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Julian Hodge Institute of
Applied Macroeconomics

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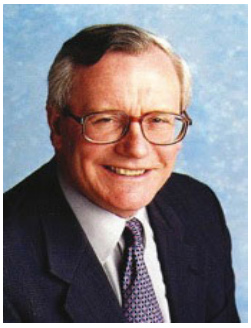
Contents

“there is a strong need for fiscal policy to support the economy as it recovers from Covid and also finds its new policy directions in the post-Brexit era. This support is both to demand which needs to be strong to help open up new sectors; and to supply which needs to be boosted by incentives for entrepreneurial revival, especially in the North needing ‘levelling up’. There is a parallel here with the 1980s when bold supply-side reforms were accompanied by expansionary demand policies.”



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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, Esmee Fairbairn Charitable Trust, the Wincott Foundation and Cardiff Business School.

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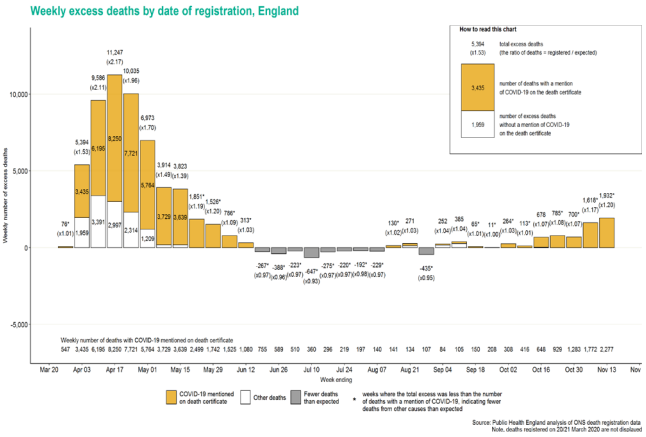
POLICYMAKING IS IN A COVID FUNK; BUT IT NEEDS TO GET MORE ROBUST

For all the official panic over the latest rise in Covid infections across the country, deaths from Covid have remained low to moderate. Also overall deaths from all causes have not risen much above their expected rate to date[1]. This is in line with the very low death rate from second waves around the world. Here by mid- November deaths were about 20% higher than usual at this time of year; not good but not noticeably worse than in a bad year for flu and other respiratory diseases. As on previous occasions the government might well have carried on with life as normal. For example, in March-April this very year deaths from non-Covid causes were running at 50% above the 5-year average and there was no reaction.

Figure 1: Weekly excess deaths date of registration, England



The following chart shows that while UK cases have certainly shot up in this second wave, deaths have responded weakly. One reason seems to be that the PCR tests may be over-recording cases, being triggered as false positives by 'dead viral load', according to the Oxford CEBM centre's Carl Heneghan[2]. In addition, those actually infected will now not include the many vulnerable people who sadly died in the original wave; mainly they will be young people reviving the economy, who are relatively robust to the virus. It is also possible that the viral loads being transmitted are smaller due to social distancing; also that the surviving viral mutations now infecting people are less virulent, due to evolutionary weeding out of those that died with their hosts or were killed by their surviving hosts' immune systems. On top of all this, treatments have improved.

Table 1: Summary of Forecast

	2017	2018	2019	2020	2021	2022	2023
GDP Growth[1]	1.8	1.3	1.4	-10.6	6.1	4.2	3.2
Inflation CPI	2.6	2.4	1.8	0.9	1.6	2.1	2.0
Wage Growth	2.8	3.0	3.5	0.3	2.3	3.2	3.3
Survey Unemployment	4.4	4.2	4.1	5.0	5.6	3.5	2.9
Exchange Rate[2]	77.4	78.6	78.1	78.6	80.1	80.0	79.9
3 Month Interest Rate	0.4	0.7	0.8	0.2	0.2	1.5	4.5
5 Year Interest Rate	0.6	1.0	0.6	0.2	0.4	1.8	4.7
Current Balance (£bn)	-68.3	-82.9	-83.8	-42.7	-47.1	-41.1	-46.8
PSBR (£bn)	53.7	39.3	43.2	332.5	155.3	86.4	40.4

[1]Expenditure estimate at factor cost
[2]Sterling effective exchange rate, Bank of England Index (2005 = 100)

Figure 2: People tested positive

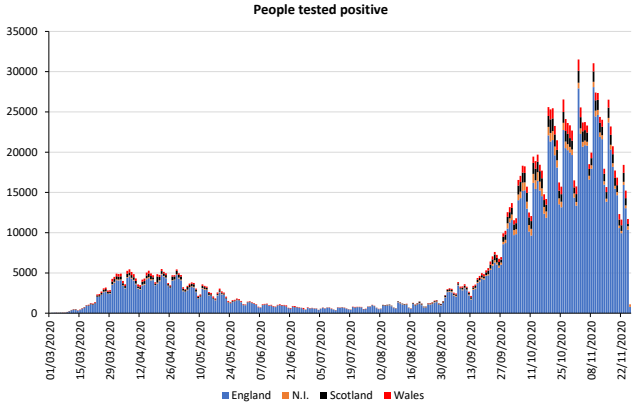
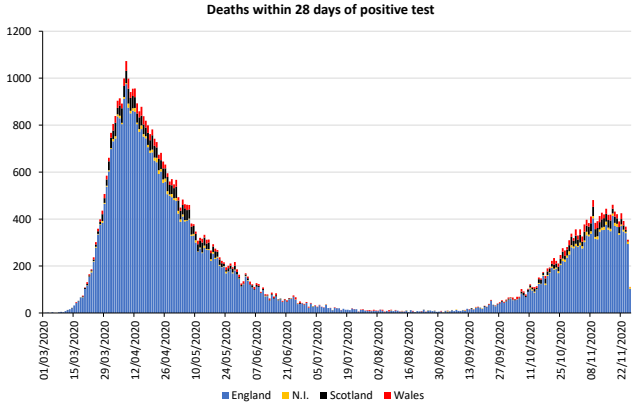


Figure 3: Deaths within 28 days of positive test



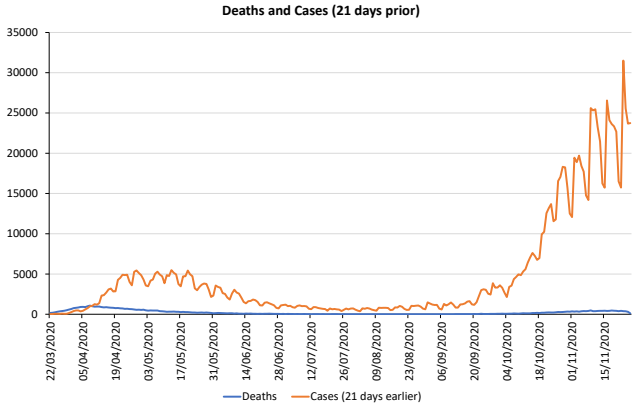
However one accounts for it, it is much less damaging than the original wave. But the government's science advisers

[1]https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-latest.html

[2] https://www.bbc.co.uk/news/health-54000629

have pushed for the same lockdown responses that were found to be both economically disastrous last time and not to give any gain over social guidance as pursued in Sweden. That lesson needs to be absorbed; but it has in fact made no impression, any more here than elsewhere in Europe, where panic also reigns.

Figure 4: UK Deaths and Cases



The death and hospitalisation rate here has plummeted.

Figure 5: UK Deaths as a Percent of Cases 21 Day Prior

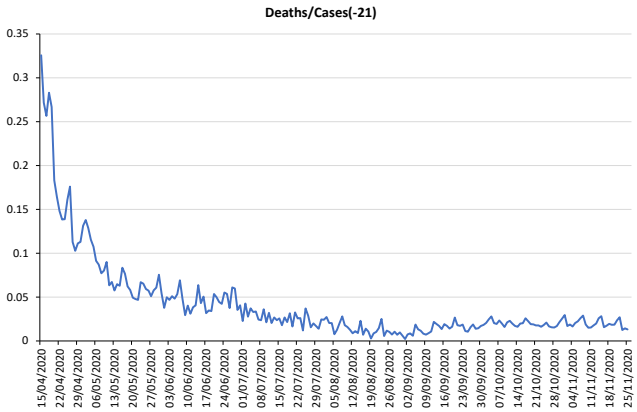
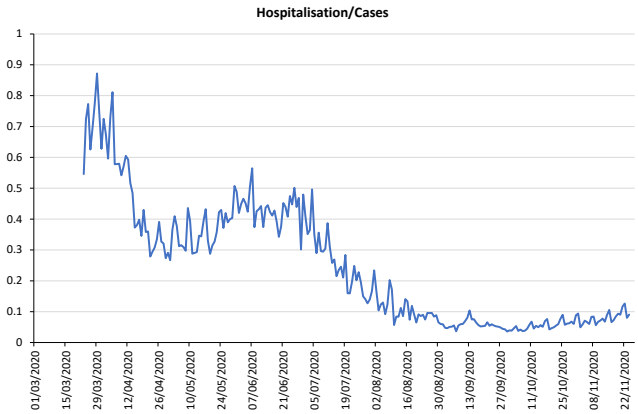
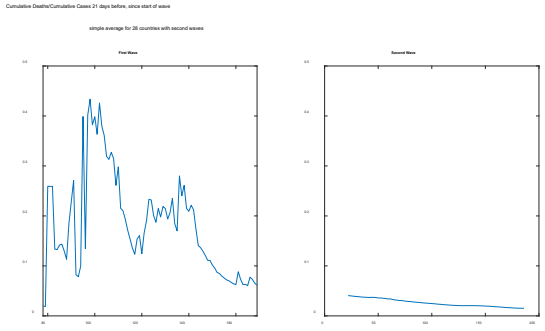


Figure 6: UK Hospitalisations as a Percent of Cases



The death rate in 28 countries with second waves has also fallen sharply.

Figure 7: 28 Countries Deaths as a Percent of Cases 21 Day Prior (First and Second Wave Comparison)



With such low death rates here and elsewhere, you might have expected policy around the world to be more robust in leaving the economy open. But you would be wrong. Governments across the developed world generally, with the possible exception of the US where policy has been riven with controversy in this election period, have tightened restrictions.

True, there is backing from public opinion, frightened by Covid as a nasty disease, threatening death to the old and infirm and possible longterm complications even to the young. So restrictions have been accepted, encouraged even, by the public. Yet policies to fast-spreading infectious diseases like flu have never closed society and the economy down in the recent past. The Sage advisory committee is constantly producing gloomy projections of deaths in spite of the evidence above. These are called ‘reasonable worst case scenarios’; yet why these rather than ‘central projections’ should be used is never explained.

It is true that cases of infection are rising sharply; but as the facts above show, this second wave is far less deadly than the first, for the reasons discussed above. Currently the government is again in a panic, locking down again. We must hope that as the evidence accumulates that Covid is not causing a lot of extra deaths, policies will normalise towards our usual past robustness. More likely however, the government will claim that falling cases proves lockdowns work, until vaccination releases us, we can now hope and expect, from the whole episode around Easter.

