronisation increased substantially with the global financial crisis. Third, the recovery after the crisis was uneven across the different economies and, accordingly, cyclical synchronisation decreased.

In this setting, the aim of this paper is twofold. First, the paper provides a set of stylised facts on the main regularities of the cyclical patterns in Spain compared with those of the major European countries (Germany, France, Italy and the United Kingdom) and the euro area as a whole. Second, it analyses the extent to which the changes in the main real variables of these economies, which have close trading and financial relationships, are synchronised. To this end, rather than only focusing on the changes in a significant variable for measuring economic activity, such as GDP or employment, this paper uses the highest level of disaggregation allowed by the Quarterly National Accounts. Specifically, a sectoral approach is used to take into account the heterogeneous behaviour of the different supply and demand components. To calculate the degree of synchronisation, Peña and Rodríguez's (2003) effective dependency index is used.

³ For instance, De Grauwe and Ji (2017).

After this introduction, the paper is structured as follows. Section 2 reviews the recent literature on business cycle synchronisation. Section 3 describes the data and methodology used. Section 4 aims to identify a set of stylised facts to summarise the main regularities of cyclical patterns in Spain and in the major European economies. Section 5 addresses the extent to which changes in the main real variables of these economies, which have close trading and financial relationships, are synchronised. The final section concludes.

2 A review of the literature

Numerous papers have described the characteristics of business cycles in European countries and their degree of synchronisation. Specifically, for the period prior to the global financial crisis, De Haan et al. (2008) and Giannone et al. (2010) provide overviews of the empirical evidence available. The most salient findings of this branch of literature are that the increase in the degree of synchronisation is far from being a continuous process and that the euro area cycles have gone through periods of convergence and divergence. Also, trade intensity across countries is a factor determining similarity in the changes in the business cycle, while the evidence for other types of factors is much less conclusive.

The recession caused by the global financial crisis and the uneven economic developments in the different countries during the subsequent recovery period triggered a further boost in the literature dealing with business cycle synchronisation, which we summarise here. Thus, Degiannakis et al. (2014) investigate the time variation in the degree of synchronisation using a covariance model. Their main findings are that the degree of co-movement among a broad set of European countries had increased prior to the global financial crisis. However, as a result of the recession and subsequent crises, several peripheral countries, Greece in particular, experienced a loss of cyclical synchronisation with the European countries as a whole. Ferroni and Klaus (2015) study the statistical properties of the business cycles of the four largest euro area countries using a factor model. Their estimates support the idea of substantial economic integration among France, Germany and Italy, but not with Spain. Spanish business cycles appear to be decoupled from those of the rest of the euro area. Specifically, the Spanish economy showed some overheating before the global financial crisis and a sharper depression in the aftermath. Grigoras and Stanciu (2016) compare concordance and correlation measures for a sample of European economies, concluding that the degree of co-movement of these countries' cycles decreased after the global financial crisis compared with the period following the adoption of the euro as a single currency. Matesanz et al. (2016) use network analysis, finding that the financial crisis led to an increase in economic co-movement within the European Union (EU), since all the countries entered into recession simultaneously. However, a strong desynchronisation effect arose subsequently, owing to the uneven economic recovery. In this connection, Gadea et al. (2016) find that the degree of synchronisation increased during the convergence process prior to the adoption of the single currency and received a strong impulse with the global financial crisis, declining somewhat subsequently. They also find evidence of a single cycle common to the European economies. Duran and Ferreira-Lopes (2017) adopt a rolling-window correlations approach, also finding an increase in the degree of cyclical synchronisation until the global financial crisis and a subsequent decline. Gouveia (2016) concludes that since the inception of the European Monetary Union, the cycles of the euro area Member States, except for Greece, have become increasingly synchronised with the area as a whole. She also documents that changes in the export market structures of certain countries, such as Spain, contributed to increasing their synchronisation with the euro area. Belke et al. (2017) study business cycle synchronisation, highlighting the differences between core and peripheral country developments in the post-crisis period. They find

that core countries show greater synchronisation with each other after the financial crisis, while peripheral countries decreased synchronisation with regard to the core countries and among each other. Lastly, Campos et al. (2019) construct a database of 3,000 measures of business cycle synchronisation in Europe, to carry out a systematic assessment thereof. Their main findings include an increase in the correlation coefficients in the period following the introduction of the euro compared with the pre-euro period. Also, this increase occurred in both the core and peripheral euro countries, and in the non-euro countries of Western Europe, such as Sweden and the United Kingdom. However, the increase seems to have been larger for euro area (particularly core) countries.

In short, although the different studies available in the literature show differences in the methodologies used,⁴ variables, sample periods and economies analysed, commonly there are three types of findings. First, the convergence process preceding the adoption of the single currency led to an increase in the degree of synchronisation. Second, synchronisation increased substantially with the global financial crisis. Third, the post-crisis recovery was uneven and, accordingly, cyclical synchronisation declined.

⁴ A wide range of methodologies was used, such as calculation of GDP among closely-related pairs, dynamic factor models and covariance models.

3 Data and methodology used

To analyse Spain's business cycle in the context of Europe, this paper also considers the four major European countries: Germany, the United Kingdom, France and Italy. The euro area as a whole is also analysed.

