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Julian Hodge Institute of  
Applied Macroeconomics

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With the coronavirus lockdown factor being eased across most economies, helped by rising vaccination penetration, the world economy is reviving rapidly. In the UK growth in 2021 should reach 8%, with the public finances moving into a sustainable situation, so that fiscal policy can remain supportive while the debt ratio gradually falls over time. The Brexit policies of moving rapidly to free trade with the non-EU world, combined with intelligent reform of regulation and state aid for R&D, will underpin rising growth, with the North taking a larger share.

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We look at ways in which the euro-zone can minimise the risks of another euro crisis, asymmetrically hitting the South of the zone. We find that active fiscal policy by individual countries, unhampered by the Stability and Growth Pact, provides the key.

## **The Julian Hodge Institute of Applied Macroeconomics**

**Editorial and Research Direction:** Patrick Minford<sup>†</sup>.

**Senior Research Associates:** Kent Matthews<sup>†</sup>, Anupam Rastogi, Peter Stoney<sup>‡</sup>.

**Research Associates:** Vo Phuong Mai Le<sup>†</sup>, David Meenagh<sup>‡</sup>, Francesco Perugini, Yongdeng Xu<sup>†</sup>, Zheyi Zhu<sup>†</sup>

<sup>†</sup> Cardiff Business School

<sup>‡</sup> University of Liverpool

The Julian Hodge Institute of Applied Macroeconomics was launched in autumn 1999 in a new collaboration between the Cardiff Business School of Cardiff University and Julian Hodge Bank. The aim of the Institute is to carry out research into the behaviour of the UK economy, and to study in particular its relationship with the other economies of Europe. This research has been given added urgency by the ongoing discussions about the UK's adoption of the Euro in place of the Pound. The new Institute has aimed to develop research relevant to this important debate.

The Institute embraces the original Liverpool Research Group in Macroeconomics, which is now based at Cardiff Business School and is pursuing a research programme involving the estimation and use of macroeconomic models for forecasting and policy analysis. It is grateful for financial support to the Jane Hodge Foundation, the Economic and Social Research Council, Esme Fairbairn Charitable Trust, the Wincott Foundation and Cardiff Business School.

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# THE LATEST CORONAVIRUS SITUATION

Patrick Minford

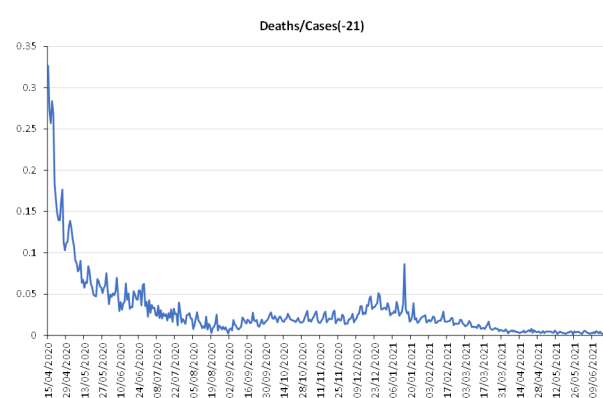
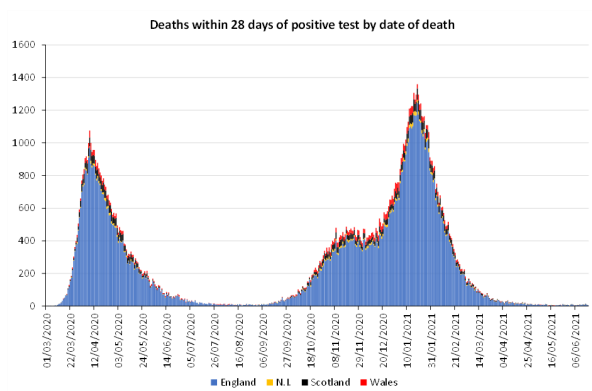
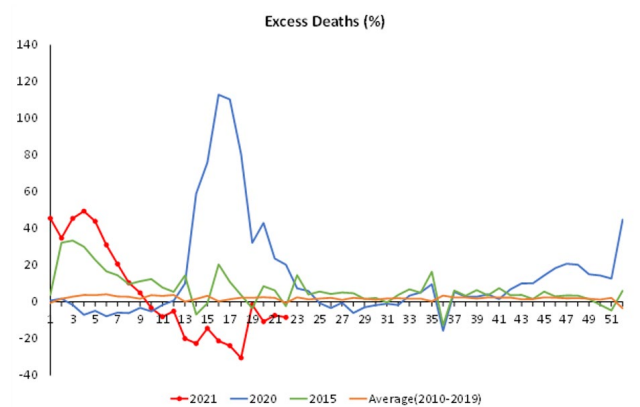
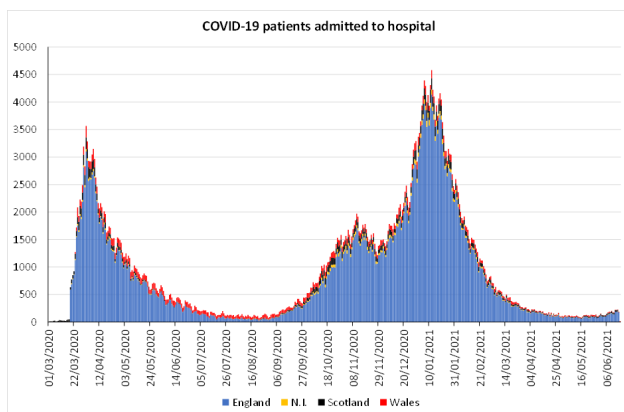
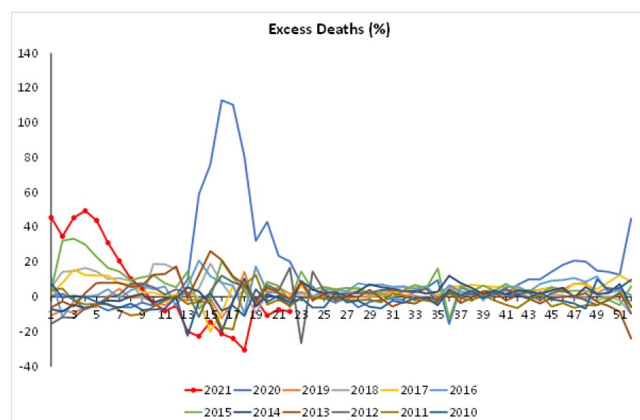
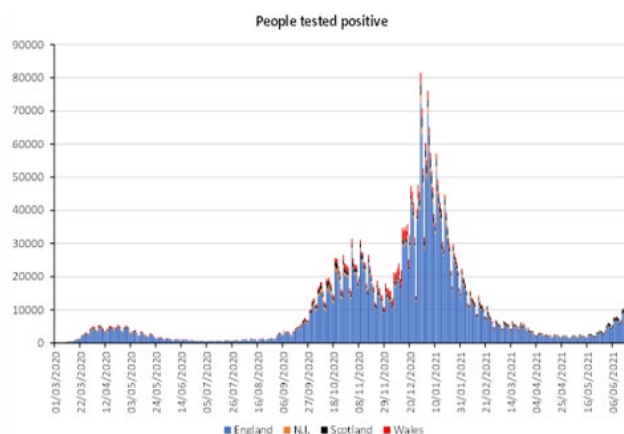
In the following charts we show the latest situation over virus infections, hospitalisations and deaths in the UK and elsewhere. In the UK the key point is that deaths have fallen to virtually zero. While infections have risen with the spread of the new D-variant, which is more highly transmissible even than the Kent variant, the connection to a rise in deaths has been firmly cut by vaccination (which for a double jab of either the Oxford or the Pfizer vaccine is around 90% effective), and even hospitalisations have risen little.

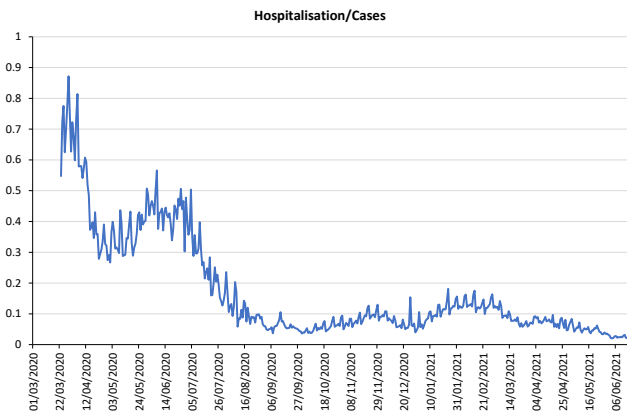
**Table 1: Summary of Forecast**

	2018	2019	2020	2021	2022	2023	2024
GDP Growth <sup>1</sup>	1.3	1.4	-9.9	7.8	8.5	2.5	2.1
Inflation CPI	2.4	1.8	1.0	1.7	5.0	4.0	3.0
Wage Growth	3.0	3.5	1.6	3.8	6.0	5.3	4.2
Survey Unemployment	4.1	3.8	4.5	5.4	5.1	3.6	2.8
Exchange Rate <sup>2</sup>	78.6	78.3	78.2	80.7	78.8	77.9	77.6
3 Month Interest Rate	0.4	0.8	0.2	0.1	1.5	4.5	5.0
5 Year Interest Rate	1.0	0.6	0.1	0.4	1.5	4.7	5.0
Current Balance (£bn)	-82.9	-89.1	-58.2	-48.8	-36.0	-24.2	-17.0
PSBR (£bn)	39.3	49.1	311.2	137.5	57.0	41.5	22.7

<sup>1</sup>Expenditure estimate at factor cost

<sup>2</sup>Sterling effective exchange rate, Bank of England Index (2005 = 100)





The government delayed the final abolition of restrictions by a month on precautionary grounds, in case the spread worsened. But this looks like an excess of caution that will slightly damage the economy. It seems rather clear that vaccinations have firmly cut the link between infections and hospitalisation/death; the ratio of these last two to cases has dropped to virtually zero.

Other countries have had similarly low cases of infection and deaths- see Table following- and have reacted by further easing of lockdowns, in contrast to the UK's caution. This has paid off in terms of economic recovery which is going ahead widely. Nevertheless, the concern must be about the spread of the D-variant, which is around 10% in the US and similarly low in the EU. If this takes off in the US, the high rate of double vaccination should prevent a sharp rise in hospitalisation and death; but EU countries remain much more exposed to a setback due to the slow rollout of vaccines.

#### Latest 28 days daily cases and deaths – US, Europe and UK

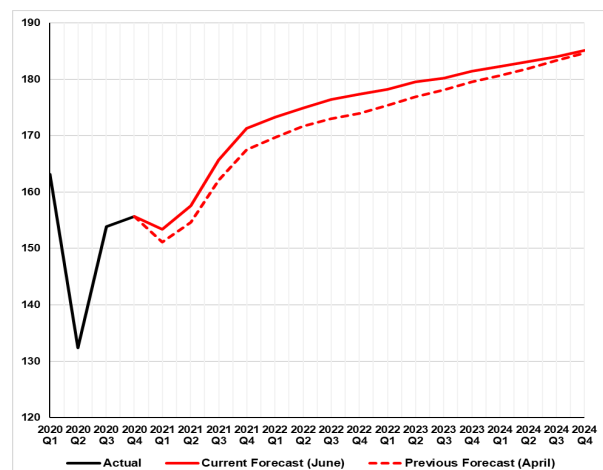
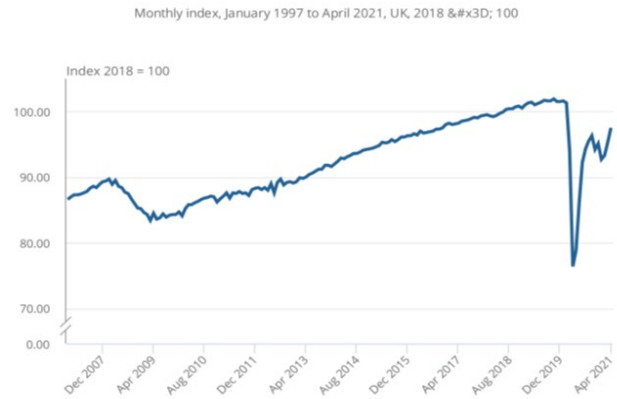
Last 28 days average	US	United Kingdom	Germany	France	Italy	Spain
Daily Cases	14546.39	6271.68	2522.46	5290.85	2099.57	4183.25
Daily Deaths	421.32	9.18	107.71	72.39	69.86	34.93
Deaths/Cases	0.0290	0.0015	0.0427	0.0137	0.0333	0.0083

Whatever the outcome in the short term, policymakers here and elsewhere are now determined to move to 'living with Covid', and relying on vaccination to keep public health in reasonable shape with no more lockdowns, at least general ones.

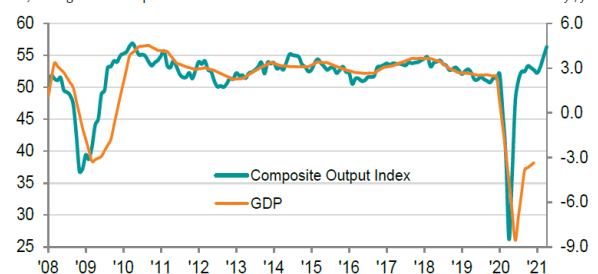
As a result recovery is gathering speed. Here the wobbling V is firming up, with our latest quarterly forecast consistent with about 8% growth in 2021 YOY. Worldwide recovery is also well set and the latest PMIs are signalling YOY world GDP growth of around 3%. The chart that follows shows the very latest ONS monthly figures for UK GDP, now including April, when MOM growth was 2.3%. The

economy was in April only about 4% below its pre-pandemic level.

Figure 1: GDP is estimated to have grown by 2.3% in April 2021 as government restrictions affecting economic activity continued to ease



J.P.Morgan Global Composite Output Index  
sa, >50 = growth since previous month



Sources: J.P.Morgan, IHS Markit.

With the rollout of the vaccine in the UK and its unprecedented efficiency, economic forecasters are steadily raising their UK growth forecasts for YOY 2021, with many now moving up to 7%, including most recently the Bank. This evolution reflects the higher than expected Q1 monthly

GDP estimates, which show less effect of lockdown as ‘workarounds’ have got better.

Our own forecast has gone up as well. We now expect nearly 8% growth YOY in 2021. Correspondingly our PSBR forecasts have come down.

Forecasts for the PSBR are similarly coming down for the Consensus. The latest PSBR forecast average for 2022/23 is 6% of GDP. However this still looks far too high- as do the OBR projections we reviewed last time. Our own forecast is shown below; in it by 2022/23 both the public spending rate and the net tax rate have returned to the normality of 2019/20, with the Covid effects well behind them. Consensus forecasters have assumed spending stays high even after Covid and revenues stay low. But the basis for this is weak in the extreme. Looking ahead, our baseline forecast is for the debt/GDP ratio to fall steadily to just over 50% with growth and inflation doing the work.

**Table 2: Basic Forecast**

	Nom PSBR	Nom GDP	Nom Pub Spend	Spend/ GDP	PSBR/ GDP	Nom Debt	Debt Interest	Debt/ GDP	Net Taxes	Net Tax Rate
2019/20	49.1	2196.3	472.2	21.5	2.2	1621.0	48.1	73.8	471.2	21.5
2020/21	311.2	1987.9	473.3	23.8	16.1	1932.2	39.8	97.2	201.9	10.2
2021/22	137.5	2289.4	481.7	21.0	6.0	2069.7	42.6	90.4	386.8	16.9
2022/23	57	2547.0	557.2	21.9	2.2	2126.7	41.1	83.5	541.3	21.3
2023/24	41.5	2704.5	596.3	22.0	1.5	2168.2	42.9	80.2	597.8	22.1
2024/25	22.7	2843.4	635.1	22.3	0.8	2190.9	41.1	77.1	653.6	23.0
2025/26	3.7	2957.1	665.5	22.5	0.1	2194.6	44.5	74.2	706.3	23.9
2026/27	0.2	3075.4	716.7	23.3	0.0	2194.8	47.8	71.4	764.3	24.9
2027/28	0.2	3198.4	776.0	24.3	0.0	2195.0	50.9	68.6	826.7	25.9
2028/29	0	3326.4	840.3	25.3	0.0	2195.0	53.8	66.0	894.2	26.9
2029/30	0	3459.4	910.5	26.3	0.0	2195.0	56.6	63.4	967.1	28.0
2030/31	0	3597.8	986.8	27.4	0.0	2195.0	59.3	61.0	1046.0	29.1
2031/32	0	3741.7	1069.6	28.6	0.0	2195.0	61.8	58.7	1131.4	30.3
2032/33	0	3891.4	1159.5	29.8	0.0	2195.0	64.2	56.4	1223.7	31.5
2033/34	0	4047.0	1257.1	31.1	0.0	2195.0	66.5	54.2	1323.6	32.7
2034/35	0	4208.9	1362.9	32.4	0.0	2195.0	68.7	52.2	1431.6	34.0

This paves the way for a fiscal policy that can continue to be supportive of the economy, and keeps taxes low, with definite scope for lowering in a supply-side package, as set out in our last Quarterly Bulletin, chapter 1. We repeat in what follows for convenience the details of the package and its variant effects on growth and the public finances.

According to our models the package of tax cuts and spending rises raises growth by 1% p.a. over the decade to 2034/35; with higher growth of GDP comes a rising average net tax rate after the initial drop in revenues from the programme. Again the debt ratio falls with now faster growth to a safe and sustainable 45% by 2034/35. In effect the package pays for itself. This underlines the UK’s solid solvency.