These restrictions are again slowing the economy down. However, the evidence suggests growth is still continuing. Global purchasing indicators suggest world GDP is slightly up on a year ago. Here in the UK they and the ONS’ monthly GDP estimates suggest GDP is headed for year ago levels by the beginning of next year; it was 9% below in September and growing by 1% a month, with purchasing indices still running above the 50 mark in October. Retail sales are already 5.5% above the February pre-Covid levels. What

with online and local deliveries business is side-stepping the restrictions- much as many a country under sanctions has regularly done. The hospitality and arts sectors are the big exceptions that are caught most tightly by the clampdowns; even there stirrings are being seen, with shows going online, and some quarantine 'corridors' opening up to restore travel. The emerging good news on vaccines will strengthen confidence as the year end approaches. Spending on investment and consumption will rise in anticipation of a return to normal by Easter.

Monetary Policy — We Must be Ready to Reverse the QE and Not Move to Negative Rates

If we raise our eyes to policy for 2021 when we can perhaps assume that the economy has returned to normal, with the vaccines in the offing, we see some worrying policy developments.

We have seen extreme monetary ease in 2020. This needs to be rolled back once the economy recovers. Yet the sounds from the Bank of England's Monetary Policy Committee suggest that yet more loosening is more likely. There is even some support for negative interest rates- for example in a speech recently by Gertjan Vlieghe, an MPC member[3]. He argues that the economy requires yet more easing.

This is worrying in the extreme. We have seen damaging effects on the economy's health from zero interest rates, brought about by aggressive buying of gilts by the Bank. Returns on savings have evaporated, pushing pension funds into trouble. Large firms have been able to borrow or issue equity for next to no cost and create impregnable market positions, greatly reducing competition.

Furthermore the growth rate of money (M4) has risen sharply, and is now over 10% on a year ago[4]. This reflects both the QE programme and the relaxation of bank regulation under the Covid response programme; credit is now growing sharply, and deposits rising with it as people and firms shift out of bonds into money. Why hold bonds at no yield when you can hold money which is safer as it has no capital risk? The Bank's policies have recreated the 'liquidity trap' that Keynes identified in the 1930s, where the willingness to switch into money out of bonds would be limitless.

This situation is a threat to monetary policy, as well as causing that structural damage to the economy by undermining savings and competition. Confidence in monetary assets in general is being undermined by the threat of inflation from this massive money creation. The Bank should be thinking now of how best it can retreat from this dangerous predicament, not planning to deepen it by going to negative rates.

Currently it has the excuse of the virus crisis, helping the Treasury to fund its Covid emergency package by keeping borrowing costs down. But we need to look forward to 2021 when the crisis will at some point be over. We really do not want to see endless money printing in the post-Covid recovery period. Indeed money will need to be tightened then to head off inflation.

The Bank would be wise to prepare for that episode now, by pulling back some of the overhang of money it has already printed and forcing the Treasury to borrow genuinely in the markets, while rates are still low across the world. The Treasury should then move to lock in these low rates, for the taxpayer's sake, by borrowing at the longest possible maturities- perpetuities as far as possible.

Better all round that the Bank starts that pullback now rather than be forced into suddenly raising interest rates sharply, destabilising the economy and Treasury finances, in a recovery period where inflation is getting out of control. That would both wreck the recovery and endanger the Bank's independence.

Will the job market derail the ongoing recovery?

Plainly the latest restrictions against the Covid virus, the new national lockdown, are a blow to the recovery which has been essentially V-shaped. In themselves however the latest localised lockdowns and the reversal of the 'return to work' are not big dampeners. Also the Chancellor has now extended the furlough scheme that was to finish at end October. This needs to be factored in alongside the existing universal benefit/tax credit scheme that boosts full-time employment. This already puts the taxpayer behind new jobs.

Is the recovery holding up in spite of the policy?

Up until August the recovery has been strong. The IHS Markit composite PMI hit 59.1 in August. Between April and July the economy grew 19%, recovering virtually all the 20% fall in April. With slower 2.2% growth rate in August and 1.1% in September, by September GDP had recovered to about 8% below its pre-Covid level last February. The chart below shows the picture. Taken with the near-certainty now of a vaccine widely rolled out by early in the new year, the recovery should be complete by April of 2021.

[3] https://www.bankofengland.co.uk/-/media/boe/files/speech/2020/assessing-the-health-of-the-economy-speech-by-gertjan-vlieghe.pdf?la=en&hash=6F764B4A74358C059E7BCE6C322C3DDE7746AC77

[4] https://mcusercontent.com/78302034f23041fbbcab0ac6d/files/8dea4789-d85c-4ce8-a3ac-d993ed94f279/Monthly_e_mail_2009_Global_money_round_up_v2.pdf

Figure 8: GDP grew by 1.1% in September 2020, the fifth consecutive monthly increase; however, it remains 8.2% below the February 2020 level
UK, monthly index, January 2007 to September 2020

The main concerns from forecasters are for the job market. We are forecasting that unemployment will hit 7% before year end. However, the UK labour market is highly flexible and wages will respond, encouraging job creation. In addition the Chancellor has now extended the furlough until next year, because of the lockdown. So we expect unemployment to fall quite quickly from this peak, assisted by the continued recovery in output. It is often forgotten that employment is a lagging variable, driven by output. As output recovers naturally in the post-Covid world, employment will follow it up.

Fiscal Policy in the post-Covid post-Brexit economy

We discussed above the need for monetary policy to get back on track to avoid an inflation resurgence. Now eyes are also turning to fiscal policy, with the usual official noises in favour of raising taxes and 'restoring' fiscal balance', as well as 'paying down the Covid debt'.

It seems pretty obvious to Tory politicians that such talk makes no sense, certainly politically. It makes no sense economically either. Unfortunately this sort of cheeseparing short term calculus was put in place by the Cameron government after the financial crisis to justify 'austerity'- with the new OBR set up to be its cheerleader. Of course this thinking was blown away by the Covid crisis. But like a bad habit, it is creeping back in as the crisis unwinds.

It is well past time to return to first principles over budget thinking and appropriate rules. These concern the 'solvency' of the public sector, which is a matter of the longterm capacity to pay off debts and so concerns the state of projected long term balance sheets for the public sector. Solvency exists if the government's future taxes will be sufficient to pay off the debt. Public debt, as we have seen vividly in the Covid crisis, has a function which is to pay for unusually large expenditures and revenue shortfalls until the time is convenient to pay off the resulting debts with a higher tax flow. Longterm in the normal situation where the real interest rate is higher than the growth rate, the amount that needs to be raised in the tax rate is the spending rate plus (r-g) times debt/GDP (namely the real interest rate minus the growth rate times the debt/GDP ratio). This is because the cost of the debt is the interest rate, while real GDP growth and inflation will reduce the debt automatically by raising revenues by more than the interest cost. To spell out the logic of this situation, the extra tax rate required to pay the debt interest from existing debt is held down by inflation because this devalues the debt year over year and by growth because this raises the yield of the tax rate in extra revenues year over year.

Currently however both the growth and the inflation are more than paying off the nominal interest burden each year because the interest rate is less than inflation plus growth, hence the real interest rate is less than the growth rate. This means that interest will be so much paid off by inflation and growth that the tax rate can be cut and the debt burden still paid in perpetuity.

The real interest rate the government paying on its mostly longterm debt is actually negative, probably around minus 1%. By issuing longterm debt the government has been 'locking in' this real interest rate. This means that although we must aim for interest rates to rise back to normal, as we argued earlier is the job of monetary tightening, this will not affect the government's interest rate bill until new debt has to be issued as old debt matures; this is a long way off. The more the government can reissue its debt in a longdated form today- preferably in perpetuities- while interest rates are exceedingly low, the more protected it will be against this likely interest rate resurgence.

With its post-Covid debt now around 100% of GDP, this logic implies that the government still faces highly favourable fiscal arithmetic in paying for it. Strictly speaking, assuming future growth of 2-3% pa, the 100% debt ratio times (minus 3-4%) gives the government scope to lower taxes steadily as well as financing temporary tax cuts and spending rises by raising debt. Effectively markets are paying the government to borrow from them.

This is just as well because there is a strong need for fiscal policy to support the economy as it recovers from Covid and also finds its new policy directions in the post-Brexit era. This support is both to demand which needs to be strong to help open up new sectors; and to supply which needs to be boosted by incentives for entrepreneurial revival, especially in the North needing 'levelling up'. There is a parallel here with the 1980s when bold supply-side reforms were accompanied by expansionary demand policies.

THE OBR's latest report

In its latest Review the OBR has avoided this conclusion by making unduly pessimistic projections of growth, spending and tax yields. We show next its GDP scenarios. It can be seen that even its 'upside' projection is pessimistic with the

economy not getting back to normal until the beginning of 2022- a year later than we think probable, as set out above.

Figure 9: Real GDP: central forecast and alternative scenarios in November OBR Report

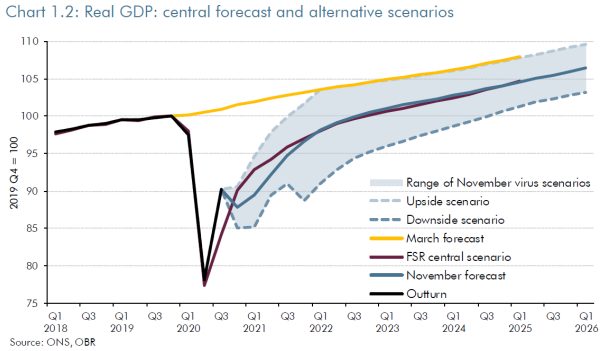
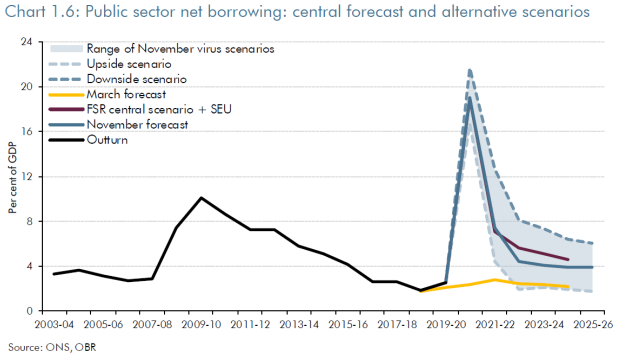


Figure 10: Public sector net borrowing: central forecast and alternative scenarios in November OBR Report



As our own forecasts show, we do not agree with the OBR's projections; we consider them far too gloomy. However, the OBR was set up by the Cameron government of 2010 to buttress the case for austerity, which that government regarded as a key priority. Hence naturally the OBR sees itself as the keeper of the flame of 'responsibility' that justified the austerity programme. It hints darkly in its Report that the government could risk the reputation of gilts as a safe asset internationally if it does not cut borrowing back sharply to previous target rates. Yet the market has been driving interest rates on longterm UK debt lower and lower which runs counter to this pessimistic view. The most pressing policy needs going into 2021 are to support recovery and promote long term growth, with fiscal policy safeguarding strong demand and also creating strong supply-side reforms of taxes and regulations. Monetary policy, as argued above, can then tighten, keeping inflation under control and normalising interest rates.