The variable most used in the literature to determine cyclical patterns and the synchronisation of economies is GDP, given that it provides a comprehensive measure of economic activity. This paper follows this practice, but also adopts a sectoral approach to capture agents' heterogeneous behaviour as regards both supply and demand.⁵ Specifically, the demand variables considered in the analysis refer to both private consumption (broken down into its durable and non-durable components) and government consumption, investment (in capital goods, construction and intangibles) and foreign trade (exports and imports of goods and services). From a supply perspective, gross value added (GVA) is considered for agriculture, industry (broken down into manufacturing GVA and construction GVA) and services. GVA for services is disaggregated into non-market services GVA and market services GVA and, alternatively, into: GVA for retail trade, GVA for information and communication, GVA for financial activities, GVA for real estate activities, GVA for professional and scientific activities and GVA for arts and entertainment. In total, 24 economic aggregates are considered. Quarterly data covering the period 1996 Q1-2019 Q3 are used. The source of data used is Eurostat.

As regards the business cycle extraction methodology, it should be borne in mind that the cycle is not a directly observable variable. Consequently, in order to identify the cycle, one of the multiple methodologies proposed in the literature must be adopted in the analysis.⁶ These techniques break down an activity series into three large components: trend, cycle and irregular component. The trend measures long-term behaviour. From an economic viewpoint, potential output is often considered as characterising the economy's sustainable aggregate supply capability (i.e. consistent with stable inflation). Alternatively, potential output could be defined as the level of output attainable when full use is made of all factors of production. The cyclical component, which is the main object of analysis in this paper, reflects recurrent, albeit not necessarily periodic, behaviour and shows a succession of upswings and downturns of varying length. Lastly, the irregular component includes changes in the series without a recognisable pattern in terms of periodicity or trend, which may be caused by multiple factors.

In this paper, a filter known in the literature as the *band-pass filter* is applied to break down GDP into its trend, business cycle and short-term movements. The main purpose of these approaches is to design a filter which eliminates very slow-moving (trend) components and very high-frequency (irregular) components, while retaining intermediate (business cycle) components. This type of filter allows components of a time series

⁵ There is scant literature adopting a sectoral standpoint. See, for instance, Furceri and Karras (2008) or Afonso and Furceri (2009).

⁶ For a review of the different estimation methods, see Alvarez and Gómez Loscos (2018).

belonging to a pre-specified band of frequencies (passband) to remain, while removing components at higher and lower frequencies.

The ideal band-pass filter (G_I^{BP}) has a gain function defined as:

$$G_I^{BP}(\omega) = \begin{cases} 0 & \text{if } |\omega| < \omega_{p1} \\ 1 & \text{if } \omega_{p1} \leq |\omega| \leq \omega_{p2} \\ 2 & \text{if } |\omega| > \omega_{p2} \end{cases}$$

This means that frequencies within the interval $[\omega_{p1}, \omega_{p2}]$ would pass through the filter, but all other frequencies are removed. ω_{p1} is the lower frequency and ω_{p2} is the higher frequency. For empirical applications, it is necessary to define a band of frequencies, i.e. $[\omega_{p1}, \omega_{p2}]$, must be specified. The most widespread definition considers cycles of between 6 and 32 quarters. The most widely used filters include those of Baxter and King (1999) and Christiano and Fitzgerald (2003). Since the Baxter and King (1999) filter entails losing observations at the beginning and at the end of the sample, in this paper we use the Christiano and Fitzgerald (2003) filter. The proposal of these authors involves an optimal approximation⁷ of the band-pass filter that can be used in real time, since it considers one-sided filters (i.e. those whose value only depends on past, not future, observations). In our application of the filter, we use a logarithmic transformation of the series, considering frequencies of between 6 and 32 quarters as the cyclical component. Trend movements would refer to frequencies longer than 32 quarters.

Once the cyclical component has been removed from the different series, we calculate their degree of synchronisation using a measure of multivariate linear dependence proposed by Peña and Rodríguez (2003) called *effective dependence*. In the bivariate case, this measure can be considered a generalisation of the squared correlation coefficient. Specifically, this measure (ED) is defined as:

$$ED = 1 - |R|^{1/p}$$

where $|R|$ denotes the determinant of the correlation matrix and p represents the number of variables. This measure ranges from 0 to 1 and a higher (lower) value denotes a greater (lesser) degree of linear dependence. A zero value would correspond to a set of orthogonal variables, i.e. no linear relationship between them, whereas a measure of 1 indicates perfect multicollinearity. An additional advantage of this measure of effective dependence is that it can be used to compare the degree of synchronisation between groups which do not have the same number of variables. In addition, the null hypothesis that the analysed variables are independent can be tested. In this paper we consider both the measure originally proposed by Peña and Rodríguez (2003) and a time-varying version of the measure in which five-year rolling windows are considered as sample periods.

⁷ Optimal approximations depend on the stochastic properties of the time series. However, these authors find that they obtain very proximal results under the assumption that the series follow a random walk.

4 Characterisation of the business cycle

Prior to analysing the cyclical patterns of the Spanish economy compared with those of the other main European countries over the period analysed, it should be borne in mind that average growth over the period 1996-2019 in the different economies shows noticeable differences. For instance, Spanish GDP grew by 2.1%, slightly above the 2% growth recorded in the United Kingdom. The French, euro area and German GDPs grew on average by 1.6%, 1.5% and 1.4%, respectively. At the other end of the scale, GDP growth in Italy was very modest (0.5%).

Among the demand components, the greater momentum of the Spanish economy as compared with the euro area was due to domestic factors, while growth in both exports and imports of goods and services was somewhat weaker in Spain than the euro area average. On the supply side, the Spanish economy's greater relative momentum was also broad-based, except for two sectors where technological innovation is particularly important (manufacturing, and information and communication) in which the Spanish economy recorded weaker growth than in the euro area as a whole.