**Table 3: A fiscal stimulus package costing £100 billion p.a.**

Tax Cuts	Amount
Cut corporation tax by 10%	£32 bn
Abolish the very top additional 5% rate	£1bn
Cut the top rate of income tax to 30%	£15bn
Cut the standard rate of income tax by 5%	£28bn
Total Tax Cuts <sup>1</sup>	£76bn
Public Spending <sup>2</sup>	£24bn
Total Package	£100 bn

<sup>1</sup> Representing a weighted average tax cut across all income of about 15%

<sup>2</sup> On public services and infrastructure

**Table 4: Forecast – Fiscal package of stimulus**

	Nom PSBR	Nom GDP	Nom Pub Spend	Spend/ GDP	PSBR/ GDP	Nom Debt	Debt Interest	Debt/ GDP	Net Taxes	Net Tax Rate
2019/20	49.1	2196.3	472.227	21.5	2.2	1621.0	48.1	73.8	471.2	21.5
2020/21	311.2	1987.9	473.269	23.8	15.7	1932.2	39.8	97.2	201.9	10.2
2021/22	137.5	2289.4	481.691	21.0	6.0	2069.7	42.6	90.4	386.8	16.9
2022/23	57	2547	557.201	21.9	2.2	2126.7	41.1	83.5	541.3	21.3
2023/24	41.5	2704.5	596.327	22.0	1.5	2168.2	42.9	80.2	597.8	22.1
2024/25	127.9	2843.4	659.100	23.2	4.5	2296.1	41.1	80.8	572.3	20.1
2025/26	97.6	2985.6	689.500	23.1	3.3	2393.7	45.1	80.2	637.0	21.3
2026/27	80.7	3134.8	740.700	23.6	2.6	2474.4	49.0	78.9	709.0	22.6
2027/28	63.8	3291.6	800.000	24.3	1.9	2538.2	52.9	77.1	789.1	24.0
2028/29	42.7	3456.2	864.300	25.0	1.2	2580.9	56.7	74.7	878.3	25.4
2029/30	17.4	3629.0	934.501	25.8	0.5	2598.3	60.4	71.6	977.5	26.9
2030/31	-13.4	3810.4	1010.799	26.5	-0.4	2584.9	63.8	67.8	1088.0	28.6
2031/32	-50.4	4000.9	1093.599	27.3	-1.3	2534.6	67.0	63.3	1210.9	30.3
2032/33	-94.5	4201.0	1183.500	28.2	-2.3	2440.0	69.7	58.1	1347.7	32.1
2033/34	-147.0	4411.0	1281.100	29.0	-3.3	2293.1	72.0	52.0	1500.0	34.0
2034/35	-209.1	4631.6	1386.900	29.9	-4.5	2084.0	73.6	45.0	1669.5	36.0

**The prospects for inflation and interest rates**

In its latest statement the Bank has said it expects little sustained inflation but will be vigilant. It certainly plans to keep interest rates low unless there is a sustained rise in inflation. With commodity prices in free rise as the world growth takes off post-Covid, inflation is likely to be strong and sustained. The labour market is likely to see rising wage growth, with vacancies soaring in a fast-recovering economy.

For all the Bank's announced reluctance, we see interest rates rising steadily in 2022. This will at last restore some monetary normality, with savings returns recovering to reasonable long-term rates.

**The better outlook and the reassessment of the Brexit trade opening process**

It has been fashionable among forecasters to take a negative view of the UK. This attitude comes from the widespread hostility of both the business and the official forecasting community to Brexit; as we know, this hostility was consistent with the strong business and civil service interests in remaining inside the EU, so continuing protection and easily-lobbied regulation, as well as official opportunities for promotion.

However, the post-Covid situation will be one of strong rebound, in which the UK, thanks to a highly successful vaccination strategy, will grow considerably faster than most other major countries. The negative Remainer commentary will continue, nevertheless, shifting its focus to trade and productivity; this is exemplified in the FT columns of Martin Wolf and others.

The trade negotiations with Australia will be a pivotal moment. Boris Johnson's government has signed an agreement in spite of strong complaints from the farming lobby. So much comment on FTAs misguidedly focuses on the size of new market access for UK producers; but the key gain for the UK is hiding in plain sight- namely, lower prices for consumers and increased competition on producers, forcing higher productivity. As we stated frequently in the Brexit campaign, only some 10% of UK residents work in protected industries, the other 90% have an overwhelming interest in lower prices, particularly poorer people for whom food prices contribute more to their budget. So the government's determination to free trade with Australia is not just good economics but also excellent politics- notably in 'red wall' areas of the country.

The FTA with Australia is just the first. Others will continue with other countries on the Pacific Rim, primarily, leading it is hoped to full membership of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership CPTPP). This should include the US, NZ, Japan and the other SE Asian growth tigers like S Korea and Vietnam. These countries can supply food and manufactures at the most competitive world prices, bringing yet further benefits to our consumers. As for our producers, they will gain from higher productivity and from long term links to and competition with the fastest-growing markets in the world.

It has been the 'gravity' modelling by Remainer trade economists that have damned these gains relative to supposed losses from reduced trade with the EU. Yet our work on these models compared with the 'classical' one we have used based on comparative advantage shows that the facts of world trade lie far closer to our classical than to the

gravity model for the UK; and that this extends also to other major countries and groups including the US, China and the EU. These tests compare the simulated behaviour of our models with the actual behaviour of the data. The latter's probability under the model can be assessed from this comparison. Basically, one can see how well the two models do by comparing the trends in the data with the average simulated trends from the model. The charts below- Figure 2- show this for the UK. If you examine the trade shares, you can see that the average gravity simulations depart sharply from the data, while the classical broadly mirror the data. It is not surprising therefore that for the UK, the Gravity model is strongly rejected. Similar charts occur for China where the Gravity model is also rejected- see next section.

The classical model when simulated over past histories comfortably fits the data of actual history for all the major countries we have examined. This implies that the classical model is likely to be close to the true model; and a reliable guide to the policy effects of the government's programme of free trade deals around the world. According to this model the total gains to the UK from this programme in the long run- from fully eliminating the EU's protection of 20% on food and manufactures are around 15% of GDP, with consumer prices lowered by around 12%. The main effect on UK trade with the EU will be to lower the prices at which it happens by 20% on food and manufactured trade; the volumes of trade are not likely to change much, since there will continue to be no tariffs and each exporting side will meet required import standards.

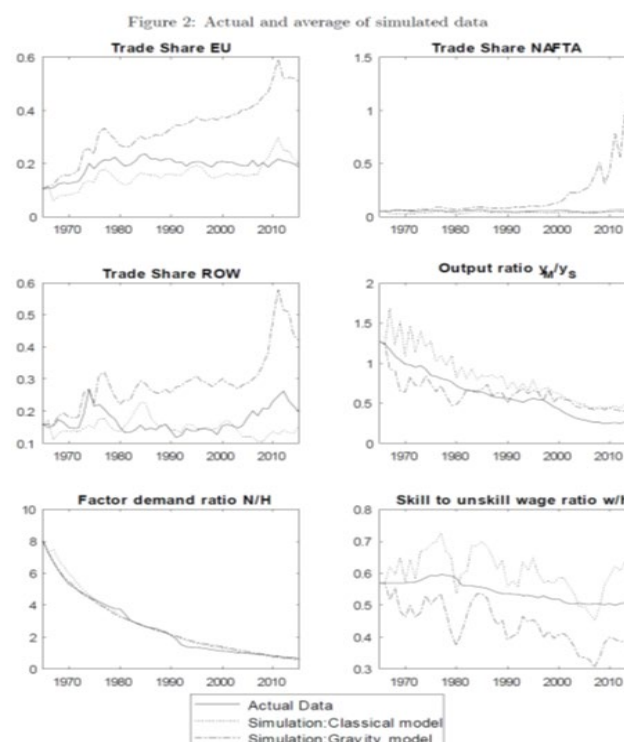
#### Latest results from testing models on other countries' behaviour

We have, as noted, recently been extending our tests to other major countries or groups, namely the US, China and the EU (Chen et al, 2021- [http://carbsecon.com/wp/E2021\\_14.pdf](http://carbsecon.com/wp/E2021_14.pdf)). We do this through simulating each country model on its own, with world variables simulated by a separate statistical model of world behaviour (for the UK this is not needed, as the UK is too small to affect world activity and prices); this 'Part of Model' test can tell us how likely the trade behaviour of each country is to come from either the Classical or Gravity model. The Table below summarises our findings in the form of the probability of each model being correct- 'p-values'. When this falls below 0.05 (5%) the model is considered rejected.

#### PART-OF-Model tests for major countries

	Classical	Gravity
UK	0.09	0.000
US	0.07	0.07
EU	0.115	0.075
CHINA	0.11	0.034

One can see that for all these countries the Classical Model is accepted; and also that the Gravity Model is in all cases either as or less probable than the Classical. In two cases, the UK and China, the gravity model is strongly rejected. For the UK the rejection is extremely strong; the test we have used implies that the Classical Model cannot be more than 5% inaccurate for the UK- in other words a model very close to the assumed Classical one is virtually certain to be the true one. For all the other countries the test used implies the Classical Model cannot be more than 20% inaccurate- so a model close to the Classical is very likely to be the true one.



The policy implications of this general result in favour of the Classical Model are of great importance for the UK and Brexit, as well as more widely for trade policies. Policies of free trade deliver best welfare results for all countries; protection implies self-harm. According to the model a 10% tariff equivalent on food and manufacturing (the EU's is 20%) causes welfare to fall by between 6.4% (EU) and 9.4% (US); the cost to China is 8.1% and to the UK 7.2%. Clearly the model condemns protection severely. Customs union also damages the totality of members signing up, as illustrated for the EU, where the customs union choices made are assessed to reduce welfare by 12.8%; it can of course benefit particular members whose exports are the most protected but then others are better off refusing to join. Brexit greatly benefits the UK via withdrawing from the generally damaging EU customs union. It gains in two ways: first it gets rid of 20% protection on food and manufactures, a gain of 14.4% of GDP. Second it removes the terms of trade loss on paying 20% too much on its net imports of food and manufactures from the EU (worth 5% of GDP), this loss is 1% of GDP. So overall the UK gain from Brexit is about 15% of GDP. This is to be compared with the estimates made by Gravity modellers, such as found in the



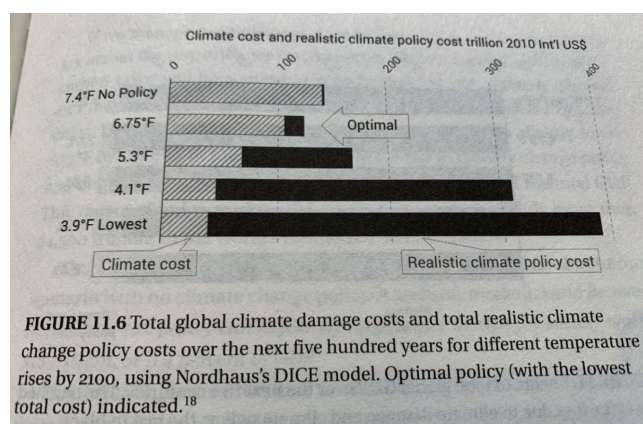
Treasury's official anti-Brexit 2018 report, of quite large losses: for example the Treasury there sets the cost of a No Deal Brexit at a loss of 9.3% of GDP (see Figure 2.1 on p 23 of Minford and Meenagh, After Brexit what next? Edward Elgar and IEA, 2020.)

### The role of post-Brexit regulatory reform

A further key role on post-Brexit policy is to be played by the reform of regulation. The government has issued an important new report on this from a Task Force - <https://www.gov.uk/government/publications/taskforce-on-innovation-growth-and-regulatory-reform-independent-report> - chaired by Sir Ian Duncan-Smith. The report reveals a wide scope for reform of inherited EU regulation in areas including digital, technological innovation, energy, transport, finance and agriculture. The aim would be to move regulation away from prescriptive prevention of activity stemming from the top-down Napoleonic law system towards smart outcome-based common-law methods permitting experiment ('sandboxes') and reactive proportionate remedies. At the same time the government can be more of a partner in R&D aid, helping to promote innovation. The UK's vaccination success neatly illustrates what can be done with this new approach.

### The Great Climate Policy Demarche

The world is busy signing up to big shifts to 'carbon-neutrality' in short periods of time. These will be extremely expensive and damaging to growth. The chart that follows shows the costs to the world as percent of GDP of pursuing various targets for holding the world temperature rise by 2100 to between a low of 3.9 degrees Fahrenheit and a high of 7.4 degrees. The dark mass is the policy cost, the hatched area is the climate warming cost. The bottom line for 3.9 degrees is roughly what is being currently attempted; the top line, of 7.4 degrees, is if nothing much is done. The figures shown in the graph below come from the Nordhaus DICE model. The figures favour aiming for 6.3 degrees, in other words letting warming proceed while taking a fair amount of action.



The world is currently announcing intentions to embark on the bottom, most rapid, strategy- at immense cost. By contrast, the optimal policy involves proceeding with carbon tax policies that put a price on carbon, so stimulating substitution; adaptation (such as flood, fire, and hurricane defences); raising incomes among the poorest (who are thereby better able to spend on adapting); and spending on R&D for climate change reversal strategies (geo-engineering),

These ideas are spelt out in detail in an excellent recent book by Bjorn Lomborg, 'False Alarm' (2020, Basic Books), from which the above chart is taken (p.163).

The present political rhetoric being used in the COP26 meetings following the Paris Accords may well in practice lead to little action because of internal opposition from ordinary people to the high costs of energy that would result. In France, we have seen the 'gilets jaunes' protesting against higher fuel costs. China is determined to grow rapidly and for this needs coal-fired energy, with renewables supplying inadequate amounts. President Trump represented US voters' needs for cheap energy in his anti-climate policies; President Biden cannot be insensitive to these voters' views, with mid-term elections not far away.

In this business, we are dealing with a clash of a new climate ideology with the politics of the possible. It is a case of 'watch this space'. From a forecasting viewpoint, we must assume that the impossible will fail to occur.

# THE UK ECONOMY

Vo Phuong Mai Le

The Covid-19 pandemic continued to negatively impact economic activities. The third national lockdown stalled the economic recovery and resulted in an economic contraction in Q1. Real GDP fell 1.5% in Q1, following a rebound of 1.3% in Q4 2020. The slowdown was observed in services (-2.0% compared to +1% in Q4) and industrial production (-0.4% compared to +2% in Q4), while the construction sector continued its expansion (2.6% compared to 2.7% in Q4).

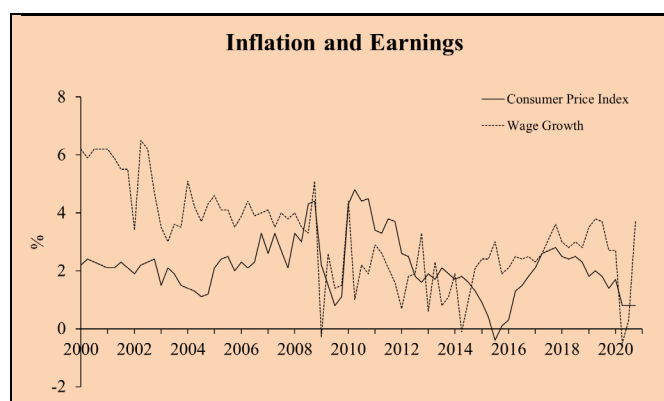
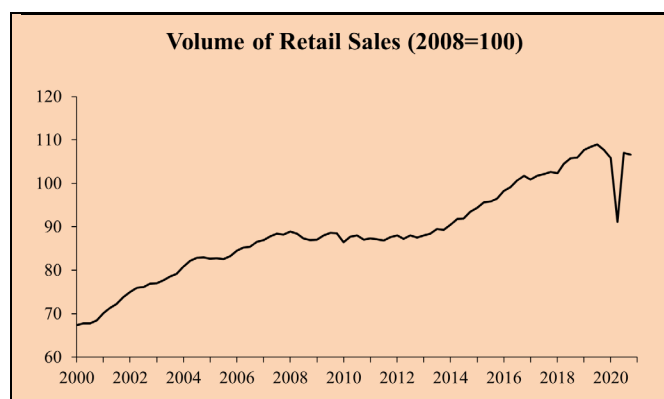
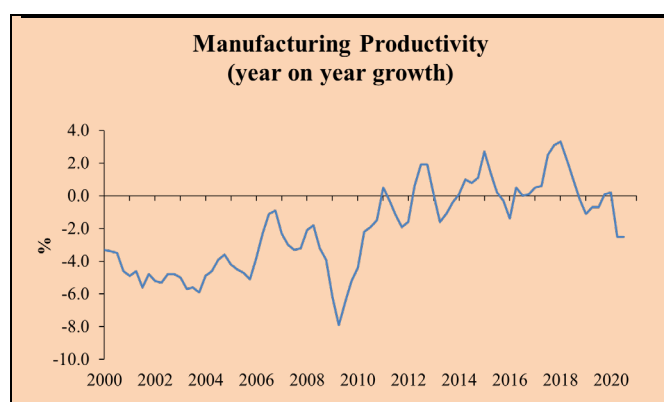
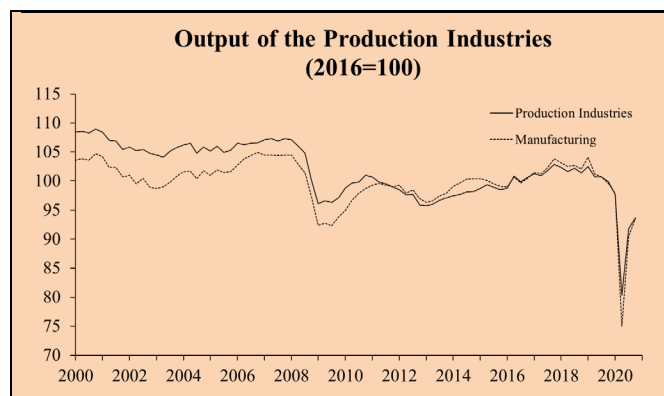
On the expenditure side, the growth in domestic demand fell after a rebound in Q3 and Q4 2020. Private consumption fell 3.9% in Q1, following a contraction of 1.7% in Q4 2020. Fixed investment fell 2.3% in Q1, after rising 4.4% in Q4. The quarterly contraction was partially offset by an improvement in net trade as imports (-13.6% compared to -7.1% in Q4) declined by more than exports (-11.6% compared to -18.9% in Q4).

## Labour market, costs and prices

Since the start of the pandemic, the labour market had deteriorated continuously. However, the latest data for February to April 2021 showed a sign of recovery. The unemployment rate was 4.7% in February-April, compared to 4.8% in the period of January-March. The employment rate rose to 75.2% from 75.0% in the January-March period. With the Covid-19 restrictions easing, job vacancies have increased. In March to May the number of vacancies was 758,000, which was only 27,000 (3.4%) lower than the pre-pandemic level in January-March 2020.

The growth outlook for Q2 onwards is better due to the easing of the Covid-19 restrictions, the successful vaccination programme and continuous generous fiscal support, which have worked together to boost economic growth. According to recent surveys and data, Q2 GDP is expected to rise strongly. The Markit/CIPS Composite Purchasing Managers' Index (PMI) of 61.7 in June (after 62.0 in May) remained above the 50-threshold and indicates optimistic business conditions. Growth was observed in all industries. The Markit/CIPS Manufacturing PMI was 63.9 in June, after 65.6 in May. Construction output growth (PMI of 64.2 in May, compared to 61.6 in April) accelerated most rapidly since September 2014. Consumer confidence has improved slowly, standing at -9 in June and May, which is the highest level since March 2020.