THE UK ECONOMY

Vo Phuong Mai Le

As the first national lockdown measures ended, UK economic activity recovered substantially but remained below the output level prior to corona virus. According to the National Office of Statistics, real GDP grew by 15.5% in Q3 compared to a fall of 22% in Q2. However, annually real GDP is down by 9.6% compared to the same quarter 2019. Despite a strong recovery in Q3 across all sectors, with continuous local lockdown, the recent surveys indicate a slower pace of recovery. The Markit/CIPS UK Purchasing Managers' Index (PMI) Composite Output was at 47.6 in November, down from 52.1 in October. This shows that private sector output shrank the first time after expansion in the previous 4 months. This decrease was driven by a big deterioration in services sector output with the Markit/CIPS Services PMI Business activity index at 45.8 in November (compared to 51.4 in October). In contrast, manufacturing sector output continued to strengthen. Its November Markit/CIPS manufacturing PMI was 55.2 up from 53.7 in October, and the highest since August. The construction sector also has recovered since June, but the pace is slowing down. Its October Markit/CIPS total activity index was 53.1, down from 56.8 in September.

On the expenditure side, the recovery was driven by a strong rise in domestic demand. Private consumption increased by 18.3% in Q3 (compared to -23.6% in Q2) driven mainly by a recovery in hospitality, transport and a higher spending on cars and fuel and clothes. Investment also recovered strongly, with a 15.1% rise following a fall of 21.6% in Q2. The negative contribution came from net trade. It subtracted 2.12% from the quarterly growth (compared to +3.54% in Q2), as imports growth accelerated significantly more than exports growth, 13.2% (compared to -22.7% in Q2) and 5.1% (compared to a fall of 11.0% in Q2) respectively.

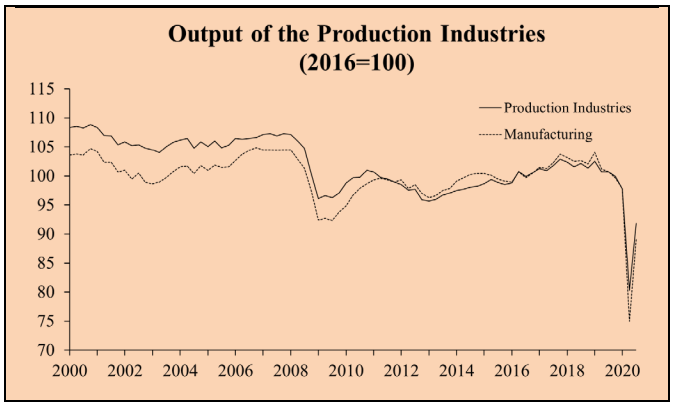
Labour market, costs and prices

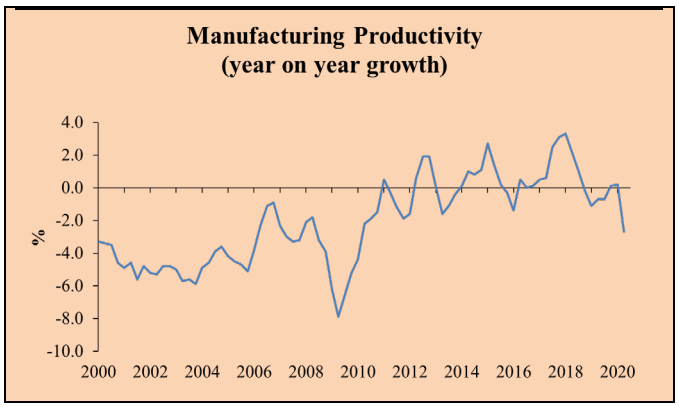
Given relatively weak economic conditions, weak inflation and uncertainty associated with the Brexit date approaching, at its November meeting the Bank of England, beside maintaining its existing programme of £100 billion of government bond purchases, decided to extend its purchase programme further by £150 billion to take the stock of government bond purchases to £875 billion.

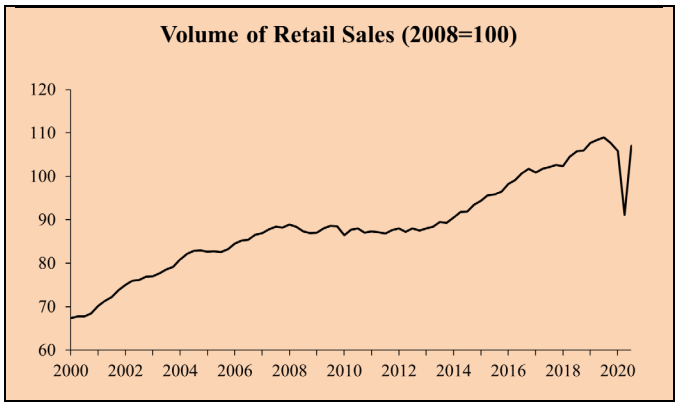
The annual CPI inflation rate was 0.7% in October, up from 0.5% in September. Given the negative impact of the crisis on demand, the Bank of England forecasts that inflation will remain under 1% at least until the beginning of 2021.

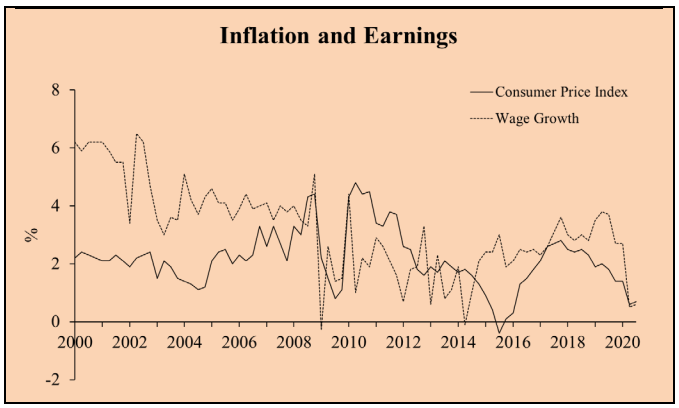
Fiscal and Monetary Developments

To support the economy through the Covid crisis, the government net borrowing in fiscal year 2021 has reached 9.9% of GDP. It pushed up the public debt (excluding Bank



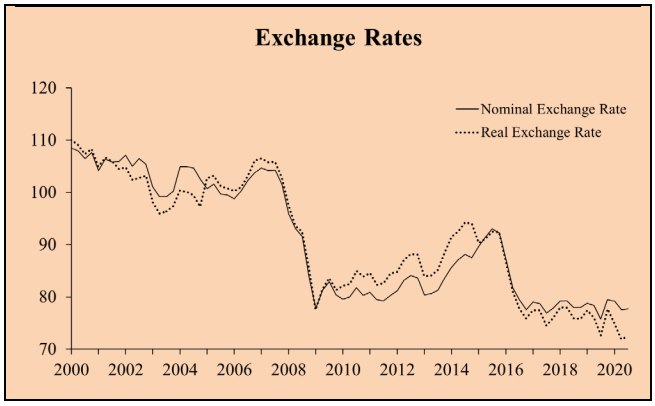


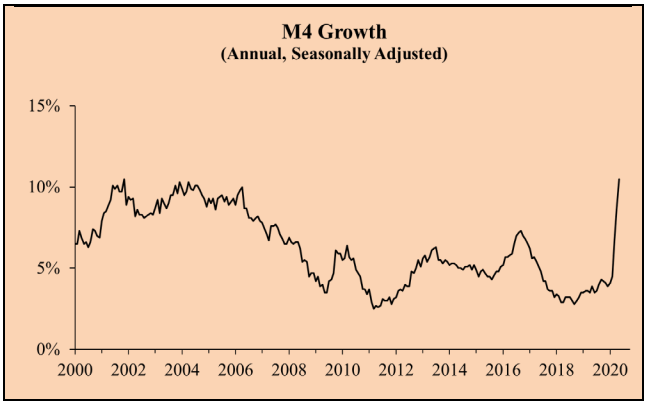


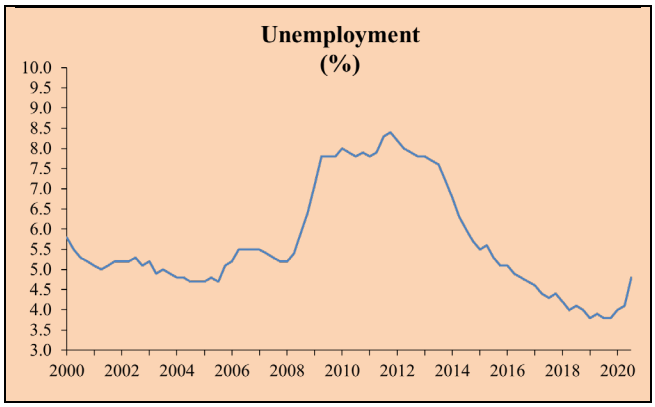


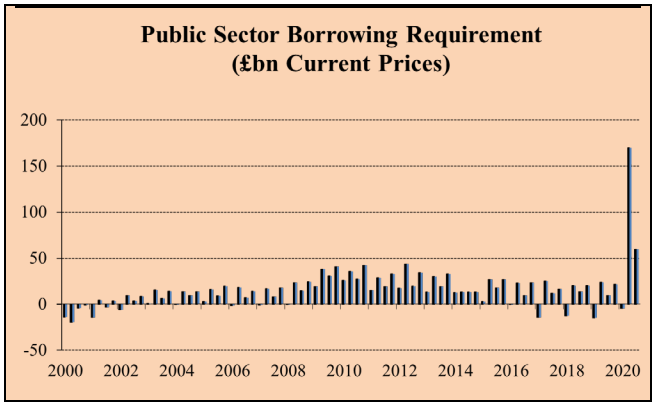
operations) to 100.8% of GDP at the end of October, significantly up from 86% in October 2019. The government is also committed to provide £55billion for the public services and raise capital spending to £100 billion for the rest of the current fiscal year.

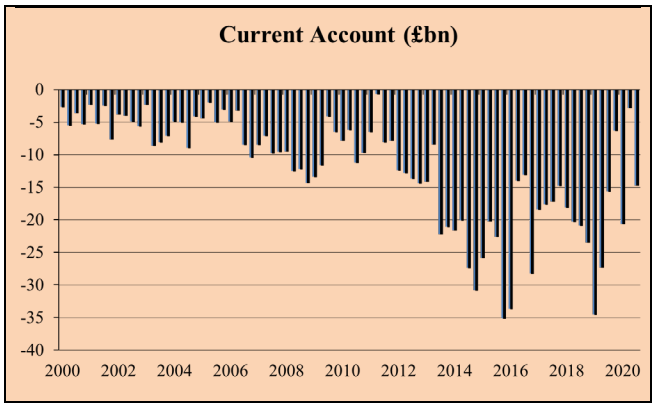
Given relatively weak economic conditions, weak inflation and uncertainty associated with the Brexit date approaching, at its November meeting the Bank of England, beside maintaining its existing programme of £100 billion of government bond purchases, decided to extend its purchase programme further by £150 billion to take the stock of government bond purchases to £875 billion.