Table 1
AVERAGE GROWTH

%	Euro area	Germany	France	Italy	Spain	United Kingdom
GDP	1.5	1.4	1.6	0.5	2.1	2.0
Private consumption	1.3	1.0	1.6	0.7	1.8	2.3
Durable consumption	2.6	2.4	3.4	1.8	3.1	5.4
Non-durable consumption	1.1	0.8	1.4	0.5	1.7	2.0
Government consumption	1.5	1.7	1.4	0.5	2.6	2.0
GFCF	1.9	1.6	2.1	0.4	2.0	1.7
GFCF capital goods	2.6	2.8	2.4	1.2	3.3	0.7
GFCF construction	0.6	0.2	1.4	-0.6	0.7	1.6
GFCF intangibles	4.5	3.0	3.4	2.2	5.4	2.1
Exports	4.5	5.2	3.7	2.3	4.4	3.3
Imports	4.4	4.7	4.2	2.7	4.1	3.7
GVA for agriculture	0.8	0.1	0.9	0.1	1.6	0.9
GVA for industry	1.4	1.6	1.1	-0.1	1.2	-0.1
GVA for manufacturing	1.6	1.8	1.3	0.1	1.0	0.1
GVA for construction	0.0	-0.4	0.2	-1.0	-0.1	1.6
GVA for services	1.8	1.6	1.8	0.9	2.6	2.6
GVA for non-market services	1.1	1.4	0.9	0.0	1.9	1.3
GVA for market services	2.0	1.7	2.2	1.2	2.9	3.0
MEMORANDUM ITEMS						
GVA for retail trade	1.8	1.8	1.9	1.2	1.9	1.9
GVA for information and communication	4.9	5.0	4.7	3.3	4.0	5.5
GVA for financial activities	1.2	-1.1	2.4	0.8	2.9	2.9
GVA for real estate activities	1.7	1.6	1.5	0.8	3.8	2.3
GVA for professional and scientific activities	2.2	1.8	2.2	1.0	3.8	4.7
GVA for arts and entertainment	1.1	0.1	1.7	0.9	2.9	1.4

SOURCES: Eurostat and own calculations.

4.1 Aggregate demand

The top half of Table 2 compiles, for the demand components of each of the European economies, the contemporaneous correlation between the cyclical component of each of the variables analysed and the cyclical component of that economy's GDP. A positive (negative) value for this coefficient indicates that the variable is procyclical (countercyclical), while a value of zero indicates that the variable is acyclical. The higher (lower) the coefficient's absolute value, the stronger (weaker) the relationship between the two variables. The bottom half of Table 2 shows the variability of each cyclical component, defined as the standard deviation of the series, expressed as a percentage.

From an expenditure standpoint, the main stylised features of the business cycle can be summarised as follows:

In Spain, private consumption is highly procyclical, given that the correlation coefficient between it and GDP is 0.89. The procyclicality of household spending is a common feature in all the analysed economies and largely reflects the importance of households' disposable income and wealth as determinants of their consumption and the relationship between GDP and disposable income and wealth. However, the strength of the relationship varies across countries. For instance, the relationship is strongest in Spain and weakest in Germany. The procyclicality of consumption affects both consumer durables and other consumer goods, although it is smaller in the first case. Likewise, Spanish household spending (whose cyclical component has a standard deviation of 0.99) is more variable than economic activity as a whole (whose cyclical component has a standard deviation of 0.87). This greater relative variability of consumption compared to output in Spain seems to be an anomaly from an international standpoint.⁸ In addition, this seems to contradict the consumption smoothing predicted by the permanent income hypothesis. A possible explanation could be that durables, which are typically highly cyclically sensitive, account for a portion of private consumption. The wider swings in durable goods consumption is a feature present in the different economies analysed. However, unlike the other areas analysed, non-durable goods consumption in Spain is also more variable than output. A possible explanation could be the influence of household wealth on consumption, which could lead to larger fluctuations in household spending than in GDP. In any event, a stylised fact in all the economies analysed is that durable goods consumption fluctuates much more than non-durable goods consumption. The fact that non-durable goods consumption (e.g. food) is more essential would explain its more moderate response to fluctuations in income.

Government consumption in Spain, on the other hand, is weakly procyclical. This could seem striking given that, overall, fiscal policy is considered traditionally to be countercyclical. However, general government consumption does not include items such as grants and subsidies, which are usually countercyclical. Government consumption includes mainly the public sector wage bill and expenditure on goods and services, which, in Spain,

⁸ This result is common in papers on the Spanish economy. See, for example, Dolado et al. (1993).