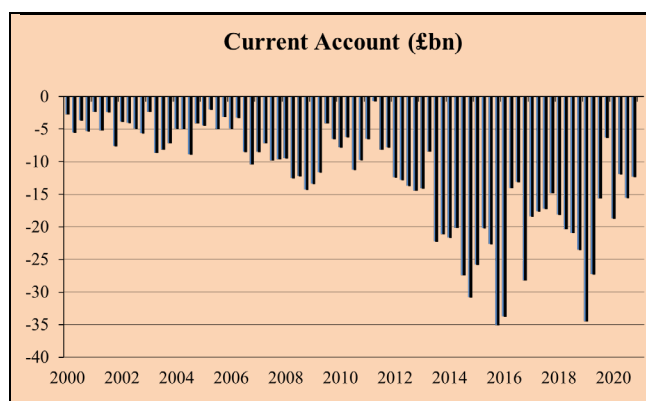
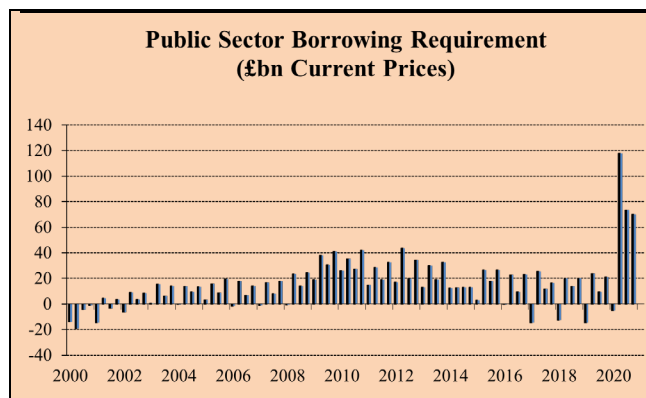
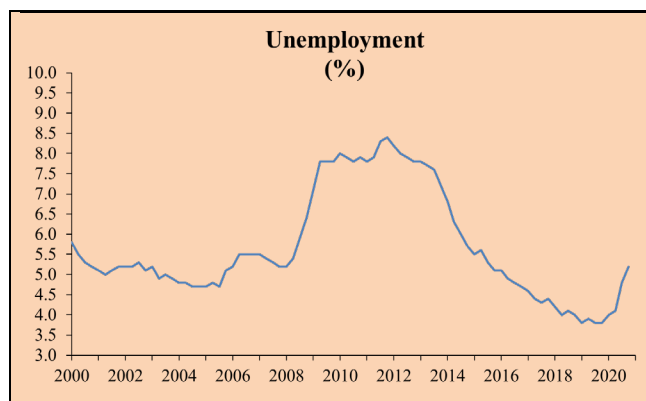
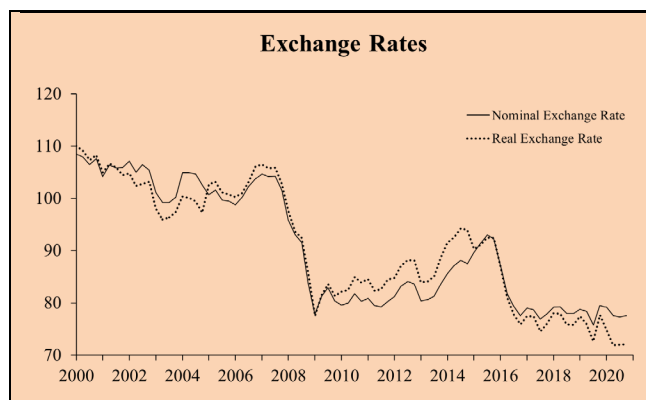
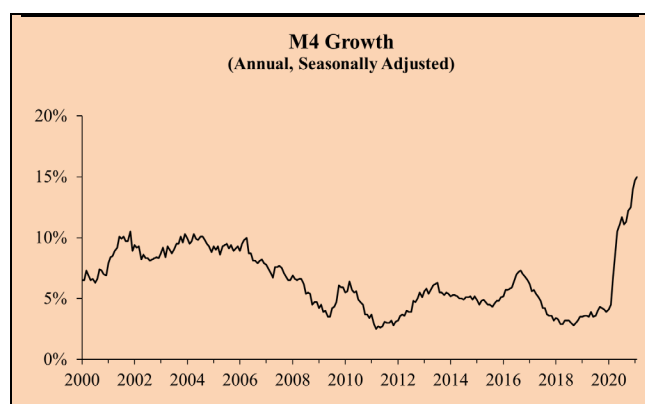
Annual CPI inflation was 2.1% in May, up from 1.6% in April. This was the highest rate since April 2019. The main upward pressure on inflation came from reviving demand and higher commodity prices. Core inflation rose 2.0% in May, up from 1.3% in April. Although the annual inflation is above the target rate of 2%, the Bank of England has



viewed these upward pressure factors as temporary and thus inflation expectations were considered as stable and remaining well anchored against the target.

### Fiscal and Monetary Developments

To support the economic recovery, both monetary and fiscal policy remain accommodative. The government continues to borrow. In May 2021, the public sector net borrowing was £24.3 billion, down from £43.7 billion in May 2020. The public sector net debt (excluding public sector banks) at the end of May stood at 99.2% of GDP compared to 91.4 % in the previous year. In the June meeting the Bank of England decided to maintain both conventional and unconventional monetary measures unchanged. It kept the Bank rate at 0.1% and the existing programme of corporate and government bond purchases at the cumulative total of £895 billion.



## UK FORECAST DETAIL

### Prices, Wages, Interest Rates and Exchange Rate Forecast (Seasonally Adjusted)

	Inflation % <sup>1</sup> (CPI)	Short Dated (5 Year) Interest Rates	3 Month Int. Rates	Nominal Exchange Rate (2005=100) <sup>2</sup>	Real Exchange Rate <sup>3</sup>	Real 3 Month Int. Rates % <sup>4</sup>	Inflation (RPIX)	Real Short Dated Rate of Interest <sup>5</sup>
2019	1.7	0.6	0.8	78.3	73.8	-0.7	2.6	-0.5
2020	1.0	0.1	0.2	78.2	72.9	-1.0	1.6	-1.2
2021	1.7	0.4	0.1	80.7	76.4	-3.7	2.4	-3.4
2022	5.0	1.5	1.5	78.8	77.6	-2.8	6.1	-2.9
2023	4.0	4.7	4.5	77.9	78.9	1.1	5.5	1.4
2024	3.0	5.0	5.0	77.6	80.0	2.6	4.6	2.6
2019:1	1.8	0.9	0.9	79.0	75.4	-0.8	2.4	-0.8
2019:2	2.0	0.7	0.8	78.6	74.0	-0.7	3.0	-0.6
2019:3	1.8	0.4	0.8	76.0	70.7	-0.8	2.7	-0.4
2019:4	1.4	0.5	0.8	79.6	75.0	-0.5	2.2	-0.2
2020:1	1.7	0.4	0.6	79.5	74.9	-0.2	2.7	-0.4
2020:2	0.8	0.0	0.1	77.6	71.9	-1.0	1.3	-1.1
2020:3	0.8	-0.1	0.1	77.6	72.2	-1.3	1.1	-1.5
2020:4	0.8	0.0	0.1	78.0	72.6	-1.6	1.1	-1.7
2021:1	0.8	0.2	0.1	80.8	76.2	-2.6	1.4	-2.5
2021:2	1.9	0.4	0.1	80.5	75.9	-3.4	3.0	-3.1
2021:3	2.0	0.6	0.1	80.5	76.5	-4.2	2.5	-3.7
2021:4	2.1	0.6	0.2	81.0	77.0	-4.8	2.6	-4.4
2022:1	4.9	1.0	1.0	79.0	77.3	-3.8	5.4	-3.8
2022:2	5.0	1.5	1.5	78.8	77.3	-3.0	6.5	-3.0
2022:3	5.0	1.6	1.7	78.4	77.3	-2.6	6.3	-2.7
2022:4	5.1	2.0	2.0	79.1	78.4	-2.0	6.3	-2.0
2023:1	4.0	4.0	4.0	78.1	78.7	0.3	5.5	0.3
2023:2	4.0	5.0	4.5	77.9	78.7	1.0	5.5	1.5
2023:3	4.0	5.0	4.5	77.5	78.7	1.3	5.4	1.8
2023:4	4.0	5.0	5.0	78.2	79.7	2.0	5.4	2.0
2024:1	3.0	5.0	5.0	78.0	80.0	2.2	4.6	2.2
2024:2	3.0	5.0	5.0	77.6	79.7	2.5	4.6	2.5
2024:3	3.0	5.0	5.0	77.3	79.7	2.7	4.6	2.7
2024:4	3.1	5.0	5.0	77.7	80.7	3.0	4.7	3.0

<sup>1</sup> Consumer's Expenditure Deflator

<sup>2</sup> Sterling Effective Exchange Rate Bank of England

<sup>3</sup> Ratio of UK to other OECD consumer prices adjusted for nominal exchange rate

<sup>4</sup> Treasury Bill Rate less one year forecast of inflation

<sup>5</sup> Short Dated 5 Year Interest Rate less average of predicted 5 year ahead inflation rate

# Labour Market and Supply Factors (Seasonally Adjusted)

	Average Earnings (1990=100) <sup>1</sup>	Wage Growth <sup>2</sup>	Survey Unemployment Percent	Millions	Real Wage Rate <sup>3</sup> (1990=100)
2019	275.7	3.5	3.8	1.0	148.8
2020	279.4	1.6	4.5	1.3	149.9
2021	290.2	3.8	5.4	1.7	153.1
2022	307.8	6.0	5.1	1.6	154.7
2023	324.1	5.3	3.6	1.0	156.7
2024	337.8	4.2	2.8	0.7	158.5
2019:1	273.4	3.4	3.8	1.0	148.1
2019:2	273.5	4.0	3.9	1.0	147.9
2019:3	275.5	3.7	3.8	1.0	149.7
2019:4	277.6	2.7	3.8	1.0	149.6
2020:1	279.7	2.7	4.0	1.1	150.0
2020:2	270.1	-0.5	4.1	1.2	145.9
2020:3	279.3	0.4	4.8	1.4	149.4
2020:4	288.5	3.8	5.2	1.6	154.2
2021:1	292.2	4.5	4.8	1.4	155.5
2021:2	281.0	4.1	5.7	1.8	149.0
2021:3	288.8	3.4	5.5	1.8	151.4
2021:4	298.7	3.5	5.5	1.7	156.3
2022:1	309.0	5.7	5.5	1.7	156.9
2022:2	298.4	6.2	5.2	1.6	150.7
2022:3	306.4	6.1	5.0	1.5	153.0
2022:4	317.3	6.2	4.7	1.4	158.0
2023:1	325.1	5.2	4.2	1.2	158.8
2023:2	314.8	5.5	3.6	1.0	152.9
2023:3	322.9	5.4	3.4	0.9	155.1
2023:4	333.6	5.2	3.2	0.9	159.8
2024:1	338.2	4.0	2.9	0.8	160.4
2024:2	328.2	4.2	2.8	0.7	154.8
2024:3	337.2	4.4	2.8	0.7	157.3
2024:4	347.6	4.2	2.8	0.7	161.5

<sup>1</sup> Whole Economy

<sup>2</sup> Average Earnings

<sup>3</sup> Wage rate deflated by CPI

# Estimates and Projections of the Gross Domestic Product<sup>1</sup> (£ Million 1990 Prices)

	Expenditure Index	£ Million '90 prices	Non-Durable Consumption <sup>2</sup>	Private Sector Gross Investment Expenditure <sup>3</sup>	Public Authority Expenditure <sup>4</sup>	Net Exports <sup>5</sup>	AFC
2019	167.8	803514.3	475369.3	308458.5	209136.4	-70959.7	118490.2
2020	151.3	724452.0	427617.5	255473.0	199184.4	-33404.9	124418.0
2021	162.0	775948.8	444420.8	281634.5	211536.4	-29515.7	132127.2
2022	175.5	840400.5	466406.2	313570.9	224219.9	-23606.4	140190.1
2023	179.8	861137.1	480436.0	311736.0	230959.3	-18606.2	143388.0
2024	183.6	879262.0	493915.4	309499.8	237826.1	-15888.6	146090.7
2019/18	1.4		0.3	3.1	3.0		-0.1
2020/19	-9.9		-10.1	-17.3	-4.8		5.0
2021/20	7.8		4.8	12.8	6.6		6.2
2022/21	8.5		5.0	11.6	6.0		6.1
2023/22	2.5		3.0	-0.7	3.0		2.3
2024/23	2.1		2.8	-0.7	3.0		1.9
2019:1	167.5	200481.1	119045.5	83717.3	53429.6	-27900.7	27810.6
2019:2	167.1	200009.6	118526.3	74816.9	51617.9	-19203.6	25747.9
2019:3	168.3	201443.7	118808.6	71008.4	51891.0	-12473.8	27790.5
2019:4	168.4	201579.9	118988.8	78916.0	52197.9	-11381.7	37141.1
2020:1	163.4	195632.5	118032.8	72147.1	51656.8	-11632.2	34572.0
2020:2	131.6	157502.4	91565.8	47009.3	43743.5	429.6	25245.8
2020:3	154.0	184370.2	109964.7	64379.7	50846.1	-9700.7	31119.6
2020:4	156.1	186946.9	108054.2	71936.9	52938.0	-12501.5	33480.7
2021:1	153.4	183686.9	105676.5	71230.6	51082.9	-12804.4	31498.7
2021:2	157.6	188732.4	107095.1	65392.4	51382.2	-3077.5	32059.8
2021:3	165.7	198414.8	112878.2	73163.6	52892.3	-6663.8	33855.5
2021:4	171.3	205114.7	118771.0	71847.9	56179.1	-6970.1	34713.2
2022:1	173.3	207500.0	111591.7	87583.4	54146.0	-11003.8	34817.3
2022:2	174.9	209339.1	113522.4	79035.0	54465.4	-2829.7	34854.0
2022:3	176.4	211137.1	115432.9	80169.6	56071.4	-5098.5	35438.3
2022:4	177.4	212424.4	125859.2	66782.9	59537.0	-4674.4	35080.3
2023:1	178.2	213316.9	114937.4	89306.9	55769.8	-11225.4	35471.8
2023:2	179.5	214872.4	116928.3	80293.6	56099.4	-2726.0	35722.9
2023:3	180.2	215795.6	118896.2	77383.0	57753.8	-2249.0	35988.4
2023:4	181.4	217152.1	129674.1	64752.6	61336.3	-2405.7	36205.2
2024:1	182.2	218132.0	118385.5	88288.1	57442.9	-9648.0	36336.5
2024:2	183.1	219182.2	120436.1	79905.0	57782.4	-2453.6	36487.7
2024:3	184.0	220293.1	122463.0	76853.2	59486.3	-1824.1	36685.3
2024:4	185.1	221654.7	132630.8	64453.5	63114.4	-1962.8	36581.2

<sup>1</sup> GDP at factor cost. Expenditure measure; seasonally adjusted

<sup>2</sup> Consumers expenditure less expenditure on durables and housing

<sup>3</sup> Private gross domestic capital formation plus household expenditure on durables and clothing plus private sector stock building

<sup>4</sup> General government current and capital expenditure including stock building

<sup>5</sup> Exports of goods and services less imports of goods and services

## Financial Forecast

	PSBR/GDP % <sup>1</sup>	GDP <sup>1</sup> (£bn)	PSBR (£bn) Financial Year	Current Account (£ bn)
2019	2.3	2166.6	49.1	-89.1
2020	16.1	1987.9	311.2	-58.2
2021	6.0	2289.4	137.5	-48.8
2022	2.2	2547.0	57.0	-36.0
2023	1.5	2704.5	41.5	-24.2
2024	0.8	2843.4	22.7	-17.0
2020:1	-0.9	549.4	-5.0	6.5
2020:2	27.0	437.6	118.0	6.4
2020:3	14.5	514.8	74.8	6.4
2020:4	13.8	519.8	71.9	6.4
2021:1	9.0	515.6	46.5	6.5
2021:2	6.8	533.1	36.5	6.5
2021:3	6.4	559.3	35.7	6.6
2021:4	5.6	585.8	32.8	6.7
2022:1	5.3	611.2	32.5	7.0
2022:2	2.1	621.4	13.2	7.1
2022:3	2.4	631.9	15.2	7.3
2022:4	2.4	639.4	15.3	7.4

<sup>1</sup>GDP at market prices (Financial Year)

## Public Finance Forecast

	Nom PSBR (£bn)	Nom GDP (£bn)	Nom Pub Spend (£bn)	PSBR/GDP % <sup>1</sup>	Spend/GDP %	Nom Debt (£bn)	Debt Interest (£bn)	Debt/GDP %	Net Taxes (£bn)	Net Tax Rate%
2019/20	49.1	2196.3	472.2	21.5	2.2	1621.0	48.1	73.8	471.2	21.5
2020/21	311.2	1987.9	473.3	23.8	16.1	1932.2	39.8	97.2	201.9	10.2
2021/22	137.5	2289.4	481.7	21.0	6.0	2069.7	42.6	90.4	386.8	16.9
2022/23	57	2547.0	557.2	21.9	2.2	2126.7	41.1	83.5	541.3	21.3
2023/24	41.5	2704.5	596.3	22.0	1.5	2168.2	42.9	80.2	597.8	22.1
2024/25	22.7	2843.4	635.1	22.3	0.8	2190.9	41.1	77.1	653.6	23.0
2025/26	3.7	2957.1	665.5	22.5	0.1	2194.6	44.5	74.2	706.3	23.9
2026/27	0.2	3075.4	716.7	23.3	0.0	2194.8	47.8	71.4	764.3	24.9
2027/28	0.2	3198.4	776.0	24.3	0.0	2195.0	50.9	68.6	826.7	25.9
2028/29	0	3326.4	840.3	25.3	0.0	2195.0	53.8	66.0	894.2	26.9
2029/30	0	3459.4	910.5	26.3	0.0	2195.0	56.6	63.4	967.1	28.0
2030/31	0	3597.8	986.8	27.4	0.0	2195.0	59.3	61.0	1046.0	29.1
2031/32	0	3741.7	1069.6	28.6	0.0	2195.0	61.8	58.7	1131.4	30.3
2032/33	0	3891.4	1159.5	29.8	0.0	2195.0	64.2	56.4	1223.7	31.5
2033/34	0	4047.0	1257.1	31.1	0.0	2195.0	66.5	54.2	1323.6	32.7
2034/35	0	4208.9	1362.9	32.4	0.0	2195.0	68.7	52.2	1431.6	34.0

<sup>1</sup>GDP at market prices (Financial Year)

# THE WORLD ECONOMY

## US

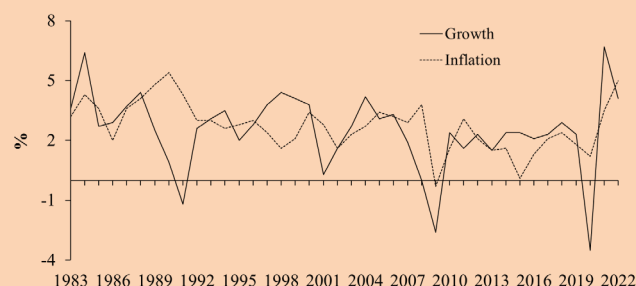
The economic recovery gathered more momentum. Real GDP expanded 1.6% in Q1, following a 1.1% increase in Q4 2020. The acceleration was driven mainly by stronger domestic demand. Private consumption rose 2.9% after an increase of 0.8% in Q4 2020. Government spending rose 2.6% after falling 0.2% in Q4. Investment expanded 2.52%, after +4.65% in Q4. The negative contribution to GDP growth came again from net trade. It subtracted 2.25 percentage points from Q1 GDP growth (compared to -3.75 percentage points in Q4) as imports grew (1.425% compared to 7.45% in Q4) but exports declined (-0.275% compared to 5.6% in Q4).