UK FORECAST DETAIL

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

	Inflation %[1] (CPI)	Short Dated (5 Year) Interest Rates	3 Month Int. Rates	Nominal Exchange Rate (2005=100) [2]	Real Exchange Rate[3]	Real 3 Month Int. Rates %[4]	Inflation (RPIX)	Real Short Dated Rate of Interest[5]
2018	2.4	1.0	0.7	78.6	76.9	-1.4	3.3	-1.0
2019	1.8	0.6	0.8	78.1	75.9	-0.9	2.5	-1.1
2020	0.9	0.2	0.2	78.6	73.5	-1.4	1.2	-0.8
2021	1.6	0.4	0.2	80.1	75.5	-1.0	2.2	-2.7
2022	2.1	1.8	1.5	80.0	75.8	2.2	3.0	-1.5
2023	2.0	4.7	4.5	79.9	76.0	2.9	2.7	1.5
2018:1	2.5	1.0	0.5	79.0	78.1	-1.6	3.7	-1.3
2018:2	2.3	1.0	0.7	79.3	77.9	-1.9	3.4	-1.2
2018:3	2.2	1.0	0.8	78.0	75.9	-1.3	3.2	-1.0
2018:4	2.1	1.0	0.8	78.0	75.8	-0.7	3.0	-0.8
2019:1	1.8	0.9	0.9	78.8	77.4	-0.5	2.4	-0.9
2019:2	2.0	0.7	0.8	78.4	76.0	-0.5	3.0	-1.1
2019:3	1.8	0.4	0.8	75.8	72.7	-1.4	3.0	-1.4
2019:4	1.4	0.5	0.8	79.5	77.7	-1.3	1.7	-1.2
2020:1	1.4	0.4	0.6	79.5	74.9	0.6	2.7	0.8
2020:2	0.6	0.0	0.1	77.6	71.9	-1.8	1.4	-0.6
2020:3	0.7	0.1	0.1	77.7	72.4	-2.0	0.3	-1.6
2020:4	1.0	0.4	0.1	79.6	74.8	-2.6	0.6	-1.9
2021:1	1.2	0.4	0.2	79.6	75.2	-1.1	1.6	-2.7
2021:2	1.5	0.4	0.2	80.7	75.7	-1.1	1.9	-2.7
2021:3	1.7	0.5	0.3	80.2	75.7	-1.2	2.4	-2.7
2021:4	1.9	0.5	0.3	80.0	75.5	-0.5	2.8	-2.7
2022:1	2.1	1.0	1.0	79.5	75.4	1.0	3.3	-2.7
2022:2	2.1	1.8	1.5	80.5	76.0	2.1	3.0	-1.4
2022:3	2.1	2.0	1.6	80.1	75.9	2.5	2.9	-1.3
2022:4	2.0	2.5	2.0	80.0	75.8	3.1	2.7	-0.8
2023:1	1.9	4.0	4.0	79.5	75.7	2.9	2.6	0.6
2023:2	2.0	5.0	4.5	80.4	76.2	2.9	2.8	1.8
2023:3	2.0	5.0	4.5	80.0	76.1	2.9	2.7	1.9
2023:4	2.0	5.0	5.0	79.8	76.0	3.0	2.8	1.8

[1] Consumer's Expenditure Deflator
[2] Sterling Effective Exchange Rate Bank of England
[3] Ratio of UK to other OECD consumer prices adjusted for nominal exchange rate
[4] Treasury Bill Rate less one year forecast of inflation
[5] 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)[1]	Wage Growth[2]	Survey Unemployment Percent	Millions	Real Wage Rate[3] (1990=100)
2018	266.6	3.0	4.1	1.1	142.8
2019	275.7	3.5	3.8	1.0	148.8
2020	275.9	0.3	5.0	1.3	147.9
2021	282.1	2.3	5.6	1.5	148.9
2022	291.0	3.2	3.6	1.0	150.5
2023	300.6	3.3	2.9	0.8	152.4
2018:1	264.6	3.0	4.2	1.1	142.6
2018:2	263.4	2.6	4.0	1.0	141.5
2018:3	268.0	2.7	4.1	1.1	143.2
2018:4	270.2	3.5	4.0	1.0	144.0
2019:1	273.4	3.4	3.8	1.0	144.9
2019:2	273.5	4.0	3.9	1.0	144.4
2019:3	275.5	3.7	3.8	1.0	146.0
2019:4	277.6	2.7	3.8	1.0	145.9
2020:1	279.7	2.7	4.0	1.0	150.0
2020:2	270.1	-0.5	4.1	1.1	145.9
2020:3	276.4	-0.6	4.8	1.3	147.8
2020:4	277.3	-0.2	6.9	1.8	148.0
2021:1	279.4	-0.1	6.4	1.7	147.9
2021:2	278.6	3.2	5.8	1.5	148.3
2021:3	284.4	2.9	5.3	1.4	149.5
2021:4	285.9	3.1	4.7	1.2	149.8
2022:1	288.1	3.1	4.2	1.1	149.4
2022:2	287.8	3.3	3.8	1.1	150.0
2022:3	293.3	3.1	3.3	0.9	151.1
2022:4	294.7	3.1	3.0	0.8	151.4
2023:1	297.0	3.1	3.0	0.8	151.2
2023:2	297.9	3.5	3.0	0.8	152.2
2023:3	303.3	3.4	2.8	0.7	153.2
2023:4	304.0	3.2	2.8	0.7	153.1

[1] Whole Economy
[2] Average Earnings
[3] Wage rate deflated by CPI

Estimates and Projections of the Gross Domestic Product[1] (£ Million 1990 Prices)

	Expenditure Index	£ Million '90 prices	Non-Durable Consumption[2]	Private Sector Gross Investment Expenditure[3]	Public Authority Expenditure[4]	Net Exports[5]	AFC
2018	165.5	792330.9	445721.1	307723.0	201029.6	-41308.9	120833.9
2019	167.8	803514.4	475369.3	308458.5	209136.4	-70959.7	118490.1
2020	150.0	718476.1	420452.9	249418.8	199237.6	-30051.5	120581.7
2021	158.1	756923.9	447041.8	266059.5	206929.7	-33024.7	130082.4
2022	164.7	788777.8	453549.5	290984.1	208197.1	-30743.3	133209.6
2023	170.0	814289.1	460358.3	309186.2	209439.4	-28806.2	135888.6
2018/17	1.3		1.0	2.3	0.2		-4.6
2019/18	1.4		1.1	-4.7	2.2		-12.4
2020/19	-10.6		-11.6	-19	-4.8		6.8
2021/20	6.1		7.3	9.4	4.4		4.9
2022/21	4.2		1.5	9.3	0.6		3.3
2023/22	3.2		1.5	6.3	0.6		3.3
2018:1	164.1	196509.2	110809.6	74693.2	51591.3	-10814.1	29770.8
2018:2	164.9	197427.5	111248.1	77339.0	49253.6	-10094.0	30319.2
2018:3	166.2	198930.2	112094.9	75498.8	49822.6	-10001.3	28484.8
2018:4	166.6	199464.1	111568.4	80192.1	50362.1	-10399.5	32259.0
2019:1	167.5	200481.1	112289.5	83278.3	52683.0	-18452.8	29316.9
2019:2	167.1	200009.6	112720.4	81082.1	50775.9	-13738.5	30830.3
2019:3	168.3	201443.7	113162.0	72473.6	51076.1	-12057.3	23210.7
2019:4	168.4	201579.9	112601.6	55237.5	50863.3	3726.5	20849.0
2020:1	164.2	196593.0	118032.8	72147.1	51656.8	-11632.2	33611.5
2020:2	131.7	157646.1	91565.8	47009.3	43743.5	429.6	25102.1
2020:3	151.1	180847.7	99893.7	71247.0	50846.1	-10259.5	30879.6
2020:4	153.2	183389.3	110960.6	59015.4	52991.2	-8589.3	30988.6
2021:1	156.8	187734.8	112264.9	71379.2	51092.1	-14304.1	32697.3
2021:2	158.7	189958.1	111099.5	63816.2	51382.0	-4227.8	32111.8
2021:3	157.4	188426.7	111232.3	65413.0	51174.4	-6797.8	32595.2
2021:4	159.4	190804.2	112445.1	65451.1	53281.3	-7695.0	32678.3
2022:1	165.5	198169.7	113844.0	80174.4	51388.5	-13800.2	33437.0
2022:2	164.7	197178.3	112654.9	69212.6	51690.2	-3387.5	32991.9
2022:3	162.6	194610.3	112897.7	70334.8	51481.4	-6585.6	33518.0
2022:4	166.1	198819.5	114152.9	71262.3	53637.0	-6970.1	33262.6
2023:1	171.0	204706.6	115552.8	84742.9	51695.4	-13005.0	34279.5
2023:2	169.1	202488.6	114342.2	72774.8	52001.0	-3029.3	33600.1
2023:3	169.6	203051.9	114598.1	76610.7	51784.3	-6098.9	33842.3
2023:4	170.4	204042.1	115865.1	75057.9	53958.8	-6673.0	34166.7

[1] GDP at factor cost. Expenditure measure; seasonally adjusted
[2] Consumers expenditure less expenditure on durables and housing
[3] Private gross domestic capital formation plus household expenditure on durables and clothing plus private sector stock building
[4] General government current and capital expenditure including stock building
[5] Exports of goods and services less imports of goods and services

Financial Forecast

	PSBR/GDP %[1]	GDP[1] (£bn)	PSBR (£bn) Financial Year	Debt Interest (£bn)	Current Account (£ bn)
2018	1.9	2092.5	39.3	22.4	-82.9
2019	2.0	2127.5	43.2	24.0	-83.8
2020	17.9	1955.7	332.5	25.8	-42.1
2021	7.2	2149.6	155.3	26.8	-47.1
2022	3.8	2276.2	86.4	29.2	-41.1
2023	1.7	2397.8	40.4	33.4	-36.8
2018:1	-2.4	520.8	-12.5	4.6	-18.1
2018:2	3.9	521.1	20.1	5.4	-20.3
2018:3	2.6	523.1	13.7	5.5	-20.9
2018:4	3.8	528.3	20.2	5.4	-23.5
2019:1	-2.8	520.1	-14.7	6.1	-34.5
2019:2	4.5	532.3	23.8	6.0	-27.3
2019:3	1.8	531.3	9.4	6.0	-15.6
2019:4	4.0	536.5	21.3	6.0	-6.3
2020:1	-0.9	542.0	-5.0	6.5	-20.6
2020:2	39.4	431.7	170.1	6.4	-2.8
2020:3	12.0	495.3	59.4	6.4	-14.7
2020:4	11.8	508.4	60.0	6.5	-4.0
2021:1	8.3	520.3	43.0	6.6	-26.3
2021:2	7.3	526.6	38.5	6.6	-12.2
2021:3	7.6	526.8	40.2	6.7	-6.8
2021:4	8.1	534.9	43.5	6.7	-1.8
2022:1	5.9	561.4	33.0	6.8	-24.9
2022:2	4.3	557.9	24.2	6.9	-10.3
2022:3	4.9	554.6	27.0	7.0	-5.9
2022:4	4.8	570.7	27.5	7.5	0.0
2023:1	1.3	593.0	7.6	7.7	-23.4
2023:2	1.8	585.4	10.6	7.8	-9.6
2023:3	1.7	592.0	10.1	8.2	-4.8
2023:4	2.5	598.0	14.8	8.6	0.9

[1] GDP at market prices (Financial Year)

THE WORLD ECONOMY

US

Third quarter economic activity has recovered after a sharp contraction in Q2. Real GDP rose 8.3% in Q3, up from a fall of 7.8% in Q2. This growth was driven by a sharp rebound in domestic demand. Private consumption rose 10.15% in Q3 compared with -8.3% in Q2. Investment expanded 21.2% after falling 11.7% in Q2. Net trade partially offset this expansion, subtracting 0.79% from the quarterly growth as imports outgrew the expansion in exports, 23.2% (after -13.7% in Q2) and 15.1% (after -16.1% in Q2), respectively.