Table 2

DEMAND. PROCYCLICALITY AND VARIABILITY OF THE CYCLICAL COMPONENTS

Procyclicality (a)	Euro area	Germany	France	Italy	Spain	United Kingdom
Private consumption	0.81	0.59	0.62	0.73	0.89	0.83
Durable consumption	0.57	0.06	0.44	0.37	0.42	0.35
Non-durable consumption	0.88	0.65	0.83	0.80	0.91	0.78
Government consumption	-0.43	-0.48	-0.40	-0.02	0.22	-0.15
GFCF	0.90	0.92	0.94	0.94	0.75	0.84
GFCF capital goods	0.94	0.88	0.84	0.90	0.71	0.49
GFCF construction	0.86	0.73	0.92	0.79	0.63	0.84
GFCF intangibles	0.22	0.33	0.70	0.00	0.60	0.08
Exports	0.96	0.95	0.91	0.93	0.70	0.67
Imports	0.92	0.83	0.90	0.94	0.72	0.68
Variability (b)						
GDP	1.10	1.50	0.96	1.20	0.87	0.98
Private consumption	0.55	0.58	0.62	0.92	0.99	0.69
Durable consumption	1.37	1.68	2.73	3.01	3.58	2.40
Non-durable consumption	0.54	0.62	0.49	0.83	0.95	0.68
Government consumption	0.45	0.65	0.38	0.71	0.89	0.65
GFCF	2.45	2.94	2.43	2.03	2.70	2.69
GFCF capital goods	4.12	5.52	3.86	3.80	5.39	6.07
GFCF construction	1.94	2.37	2.49	1.76	2.20	3.12
GFCF intangibles	3.59	1.24	1.43	1.60	2.07	3.10
Exports	3.47	4.14	3.18	4.66	2.98	3.19
Imports	3.26	3.50	3.15	3.89	4.04	2.79

SOURCES: Eurostat and own calculations.

a Simple correlation coefficient between the variable's cyclical component and the cyclical component of GDP.

b Standard deviation of the variable's cyclical component expressed as a percentage.

have tended to grow more in expansionary phases and less in recessions. In any event, in the other analysed economies, government consumption is countercyclical. As regards the extent of the fluctuations, in Spain the variability of government consumption is similar to that of GDP, which contrasts with the pattern for the other analysed economies, in which the swings in government consumption are more subdued than those in GDP.

Investment is highly procyclical in Spain and in the other economies analysed, although the correlation is somewhat weaker in the former. Among its components, the degree of procyclicality tends to be high and quite similar for investment in capital goods and in construction, while investment in intangibles is usually weakly procyclical or even acyclical in some countries, such as Italy or the United Kingdom. As regards the extent of the fluctuations, gross fixed capital formation (GFCF) is highly variable in all the economies analysed and, moreover, the degree of variability is quite similar. This appears to be consistent with the business cycle theory predictions explaining that consumption is less variable than investment because households' joint consumption and leisure decision-making allows

them to make intertemporal adjustments in response to technology shocks. Among the components of investment, the most variable in all the countries is that associated with investment in capital goods.⁹ Fluctuations in this component are particularly sharp in the United Kingdom, in contrast to France and Italy, where they are relatively insignificant. Spain appears to be midway between the two groups. Construction investment fluctuates less than investment in capital goods in the different countries. This seems to be associated with the particularly lengthy completion periods for the different types of construction work. Lastly, investment in intangibles tends to be less variable than the other investment items, with the exception of the euro area as a whole, where swings in investment in intangibles are particularly sharp. This appears to be the result of the high variability of these series in Ireland and the Netherlands, which seems to be tied to tax-related decisions by multinationals.

Exports are highly procyclical in the different economies analysed, although the relationship between this variable and GDP is somewhat weaker in Spain and in the United Kingdom. The high procyclicality would be explained by the relationship between the sales of goods and services abroad and export markets and the synchronisation of the GDP fluctuations across the different countries. As regards the extent of the fluctuations, a stylised feature in the different countries is that sales abroad are much more variable than GDP. By country, sales abroad fluctuate significantly in Italy, whereas in Spain they are relatively less variable.

Imports of goods and services also tend to be highly procyclical in all the economies, although, once again, this relationship is somewhat weaker in Spain and the United Kingdom. This high procyclicality owes to the strong explanatory power of activity in import demand. As regards variability, imports fluctuate particularly sharply in Spain, whereas in the United Kingdom they do so much less markedly.

Comparing the degree of procyclicality across variables for the countries analysed as a whole indicates that the strongest relationships are between GDP and capital goods and transactions with the rest of the world, while investment in intangibles and government consumption generally bear little relation to GDP. As regards variability, once again capital goods, exports and imports show the largest swings, whereas consumption tends to fluctuate more moderately.

4.2 Aggregate supply

After analysing the cyclical characteristics of the GDP components from a demand perspective, in this section we conduct a similar analysis but from a supply-side standpoint. The findings are shown in Table 3, which, like Table 2, compiles the degree of procyclicality and variability of the supply-side GDP components.

⁹ An exception is investment in intangibles in the euro area, which is affected by the high variability of these series in Ireland and the Netherlands.