In line with these economic improvements, the labour market showed signs of recovery. The unemployment rate was 5.9% in June, changed slightly from 5.8% in May, but much improved from 11.1% in June 2020. Total nonfarm payroll employment rose by 850,000 in June, following a rise of 583,000 in May. As the market became tighter, annual average hourly earnings growth accelerated. It rose to 3.6% in June from 1.9% in May.

Recent surveys and data indicated that despite supply chain disruptions the recovery momentum was strong in Q2. The Markit Flash Composite PMI was 63.9 in June, following 68.7 in May. The manufacturing and services sectors continued to expand strongly. The Services Business Activity Index was at 64.8 (down from 70.4 in May) and the Manufacturing Output Index was at 59.2 (down from 59.6 in May).

Consumer price inflation continued to increase beyond the official target of 2%. The annual rate of CPI inflation rose to 5.0% in May, following April's 4.2%. The increase was mainly driven by a continuous big increase in energy prices (28.5% in May, up from 25.1% in April). Core inflation, less food and energy, rose 3.8%, up from 3.0% in April. The Federal Reserve Board viewed the factors driving inflation higher as transitory. In the June meeting, to keep supporting the economic and labour market recovery process, the Federal Reserve decided to maintain its conventional monetary policy and keep the federal funds rate at its range of 0.0%-0.25%. It also reiterated its commitment to increase its purchases of Treasury securities, and agency residential and commercial mortgage-backed securities, at least at the pace of monthly \$80 billion and \$40 billion, respectively. The most significant point at the June meeting was that the Fed signalled its plan for tightening monetary policy and addressing the inflation issue by announcing its projection for the federal funds rate to be raised to an average of 0.6% in 2023.

**U.S.: Annual Growth Rates of Real GNP and Consumer Prices**



## US

	2017	2018	2019	2020	2021	2022
Real GDP Growth (% p.a.)	2.3	3.0	2.2	-3.5	6.7	4.1
Inflation (% p.a.)	2.1	2.4	1.8	1.2	3.5	5.0
Real Short Int. Rate	-1.0	0.6	0.3	-3.1	-3.1	-4.9
Nominal Short Int. Rate	1.4	2.4	1.5	0.4	0.1	0.1
Real Long Int. Rate	0.4	0.9	0.7	-2.6	-3.3	-3.0
Nominal Long Int. Rate	2.8	2.7	1.9	0.9	1.7	2.0
Real Ex. Rate (2000=100) <sup>1</sup>	94.5	93.5	96.3	96.2	95.5	94.9
Nominal Ex. Rate <sup>2</sup>	101.68	100.96	104.31	106.41	101.30	100.50

<sup>1</sup>The real exchange rate is the domestic price level relative to the foreign price level converted into domestic currency. A rise in the index implies an appreciation of the real exchange rate.

<sup>2</sup> The series for the USA is a trade weighted index (1990=100)

**Japan: Annual Growth Rates of Real GNP and Consumer Prices**



## Japan

	2017	2018	2019	2020	2021	2022
Real GDP Growth (% p.a.)	1.7	0.6	0.0	-4.7	2.6	2.8
Inflation (% p.a.)	0.5	1.0	0.5	0.0	0.0	0.5
Real Short Int. Rate	-0.9	-0.4	0.1	0.0	0.0	-0.4
Nominal Short Int. Rate	0.1	0.1	0.1	0.0	0.1	0.1
Real Long Int. Rate	-0.9	-0.5	0.0	0.0	-0.4	-0.4
Nominal Long Int. Rate	0.1	0.0	0.0	0.0	0.1	0.1
Real Ex. Rate (2000=100) <sup>1</sup>	58.3	57.8	56.3	54.2	51.4	48.0
Nominal Ex. Rate	112.10	110.40	109.02	106.80	108.20	107.50

<sup>1</sup>The real exchange rate is the domestic price level relative to the foreign price level converted into domestic currency. A rise in the index implies an appreciation of the real exchange rate.

## Japan

The economy contracted in Q1 due to the second state of emergency related to a resurgence of Covid-19. Real GDP declined 1.275%, after a rise of 2.9% in Q4 2020. The sharp contraction was driven by a collapse in domestic and foreign



demand. Private consumption decreased 1.35% in Q1 after rising 2.25% in Q4. Government spending dropped 1.725%, compared to a rise of +1.825% in Q4. Investment declined 0.95% compared to a rise of +3.1% in Q4. Net trade subtracted 0.225 percentage points from Q1 growth (down from a positive contribution of 1.05% to the Q4 growth) as imports growth (4.2%, down from 5.175% in Q4) dominated that of exports (2.425% in Q1, down from 13.925% in Q4).

According to recent data and surveys, the economy rebounded modestly in Q2. While the au Jibun Bank Japan Composite PMI of 51, above the threshold of 50, showed an expansion in private sector activity in April, since then the index has deteriorated to 48.8 in May and 47.8 in June which showed a contraction in output. The services PMI rose to 47.2 in June from 46.5 in May, as output fell at a more moderate pace. On the other hand, the manufacturing PMI fell to 51.5 in June from 53.0 in May. Business sentiment improved in Q2 as shown by the business confidence index (14, up from 5 in Q1) being at its highest reading since the Q4 2018.

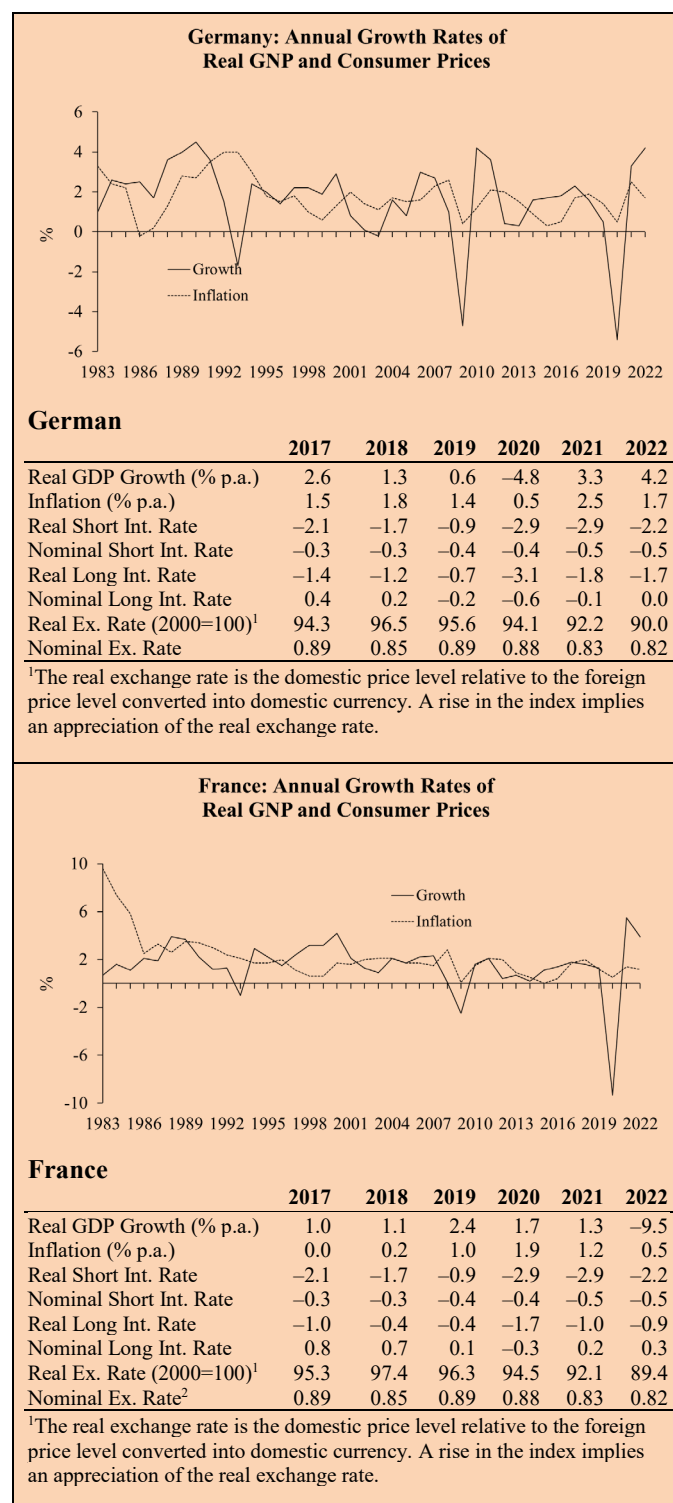
To continue to support the economic recovery, the Bank of Japan maintained its accommodative monetary policy. In its June meeting, the Bank decided to leave the short-term policy rate unchanged at -0.10%. It continued to not set an upper limit on government bonds purchases to ensure the 10-year government bond yield at 0%. The Bank also was committed to keep its overall asset purchases unchanged.

## Germany

The Covid-19 crisis caused another decline in economic growth. Germany suffered one of the biggest contractions in the Euro area in Q1 2021. Real GDP fell 1.8% after expanding 0.5% in Q4 2020. The negative contributions came from weak private consumption and trade. Private consumption fell 5.4% following -2.3% in Q4. Net trade subtracted 0.6 percentage points from the quarterly growth (whereas it added 0.7 percentage points to Q4's growth) as the increase in imports (3.8% after +3.3% in Q4) was larger than the increase in exports (1.8% after 4.4% in Q4). This was partially offset by positive contributions from government consumption (up 0.2% after 0.1% in Q4) and gross capital formation (up 7.5% after 5.1% in Q4).

With a gradual reopening expected as the pandemic situation improves and the vaccination programme makes more progress, recent data and surveys have signalled a recovery in Q2. The private sector has expanded and the rate of growth picked up further towards the end of this quarter, just ended. The Markit/CIPS Composite PMI rose to a ten-year high of 60.4 in June from 56.2 in May. The improvements came in both manufacturing and services sectors with the easing of Covid-19 restrictions boosting activity. The Services PMI Activity index rose to 58.1 in June from 52.8

in May, while the manufacturing PMI rose to 64.9 from 64.4 in May. Businesses became more optimistic about the business situation in June with the business confidence index rising to 101.8 (from May's 99.2).



## France

The economy has ended up currently in a further Covid recession. Real GDP shrank 0.1% following a fall of 1.4%

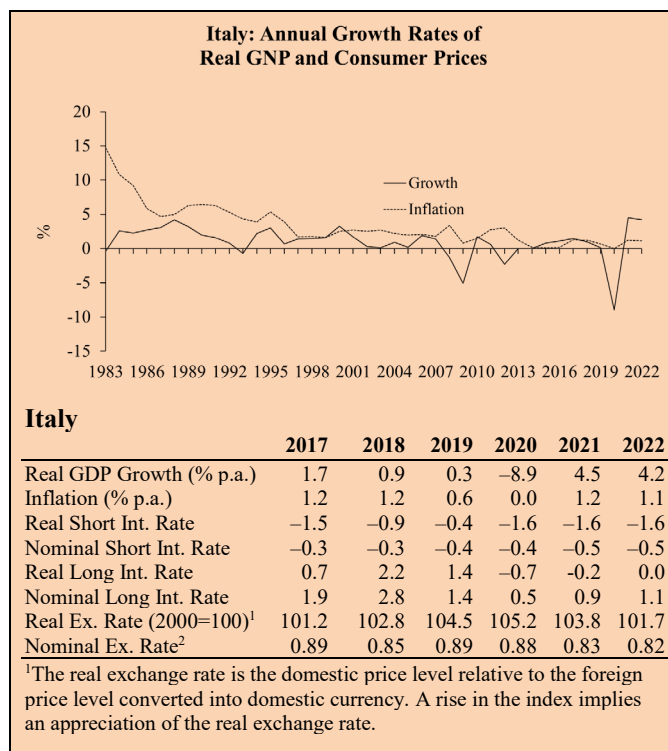
in Q4 2020. The contraction was driven by a weak trade balance. It subtracted 0.4 percentage points from Q1's growth (after adding 1.2 percentage points in Q4) as exports contracted 0.2% (compared +4.9% in Q4) and imports grew 1.1% (compared to 2.2%). A positive contribution to the growth rate came from domestic demand. Fixed investment rose 0.2% (after 1.7% in Q4) and private consumption recovered to grow at 0.1% (after falling -5.6% in Q1).

Looking ahead to Q2, data and surveys predicted that the economy would rebound in the quarter. The Composite PMI Output index increased to 57.1 in June, up from 57.0 in May. Both are above the threshold of 50, signalling strong growth in the private sector over these two months- in both manufacturing and services sectors. The Markit Flash Services Activity Index of 57.4 in June (compared to 56.6 in May) was the highest reading in 38 months. The Markit Manufacturing Output Index was 55.5 in June, down from 58.7 in May. June's Business Confidence Index of 107 June (unchanged from May's reading) remained above the long-term average of 100, indicating optimism about the recovery from Covid.

## Italy

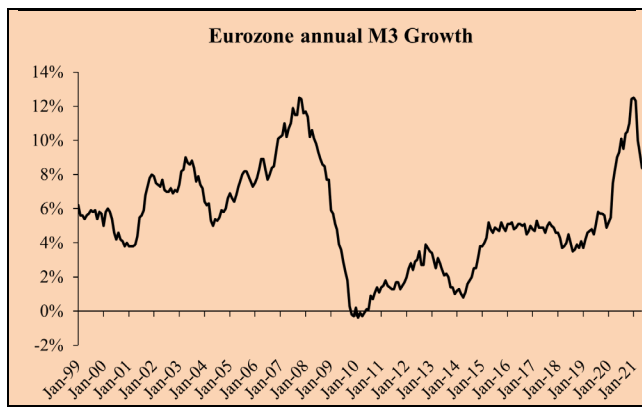
The economy recovered in Q1. Real GDP rose 0.1% compared to a sharp contraction of 1.8% in Q4. The negative contributions came from final consumption (-1% following -1.6% in Q4) and net trade as imports growth (2.3% after 5.4% in Q4) once again dominated exports growth (0.5% after 1.3% in Q4). The only positive contribution came from gross fixed capital formation (up 3.7%, from 0.2% in Q4).

Recent data and surveys showed improving conditions in Q2. The manufacturing sector continued to expand rapidly in June, at the second quickest pace in history. The Markit Manufacturing PMI rose to 62.2 in June, after 62.3 in May. The expansion has been going on in the construction sector for 4 consecutive months. The Markit Construction PMI rose from 57.6 in April to 58.3 in May. June's Business confidence of 112.8 (up from 107.3 in May) was at an all-time high and consumer confidence of 115.1 (up from 110.6) marked the highest reading since October 2019. As elsewhere in the EU, Italy is recovering strongly from the Covid collapse.



## Euro-zone monetary policy

The Harmonized Index of Consumer Price Inflation rate has been rising steadily. It was at 1.9% in June, slightly down from 2.0% in May. The inflation was driven mainly by a strong increase in energy prices (12.5% compared to 13.1% in May) and services (0.7% compared to 1.1% in May). The core HICP, without energy and food, rose 0.9%, down from 1.0% in May. The European Central Bank expects inflation to remain close to, but below, the target of 2%. It expects inflation to decline again at the start of next year because of the appreciation of the Euro, relatively weak labour market conditions and the easing of global energy prices. Given the fragile economic recovery conditions and this inflation prospect, in its June meeting the European Central Bank decided to maintain its accommodative monetary policy. It kept the interest rate on the main refinancing operations, the marginal lending facility and the deposit facility at 0.00%, 0.25% and -0.50% respectively. It is also keeping the net asset purchases total planned under the pandemic emergency purchase programme at €1850 billion until at least the end of March 2022. It also decided to carry on with net purchases under the asset purchase programme at monthly rate of €20 billion.