Despite the economic recovery, the labour market's pace of recovery is lagging behind. Although the October unemployment rate fell marginally to 6.9% from 7.0% in September, it was almost double what it was in February 2020 (3.5%). Total nonfarm payroll employment rose by 638,000 in October, but compared to the February level there was a loss of over 10 million jobs.

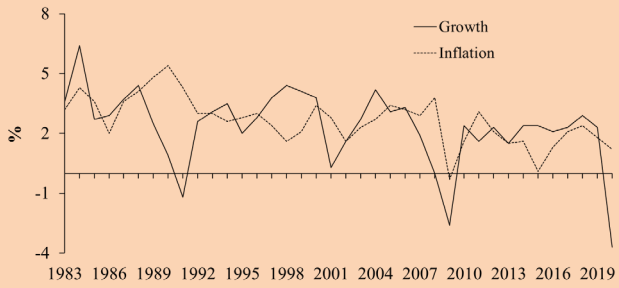
Despite the resurgence of the epidemic, economic recovery has gathered further momentum in Q4 according to recent surveys and data. US private sector business activity rose sharply in November. The PMI Composite Output index was at 57.9, up from 56.3 in October. It is the fastest pace of expansion for over 5 years. The growth is driven by strong expansion in output across all sectors. The PMI Services Business Activity Index was 57.7 up from 56.9 in October and the Markit Manufacturing PMI was 56.7, up from 53.4 in October. Firms' optimism about the outlook is rising.

Low oil prices and weak demand continued to put downward pressure on inflation. The annual rate of CPI inflation was only 0.04% in October, down from 0.20% in September. Given the inflation situation, weak labour market and recovering economy, at the November meeting the Fed decided to keep the target Fed Funds rate at its current range of 0%-0.25% and committed to use the full range of monetary measures such as its purchases of Treasury securities, agency residential and commercial mortgage-backed securities to support the economic recovery at least at its current pace. It confirmed that it would continue to offer large scale overnight and term repurchase agreement operations.

Japan

Economic recovery has started since the end of the lockdown. Real GDP rose by 5.35% in Q3, after a sharp contraction of 8.2% in Q2. The growth reflected a strong rebound in private consumption (5.0% compared to -7.2% in Q2) and net trade (which contributed 3.05% to Q3's growth, after subtracting 2.9% from Q2's growth). Net trade improved in Q3 as exports rose 7.8% (after -13.3% in Q2) and imports declined sharply 8.45% (after rising 2.25% in Q2). In Q4, the pace of recovery is expected to be slower according to recent surveys. The quarter started off well with an increase in October's consumer sentiment (33.6, up from 32.7 in September) and a smaller output contraction in manufacturing (a PMI of 48.7 up from September's 47.7)

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

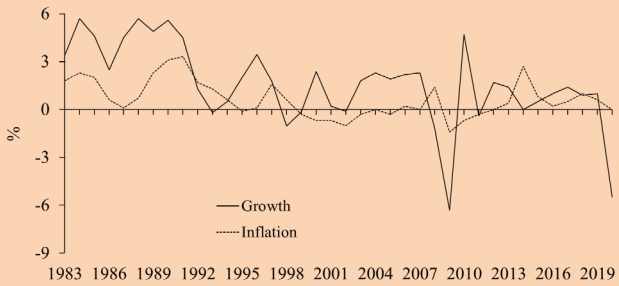


US

	2015	2016	2017	2018	2019	2020
Real GDP Growth (% p.a.)	2.9	1.6	2.2	2.9	2.3	-3.7
Inflation (% p.a.)	0.1	1.3	2.1	2.4	1.8	1.2
Real Short Int. Rate	–1.1	–1.6	–1.5	0.1	0.1	-1.7
Nominal Short Int. Rate	0.2	0.5	0.9	1.9	2.1	0.2
Real Long Int. Rate	0.3	0.5	0.4	0.9	0.1	-0.9
Nominal Long Int. Rate	2.2	2.5	2.4	2.9	2.1	0.9
Real Ex. Rate (2000=100)[1]	93.0	94.0	94.5	93.5	96.3	96.2
Nominal Ex. Rate[2]	103.08	101.91	101.68	100.96	104.31	106.53

[1]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.
[2] The series for the USA is a trade weighted index (1990=100)

Japan: Annual Growth Rates of Real GNP and Consumer Prices



Japan

	2015	2016	2017	2018	2019	2020
Real GDP Growth (% p.a.)	1.3	0.6	2.2	0.3	1.0	-5.5
Inflation (% p.a.)	0.8	–0.1	0.5	1.0	0.5	0.0
Real Short Int. Rate	0.1	–0.4	–0.8	–0.9	–0.8	–0.6
Nominal Short Int. Rate	0.2	0.1	0.1	0.0	-0.1	0.0
Real Long Int. Rate	–0.5	–1.0	–1.1	–0.9	–0.5	–0.7
Nominal Long Int. Rate	0.3	0.0	0.1	0.1	-0.1	-0.1
Real Ex. Rate (2000=100)[1]	56.0	58.4	58.3	57.8	56.3	54.2
Nominal Ex. Rate	121.11	108.61	112.10	110.40	109.02	104.20

[1]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.

and services (a Business Activity Index PMI of 47.7 compared to 46.9 in September) sector. However, with the onset of the second wave of Covid the private sector's confidence declined in November. The Jibun Bank Composite PMI, combining PMIs for both manufacturing and services sector, fell to 47 in November down from October's 48.

At its meeting in October, the Bank of Japan decided to keep its monetary policy unchanged. It maintained the short-term policy rate at -0.10%. It decided to continue to not set an upper limit on purchase of the amount of government bonds to fix the 10-year bonds yield at around 0%. It left its asset buying commitments unchanged.

Germany

The economy rebounded at a very fast speed. Real GDP expanded 8.5% in Q3 after a sharp contraction of 9.8% in Q2. Strong domestic and foreign demand drove this recovery. Private consumption rose 10.8%, rebounding from -11.1% in Q2. Investment increased 3.6% in Q3, after -6.6% in Q2. Net trade contributed positively to the growth with exports rising 18.1% (after -20.5% in Q2) and imports jumped 9.1% (after -15.1% in Q2).

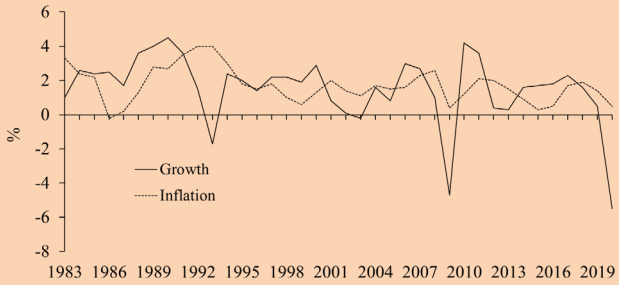
The pace of recovery seems to be slower in Q4. The pace of expansion in the private sector is at the lowest for 5 months. The Markit Composite PMI was 52.0 in November, down from 55.0 in October. With a resurgence of the pandemic in the winter, businesses have more pessimistic views on the current and expected economic situation. The business confidence index fell to 90.7 from October 92.5.

France

The economy recovered in Q3 quickly after lockdown measures were lifted. Real GDP expanded 18.2% after contracting 13.7% in Q2. The expansion was driven by both strong domestic and external demand. From the domestic side, expansion was observed across all categories — private consumption (17.3% after -11.6% in Q2), investment (23.3% after -14.3% in Q2) and government spending (15.4%, after -10.4%). Net trade contributed positively to the quarterly growth with an expansion in both exports and imports, 23.2% (after -25.7%) and 16.0% (after -17.1% in Q2), respectively.

The second national lockdown means that the economic outlook for Q4 is less optimistic. Private sector activity declined at the quickest rate in six months in November. The Markit PMI Composite output index dropped to 39.9 in November from 47.3 in October. Business confidence declined to 92 from 94 in October as businesses' expectations deteriorated.

Germany: Annual Growth Rates of Real GNP and Consumer Prices

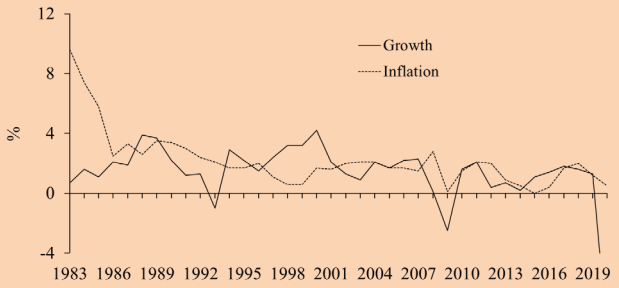


German

	2015	2016	2017	2018	2019	2020
Real GDP Growth (% p.a.)	1.7	1.9	2.5	1.5	0.5	–5.5
Inflation (% p.a.)	0.3	0.5	1.5	1.8	1.4	0.5
Real Short Int. Rate	–0.6	–2.0	–2.1	–1.7	–1.8	–1.9
Nominal Short Int. Rate	–0.1	–0.3	–0.3	–0.3	–0.4	–0.5
Real Long Int. Rate	–0.9	–1.7	–1.3	–1.1	–1.9	–1.9
Nominal Long Int. Rate	0.6	0.1	0.3	0.4	–0.3	–0.5
Real Ex. Rate (2000=100)[1]	94.7	95.0	94.3	96.5	95.6	94.1
Nominal Ex. Rate	0.90	0.90	0.89	0.85	0.84	0.84

[1]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.

France: Annual Growth Rates of Real GNP and Consumer Prices



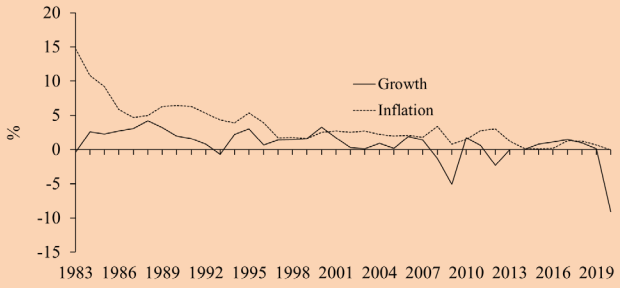
France

	2015	2016	2017	2018	2019	2020
Real GDP Growth (% p.a.)	1.0	1.1	2.4	1.7	1.3	–9.5
Inflation (% p.a.)	0.0	0.2	1.0	1.9	1.2	0.5
Real Short Int. Rate	–0.3	–1.3	–2.1	–1.7	–1.8	–1.7
Nominal Short Int. Rate	–0.1	–0.3	–0.3	–0.3	–0.4	–0.5
Real Long Int. Rate	–0.7	–0.9	–0.6	–0.5	–1.2	–1.4
Nominal Long Int. Rate	1.0	0.7	0.8	0.8	0.2	-0.2
Real Ex. Rate (2000=100)[1]	96.2	96.0	95.3	97.4	96.3	94.5
Nominal Ex. Rate[2]	0.90	0.90	0.89	0.85	0.84	0.84

[1]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.