Table 3

SUPPLY. PROCYCLICALITY AND VARIABILITY OF THE CYCLICAL COMPONENTS

Procyclicality (a)	Euro area	Germany	France	Italy	Spain	United Kingdom
GVA for agriculture	-0.04	-0.22	0.00	0.16	0.36	0.16
GVA for industry	0.96	0.93	0.94	0.94	0.88	0.82
GVA for manufacturing	0.97	0.95	0.92	0.95	0.91	0.82
GVA for construction	0.78	0.62	0.70	0.72	0.32	0.43
GVA for services	0.96	0.87	0.99	0.94	0.95	0.93
GVA for non-market services	-0.18	-0.15	0.23	0.02	0.30	-0.01
GVA for market services	0.95	0.84	0.99	0.96	0.94	0.96
MEMORANDUM ITEMS						
GVA for retail trade	0.98	0.85	0.91	0.95	0.93	0.83
GVA for information and communication	0.68	0.60	0.72	0.12	0.34	0.63
GVA for financial activities	0.74	0.45	0.20	0.68	0.45	0.28
GVA for real estate activities	0.48	0.13	0.42	0.04	0.10	0.12
GVA for professional and scientific activities	0.93	0.89	0.95	0.68	0.86	0.93
GVA for arts and entertainment	0.71	0.66	0.06	0.57	0.56	0.50
Variability (b)						
GDP	1.10	1.50	0.96	1.20	0.87	0.98
GVA for agriculture	2.28	7.71	4.99	2.46	3.26	3.44
GVA for industry	2.68	3.77	1.65	3.24	1.89	1.49
GVA for manufacturing	3.25	4.70	1.82	3.78	1.71	1.98
GVA for construction	1.29	1.99	2.04	1.60	1.75	2.90
GVA for services	0.77	1.09	0.81	0.79	0.70	0.99
GVA for non-market services	0.27	0.74	0.25	0.45	0.42	0.73
GVA for market services	1.06	1.54	1.11	1.01	0.90	1.26
MEMORANDUM ITEMS						
GVA for retail trade	1.28	1.96	1.31	1.53	1.00	1.54
GVA for information and communication	1.57	3.10	1.84	2.26	1.38	2.59
GVA for financial activities	1.31	3.24	1.99	2.25	2.16	2.95
GVA for real estate activities	0.47	0.97	1.22	0.57	0.96	0.94
GVA for professional and scientific activities	1.66	2.19	1.98	1.73	2.05	3.00
GVA for arts and entertainment	0.72	1.27	0.59	1.44	1.10	1.47

SOURCES: Eurostat and own calculations.

a Simple correlation coefficient between the variable's cyclical component and the cyclical component of GDP.

b Standard deviation of the variable's cyclical component expressed as a percentage.

No common European pattern for the procyclicality of GVA for agriculture exists. This may be explained by the importance of country-specific weather-related shocks. Thus, GVA for the primary sector is weakly procyclical in Spain, as in Italy or in the United Kingdom. However, the GVA for agriculture in France or the euro area as a whole is acyclical and in Germany it is weakly countercyclical. Nonetheless, as regards the extent of the fluctuations, agriculture GVA does share a common feature: they are substantially sharper than fluctuations in GDP, as the supply of agricultural products is heavily affected by climatic conditions.

Industry GVA is highly procyclical in all of the countries, although it is more pronounced in manufacturing than in construction. The relationship between manufacturing and GDP is somewhat weaker in Spain and in the United Kingdom than in the other economies analysed. The relationship between construction and GDP is also weaker in Spain and the United Kingdom in comparison with the other countries. As regards variability, a feature observed in all the economies is that both manufacturing and construction are more variable than GDP, although the fluctuations are much larger in manufacturing than in construction. The time needed to undertake construction projects could explain the difference between the extent of the fluctuations in the secondary sector activities.

GVA for the tertiary sector is highly procyclical in all countries. However, there is a particularly marked difference across its components. Market services are highly procyclical, whereas there is no common feature observed across the countries in non-market services, most of which are rendered by the general government. In Spain and France GVA for non-market services is procyclical, in the United Kingdom and Italy it is acyclical, while in Germany and in the euro area as a whole it is weakly countercyclical. An alternative analysis of the services sector can be conducted by breaking it down into the six activities provided by the Quarterly National Accounts. In all the countries analysed, retail trade and professional and scientific activities are highly procyclical. The relationship between GDP and information and communication, and between GDP and arts and entertainment is somewhat weaker. Lastly, while they are also procyclical, the greatest cross-country heterogeneity is observed in real estate and financial activities. A noteworthy aspect of the analysis of the cyclicity in tertiary sector activities is that in all the countries market services activity fluctuates much more than non-market services activity. Likewise, the various services sector activities tend to fluctuate more than GDP, except for real estate activities, which normally fluctuate more moderately than overall activity.

Taking into account the different countries analysed, a series of regularities are observed in the degree of procyclicality across variables on the supply side: manufacturing and market services have the strongest relationships with GDP, whereas primary sector activities and non-market services generally bear little relation to GDP. As for variability, analysing output on the supply side shows that the different productive sectors, except for services sector activities, are more variable than GDP. The secular trend towards the increasing materiality of the output of services seems to entail a trend towards subdued aggregate fluctuations in output.¹⁰ Among the main sectors of activity, the agricultural sectors, which are subject to frequent weather-related supply shocks, tend to show sharper fluctuations. Fluctuations also appear to be quite large in the secondary sector.

¹⁰ Nevertheless, the COVID-19 pandemic is bringing into relief that health crises can entail sharp adjustments to some services owing to the need to ensure social distancing.

5 The synchronisation of cyclical movements in the main European economies

There are manifold external (such as globalisation) and internal (e.g. EU and euro area membership) reasons that could explain why the cyclical developments in the different European economies are synchronised.¹¹ In addition, theoretical models have been developed, such as dynamic stochastic general equilibrium (DSGE) models and behavioural macroeconomics models, which could explain the synchronisation of the different economies' cyclical fluctuations.

Over recent decades globalisation has led to more integrated markets in the world economy, resulting in a reduction of the cross-border frictions limiting the movement of people, capital, goods and services. These frictions have tended to ease thanks to the elimination of trade barriers and technological improvements. Broadly speaking, against a background of reduced trade barriers world trade has become notably stronger over recent decades,¹² such that global imports as a percentage of GDP have gained significant weight. This increase in imports has arisen in terms of both final goods and intermediate goods used in global value chains.¹³

There has been greater economic integration in EU countries than in the world as a whole, as the different Member States participate in the European Single Market,¹⁴ which allows the free movement of goods, services, capital and people. For example, under the free movement of goods, duties cannot be levied on transactions between Member States and common customs duties are applied to non-member countries. Moreover, intra-EU trade is fostered by the existence of a broad common legal corpus. In the case of euro area countries, the absence of exchange rate uncertainty is also conducive to purchases and sales of goods and services among Member States.