## WORLD FORECAST DETAIL

### Growth Of Real GNP

	2017	2018	2019	2020	2021	2022
U.S.A.	2.3	3.0	2.2	-3.5	6.7	4.1
U.K.	1.8	1.3	1.4	-9.9	7.8	8.5
Japan	1.7	0.6	0.0	-4.7	2.6	2.8
Germany	2.6	1.3	0.6	-4.8	3.3	4.2
France	2.4	1.8	1.8	-8.0	5.5	3.9
Italy	1.7	0.9	0.3	-8.9	4.5	4.2

### Growth Of Consumer Prices

	2017	2018	2019	2020	2021	2022
U.S.A.	2.1	2.4	1.8	1.2	3.5	5.0
U.K.	2.6	2.5	1.8	1.0	1.7	5.0
Japan	0.5	1.0	0.5	0.0	0.0	0.5
Germany	1.5	1.8	1.4	0.5	2.5	1.7
France	1.0	1.9	1.3	0.5	1.4	1.2
Italy	1.2	1.2	0.6	0.0	1.2	1.1

### Real Short-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	-1.0	0.6	0.3	-3.1	-3.1	-4.9
U.K.	-2.0	-1.1	-0.2	-1.5	-1.5	-4.9
Japan	-0.9	-0.4	0.1	0.0	0.0	-0.4
Germany	-2.1	-1.7	-0.9	-2.9	-2.9	-2.2
France	-2.1	-1.4	-0.9	-1.8	-1.8	-1.7
Italy	-1.5	-0.9	-0.4	-1.6	-1.6	-1.6

### Nominal Short-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	1.4	2.4	1.5	0.4	0.1	0.1
U.K.	0.4	0.7	0.8	0.2	0.1	1.5
Japan	0.1	0.1	0.1	0.0	0.1	0.1
Germany	-0.3	-0.3	-0.4	-0.4	-0.5	-0.5
France	-0.3	-0.3	-0.4	-0.4	-0.5	-0.5
Italy	-0.3	-0.3	-0.4	-0.4	-0.5	-0.5

### Real Long-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	0.4	0.9	0.7	-2.6	-3.3	-3.0
U.K.	-1.8	-0.8	-0.4	-1.5	-4.6	-3.5
Japan	-0.9	-0.5	0.0	0.0	-0.4	-0.4
Germany	-1.4	-1.2	-0.7	-3.1	-1.8	-1.7
France	-1.0	-0.4	-0.4	-1.7	-1.0	-0.9
Italy	0.7	2.2	1.4	-0.7	-0.2	0.0

### Nominal Long-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	2.8	2.7	1.9	0.9	1.7	2.0
U.K.	0.6	1.0	0.6	0.2	0.4	1.5
Japan	0.1	0.0	0.0	0.0	0.1	0.1
Germany	0.4	0.2	-0.2	-0.6	-0.1	0.0
France	0.8	0.7	0.1	-0.3	0.2	0.3
Italy	1.9	2.8	1.4	0.5	0.9	1.1

### Index Of Real Exchange Rate(2000=100)<sup>1</sup>

	2017	2018	2019	2020	2021	2022
U.S.A.	94.5	93.5	96.3	96.2	95.5	94.9
U.K.	77.4	78.6	78.3	78.2	80.7	78.8
Japan	58.3	57.8	56.3	54.2	51.4	48.0
Germany	94.3	96.5	95.6	94.1	92.2	90.0
France	95.3	97.4	96.3	94.5	92.1	89.4
Italy	101.2	102.8	104.5	105.2	103.8	101.7

<sup>1</sup> The real exchange rate is the domestic price level relative to the foreign price level converted into domestic currency. A rise in the index implies an appreciation in the real exchange rate.

### Nominal Exchange Rate

(Number of Units of Local Currency To \$1)

	2017	2018	2019	2020	2021	2022
U.S.A. <sup>1</sup>	101.68	100.96	104.31	106.41	101.30	100.50
U.K.	1.29	1.34	1.28	1.28	1.40	1.41
Japan	112.10	110.40	109.02	106.80	108.20	107.50
Eurozone	0.89	0.85	0.89	0.88	0.83	0.82

<sup>1</sup> The series for the USA is a trade weighted index (1990=100); the series for the UK is \$ per £

\* Forecasts based on the Liverpool World Model

# EMERGING MARKETS

Anupam Rastogi

## India

In India, the devastating second wave of COVID-19 has peaked and economic activity is accelerating. The Covid-19 positivity rate is around 2.5%, which has given confidence to policy makers to accelerate economic activity across the country. The campaign to vaccinate all people above 19 years old in the country is in full swing. The government is sending a message to all through all forms of electronic media that only vaccination can save India from the third wave of the pandemic.

Our forecast of GDP growth is more bullish than international agencies like World Bank and IMF as we expect economic activity to accelerate in the second half of the current fiscal year which ends in March. The lost momentum will be regained in the coming months. Moreover, high frequency data such as railways loading, electricity generation and bank credit support acceleration of economic activity across India. The April to June quarter bore the direct economic cost of the second wave, contracting 13% quarter-on-quarter, which is half the contraction in the same quarter last year. The rebound in the second quarter is underway. A full growth rebound is likely to come only in the second half of FY22, when a critical mass of the population is expected to be vaccinated. Bringing all of this together, we forecast GDP to grow 10% in FY22, following a 7.3% contraction in FY21. According to Moody's credit outlook report, India is expected to return to the pre-covid levels by the end of the year. India's GDP surpassed its pre-Covid-19 fourth-quarter 2019 levels. India's first-quarter GDP rose 1.5% quarter on quarter and year on year.

To kick start the services sector, the government announced a relief package. The stimulus will have a minimal impact on the fiscal deficit numbers because a large part of USD 84 million is credit guarantees. The actual cash outgo will be less than USD 20 million.

India's retail inflation shot up to six-month high of 6.3% in May, after easing to a three-month low of 4.23% in April. The RBI is mandated to maintain the crucial number at 4% in the medium term, with a 2 percentage point margin on either side as part of its inflation target. The wholesale price-based inflation soared to a record high of 12.94% in May on rising prices of crude oil and manufactured goods. While there were fewer supply chain disruptions during the recent pandemic lockdowns compared with last year, a general rise in inflation globally has elevated domestic price pressures. Higher global commodity prices including crude, edible oils and gold are clearly spilling over into consumer inflation in India. We expect an inflation rate of 6% for the current

India: BSE Sensitive



financial year. The central bank's focus now is on supporting a recovery with an accommodative stance.

India's current account deficit (CAD) widened to a seven-quarter high of US\$8.2bn in Q4FY21, marking the second consecutive quarter to report a deficit following a surplus in the previous three quarters. This was primarily led by a 21% QoQ (19% YoY) jump in merchandise trade deficit, caused by record-high non-oil imports during the quarter and higher crude oil prices, even as exports also registered a strong rebound amid improving global demand. Tepid foreign capital inflows and net outflows by NRIs — the first in 17 quarters — led to a sharp drop in capital account balance, partly offset by higher external commercial borrowings (ECB). Consequently, the Balance of Payments (BoP) surplus moderated sharply (-82% YoY) to a nine-quarter low of US\$3.4bn.

We expect the current account balance to slip into deficit again in FY22 to the extent of 1% of GDP assuming average crude oil prices at \$65/bbl. This, along with moderation in foreign capital inflows and a sooner-than-expected reversal in easy monetary policy conditions in the US, are expected to translate into a significantly lower BoP surplus this year.

Indian equities significantly outperformed the broader emerging markets, with the market Index ending the month 6.5% higher (YTD: 12.6%). Positive global trade conditions apart, a sharp drop in the daily Covid-19 caseload, robust corporate performance and marginally enhanced fiscal and monetary policy support helped the markets to rally further. The Indian stock market is likely to remain in bulls territory as analysts have reversed the earnings cut that took place during the first wave of the pandemic. The benchmark index earnings projections imply earnings growth of 40% and 14% for FY22 and FY23, respectively, one of the highest among the emerging market equities.

	19-20	20-21	21-22	22-23	23-24
GDP (%p.a.)	4.0	-7.3	10.0	5.5	6.0
WPI (%p.a.)	3.6	5.5	6.0	5.5	5.3
Current A/c(US\$ bill.)	-20.0	35.0	-20.0	-10.0	-10.0
Rs./\$(nom.)	73.0	75.0	74.0	76.0	78.0

## China

The Chinese economy is growing at a stable rate of 8%. Some of the short-term indicators signal towards slowing down but it is mostly due to interruptions in the domestic supply chain caused by complete lockdowns in affected parts of the country. As the developed countries are coming out of the Covid-19 pandemic, demand for Chinese goods is growing. Political leadership is more concerned about securing an enhanced role for the country and recognition that China is second to none.

According to the World Bank forecast, China's GDP is expected to grow 8.5% this year, and slow down to 5.4% in 2022 and 5.3% in 2023. China's economic growth moderated in May as Chinese consumers turned cautious. Retail sales grew 12.4% in May compared to the 17.7% year-over-year growth rate in April. Chinese manufacturing sector activity slipped to a three-month low in June. IHS Markit's China manufacturing sector Purchasing Managers' Index dipped to 51.3 in June compared to May's reading of 52. Activity in China's services sector also moderated as COVID-19 curbs from a resurgence in cases in Southern China restrained a rebound in consumption. The official non-manufacturing Purchasing Managers' Index (PMI) fell to 53.5 in June from 55.2 in May.

The producer price index (PPI) is expected to be around 8.8% in June. China's surging PPI poses a greater upside risk to the global inflation outlook than to China's own. A strengthening yuan is also feeding into global inflation. The consumer price index rose 1.3% in May from a year earlier, up from 0.9% in April. Beijing has set a 2021 CPI growth target of around 3%. We expect CPI to be below 2% in the coming quarters.

The People's Bank of China (PBOC), the central bank, is unlikely to trigger any shift in monetary policy. The PBOC has said it will make its monetary policy flexible, targeted and appropriate, while keeping interbank liquidity reasonable, as authorities seek to consolidate a post-COVID-19 economic recovery.

China's exports and imports are booming. China's imports grew at their fastest pace in 10 years in May, fuelled by surging commodity prices, while export in dollar terms grew 27.9% in May from a year earlier, slower than the 32.3% growth reported in April due to disruptions caused by Covid-19 cases at major ports in the country's south. Besides the impact of the Covid-19 cases in Guangdong, the global chip shortage has started to hit all of China's export items related to semiconductors. China posted a trade surplus of \$45.5 billion for the month of May.

The yuan has depreciated a little to 6.46 per dollar from 6.38 per dollar. It has appreciated nearly 12% since May 2020. China's relatively attractive interest rates and recovering economy have spurred domestic and foreign investors to increase holdings of renminbi-denominated assets. Barring a

China: SSE Composite Index



surprise rate hike by the Federal Reserve, or a drastic relaxation of Chinese capital controls, a gradual appreciation of yuan is expected in our forecast. This is in line with the PBOC's action in recent times.

Chinese policy makers are discussing the possibility of fully doing away with birth restrictions by 2025, the end of the ruling Chinese Communist Party's current five-year economic plan. It is believed that China will begin by eliminating birth restrictions in provinces where the birth rate is the lowest before enacting nationwide changes.

While celebrating the 100th anniversary of the Chinese Communist Party on July 1 in Beijing's Tiananmen Square — a location reserved for the most important national events — the Party pointed out its many achievements in the field of economic growth, a high-tech military, including the world's largest navy, sophisticated modern cities with a vast, entrepreneurial middle class, and universities and research centres pitching for leadership in the key technologies of the century ahead. Within its ranks there is no sign of challenge to the authority of the top leader, Xi Jinping, and the party enjoys strong support among the Chinese public. By 2049, the 100th anniversary of the founding of the People's Republic, the CCP has declared that it intends to make China a "strong, democratic, civilized, harmonious and modern socialist country". Xi Jinping's strong message to the world is that China, "does not carry aggressive or hegemonic traits in its genes", but the days when it could be bullied by foreign powers have long gone. However, it does not square up with what he told to the world that any would-be foreign oppressors would have their heads cracked open against a "steel Great Wall." He has set the tone for a bolder, more defiant and nationalist China that's likely to push back hard against any "sanctimonious preaching" from the U.S. and Europe over human rights or other issues.

	19	20	21	22	23
GDP (%p.a.)	6.1	2.3	8.0	5.2	5.0
Inflation (%p.a.)	2.9	2.5	1.8	2.0	2.0
Trade Balance(US\$ bill.)	40.0	60.0	80.0	60.0	52.0
Rmb/\$ (nom.)	7.1	6.7	6.3	6.2	6.0

## South Korea

South Korea's government expects gross domestic product and inflation to grow at a faster clip than earlier. We are maintaining our earlier forecast of GDP growth of 4% and inflation at 2% for 2021. In 2022, the country's GDP is forecast to expand 3% and inflation is expected to average 1.4% on the back of worldwide recovery after the Covid-19 pandemic.

The growing inflationary expectations have been rationalized on the lower base achieved last year due to the collapse in prices. In June, inflation hit 2.6% from a year earlier. The central bank would like to manage inflationary expectations, otherwise it would put pressure on the bank to hasten its exit strategy. Inflation will remain moderate in the second half as the government is increasing imports of eggs and ramping up rice supplies.

The central bank is preparing to raise rates this year, as the economy recovers faster than expected. The Bank of Korea (BOK) Governor Lee Ju-yeol has announced that he is thinking of raising rates "within this year," though the exact timing and pace will depend on economic conditions. The BOK has four more policy rate-setting meetings this year in July, August, October and November. The bank has kept its policy rate at a historically low 0.50% since May 2020 to support economic growth, which had been badly hit by the Covid-19 pandemic.

South Korea recorded a trade surplus of about \$4.44 billion in June, a year-on-year increase of 51.5%. Exports are expected to grow 18.5% to USD607 billion in 2021 and imports will grow 22.4% to USD572 billion. The country's exports kept rising for the seventh consecutive month through May on the back of the global demand recovery from the Covid-19 pandemic shock. South Korean exports grew by 39.7% year-on-year to \$54.8 billion, driven by an increase in demand for chips and automobiles amid a recovery of commercial activity in the current context of the pandemic.

The Korean Won was steady in the past few months as monetary policy remains accommodative while budgetary support to the economy is being rolled out.

	19	20	21	22	23
GDP (%p.a.)	1.8	-1.0	4.0	3.0	2.5
Inflation (%p.a.)	0.4	0.5	2.0	1.4	1.0
Current A/c(US\$ bill.)	60.0	70.0	60.0	40.0	40.0
Won/\$ (nom.)	1200	1070	1100	1100	950

## Taiwan

Taiwan's GDP is forecast to grow 5.5% as its export partners' economies are rebounding and technology related exports are touching all time highs. This will be the highest growth since 2010, when the country's GDP grew 10.25%. The economy is getting traction from its strong exports on the back of recovering global demand in 2021, while

Korea: Composite Index



Taiwan: Weighted TAIEX Price Index



emerging technologies such as 5G applications is expected to give an additional boost to outbound sales of 5G gear this year. But, the unexpected changes in the US Fed monetary policies and a tech competition between the United States and China could create uncertainty for the economy.

Taiwan's consumer price index (CPI) will likely grow 1.5% in 2021. In the first half of 2021, the CPI grew 1.5%. In view of the stable prices, the central bank left its key interest rate unchanged in June, for the fifth consecutive quarter, with the discount rate remaining at 1.125%, the lowest in the country's history. Monetary policy is accommodative and supports growth. The bank is tolerating a stronger Taiwan dollar, as its appreciation helps to offset some of the inflationary impact of surging raw material prices.

Taiwan's exports of merchandise and services are expected to grow 15.5% in 2021, while its imports are estimated to grow 16.25%.

China's grey-zone warfare is seen by some geopolitical experts as a run-up to an invasion of Taiwan. Though many rule out that possibility, as it could hurt China's economic interests. However, India, as a member of Quad, a group of US, Japan, Australia and India, has doubled its presence on its northern border. The US and Japan have been conducting war games and joint military exercises in the event of a conflict with China over Taiwan, amid escalating concerns over the Chinese military's assertive activity. China flew more than two dozen Chinese warplanes through the skies around Taiwan in June, the largest incursion of its kind this year. That came after the G-7 summit in the U.K. included in its communique a call for a "peaceful resolution" of the

ongoing dispute between Beijing and Taipei, the latest sign that Taiwanese President Tsai Ing-wen's efforts to garner international support for the self-governing island are yielding results.

	19	20	21	22	23
GDP (%p.a.)	2.0	3.1	5.5	3.5	3.0
Inflation (%p.a.)	1.0	-1.0	1.5	1.0	1.0
Current A/c(US\$ bill.)	70.0	71.0	90.0	100.0	65.0
NT\$/\$(nom.)	31.0	29.0	28.5	27.5	27.0

## Brazil

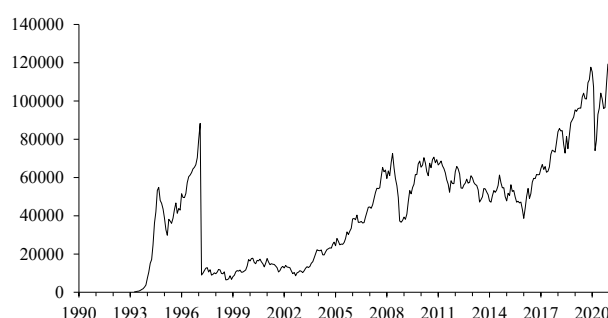
Brazil is all set to grow more than 5% in 2021 and will surpass its 2019 GDP which contracted 4.5% in 2020. Brazil's first-quarter GDP expanded 1.2% from the previous quarter and 2.3% from first-quarter 2020. The economy is expected to pick up in the second half of the year as the vaccination campaign gathers pace and restrictions are lifted more effectively. The picture of the Brazilian economy looks better.

Inflation is the challenge for the current year. It spiralled upward and international commodity prices remain the main source of pressure. Brazil's inflation is forecast to clock 6% in 2021 and 4% in 2022, above the targets of 3.75% and 3.5% for each year.

In order that inflationary expectations take hold in the country, the central bank has left the door open for a bigger increase to the benchmark interest rate in August, following three consecutive hikes of 75 basis points. The Selic benchmark lending rate is at 4.25% from a historic low of 2% set last year to shore up the economy during the pandemic. The degree of uncertainty for next year's inflation remains high amid concerns that rainfall may remain below historic averages once again.

Brazilian inflation jumped to its highest monthly rate for May in a quarter century and the annual rate scaled 8% for the first time in nearly five years.

**Brazil: Bovespa**



Brazil's worst water crisis in nearly a century is fuelling inflation expectations and posing an additional challenge for the central bank and for President Jair Bolsonaro's re-election bid. Electricity bills will increase as much as 15% next month as dangerously low water levels in hydroelectric reservoirs force the government to turn to more expensive power plants fuelled by natural gas, diesel or coal.

Brazil registered a trade surplus of USD37.5 billion during the first half of this year, the greatest surplus since 1997, when records began to be compiled. The surplus is higher by 68.2% in comparison with the first half of last year, when it came to USD22.3 billion. Exports in the January-May period of 2021 expanded by 35.8% hitting USD136.7 billion, whereas imports soared by 26.5% reaching USD99.2 billion.

The Brazilian real was the only developing-world currency to gain against a strengthening US dollar after the country's central bank raised the selic rates for the third time this year and left the door open for more in August. The real is trading around five to a dollar and likely to stabilize around this for the rest of the year.