Italy

The economy rebounded in Q3 from the previous quarter's collapse. Real GDP rose 16.1% following a sharp decrease of 13.0% in Q2. The growth reflected expansion in production in all sectors. However, the economic outlook for Q4 is less optimistic according to recent surveys and data. The recovery is losing its momentum under renewed lockdown measures. Although manufacturing signals an expansion with the PMI at 53.8 in October (up from 53.2 in September), the services sector continued to shrink with PMI at 46.7 (down from 48.8 in September). With the Covid prevention measures imposed in November, both business and consumer confidence dropped, 82.8 (compared 92.2 in October) and 98.1 (compared to 101.7 in October), respectively.



Italy

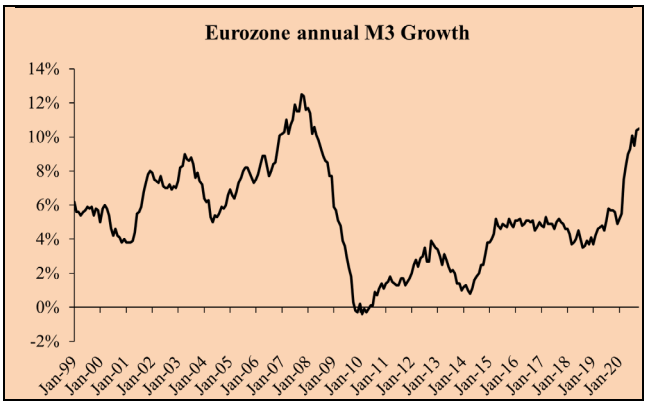
	2015	2016	2017	2018	2019	2020
Real GDP Growth (% p.a.)	1.0	0.9	1.7	0.8	0.2	–9.1
Inflation (% p.a.)	0.1	–0.1	1.2	1.2	0.7	-0.1
Real Short Int. Rate	0.0	–1.5	–1.5	–1.0	–1.4	–1.2
Nominal Short Int. Rate	–0.1	–0.3	–0.3	–0.3	–0.5	–0.5
Real Long Int. Rate	0.4	0.1	1.1	1.6	0.9	0.1
Nominal Long Int. Rate	1.6	1.7	2.1	2.6	2.1	1.1
Real Ex. Rate (2000=100)[1]	102.1	102.0	101.2	102.8	104.5	105.2
Nominal Ex. Rate[2]	0.90	0.90	0.89	0.85	0.84	0.84

[1]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.

Euro-zone monetary policy

The Harmonized Index of Consumer Price Inflation rate has fallen into negative territory in the three months to October. The annual inflation rate was -0.3% in October, unchanged from September. This reflected mainly the decline in energy price inflation (-8.2% in both October and September). Annual core inflation was 0.2% in October, unchanged from September. The inflation is expected to remain below the target of 2% due to weak demand.

Faced with low inflation, low expected inflation, and tentative recovery due to the second wave of Covid, the European Central Bank reconfirmed its accommodative monetary stance at the October meeting. it maintained rates on the main refinancing operations, the marginal lending facility and the deposit facility at 0.0%, 0.25& and -0.50% respectively. It will continue its purchases under the pandemic emergency purchase programme with a total of €1350 billion. And its net purchases under the asset purchase programme continues at a monthly pace of €20 billion with an additional €120 billion temporarily until the end of 2020.



WORLD FORECAST DETAIL

Growth Of Real GNP

	2017	2018	2019	2020	2021	2022
U.S.A.	2.2	2.9	2.3	–3.7	3.8	2.5
U.K.	1.8	1.4	1.4	–10.6	6.1	4.2
Japan	2.2	0.3	1.0	–5.5	2.5	1.0
Germany	2.5	1.5	0.5	–5.5	3.8	2.0
France	2.4	1.7	1.3	–9.5	5.9	2.0
Italy	1.7	0.8	0.2	–9.1	4.8	1.9

Growth Of Consumer Prices

	2017	2018	2019	2020	2021	2022
U.S.A.	2.1	2.4	1.8	1.2	2.0	2.0
U.K.	2.6	2.4	1.8	0.9	1.6	2.0
Japan	0.5	1.0	0.6	0.0	0.0	0.0
Germany	1.5	1.8	1.4	0.5	1.5	1.7
France	1.0	1.9	1.2	0.5	0.8	1.5
Italy	1.2	1.2	0.7	-0.1	0.4	1.3

Real Short-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	–1.0	0.6	–0.5	–1.6	–1.0	0.0
U.K.	–2.0	–1.1	–0.1	–1.4	–1.9	–0.5
Japan	–0.9	–0.4	0.1	0.0	–0.4	–0.5
Germany	–2.1	–1.7	–0.9	–1.9	–2.2	–1.9
France	–2.1	–1.4	–0.9	–1.2	–2.0	–1.7
Italy	–1.5	–0.9	–0.2	–0.8	–1.5	–1.4

Nominal Short-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	0.9	1.9	2.1	0.1	0.2	2.0
U.K.	0.4	0.7	0.8	0.2	0.2	1.5
Japan	0.0	–0.1	–0.1	0.0	0.0	0.0
Germany	–0.3	–0.3	–0.4	–0.5	–0.5	–0.1
France	–0.3	–0.3	–0.5	–0.5	–0.5	–0.1
Italy	–0.3	–0.3	–0.5	–0.5	–0.4	-0.1

Real Long-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	0.4	0.9	0.1	0.3	0.8	1.0
U.K.	–1.2	–0.7	–1.1	–1.7	–1.6	–0.2
Japan	–0.6	–0.6	–0.6	–0.5	–0.6	–0.7
Germany	–1.2	–1.4	–1.9	–2.3	–2.2	–2.0
France	–0.6	–0.7	–1.4	–1.9	–1.7	–1.6
Italy	0.9	1.8	0.2	–0.6	–0.5	–0.3

Nominal Long-Term Interest Rates

	2017	2018	2019	2020	2021	2022
U.S.A.	2.4	2.9	2.1	0.9	1.2	3.0
U.K.	0.6	1.0	0.6	0.2	0.4	1.8
Japan	0.1	0.1	–0.1	–0.1	0.0	0.1
Germany	0.3	0.4	–0.3	–0.5	–0.3	0.0
France	0.8	0.8	0.2	–0.2	0.0	0.2
Italy	2.1	2.6	2.1	0.8	1.1	1.5

Index Of Real Exchange Rate(2000=100)[1]

	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	78.1	78.6	80.1	80.0
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

[1] 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.[1]	101.68	100.96	104.31	106.53	105.84	104.43
U.K.	1.29	1.34	1.28	1.30	1.28	1.30
Japan	112.10	110.40	109.02	104.20	104.20	104.50
Eurozone	0.89	0.85	0.89	0.85	0.84	0.84

[1] 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

With India's coronavirus situation now improving and mobility returning to pre-pandemic levels, the focus has shifted to pacing up economic recovery. India's relative performance against other emerging economies will depend on its ability to sustain domestic demand, as well as the gains made against the virus, even after the festive season has passed by. In numbers, India had the confirmed cases risen to nearly 8.22mn by the end of October but only 0.56mn active case now. As many as 7.54mn cases recovered and only 0.12mn died.

India's economy picked up speed in September as a revival in demand and business activity helped drive the South Asian nation toward recovery from the pandemic-induced slump. The high-frequency indicators including exports are indicating that the economy has turned around. Emboldened by fewer Covid 19 cases in most parts of the country, the government has decided to introduce Unlock-5. More and more activities are opening up as we move into Unlock-5. Restaurants and bars are open now.

Activity in India's dominant services sector continued to recover, with the main index rising to 49.8 in September from 41.8 in August. A number below 50 suggests it's still in contraction territory and will probably be a drag on overall growth in the July–September quarter.

Manufacturing activity was a bright spot, with the purchasing manager's index rising to 58.9 in October — the highest reading since January 2012 — on the back of a sharp expansion in new work orders.

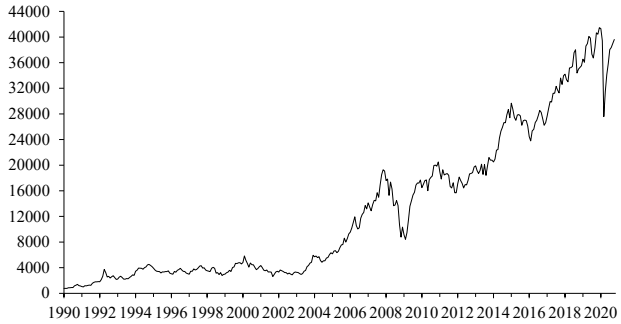
The rise in exports lifted India's manufacturing PMI, which had already returned to the expansion path in August. The reading improved further to 56.8 in September, the highest since early 2012.

Other real activity data, too, such as automobile sales and railway freight loading, point towards recovering economic activity in India. These improvements have likely been driven by further easing of localized pandemic-related restrictions, slower spread of the coronavirus, and the onset of the festive season in India.

This has encouraged the finance minister to announce that GDP growth in 2020 will be near zero in the current fiscal year. We remain cautious and continue to maintain our GDP forecast of a contraction of 6% in 2020–21 and rebound in GDP growth rate to 5% in 2022–23.

India's consumer price index-based inflation rate, which breached the central bank's upper limit of 6% in April, rose to 7.3% in September. Inflation could start softening after December with a decline in vegetable prices, easing of

India: BSE Sensitive



supply chain disruptions, weak demand and a favourable base effect.

The central bank is expected to continue to focus on liquidity infusion and effective monetary transmission to support growth for now, while keeping policy rates unchanged amidst an elevated inflation trajectory.

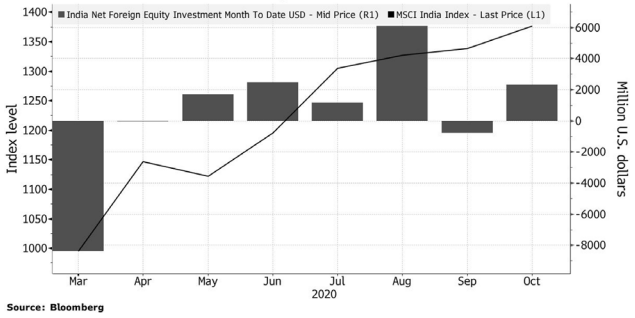
India's merchandise trade deficit contracted to a three-month low of US$2.7bn in September from US$6.8bn in August which was led by a strong rebound in exports and a sustained double-digit decline in imports.

India's stock market will see a net inflow of about $2.5 billion from the next round of changes to MSCI Inc.'s indices, according to Morgan Stanley.