From a theoretical standpoint, it is difficult for DSGE models to replicate the high degree of synchronisation between different countries' economic fluctuations (for example, see Alpanda and Aysun (2014)). In general, this type of model has to rely on the assumption that there is sufficiently high cross-country correlation in the exogenous shocks, which could be justified in the case of technology shocks, but is less clear in other types of shock. Recent attempts to introduce financial flows into these models have been more successful, although they have also had to assume that the exogenous financial shocks are correlated, thus admitting that a large part of cyclical synchronisation originates from outside the macroeconomic

¹¹ Empirical evidence exists for the degree of synchronisation of the business cycles being influenced by the degree of trade integration. Frankel and Rose (1998) is the seminal paper which shows that growing trade integration entails greater cyclical synchronisation.

¹² Since 2018 H2 global trade tensions and geopolitical uncertainty have been observed, exemplified by the trade disputes between the United States and China and Brexit, reflecting that the open and multilateral economic and trade order of recent years is petering out. In addition, the ongoing pandemic could lead to a further reversal of trade openness.

¹³ Global value chains reflect the fact that commodities and intermediate goods are sent around the world on several occasions and are subsequently assembled in another country. The final good is re-exported to end consumers.

¹⁴ Wolfmayr et al. (2019) assess the functioning of the Single Market.

Table 4

DEMAND. SYNCHRONISATION

	Cycles			Trends		
	Effective dependence	Test	<i>p-value</i>	Effective dependence	Test	<i>p-value</i>
GDP	0.72	341.79	0.00	0.34	159.40	0.00
Private consumption	0.40	190.35	0.00	0.11	53.04	0.00
Durable consumption	0.21	100.77	0.00	0.08	39.33	0.00
Non-durable consumption	0.49	232.69	0.00	0.12	55.55	0.00
Government consumption	0.23	110.32	0.00	0.05	25.54	0.00
GFCF	0.65	310.90	0.00	0.12	57.35	0.00
GFCF capital goods	0.61	289.57	0.00	0.09	42.84	0.00
GFCF construction	0.40	188.45	0.00	0.13	62.45	0.00
GFCF intangibles	0.15	71.65	0.00	0.03	15.48	0.12
Exports	0.83	396.44	0.00	0.20	92.06	0.00
Imports	0.71	335.88	0.00	0.13	59.42	0.00

SOURCES: Eurostat and own calculations.

model. More recently, De Grauwe and Ji (2017) have developed a two-country behavioural model where the synchronisation of the business cycle is produced endogenously. The main channel of synchronisation occurs through a propagation of “animal spirits”, i.e. waves of optimism and pessimism that become correlated internationally. This mechanism is stronger in countries that are members of a monetary union, as the existence of a shared central bank is a source of common shocks. Similarly, Levchenko and Pandalai-Nayar (2020) find that sentiment shocks play a major part in explaining international synchronisation. The existence of flows of information about world economies and, in particular, about trading partners’ economies should strengthen these mechanisms.

Table 4 shows the results of the effective dependence proposed by Peña and Rodríguez (2003), which is described in the methodology section, and a test of the null hypothesis that there is no synchronisation and the corresponding *p-value*. The table includes the different demand components and distinguishes between cyclical and trend fluctuations.

As regards cyclical fluctuations, it can be seen that synchronisation is statistically significant for all variables, although the strength of the relationship varies according to the component. As is to be expected, the strongest cross-country relationships can be found in the variables that include economic transactions with the rest of the world, i.e. imports and exports of goods and services, and in GDP.¹⁵ A notable degree of synchronisation can also be seen in investment, which could partially reflect animal spirits factors, in line with

¹⁵ The average correlation between pairs of countries is 0.82 for GDP, 0.88 for exports and 0.82 for imports.

Table 5

SUPPLY. SYNCHRONISATION

	Cycles			Trends		
	Effective dependence	Test	<i>p-value</i>	Effective dependence	Test	<i>p-value</i>
GDP	0.72	341.79	0.00	0.34	159.40	0.00
GVA for agriculture	0.13	60.84	0.00	0.07	33.03	0.00
GVA for industry	0.81	382.63	0.00	0.23	107.88	0.00
GVA for manufacturing	0.84	397.23	0.00	0.24	113.69	0.00
GVA for construction	0.25	118.49	0.00	0.21	99.14	0.00
GVA for services	0.59	281.66	0.00	0.21	97.90	0.00
GVA for non-market services	0.12	56.20	0.00	0.05	23.85	0.01
GVA for market services	0.64	302.59	0.00	0.20	92.16	0.00
MEMORANDUM ITEMS						
GVA for retail trade	0.55	259.31	0.00	0.16	75.42	0.00
GVA for information and communication	0.18	87.74	0.00	0.08	37.26	0.00
GVA for financial activity	0.18	83.15	0.00	0.06	26.83	0.00
GVA for real estate activity	0.13	59.77	0.00	0.06	29.28	0.00
GVA for professional and scientific activities	0.60	282.72	0.00	0.11	49.84	0.00
GVA for arts and entertainment	0.11	53.32	0.00	0.06	30.31	0.00

SOURCES: Eurostat and own calculations.