	19	20	21	22	23
GDP (%p.a.)	0.8	-4.5	3.0	2.5	3.0
Inflation (%p.a.)	4.3	4.5	4.0	4.0	4.0
Current A/c(US\$ bill.)	-36.0	-7.6	-20.0	-26.0	-22.0
Real\$/\$(nom.)	4.2	5.5	5.8	5.8	4.7



## Other Emerging Markets

**Hong Kong: FT-Actuaries**



**Indonesia: Jakarta Composite**



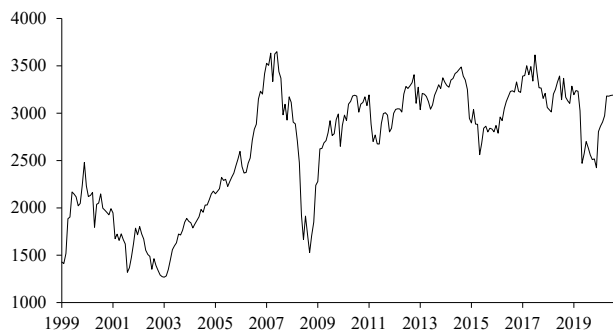
**Malaysia: FT-Actuaries  
(US\$ Index)**



**Thailand: Composite Index**



**Singapore: Straits Times Index**



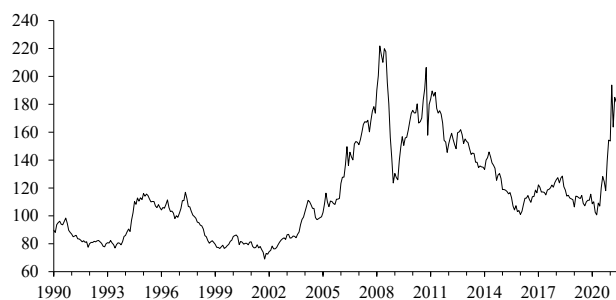
**Philippines: Manila Composite**



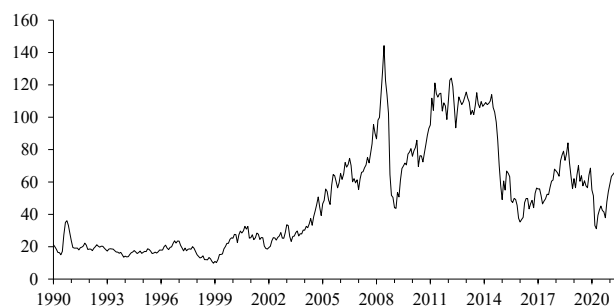
# COMMODITY MARKETS

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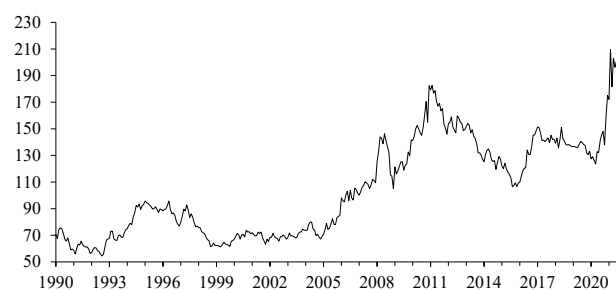
**Commodity Price Index (Dollar)**  
(Economist, 2015 = 100)



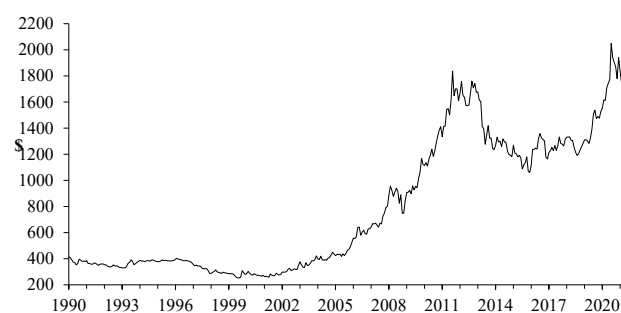
**Oil Price: North Sea Brent (in Dollars)**



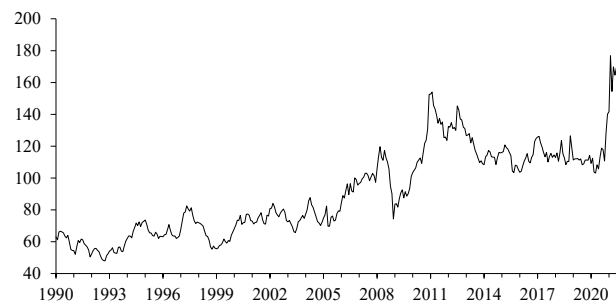
**Commodity Price Index (Sterling)**  
(Economist, 2015 = 100)



**Gold Price (in Dollars)**



**Commodity Price Index (Euro)**  
(Economist, 2015 = 100)



# THE EUROZONE: WHAT IS TO BE DONE?\*

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Patrick Minford    Zhirong Ou  
Michael Wickens    Zheyi Zhu

\*The full version of this paper can be found as CEPR Discussion paper 16313, July 2021, CEPR, London.

## Introduction

In this paper we develop a model of the eurozone and use it to examine possible policy rules that could assist it in achieving economic stability across its wide geographic membership.

To understand the tensions within the eurozone, we use the device of a three country model: North and South EU and the Rest of the World. The model is estimated and tested by indirect inference on data for the two aggregated groups, countries of the Northern and of Southern EU, as well as of the aggregate of all other countries, the RoW.

The euro's history since it was founded in 1999 as a virtual currency -- with its physical version being issued in 2001 -- has fallen into two main segments. The first was an opening 'honeymoon' period up to 2007 when world growth was strong and all parts of the zone were growing well; capital flowed freely and in some profusion from North to South with interest rates equalised by UIP. The second segment was less happy; as the financial crisis spread to the zone, it reduced growth differentially more in the South, creating crises for Southern countries' public finances. With solvency concerns growing, yields on long term public debts rose in the South and capital flows from the North abruptly ceased. The ECB was not allowed at this stage to buy government debt; however it lent prolifically to commercial banks in the afflicted Southern countries, encouraging these in turn to buy their governments' debt, so preventing public insolvency from rising yields interacting with worsening finances. Under the Maastricht Treaty's No Bailout clause inter-government help was ruled out. However, to help the governments in difficulties and in collaboration with the IMF, this was soon waived and a new transfer fund instituted across the EU. The resulting transfers were monitored by 'Troika' committees -- the three constituent monitors being the Commission, the ECB and the IMF. The conditions for the receipt of help were severe: 'austerity programmes' were enforced so that the transfers should prospectively be paid back.

These events followed fairly closely the playbook of asymmetric shocks' about which the creators of the euro had been loudly warned. Clearly, the financial crisis and its effect on the zone was a highly powerful and asymmetric shock that was bound to test the euro's structural responses

searchingly. It would have been possible to let Southern countries exit the euro, even if only temporarily, as was suggested (Argyrou and Tsoukalas, 2010). But such ideas were barely entertained, with opposition to them not just from the North, where there were fears of contamination by breaching the euro's permanence, but also from the South, where fears of political isolation from the EU prevailed.

It would also have been possible for Northern countries to undertake fiscal expansion to alleviate the lack of demand in the South. But this was also rejected by Northern governments, concerned with their own solvency fears. Instead demand stimulus was left as the province of the ECB. It took some time before the ECB moved to stimulative action in the form of QE, as this was opposed by the Bundesbank and German government opinion. Instead, for a long time the ECB conducted limited open market operations to stimulate credit at the Zero Lower Bound. It was simultaneously being forced by commercial bank needs and the public solvency problems in the South to lend freely to these banks as noted above. These loans largely replaced capital outflows to the North and so wound up creating large 'TARGET' balances, whereby under the ECB inter-central-bank TARGET settlement process, Northern central banks acquired rising deposits at the ECB against rising loans made by Southern central banks. The mechanism was that capital outflows liquidated bank deposits in the South, redepositing them in the North where they were held as bank balances at the ECB; the ECB's extra loans to Southern banks in replacement of their lost deposits wound up as the ECB asset counterpart. In effect the ECB was thereby acting as another source of official transfers from North to South.

At present there is an active debate in EU policy circles about how to develop the eurozone's institutions. One result has been a 'banking union' in which the ECB supervises all eurozone banks to common standards; and takes any necessary action to wind them up, arrange take-overs or otherwise achieve compliance. To some extent this conflicts with the national government responsibilities to regulate their own banking systems under national laws. Nevertheless the ECB's key role in lending to national commercial banks endows it with strong bargaining power in this area.

There has also been discussion about issuing euro bonds backed by all zone governments; this would amount to borrowing by the euro 'state'. However in the absence of such a state, and the fears, particularly in Germany, that this might be used by other countries to force further transfers from Germany de facto, the proposal has not got far; the one significant exception has been the Covid Recovery Fund instituted in 2020, which has been financed by an issue of euro-bonds, but will be transferred to EU governments as grants for spending proposals to be tabled with the Commission. Of course if airy talk of 'state-building' were

to bear fruit, this could become a precedent for further 'EU state' action in the same vein. Such talk is, however, bedevilled by the same problems currently arising in the context of much less ambitious proposals for cooperation beyond Covid.

Some Southern countries, notably Italy, have proposed national fiscal expansion. However this is prevented by the Stability and Growth Pact, strongly backed today by Germany and other Northern countries such as the Netherlands, which see it as a bulwark against potential Southern insolvency, leading to yet more transfers.

What is striking about this account of events and proposals is that fiscal policy, the only available policy instrument other than money, which is centrally controlled by the ECB, is effectively immobilised by the euro's internal limitations. This has made it difficult to envisage possible policy rules that could assist the euro-zone's capacity to survive; in practice, only monetary policy rules were considered and even these are necessarily limited by inter-governmental concerns.

In the policy discussion of this paper, we assume that the exigencies of endemically poor macroeconomic performance will force greater flexibility in fiscal policy on eurozone governments. Already, only a few years from modest recovery out of the severe eurozone crisis, recession again threatens the zone, with even Germany now growing weakly. QE has been heavily deployed but willingness to push it yet further is now limited. Only fiscal policy is left. If not now, when? With monetary tools failing around the western world the eurozone is not alone in being forced into fiscal action to normalise their economies.

Hence we will pay attention to fiscal policy rules here as well as zone-wide monetary policy rules for the ECB. In a spirit of pure academic enquiry we also investigate a world of independent monetary (as well as fiscal) policy where a Northern euro floats against a Southern euro; this world helps to define a benchmark of what might have been.

In what follows we set out our model of the eurozone, consisting of two subzones, North and South, and the rest of the world. We do not impose the Zero Lower Bound in this model; rather, we treat the corporate bond rate (which never hit the ZLB) as the target variable for monetary policy, whether executed by a Taylor Rule or by QE.

This framework belongs to the area of multi-country modelling, where there is a large literature -- exemplified by Chari et al. (2002) and Le et al. (2010). A difference with our approach is that these papers do not focus on modelling and matching the intra-eurozone regional economies' behaviour and interactions. The EU Commission runs a large multi-country model, QUEST (Roeger and Veld, 1997; Ratto et al., 2009; Burgert et al., 2020), which includes each EU country; however, there is no published account of its empirical ability to match the facts of these countries'

behaviour, nor of how differing macro policy regimes could stabilise their macro behaviour. This model has mainly been used to examine supply-side reforms across EU countries -- as most recently in D'Auria et al. (2009). In our work, although the overall supply-side potential output enters the model, it does so as an exogenous process (and a source of supply shocks) and we do not examine supply-side reforms, only macro policy regime changes. There appears to have been no published work related to what we are trying to do here.

To anticipate our results, firstly, we find that we can match the data behaviour of the EU and its regions with this macro model. Secondly, we find that there is considerable scope for improving macro stability (and consequently welfare) - both regional- and eurozone-wide - by introducing new fiscal policy regimes; most strikingly, we also find that a return to floating and independent monetary and fiscal policies, at least across the two regional blocs, would have the greatest benefits in macro stability. In effect, this resurrects the idea of a 'Southern euro' suggested by Arghyrou and Tsoukalas (2010). Plainly these policy conclusions would be politically controversial within the current EU institutional set-up. However, their economic implications as estimated benchmarks can inform the practical debate.

Our contribution in this paper is twofold. First, it is empirical, to find a model that matches the data according to powerful tests which carries the important implication that its policy evaluation can be taken seriously and treated as approximately accurate. Second, we have examined the effectiveness of various reforming fiscal and monetary policies which are designed to improve the macro stability of the eurozone area. As stability has been weak in recent decades, this remains an important policy issue.

The rest of the paper is organised as follows: in Section 2 we set out the model; in Section 3 we explain our indirect inference methods; in Section 4 we set out the empirical results and how the estimated model behaves and explains past events; in Section 5 we consider policy regime changes and discuss how they affect the stability and welfare of the eurozone and its regions; Section 6 concludes.

## Model

We use a three-country open-economy model modified from Minford et al. (2021) to account for the broad features of the EU which is split into North and South, and their interactions with their main trading partners which are combined to represent the world economy. The North EU consists of Austria, Belgium, Estonia, Finland, Germany, Ireland, Latvia, Lithuania, Luxembourg, Netherlands and Slovakia. The South EU consists of France, Greece, Italy, Portugal, Spain and Slovenia. The rest of the world consists of China, India, Japan, Norway, Russia, South Korea, Switzerland, Turkey, UK and US. Each of the three country models is a condensed IS-Phillips curve variant of the standard New

Keynesian model amending to allow for trade, real exchange rate determination and the balance of payments.

The derivation (which is detailed in Minford et al.) is standard: the IS curve is derived from the household Euler equation, which in turn is substituted into the output market-clearing equation for consumption, yielding a forward-looking output demand equation with terms in net exports and government spending. Net exports are substituted out in terms of their determinants: outputs and relative prices; government spending is embraced by the equation error). A labour-only production function determines output from households' labour supply and exogenous productivity. This gives rise to an exogenous trend output driven by productivity and an output gap reflecting variations in labour input around this trend, with firms' marginal costs rising with the output gap, reflecting lower marginal productivity and rising real wages. The Phillips curve for inflation is then derived under Calvo pricing, as a forward-looking function of expected future inflation and the output gap. Exports are set by other countries' import demands for them and are determined by their output and relative country prices. The real exchange rate is governed by the uncovered interest rate parity (UIP). This is supported by recent evidence for EU data (Burnside, 2019; Minford et al., 2021, 2021b). The balance of payments equation sets each economy's net increase in loans to be equal to that economy's net imports plus interest payments. Monetary policy is set by a Taylor rule, which describes the interest rate setting behaviour of the central bank; the market interest rate fluctuates around the central bank rate, subject to a risk premium. Fiscal policy, which describes government's spending behaviour, is a stable, exogenous process.

The model is listed in full in the Appendix to the full paper (see first footnote). We present only the key equations, treating the North EU as the home economy, to illustrate the model structure. All variables, except inflation and the nominal interest rate, are measured in natural logarithms. North variables and parameters are marked with '<sup>'</sup>; South variables and parameters are marked with ''<sup>'</sup>'; World variables and parameters are asterisked. All shocks in the model, except those to productivity and government spending which are assumed to follow independent AR(1) processes

North IS curve:

$$y_t' = E_t y_{t+1}' - \frac{C'}{Y'} \frac{1}{\sigma'} \Theta' (R_t' - E_t \pi_{t+1}' - \bar{r}') - \frac{X'}{Y'} z_1' \Theta' E_t \Delta y_{t+1}'' - \frac{X'}{Y'} z_2' \Theta' E_t \Delta y_{t+1}'' + \frac{X'}{Y'} z_3' \Theta' E_t \Delta q_{ns,t+1} - \frac{X'}{Y'} z_4' \Theta' E_t \Delta r_{xr,t+1} - \frac{G'}{Y'} \Theta' E_t \Delta y_{t+1}' + \varepsilon_{IS,t}'$$

where  $y_t'$ ,  $y_t''$ , and  $y_t^*$ , are the home, South and World outputs,  $R_t' - E_t \pi_{t+1}' - \bar{r}'$  is the real interest rate,  $q_{ns,t}$  is the home-South real exchange rate (an increase is a South currency depreciation),  $rxr_t'$  is the home real effective exchange rate (an increase is a home currency depreciation),  $g_t'$  is government spending.  $\frac{C'}{Y'}$ ,  $\frac{X'}{Y'}$  and  $\frac{G'}{Y'}$  are the steady-state ratios of consumption, net exports and government spending to output.  $\Theta'$ ,  $z_1'$ ,  $z_2'$ ,  $z_3'$  and  $z_4'$  are combinations of the

structural parameters (detailed in the Appendix).  $\varepsilon'_{IS,t}$  is the demand shock.

North Phillips curve

$$\pi_t' = -\lambda_{nw}' (\beta' E_t \Delta r_{xr,t+1}' - \Delta r_{xr,t}') + \lambda_{ns}' (\beta' \Delta q_{ns,t+1} - \Delta q_{ns,t}) - \lambda_{sw}' (\beta' E_t \Delta r_{xr,t+1}'' - \Delta r_{xr,t}'') + \beta' E_t \pi_{t+1}' + \kappa_a' (y_t' - y_t'') + \varepsilon'_{PP,t}$$

where  $\pi_t'$  is CPI inflation,  $y_t' - y_t''$  is the output gap,  $rxr_t''$  is the South real effective exchange rate (an increase is a South currency depreciation).  $\beta$  is the discount rate,  $\kappa_a'$  is a combination of the structural parameters including the Calvo probability of price rigidity,  $\lambda_{ns}'$ ,  $\lambda_{nw}'$  and  $\lambda_{sw}'$  are functions of the openness of each economy pair.  $\varepsilon'_{PP,t}$  is the mark-up shock, which is a supply shock.

North productivity:

$$y_t' - y_{t-1}' = \Gamma' + \delta' (y_{t-1}' - y_{t-2}') + \varepsilon'_{yf,t}$$

where  $y_t'$  is assumed to follow a random walk process with drift,  $\Gamma'$ , and reflects the permanent impact of the productivity shock,  $\varepsilon'_{yf,t}$ .  $\delta'$  is the mean-reverting parameter.