Existing members of the MSCI India Index will gain $1.93 billion in new passive funds after the implementation of new foreign ownership limits on certain stocks. India's weight in the MSCI Emerging Markets Index will rise to as much as 8.8% from the current level of 8.1%. The inflows are likely to burnish India's position as the only stock market in emerging Asia excluding China that has seen a net foreign inflow this year. Overseas investors have pumped $6.35 billion into Indian stocks year-to-date even as the nation grapples with the world's second-largest coronavirus caseload and a historic economic contraction.

Foreign Hands

India stocks are set for a fifth monthly inflow in six from overseas investors



Source: Bloomberg

India, a member of the informal four-nation Quad grouping along with America, Japan and Australia, is in talks to de-escalate military tensions with Beijing. The U.S. has been increasingly concerned about China expanding its influence in the region through infrastructure and security investments

in smaller neighbours. Beijing committed $126 billion in Central and South Asia between 2000–2017, of which $120 billion was for infrastructure.

In recent months, India has held separate naval exercises with the U.S., Japan and Australia. An indication of the closeness of four-nation coordination is further cemented as India invited Australia to the annual Malabar naval drills to be held with the U.S. and Japan later this year.

	18–19	19–20	20–21	21–22	22–23
GDP (%p.a.)	6.8	4.2	-6.0	5.0	5.5
WPI (%p.a.)	3.9	3.6	5.5	5.0	5.0
Current A/c(US$ bill.)	-70.0	-20.0	0.6	2.0	-10.0
Rs./$(nom.)	79.5	73.0	75.0	76.0	77.0

China

In the first three quarters, China's GDP expanded 0.7% year-on-year, returning to growth after the 1.6% contraction in the first half of the year and the 6.8% slump in Q1, the data showed. The economy responded to the government's sweeping efforts to stimulate demand and consumption. After the COVID-19 shock, the Chinese government has rolled out a raft of measures, including more fiscal spending, tax relief, and cuts in lending rates and banks' reserve requirements to stabilize growth and employment. Growth is projected to pick up to 8.4% in 2021, as the global economy is set to recover from the health crisis. We are conservative in our forecast for 2021. We maintain our forecast of GDP growth of 2% year-on-year in 2020 and 5.5% in 2021 as Beijing's ties with the West rapidly deteriorate. Households are spending less because China's unemployment insurance and welfare programs have cushioned those working in government and medium- to large-scale enterprises, but tens of millions of migrant workers, who lack formal protection, have been forced to return to their home provinces to find temporary employment.

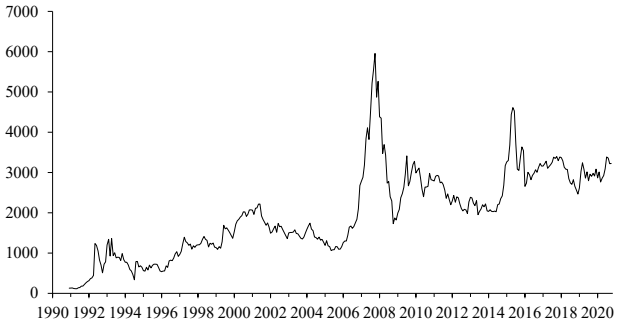
China's consumer price index (CPI) in 2020 will likely rise 2% from the previous year, slowing from a 2.9% rise in 2019. China's consumer inflation slowed in September by a moderation in food price gains. The producer price index continued to decline. It contracted 2.1%, after a 2% drop in August.

China's imports grew at their fastest pace this year in September, while exports extended strong gains as more trading partners lifted coronavirus restrictions. This gave a boost to the Chinese economy. China's imports surged 13.2% in U.S. dollar terms, according to official customs data.

Exports in September rose 9.9% from a year earlier. Shipments of medical and work-from-home gear have been

the main contributor to China's upside surprises. China continued to benefit from coronavirus-fuelled demand for medical equipment and work-from-home electronic products.

China: SSE Composite Index



The People's Bank of China has suspended the so-called countercyclical factor of its daily fix of the yuan, a tweak which helps it prop up the currency when desired. It has also lowered reserve requirements on currency forwards. China is giving investors more power in setting the value of the yuan, a move analysts said was likely intended to boost the currency's international appeal rather than to drive it lower.

The yuan is appreciating against dollar since mid-May 2020. It is hovering around 6.68 a dollar.

The steps are taken to loosen its grip on the yuan in an attempt to internationalize the yuan. The changes are introduced without significantly weakening the yuan or destabilizing global financial markets. The result has been a steady Chinese currency that remains near a two-year high. This has emboldened officials to push ahead with yuan reform. Higher-yielding Chinese assets continue to attract foreign capital into mainland bond and equity markets.

Chinese investors have already decided what they think the outcome of the US Presidential election will be: the continued decoupling of the world's two largest economies. A victory for Democratic candidate Joe Biden would likely result in a toning down of anti-China rhetoric from the White House, but it wouldn't change the now-bipartisan view in Washington of Beijing as a strategic rival. The tech war should ease off under Biden — there will likely be more transparency in supply chain access. A Biden administration would pursue reciprocity and give Beijing some time to open up before imposing new sanctions.

On the conclusion of the Fifth Plenary Session of the 19th CPC Central Committee in Beijing from October 26 to 29, the Party released two documents. First a five year plan and another one is 15-year economic blueprint.

The Communist Party's Central Committee stressed the need for sustainable growth and also pledged to develop a robust domestic market. The communique implied an aggressive path of economic expansion without mentioning the pace of gross domestic product growth explicitly. The previous five-year plan in 2015 had outlined a goal for medium-to-high growth.

The plan emphasizes quality growth over speed and the need to make China technologically self-sufficient and strong. Given the growing confrontation between Washington and Beijing over everything from trade to tech, these are not surprising objectives. However, the specifics of the plans are not released.

The new plan elevated China's self-reliance in technology into a national strategic pillar, a move signalled by officials from President Xi Jinping down in the lead up to the meeting. Central to that endeavour is self-reliance in chips, the building blocks for innovations from artificial intelligence to fifth-generation networking and autonomous vehicles. Beijing's efforts are gaining urgency as the U.S. seeks to contain the rise of its geopolitical rival. The U.S. has pressured allies to shun equipment from Huawei Technologies Co., barred dozens of China's largest tech companies from buying American parts, and even slapped bans on ByteDance Ltd.'s TikTok and Tencent Holdings Ltd.'s WeChat, "complicated international situation," a phrase that has become party shorthand for the "America First" policies of U.S. President Donald Trump. Along with the heightened U.S. tensions, a virus-battered world economy has prompted officials in Beijing to chart a course that draws on domestic resources and consumption to guarantee growth. While that strategy — known as "dual circulation" — was mentioned twice in the communique, there wasn't any specific explanation or details of what it entails. The nation needs to "smooth the domestic circulation, facilitate dual circulation at home and abroad, comprehensively promote consumption and expand room for investment," according to the statement.

	18	19	20	21	22
GDP (%p.a.)	6.6	6.1	2.0	5.5	5.5
Inflation (%p.a.)	2.2	2.9	2.0	2.0	1.8
Trade Balance(US$ bill.)	50.0	40.0	20.0	40.0	40.0
Rmb/$(nom.)	6.8	7.1	7.3	7.2	7.2

South Korea

South Korea's GDP bounced back in the third quarter of 2020 to positive sequential growth at a seasonally adjusted 1.9% quarter-on-quarter. However, the economy will register a contraction of -1.5% in 2020 due to a contraction in private consumption. In the third quarter, GDP was supported by capital investment, government spending and net exports. The large fiscal response included the 4th supplementary budget (KRW7.8 trillion) that was passed in late-September. The four supplementary budgets introduced since March have totalled KRW66.8 trillion (3.4% of GDP), on top of the financial support package and jobs programs. Worries over a fresh round of the pandemic outbreak will continue to hamper the private consumption recovery. The recovery will continue to be slow given the pandemic threat and that major economies in Europe and the US are having second waves of the COVID-19 outbreak. We maintain our GDP growth forecast of 2% in 2021 as the COVID-19 pandemic comes under control leading to resumption in exports.

South Korea's inflation accelerated at a faster-than-expected pace to hit a six-month high in September. The benchmark consumer-price index gained 1.0% from a year earlier after rising 0.7% in August. The stronger-than-expected inflation was led by higher fresh food prices ahead of the Korean thanksgiving holidays. This was driven largely by the impact of the record-long rainy season, which caused prices of agricultural, livestock and fisheries goods to rise at the steepest rate in almost a decade. The Bank of Korea expects the country's inflation to average 0.4% this year — well below its 2% annual target. Accelerating inflation may give the Bank of Korea less room to ease its monetary policy.

In the third quarter, South Korea's net exports jumped 15.6% from the previous quarter and contributed 0.4% percentage point to its overall GDP. South Korea is in something of a sweet spot for the Covid-19 era. Neighbouring China, its biggest trading partner, is driving the global rebound and the world increasingly wants the technology that Korea sells. Memory chips and electronics have benefited from a shift to work-and study-from-home during the pandemic. Other things shipped by Korea, like chemicals and metal products, haven't done so well.

The better-than-expected GDP result has helped limit the decline of the South Korean won against the dollar. Once the risk event of the U.S. presidential election is out of the way, the Korean won would be one of the biggest beneficiaries of foreign-investor flows return to Asia as the real interest rate is still positive.

	18	19	20	21	22
GDP (%p.a.)	2.7	1.8	-1.5	2.0	2.2
Inflation (%p.a.)	1.5	0.4	0.5	1.0	1.2
Current A/c(US$ bill.)	86.0	60.0	38.0	40.0	40.0
Won/$(nom.)	1130	1200	1180	1200	1240

Taiwan

GDP grew 3.33% in the July–September period from a year earlier, according to the statistics agency. In the second quarter, the economy had contracted 0.58%. We continue to keep our year-on-year GDP growth of 1.6% in 2020 and a

rebound of 3.2% in 2021. It will be one of the few major economies in the world to expand this year. Taiwan is rolling out a stimulus package worth T$1.05 trillion ($36.73 billion) to reduce the impact of strict border closures which has badly hit its services sector and tourism. Inflation remained subdued and will end up with some contraction.

Exports grew 3.5% from a year earlier in real terms, compared with a contraction of 3.5% in the second quarter, driven by global demand for semiconductors and other technologies, according to the statistics bureau. Taiwan's export orders were helped by demand for the island's tech products such as laptops.

The exchange rate for the New Taiwan dollar surged past the NT$29 mark to reach its highest value since Central Bank Governor Yang Chin-long took office more than two years ago. Taiwan would like to see it below NT$29 to maintain its competitiveness but lower inflation rate compared to its competitors and US dollar depreciation are unlikely to hold it below NT$29 per USD mark.

Taiwan, forever living in the shadow of attack from the mainland China, seems to have changed its defence strategy. It seems to favour a 'hedgehog' strategy. The idea is to arm Taiwan with arms that can inflict maximum pain instead of taking on an invading force head-on. To do this, Taiwan has purchased missiles instead of buying tanks and warplanes. The Five Year Plan of China has called for the "reunification of the motherland," whereas a similar document five years ago emphasized economic cooperation and benefits for Taiwanese residents and companies.