De Grauwe and Ji (2017). However, there are substantial differences in the main items: interconnectedness appears to be strongest in capital goods and weakest in intangible assets, with construction investment in an intermediate position. Private consumption, particularly durable goods consumption, is less synchronised than investment. Lastly, government consumption presents the lowest degree of cross-country interconnectedness.

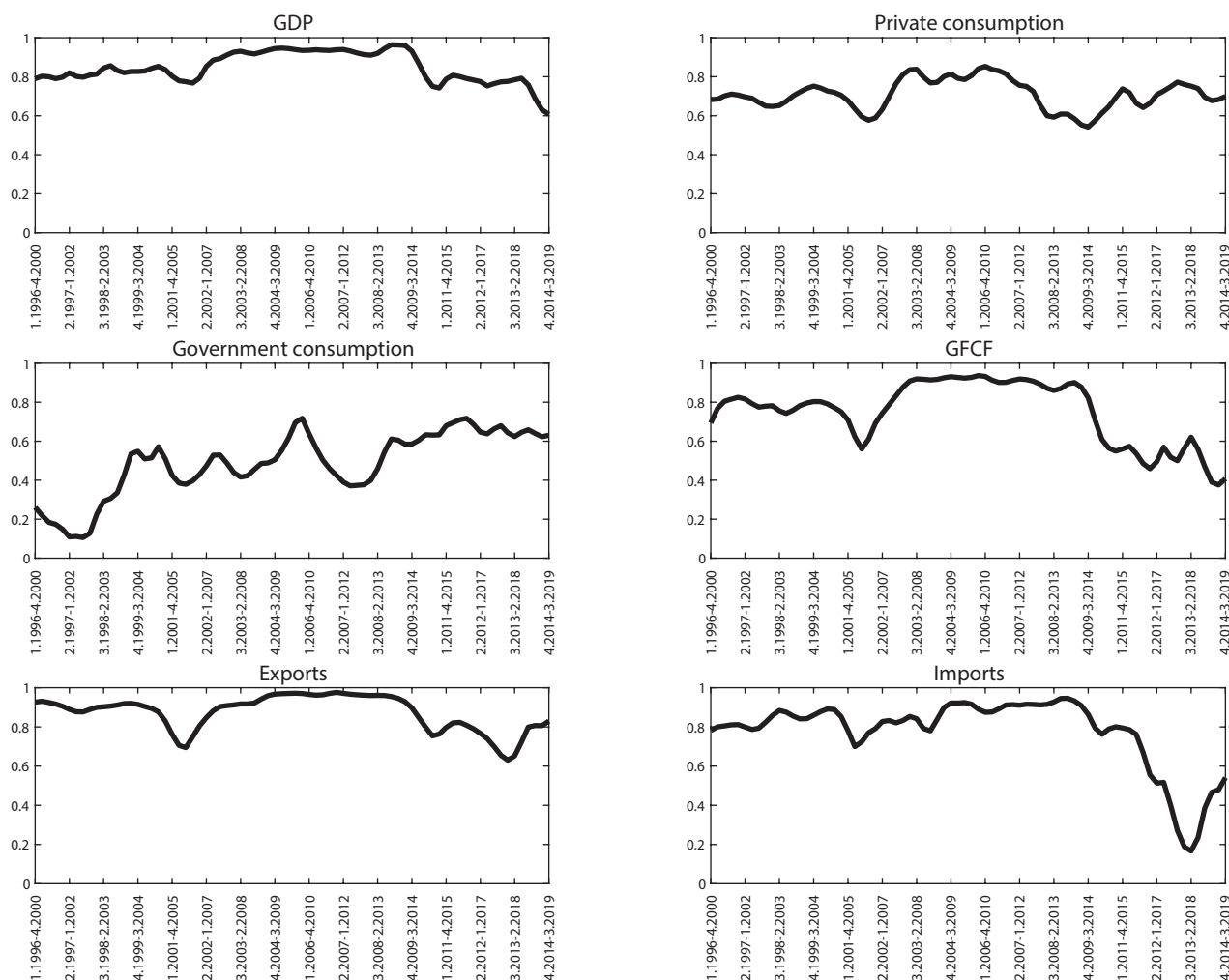
Turning to trend fluctuations, it can be seen that, with the exception of investment in intangibles, the degree of cross-country synchronisation is statistically significant, although interdependence is systematically lower in trend terms than in cyclical terms. Not only do the countries present different long-term growth rates (as documented in Section 4), but there does not seem to be that strong a relationship between the changes in trends over time.

Table 5 focuses on supply components, using a similar structure to that of Table 4. As regards the synchronisation of cyclical movements, the highest interconnectedness is observed in industries, although the relationship is much stronger in manufacturing¹⁶ than in construction. The fact that a large part of manufactured goods, be they final products or intermediate goods, are for external markets would explain the high cross-country interdependence of this variable. Moreover, as is to be expected, the lowest degree of synchronisation can be found in agricultural activities, as these are highly influenced by weather conditions which have a strong idiosyncratic

¹⁶ The average correlation between pairs of countries in manufacturing is 0.88.

Chart 2

DEGREE OF SYNCHRONISATION. DEMAND



SOURCE: Own calculations.

component. Lastly, the synchronisation in the tertiary sector is in an intermediate position. Nevertheless, there is a substantial difference between the degree of interconnectedness of market services and non-market services, which appears to be attributable to the high importance of the public sector in the latter. An analysis of the main services sectors also reveals substantial heterogeneity, with retail trade and professional and scientific activities showing much higher synchronisation than the other sectors. For all the items analysed, it can be seen that the cross-country interconnectedness of trend movements is lower than in the cyclical components and even very close to zero in some cases, such as financial activities and market services.