North imports from South (World) is a function of home income and the home-South (home effective) real exchange rate:

$$im_{s,t}' = \mu_s' y_t' + \psi_s' q_{ns,t}$$

$$im_{w,t}' = \mu_w' y_t' - \psi_w' rxr_t'$$

The real exchange rates are determined by Uncovered Interest Parity, where the home effective rate and the South effective rate adjust, respectively, to ensure that the expected real returns on investment in different markets are equal:

$$rxr_t' - E_t rxr_{t+1}' = \bar{R}_t - R_t' - (E_t \pi_{t+1}^* - E_t \pi_{t+1}') \quad (1)$$

$$rxr_t'' - E_t rxr_{t+1}'' = \bar{R}_t - R_t'' - (E_t \pi_{t+1}^* - E_t \pi_{t+1}'') \quad (2)$$

where  $R_t$  is the World nominal interest rate,  $\pi_t^*$  is World inflation. The home-South real exchange rate is solved as the (log) difference between the home effective rate and the South effective rate:

$$r_{XT_t}' - r_{XT_t}'' = -q_{ns,t}$$

North balance of payments requires the outflow of home money to be equal to the inflow of foreign money (in home currency terms),

$$BF_t' + IM_{s,t}' + IM_{w,t}' - (\bar{R}_{t-1} - E_{t-1}\pi_t^*)BF_{t-1}' = (IM_{n,t}'' + IM_{n,t}^*)/R_{XR_t}',$$

which can be log-linearised to be:

$$\begin{aligned} \frac{BF_t'}{Y_t'} b_{f_t}' &= \frac{BF_t'}{Y_t'} (\bar{R}_{t-1} - E_{t-1}\pi_t^* - \bar{r}^*) + (1 + \bar{r}^*) \frac{BF_{t-1}'}{Y_{t-1}'} b_{f_{t-1}}' \\ &+ \frac{1}{R_{XR_t}'} \frac{IM_{n,t}''}{Y_t'} (im_{n,t}'' - r_{XT_t}') + \frac{1}{R_{XR_t}'} \frac{IM_{n,t}^*}{Y_t'} (im_{n,t}^* - r_{XT_t}') \\ &- \frac{IM_{s,t}'}{Y_t'} im_{s,t}' - \frac{IM_{w,t}'}{Y_t'} im_{w,t}' \end{aligned}$$

where  $b_{f_t}'$  is the home holding of foreign bonds,  $r^*$  is the steady-state World real interest rate,  $im_{n,t}''$  and  $im_{n,t}^*$  are the South and World imports from home, respectively.  $\frac{BF_t'}{Y_t'}$ ,  $\frac{IM_s'}{Y_t'}$ ,  $\frac{IM_w'}{Y_t'}$ ,  $\frac{IM_n''}{Y_t'}$ ,  $\frac{IM_n^*}{Y_t'}$  and  $\frac{1}{R_{XR_t}'}$  are the steady-state ratios.

The North nominal market interest rate is equal to the ECB rate plus a risk premium shock,  $\varepsilon'_{PP,t}$ :

$$R_t' = R_t^{ECB} + \varepsilon'_{PP,t}$$

The ECB rate is determined through a Taylor rule:

$$R_t^{ECB} = \rho R_{t-1}^{ECB} + (1 - \rho)(\bar{r} + \phi_\pi \Pi_t + \phi_y GAP_t) + \varepsilon_{R,t}^{ECB}$$

where policy responds with inertia to mean inflation and output gap  $\Pi_t$  and  $GAP_t$ , respectively) of the whole EU. and  $\varepsilon_{R,t}^{ECB}$  is the monetary policy shock.

North fiscal policy is represented by an exogenous, stationary government spending rule:

$$g_t' = \rho_g' g_{t-1}' + \varepsilon_{g,t}'$$

where  $\varepsilon_{g,t}'$  is the fiscal policy shock.

Equations (1) – (12) constitute the North EU part of the full model. Since both productivity and home's holding of foreign bonds ( $y_t'$  and  $b_{f_t}'$ , solved by (3) and (9), respectively) are unit root processes, to solve the model we follow Fair and Taylor (1983) and Minford et al. (1984, 1986) by using the projection method, whereby rational expectations are solved such that at a terminal date T all of the endogenous variables are at their equilibrium steady-state values, with net foreign assets are not changing (current account balance), inflation at its target value, and the output gap zero. The full model which is detailed in the Appendix

is completed by South and World equations, which resemble the North equations, and have similar terminal conditions imposed.

## Data, model estimates and fit

The estimation and test results we report in this section are based on 1000 simulated samples, which we generate by bootstrapping the historical DSGE innovations. The data are observed between 2003Q1 and 2019Q4. The observable variables we use for gauging these innovations are output, productivity, inflation, market and policy interest rates, and government spending, of the three economies, together with the North and South effective exchange rates. The data are sourced from Euro-area-statistics, FRED, the IMF and the OECD. We use unfiltered data. The historical innovations are calculated from the DSGE residuals which are assumed to be AR(1) processes with a time trend and a constant. The time series used and the associated adjustments are detailed in the Appendix.

Table 1 (estimates and p-value of the DSGE model) reports the Indirect Inference (II) estimates of the DSGE model. They are contrasted with a set of calibrated starting values that are often used in the literature as the prior mean or median values in Bayesian estimation

Parameter	Definition	Calibrated starting val.			II Estimates		
		North	South	World	North	South	World
$\beta$	Time discount factor	0.99	0.99	0.99	Fixed at starting values		
$R_{XR}$	Steady-state real exchange rate	4.58	5.07	NA	Fixed at starting values		
$C/Y$	Steady-state consumption ratio	0.49	0.56	0.58	Fixed at starting values		
$X/Y$	Steady-state net exports ratio	0.43	0.29	0.20	Fixed at starting values		
$G/Y$	Steady-state government expenditure ratio	0.20	0.21	0.16	Fixed at starting values		
$IM_n/Y$	Steady-state imports ratio (from North)	NA	0.08	NA	Fixed at starting values		
$IM_s/Y$	Steady-state imports ratio (from South)	0.07	NA	NA	Fixed at starting values		
$IM_w/Y$	Steady-state imports ratio (from World)	0.34	0.21	NA	Fixed at starting values		
$IM_n^*/Y'$	South imports from North/North output (SS)	NA	0.06	NA	Fixed at starting values		
$IM_s^*/Y'$	World imports from North/North output (SS)	NA	NA	0.22	Fixed at starting values		
$IM_n^*/Y''$	North imports from South/South output (SS)	0.09	NA	NA	Fixed at starting values		
$IM_s^*/Y''$	World imports from South/South output (SS)	NA	NA	0.34	Fixed at starting values		
$BF/Y$	Hold. of foreign bonds/domestic output (SS)	35.6	-16.0	NA	Fixed at starting values		
$\sigma$	Price elasticity of consumption (Inverse of)	1.37	1.37	1.38	2.28	2.91	1.97
$\varphi$	Wage elasticity of labour (Inverse of)	2.49	2.49	1.83	2.92	4.21	3.43
$\theta$	Calvo non-adjusting probability	0.91	0.91	0.66	0.76	0.78	0.68
$\kappa_\alpha$	Slope of the Phillips curve	0.05	0.05	0.78	0.57	0.64	1.05
$\alpha$	Degree of openness	0.20	0.20	0.20	0.14	0.17	0.21
$\lambda_{ns}$	Inflation response to North-South FX rate	0.50	0.50	0.00	0.28	0.33	-0.02
$\lambda_{nw}$	Inflation response to North RxR	0.50	0.00	0.50	0.25	-0.05	0.51
$\lambda_{sw}$	Inflation response to South RxR	0.00	0.50	0.50	-0.02	0.38	0.48
$\mu$	Income elasticity of imports	1.00	1.00	1.00	0.76	0.82	0.64
$\psi$	Exchange rate elasticity of imports	0.80	0.80	0.80	0.86	0.69	0.75
$\phi_\pi$	Monetary policy response to inflation	1.52	1.52	2.50	2.23	2.23	1.99
$\phi_y$	Monetary policy response to output gap	0.10	0.10	0.08	0.42	0.42	0.48
$\rho$	Monetary policy inertia	0.96	0.96	0.60	0.59	0.59	0.76
$\rho_\pi$	Fiscal policy inertia	0.90	0.96	0.95	0.90	0.96	0.95
$\rho_{PR}$	Persistence of demand shock	0.53	0.53	0.60	0.55	0.54	0.61
$\rho_{PP}$	Persistence of mark-up shock	0.18	0.09	0.15	0.16	0.11	0.14
$\rho_{RP}$	Persistence of risk-premium shock	0.97	0.97	0.91	0.97	0.97	0.91
$\rho_{\pi\pi}$	Persistence of monetary policy shock	0.85	0.85	0.81	0.89	0.89	0.83
$\delta_{yI}$	Mean reversion of productivity growth	0.94	0.98	0.96	0.94	0.98	0.96
Model p-value		0			0.117		

$H_0$ : The DSGE model is true.

The steady-state values are fixed and calibrated to be the mean values of the sample data. The time discount factor is fixed at 0.99. The other parameters are estimated by a grid search over the parameter space of values that is permitted by the theoretical model. The II estimates of the shock parameters, and the parameters related to the open economy

part of the model, i.e., the degrees of openness ( $\alpha$ 's), inflation's responses to exchange rates ( $\lambda$ 's, which are combinations of  $\alpha$ 's), and the elasticities of imports ( $\mu$ 's and  $\psi$ 's) are similar to the calibrated starting values. The key differences are for the elasticities of consumption and labour (inverse of  $\sigma$ 's and  $\phi$ 's, respectively) and the Calvo non-adjusting probabilities ( $\theta$ 's), where the estimates are generally lower. This makes the Phillips curves steeper ( $\kappa_\alpha$ 's). There are further differences in the Taylor rule estimates which imply a more active interest rate response to inflation ( $\phi_\pi$ ) in the EU, but slightly less active in the rest of the world; the interest rate response to the output gap ( $\phi_y$ ) is generally higher; and policy inertia ( $\rho$ ) is much lower in the EU, and higher than the ROW.

Consequently, we may proceed with our analyses with confidence from both a theoretical and empirical viewpoint.

## How do the shocks affect the model?

In this section we evaluate the impact of the shocks. The full model of three economies has 17 shocks which interact via trade and capital movements. A variance decomposition will identify the most important shocks. We then evaluate the relevant impulse responses, and review how such shocks affected the data over time. We focus on the following six variables: North output and inflation, South output and inflation, and the EU output and inflation.

## Variance decomposition

Table 2 reports the forecast error-variance decomposition due to shocks for various forecast horizons (To save space we report the combined effect for a few North/South shocks and all Rest of the World shocks which on their own have little effect).

In the short run (1 year ahead), North output is determined by the North demand shock (36%) and the ECB monetary error (35%). North inflation is due mostly to the North mark-up shock (48%), with the ECB error also contributing a significant amount (23%). South variables are affected in a similar way: i.e., output is dominated by the South demand shock (58%), inflation is mainly due to the South mark-up shock (40%), ECB policy has only half as much impact on South output (19%), while the regional risk premium has a non-negligible effect on South inflation (14%). At the EU level, the demand shock explains half of the aggregate output variation, of which 33% is due to South shocks. Average inflation is dominated by the mark-up shock (about 46%), but the North-South contributions are more balanced (26% and 20%, respectively). The ECB continues to play a modest role, contributing to output and inflation, respectively, 27% and 21%.

In the medium run (3-5 years ahead): the North demand shock and the ECB monetary error continue to be the main determinants of North output (but the demand shock is now

smaller, accounting for 19-26%). Similarly, South output is determined mainly by South demand shocks and ECB policy shocks, the latter being smaller than before. Mark-up shocks continue to dominate inflation in both North and South, and also do so in the long run. Over time the contribution of demand shocks declines considerably while that of productivity shocks, which by assumption are permanent, become dominant, accounting for over 50% of output variation in North and nearly 60% for South.

These results are consistent with previous evidence on the importance of demand and supply shocks over time. There are, however, a number of new findings. First, there is little spillover between the North and South regions: shocks in one region have little impact on the other region. Second, South demand shocks have a much large effect on South output than North demand shocks have on North output. The South shock is about 66% larger. Moreover, the South demand shock has roughly double the effect on EU output as the North shock, and this difference persists through time. Third, ECB policy shocks have substantial, long-lasting, effect on inflation.

Table 2: Variance decomposition of output and inflation

Quarters ahead	North demand	North mark-up	North product	North others	South demand	South mark-up	South product	South others	ECB policy	RoW combined
4										
y (N)	35.5	4.41	1.01	8.07	4.59	3.07	0.02	1.06	35.3	6.97
y (S)	1.26	4.85	0.01	0.61	57.7	1.18	1.56	8.55	18.9	5.41
y (EU)	17.3	4.67	0.47	4.12	32.8	2.06	0.84	5.03	26.6	6.16
$\pi$ (N)	6.21	48.3	0.04	10.7	0.43	2.17	0.05	4.39	22.9	4.85
$\pi$ (S)	0.87	6.74	0.03	5.4	5.63	39.7	0.10	14.5	19.4	7.63
$\pi$ (EU)	3.38	26.3	0.03	7.9	3.19	22.1	0.07	9.75	21.0	6.32
12										
y (N)	25.9	3.11	11.9	6.6	4.43	2.14	0.33	1.44	38.7	5.45
y (S)	0.97	3.24	0.10	0.51	44.2	0.78	17.6	8.9	19.7	4.02
y (EU)	12.7	3.18	5.63	3.37	25.6	1.42	9.48	5.39	28.6	4.63
$\pi$ (N)	3.75	45.3	0.46	9.19	0.18	2.93	0.53	4.9	28.4	4.36
$\pi$ (S)	0.22	5.77	0.29	4.63	6.74	38.5	1.27	11.3	23.6	7.72
$\pi$ (EU)	1.88	24.4	0.37	6.77	3.66	21.8	0.92	8.27	25.8	6.13
20										
y (N)	19.0	2.28	33.3	4.99	3.28	1.57	1.00	1.25	29.2	4.08
y (S)	0.63	2.12	0.26	0.34	29.1	0.51	44.5	6.64	13.3	2.70
y (EU)	9.25	2.20	15.8	2.52	17.0	1.01	24.0	4.10	20.8	3.31
$\pi$ (N)	2.55	46.1	1.63	8.81	0.12	2.86	0.85	4.78	28.0	4.30
$\pi$ (S)	0.12	5.46	0.99	4.37	5.63	39.2	2.53	11.2	22.8	7.67
$\pi$ (EU)	1.27	24.6	1.29	6.34	3.05	22.1	1.74	8.18	25.2	6.08
40										
y (N)	11.6	1.40	50.9	3.07	2.01	0.96	8.47	0.83	17.9	2.86
y (S)	0.35	1.15	9.41	0.19	15.9	0.28	59.8	3.85	7.23	1.92
y (EU)	5.64	1.27	28.9	1.54	9.35	0.60	35.6	2.43	12.3	2.40
$\pi$ (N)	2.22	42.2	4.26	8.25	0.07	2.75	4.82	4.52	26.7	4.21
$\pi$ (S)	0.10	4.95	2.44	3.95	3.97	40.1	6.46	9.71	20.7	7.62
$\pi$ (EU)	1.10	22.5	3.30	5.97	2.14	22.6	5.69	7.27	23.5	6.02

The 'other' shocks of the North and the South combine the impact of the government spending shock and the risk premium shock; 'RoW combined' combines that of all the World shocks, including the monetary error.

## The key impulse response

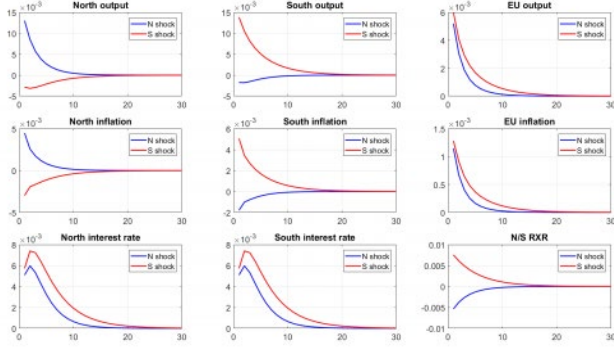
Our results suggest that in the short run to medium run demand shocks are the main determinant of output, and in the medium to long run productivity shocks become increasingly dominant. Throughout the mark-up shocks are key to inflation. Both output and inflation are also strongly affected by the ECB policy shock. In order to gain a fuller understanding of the workings of the transmission mechanism we examine the key impulse responses.

Figure 1 shows the effect of demand shocks. The impulse responses may be interpreted as follows. A rise in North demand (blue) shifts the North IS curve out, which raises North output and causes North inflation to rise via the Phillips curve trade-off. North expansion leads to a positive output gap and inflation at the EU level, which make the



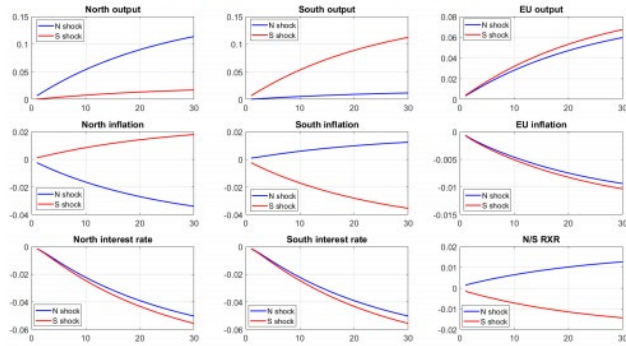
ECB raise the policy rate via the Taylor rule, causing both North and South market interest rates to rise. Nevertheless, (with a relatively steep IS curve implying unresponsive output to the interest rate) South output falls only a little, as does South inflation. The EU output and inflation both rise, however, due to the dominating impact of North. A South shock (red) works similarly, but with its impact on South dominating. Domestic demand shocks cause a domestic depreciation.

Figure 1: The effect of a demand shock



The effect of productivity shocks is shown in Figure 2. A rise in North productivity promotes output and reduces inflation in the North in the usual way. South output rises slightly due to higher North imports, which then raises South inflation. At the EU level, output rises while, as the North impact dominates, inflation falls and leads to the ECB reducing interest rates causing market interest rates in both regions to fall. The responses to a South shock develop in a similar way. Domestic productivity shocks cause a domestic depreciation.

Figure 2: The effect of a productivity shock



The mark-up shock (Figure 3) embraces the effects on inflation of exogenous cost factors, including world commodity shocks and labour-market shocks. Again, the responses to a North and South shock are similar. Thus, a positive North shock shifts up the North Phillips curve, raising both regional and EU inflation rates. This causes the ECB to raise the policy rate and hence both North and South outputs to fall in response to higher market rates; the fall in South output also leads to a fall in its inflation. Since output falls in both regions, the Union output falls. EU inflation is the net outcome of the rise in inflation in the North and the

fall in the South, in which the North inflation dominates. The effect of a South mark-up shock is analogous.