In order to take account of the possible time variation in the degree of synchronisation, Charts 2 and 3 present the effective dependence of Peña and Rodríguez (2003), calculated using a five-year rolling window, for the cyclical components of the main demand and supply items, respectively.

Chart 3

DEGREE OF SYNCHRONISATION. SUPPLY



SOURCE: Own calculations.

The charts also show a slightly upward trend in the degree of GDP synchronisation of the economies considered until the global financial crisis. The degree of international interdependence has since declined, which seems to reflect the uneven exit from the crisis and the subsequent impact of the sovereign debt crisis. This finding would be consistent with those available in the literature (for instance, Degiannakis et al. (2014) and Matesanz et al. (2016)). However, this overall trend masks a notable degree of heterogeneity in the different components, which is not usually further elaborated on in other analyses. For instance, although the synchronisation of gross fixed capital formation presents a similar time profile to that of GDP, private consumption synchronisation is fairly stable, whereas government consumption shows an upward trend, albeit starting from levels clearly below those of the other variables. Transactions with the rest of the world also show a very similar course to that of GDP, except in recent years when the decline in GDP synchronisation coincides with an increase in interdependence in terms of exports and imports.

From the supply standpoint, the similarity between the pattern of the degree of synchronisation in the gross value added for manufacturing and market services and that of GDP appears to be quite high. The other sectors – where interdependence is much lower – present a much more mixed trend. However, the gross value added for agriculture and for non-market services shows a slight increase, in contrast to the declining trend in construction.

6 Conclusions

This paper has set out an analysis of the stylised features of the cyclical behaviour of the main European economies, highlighting quite a few common attributes. For instance, the strongest relationships are between GDP and capital goods and transactions with the rest of the world, while investment in intangibles and government consumption generally bear little relation to GDP. A distinguishing feature of the Spanish economy is that government consumption is weakly procyclical, whereas it is weakly countercyclical in the other economies analysed. As regards variability, once again capital goods, exports and imports show the largest swings, whereas consumption tends to fluctuate more moderately. Unlike in the other economies, in Spain the cyclical fluctuations in private consumption tend to be larger than those in GDP.

On the supply side, manufacturing and market services have the strongest relationships with GDP, whereas primary sector activities and non-market services generally bear little relation to GDP. The Spanish economy does not appear to show any distinguishing qualitative feature in the degree of procyclicality or in variability. As for the latter, the different productive sectors, except for services sector activities, show greater variability than GDP. The agricultural sectors, which are subject to frequent weather-related supply shocks, tend to show sharper fluctuations. Fluctuations also appear to be quite large in the secondary sector.

The analysis of the degree of cross-economy interconnectedness reveals that this phenomenon is particularly cyclical, as the interplay of trend movements across countries is systematically lower than that of cyclical components.

Moreover, there is noticeable heterogeneity in the degree of synchronisation of cyclical movements. On the demand side, the strongest cross-country relationships are in the imports and exports of goods and services and in GDP. A notable degree of synchronisation can also be seen in investment, which could partially reflect animal spirits factors, with synchronisation in private consumption being lower. Lastly, the lowest degree of cross-country interconnectedness can be seen in government consumption, where idiosyncratic shocks are particularly notable.

The heterogeneity in the degree of synchronisation is also apparent from a supply-side perspective. Interconnectedness is greatest in industry, especially in manufacturing, which appears to be associated with the fact that a large part of manufactured goods are earmarked for external markets. Moreover, the lowest degree of synchronisation can be found in agricultural activities, as these are highly influenced by weather conditions which have a strong idiosyncratic component. Lastly, the synchronisation in the tertiary sector is in an intermediate position, although it is quite low in non-market services associated with public sector activity.

Turning to the time variation in the degree of cross-country synchronisation, there was a slightly upward trend in the degree of GDP synchronisation of the economies considered until the global financial crisis. The uneven exit from the crisis and the subsequent

impact of the sovereign debt crisis appear to have reduced the degree of cross-country interdependence in the most recent period.

Future lines of work notably include studying the exit from the pandemic-induced recession and the possible heterogeneity in the developments in each country, which could lessen the degree of synchronisation. Owing to its severity, there is a risk of the downturn persisting over time, despite the measures adopted both nationally and at European level to support the activity of firms and households. The global nature of the crisis has adverse effects on sales abroad and on household and business confidence, and expectations of a future decline in demand could curtail business investment even further, which would affect potential economic growth. In addition to the channels mentioned, financial fragility could ultimately have an adverse impact on consumption and investment. Hysteresis effects cannot be ruled out and may differ in each economy.¹⁷ Lastly, one feature distinguishing the current health crisis from other types of crisis (such as financial crises) is its particularly severe impact on services. By their very nature, many tertiary sector activities are affected by the non-pharmacological measures to contain the pandemic (e.g. social distancing) and have been harder hit than is usual in other types of recession. The differences in the countries' productive systems represent a major distinguishing element in their economic dynamics. In this regard, the high significance of some services activities, such as tourism, which have been particularly affected by the coronavirus containment measures poses a sizeable risk to the Spanish economy in the exit from the health crisis.

¹⁷ For instance, the rise in unemployment may erode skills and hamper the matching of firms' needs to workers' knowledge. Moreover, there could be a loss of human capital associated with the closure of educational centres or the shift from in-person to remote methodologies.

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