Both regions are affected by ECB policy in the standard way (Figure 4): a tightened policy raises the market interest rate, which reduces demand, causing output and prices to fall. On this occasion we see that -- while the interest rate responses are in the same direction in each region. As there is a bigger fall in North prices, North competitiveness rises as a result of a real depreciation.

Figure 3: The effect of a mark-up shock

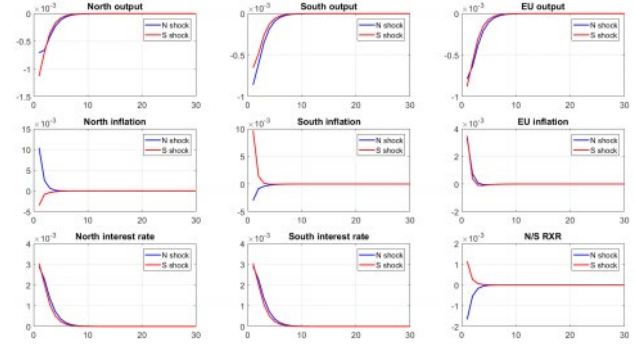
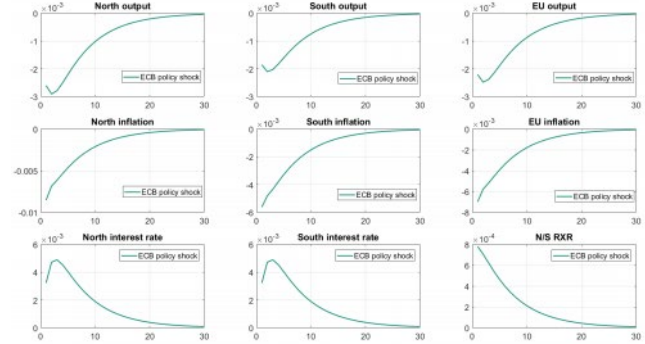


Figure 4: The effect of an ECB policy shock



## Historical decomposition

We can attribute the movements in the main variables to the estimated shocks. The historic shocks are plotted in Figure 5. These are decomposed in Figures 6 (for output) and 7 (for inflation), respectively.



Figure 5: Historical shocks

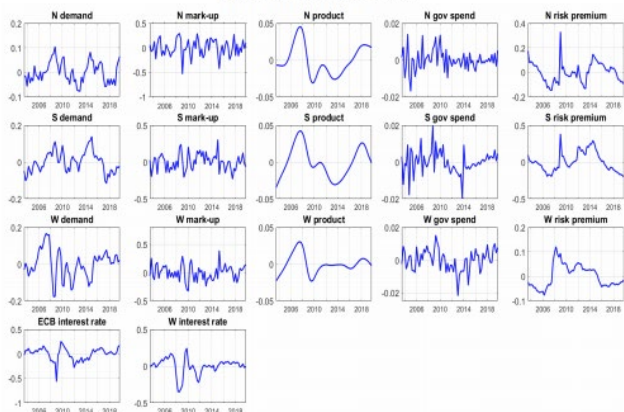
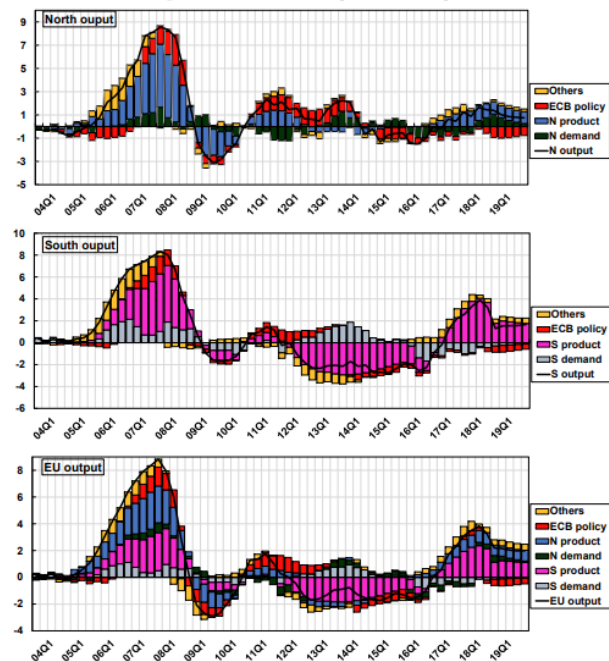


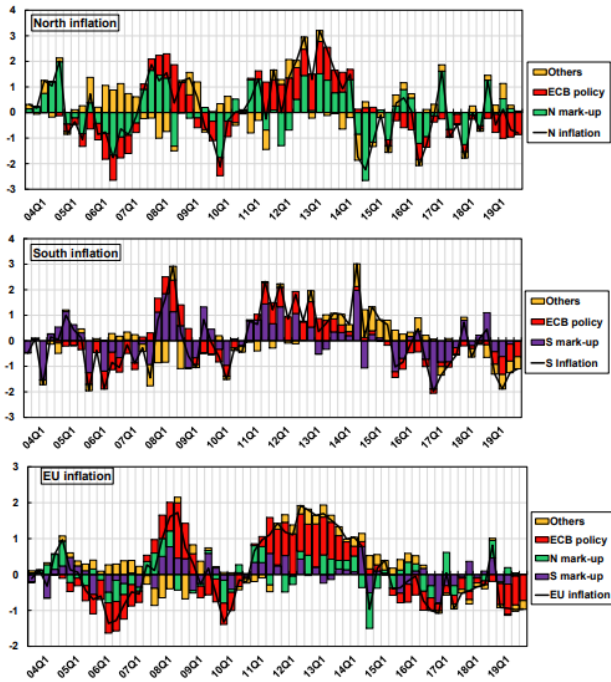
Figure 6 shows that the upswing of North output in the mid-to late- 2000s (before the spread of the global crisis) was a result of a boost of domestic productivity, supported by a modest rise of home demand partly stimulated by the ECB. The peak was reached in the end of 2007, when productivity ceased to rise, and then became negative in 2009 leading to the North recession (See also Figure 5 for the evolution of the shocks). The output then recovered with productivity, aided again by easier monetary environment, from 2010. It then fluctuated within a modest range around the steady-state level from 2014 onwards. There was little cross-border spillover, either from the South or from the World. South output was driven by the same set of 'south' factors and evolved in a similar manner. However with a prolonged episode of productivity wane (2009-16), the South recession (which was almost as deep as the North's) was much more persistent. The output only started to show a sign of recovery when productivity revived from 2017. EU aggregate output was about equally impacted by the two regions before 2009; but since then it had been mainly governed by the South, while the North had been much more stable.

Figure 6: Historical decomposition of output



Movements in inflation, Figure 7, mainly reflect the role of the mark-up shock and ECB policy. Thus, North inflation -- which was clearly more volatile between 2006 and 2013 -- was fundamentally driven by the domestic mark-up shock, with the ECB disturbances being an important destabiliser (especially during the crisis and post-crisis episodes). North inflation had been below the steady-state level since 2014, as negative mark-up shocks hit, but the ECB did not respond to these shocks actively (See also Figure 5). The South inflation evolved in a similar pattern, but was slightly less volatile and persistent. Like the North, it was dominated by the mark-up shock and the ECB error; but the ECB played a clearly smaller role. The EU inflation -- being a weighted average of the two regions' -- broadly shared the above features. Nevertheless, since the ECB affected both the regions in the same way, its policy error became the most impactful single factor in the EU perspective.

Figure 7: Historical decomposition of inflation



## Can new policy regimes improve eurozone stability?

From the previous results it emerges clearly that there is a difficult stabilisation problem. This was originally highlighted in discussions of whether the eurozone was an optimal currency area. The regional demand (IS) shocks create virtually no output spillovers onto the other region; nor do the shocks to the potential output or other supply shocks (to the Phillips curve). The inflation spillovers are bigger but still modest. Hence these shocks have asymmetrical impacts regionally. On the other hand, monetary policy shocks have fairly symmetric effects on both regions. Also the main eurozone policy instrument, the ECB interest rate, responds to asymmetric shocks symmetrically, partly accounting for the asymmetric effects of shocks. For example, a demand expansion in the North will trigger higher EU interest rates, creating recession in the South and offsetting any positive spillover, while a demand contraction in the South will trigger only somewhat lower EU rates, barely counteracting the shock to South output, and setting off a small expansion in the North -- again reducing the spillover. As we show in Table 3, some of these shocks are positively correlated, others negatively correlated or not correlated at all, across the regions of the eurozone. From a cross-regional stability viewpoint, these shocks in total create a 'cocktail' whose effects are generally destabilising to the North, the South and the EU generally.

Table 3: Correlation matrix of the North/South shocks

	$\epsilon_{IS}^N$	$\epsilon_{PP}^N$	$\epsilon_{yf}^N$	$\epsilon_g^N$	$\epsilon_{RP}^N$	$\epsilon_{IS}^S$	$\epsilon_{PP}^S$	$\epsilon_{yf}^S$	$\epsilon_g^S$	$\epsilon_{RP}^S$
N demand	1									
N mark-up	0.27	1								
N product	0.06	-0.07	1							
N gov spend	0.29	-0.05	-0.03	1						
N risk prem	0.09	-0.18	-0.43	-0.03	1					
S demand	0.61	0.19	-0.22	0.18	0.11	1				
S mark-up	0.08	0.25	-0.28	0.04	-0.03	0.44	1			
S product	0.12	-0.12	0.88	0.07	-0.44	-0.14	-0.31	1		
S gov spend	0.21	0.04	0.19	0.16	-0.18	0.02	0.02	0.33	1	
S risk prem	0.02	-0.01	-0.67	-0.02	0.62	0.44	0.30	-0.75	-0.36	1

Given these findings of policy destabilisation, we examine the implications of the model for policy regimes that might stabilise the eurozone and its regions. We consider seven hypothetical regimes, each of which embodies a potential reform of either fiscal or monetary policy, or both, of the sort widely discussed in policy issues. These are:

*Regime 1) North government spending actively stabilises the EU output -- Federal Union.*

*Regime 2) North government spending actively stabilises the South output -- Transfer Union.*

*Regime 3) North government spending actively stabilises its own output -- Stability and Growth Pact (SGP) abolished, Fiscally Active North.*

*Regime 4) South government spending actively stabilises its own output -- SGP abolished, Fiscally Active South.*

*Regime 5) North/South government spending actively stabilises the North/South output respectively -- SGP abolished, both regions fiscally active (Regimes 3 & 4 combined).*

*Regime 6) North/South operates independent monetary policy stabilising own output and inflation -- Two-euro-zone with active independent ECBs.*

*Regime 7) North/South government spending actively stabilises own output, and North/South operates independent monetary policy stabilising own output and inflation (Regimes 5 & 6 combined) -- Two-euro-zone, with both regions fiscally active.*

These regimes involve a degree of federalism, to be compared with the benchmark 'Base case' in which we assume fiscal policy is made inactive by the Stability and Growth Pact, with monetary policy conducted by the ECB as estimated in the model we recall that this Base Case resulted in destabilising policy. Thus Regime 1, 'Federal Union', assumes the North is dominant in an EU union, and uses its own budget actively to stabilise the union economy. Regime 2, 'Transfer Union', goes further and assumes the North engages in transfers to the South. In Regimes 3-5, there is no federalism, but the Pact is abolished and each region is left free to be fiscally active, which it pursues to stabilise its own regional economy; in regime 3 only North does so, in Regime 4 only South, and in Regime 5 both do so. In Regime 6, we allow the North and South each to have its own monetary policy, which in effect splits the ECB into two, and resurrects the idea of a 'Southern euro' (Argyrou

and Tsoukalas, 2010). Regime 7 combines this monetary independence with the general fiscal activism of regime 5.

We simulate the model by bootstrapping the complete set of historical shocks identified earlier in Figure 5. For each regime we generate 1000 samples from which we calculate the average variance of the output gap and inflation, and average social welfare loss and household utility.

Table 4: Average variance of the output gap and inflation

	$Var(y - y^p)$			$Var(\pi)$		
	North	South	EU	North	South	EU
Base case	2.21	2.67	1.94	0.26	0.29	0.11
Regime 1	1.19	2.34	1.08	0.28	0.30	0.12
Regime 2	4.65	2.46	2.05	0.32	0.29	0.12
Regime 3	0.95	2.54	0.98	0.29	0.30	0.11
Regime 4	2.17	0.99	1.06	0.28	0.30	0.11
Regime 5	0.92	0.95	0.75	0.28	0.29	0.11
Regime 6	1.35	1.73	1.23	0.11	0.09	0.09
Regime 7	0.78	0.86	0.54	0.11	0.08	0.08

Table 4 shows that, among all the currently available -- i.e., fiscal -- regimes, letting both North and South target their own output with a strong response (Regime 5) would provide the maximum output stability both at the regional level and at the EU level. The variance of the EU output gap compared to that of the Base case would be cut by nearly two thirds, from 1.94% to 0.75%. Since the government budget constraint is imposed throughout, this would not be at the expense of solvency but it would clearly override the SGP, which is supposed to ensure solvency and zero transfers between regions. According to the model, such an agreement is both unnecessary and damaging because it undermines the fiscal authority's capacity. Letting North stabilise South output -- a 'Transfer Union' (Regime 2) -- turns out to be the worst choice for both the North and the whole eurozone, while it fails to provide much benefit to South. This is reassuring, as any transfer regime is unlikely to be politically feasible. The other choices (Regimes 1, 3, 4), which all represent active stabilisation by only one region, are less helpful for the whole eurozone and would just marginally benefit the other region.

Turning to monetary reform, the unbundling of policy into a two-euro zone with independent policies -- hence, a floating regime (Regime 6) -- brings some gains, especially to regional inflation; but it contributes less extra stability to output than most fiscal regimes. Not surprisingly, if we allow for full independence of both fiscal and monetary policies under regional floating (Regime 7), it promotes the greatest stability of both output and inflation across the continent.

Table 5: Average social welfare loss

$SWL = \frac{1}{2}[\pi^2 + \varpi(y - y^p)^2]$							
$\varpi = 0$	North	South	EU	$\varpi = 0.1$	North	South	EU
Base case	0.13	0.15	0.05	Base case	0.24	0.28	0.15
Regime 1	0.14	0.15	0.06	Regime 1	0.20	0.27	0.11
Regime 2	0.17	0.15	0.06	Regime 2	0.40	0.27	0.16
Regime 3	0.14	0.15	0.06	Regime 3	0.19	0.27	0.11
Regime 4	0.14	0.15	0.05	Regime 4	0.25	0.20	0.11
Regime 5	0.14	0.15	0.05	Regime 5	0.19	0.19	0.09
Regime 6	0.06	0.04	0.04	Regime 6	0.12	0.13	0.10
Regime 7	0.06	0.04	0.04	Regime 7	0.10	0.09	0.07
$\varpi = 0.3$	North	South	EU	$\varpi = 0.5$	North	South	EU
Base case	0.46	0.55	0.34	Base case	0.69	0.81	0.54
Regime 1	0.32	0.50	0.22	Regime 1	0.44	0.74	0.33
Regime 2	0.86	0.51	0.37	Regime 2	1.33	0.76	0.57
Regime 3	0.29	0.53	0.22	Regime 3	0.38	0.78	0.33
Regime 4	0.46	0.30	0.22	Regime 4	0.68	0.40	0.32
Regime 5	0.28	0.29	0.16	Regime 5	0.37	0.39	0.24
Regime 6	0.26	0.30	0.23	Regime 6	0.40	0.48	0.35
Regime 7	0.17	0.17	0.12	Regime 7	0.25	0.26	0.17

Table 6: Average change in equivalent consumption

	North	South	EU
Base case	–	–	–
Regime 1	25.5%	13.2%	15.6%
Regime 2	-1758%	5.61%	-331%
Regime 3	33.3%	-2.17%	4.61%
Regime 4	-5.28%	37.7%	29.5%
Regime 5	35.1%	34.9%	34.9%
Regime 6	21.9%	23.4%	23.1%
Regime 7	49.9%	44.6%	45.6%

The social welfare losses we calculate with various output-inflation weightings (Table 5) confirm that Regime 7 is optimal, but letting each region react flexibly to its own situation with active fiscal responses remains the best choice within the constraint of the existing euro. This ranking is robust if we consider the impact on equivalent household consumption (calculated as household utility change over the effect of a 1% change in permanent consumption): according Table 6, Regime 7 would increase welfare by an equivalent consumption gain in each region of 45-50%, while Regime 5 would give a gain of some 35% -- both of which are clearly welfare-superior to the current regime, as well as the other choices.

## Conclusion

In this paper we have constructed a macro DSGE model of the eurozone and its two main regions, the North and the South, with the aim of fitting the macro facts of these economies and using the resulting empirically-based model to assess possible new policy regimes. The model that we have found to fit the facts finds that there are few spillovers between North and South other than those created by ECB policy. We also found that South demand shocks have double the effect on EU output than North demand shocks. This suggests that Monetary Union provides little or no benefit; in fact, we find it is in the main a source of destabilisation. In contrast, we found that with the

restoration of both fiscal and monetary independence to the two regions, in effect creating a second 'southern euro' bloc, there would be substantial gains in macro stability, of both output and inflation, and consequently in consumer welfare. If this is ruled out on political grounds, substantial gains in output stability both at the regional and at the EU levels, with no loss of inflation stability, are still possible if the fiscal authority in each region is given the freedom to respond to its own economic situation.

In the context of the current European policy debate, our work suggests that merely freeing regional economies to pursue fiscal activism subject to their own budget constraints would greatly improve stability and welfare in the eurozone. This merely involves abolishing the Stability and Growth Pact, while avoiding cross-region transfers, so retaining hard public budget constraints at the country level. There is no requirement for federalism in this agenda, contrary to some suggestions that 'more Europe' is needed to create stability in the eurozone. Nor is there any need for the Pact to avoid transfers, as such transfers will not willingly be made even without the Pact. These findings seem highly relevant therefore to EU policy-makers, who, like those in other developed economies, have plainly warmed to fiscal activism during the Covid pandemic.

Not surprisingly we also find that splitting the euro in two and allowing more regional monetary autonomy can add to stability and welfare. This conclusion is not relevant under the current constraints of the eurozone. But in conditions of another major euro-crisis interest in it could resurface.

Overall, the empirical work in this paper suggests that the eurozone can find practical ways to control future macroeconomic shocks and crises.

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