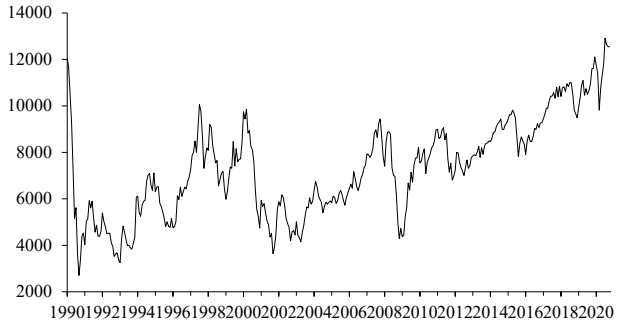
Taiwan has reported just 553 reported cases and only seven deaths. In the last week of October, it reached 200 days without a local infection. It's never had to enforce a lockdown, limiting the damage to domestic consumption.

	18	19	20	21	22
GDP (%p.a.)	2.6	2.0	1.6	3.2	2.2
Inflation (%p.a.)	1.2	1.0	-1.0	1.0	1.0
Current A/c(US$ bill.)	68.0	70.0	71.0	70.0	60.0
NT$/$(nom.)	29.8	31.0	29.0	28.5	31.0

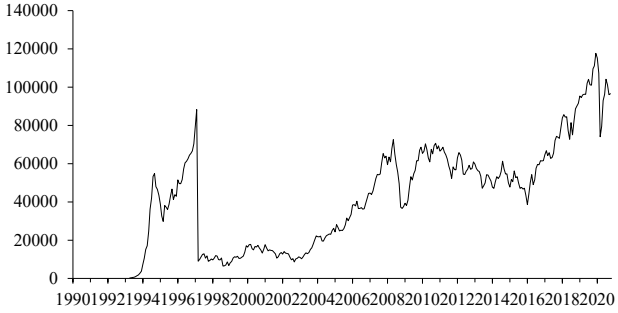
Brazil

The economic outlook is looking brighter as a massive fiscal injection is showing up in job creation. We remain a little cautious and keep our forecast of GDP shrinking 5.5% in 2020 and recovering to 2% in 2021. A recent survey suggested that contraction might be close to the government's forecast for a 4.7% contraction.

Taiwan: Weighted TAIEX Price Index



Brazil: Bovespa



Brazil's economy created 313,564 net formal jobs in September as massive government spending sustained output and demand. The formal labour market was underpinned by a government job protection program, and it is seen in all sectors of the formal economy.

Annual inflation accelerated to 3.5%, just below the central bank's 4% target for this year. A recent spike in food prices continues to intensify short-term inflation pressures. A range of staples became more expensive, including rice with an 18.48% spike, tomatoes with a 14.25% jump and meat with a 4.83% increase. The monetary authority aims for inflation of 4% this year and 3.75% in 2021. Brazil intends to hold its benchmark interest rate at a record low for the foreseeable future. For the time being, the central bank has downplayed inflation risks that led to depreciation of the currency. As expected, the central bank kept the Selic steady at 2%. In their forward guidance, it continues to hold a dovish stance and have kept the door open for a small rate cut.

This has led to heightened inflation expectations in coming years. This may force the central bank to lift its key rate by early next year.

Brazil will go into next year with a record debt and deficit around 95% and 12% of GDP, respectively, due to huge emergency expenditure this year to tackle the COVID-19 pandemic.

The government is spending this year about $57 billion on monthly stipends that, while keeping vulnerable Brazilians afloat during the pandemic, have pushed the country's finances to the brink of a crisis. President of the Central Bank Campos Neto and Economy Minister Paulo Guedes have called for a return to belt-tightening measures as public debt

nears 100% of gross domestic product. The IMF has also cautioned Brazil that growing levels of public debt represented a risk to the country.

Brazil's currency is among the worst performing emerging market units this year, falling 30%, as fears remained about the government overshooting its spending ceiling to fund the fiscal package.

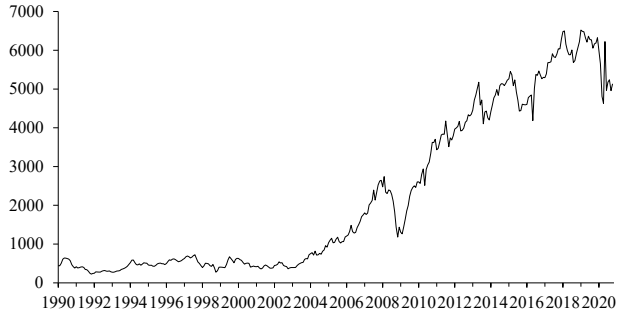
The real trading around 5.8 per dollar just below the level reached in May 2020.

	18	**19**	**20**	**21**	**22**
GDP (%p.a.)	1.1	0.8	-5.5	2.0	2.5
Inflation (%p.a.)	3.8	4.3	3.6	4.0	4.0
Current A/c(US$ bill.)	-14.6	-36.0	-40.0	-40.0	-36.0
Real/$(nom.)	3.8	4.2	5.5	5.7	5.8

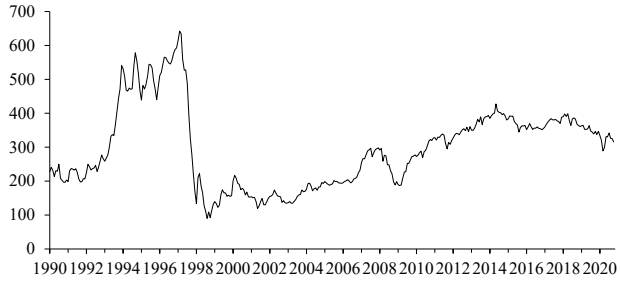
Other Emerging Markets

Hong Kong: FT-Actuaries

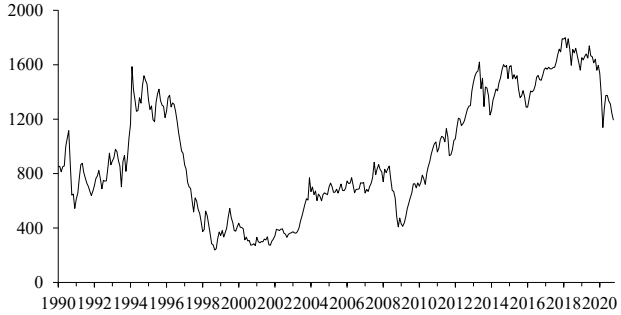
Indonesia: Jakarta Composite



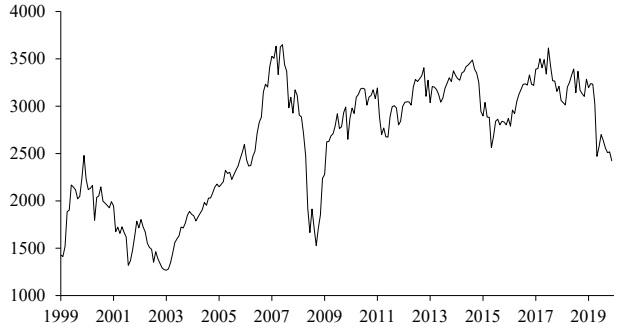
Malaysia: FT-Actuaries (US$ Index)



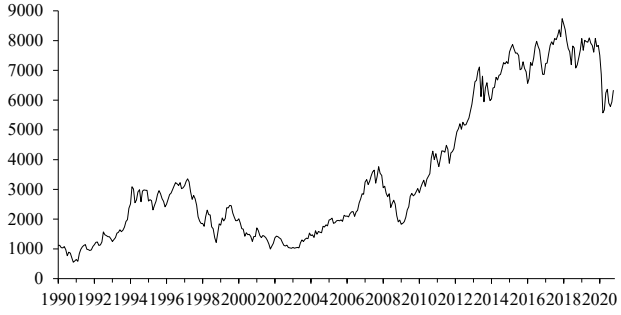
Thailand: Composite Index



Singapore: Straits Times Index

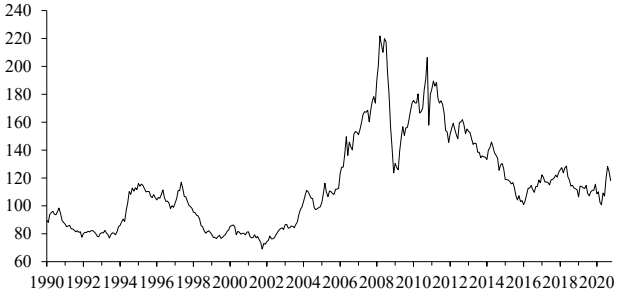


Philippines: Manila Composite

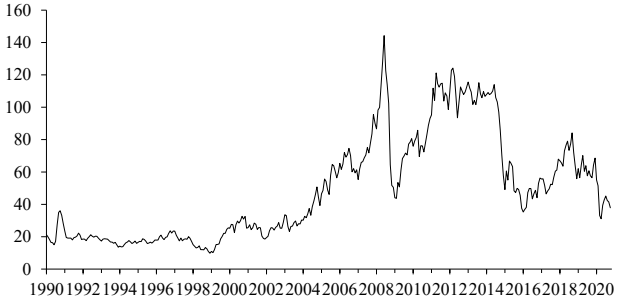


COMMODITY MARKETS

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



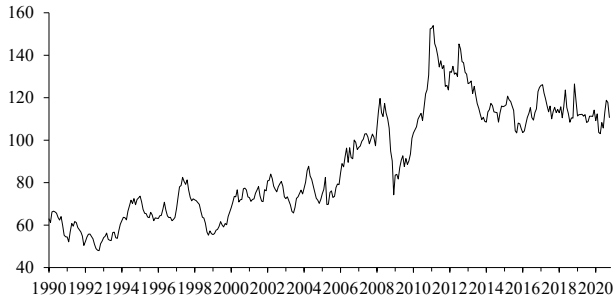
Oil Price: North Sea Brent (in Dollars)



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

Gold Price (in Dollars)

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



NORTH AND SOUTH: A REGIONAL MODEL OF THE UK

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- This chapter is an abridged version of the full working paper of this name which can be found at http://carbsecon.com/wp/E2020_14.pdf

1. Introduction

A major policy challenge of our times is to bring the North's income up to the level of that of London and the South. Our work has been stimulated by this policy challenge; much of the debate has not taken account of the manifold interactions within the economy, and our work is an attempt to provide a model in which these were fully integrated. In this two-region model of the UK economy, we focus on costs, productivity and the supply side generally. The model does not deal with money or inflation. Hence it belongs to the Real Business Cycle branch of macroeconomics (originated by Kydland and Prescott 1982), its main difference being its disaggregation into two regions, North and South, linked by a common goods market but whose residents must produce locally and buy/produce housing within their own region. While much regional modelling treats the large rest of the economy as exogenous, here the regions interact and each respond to the national outcome; in this respect the model has much in common with two-country open-economy models - for example, Chari, Kehoe, and McGrattan (2002), Kollmann et al. (2016) and Le et al. (2010).

In what follows we begin with a discussion of the UK policy context, outline the basic workings of the model, and summarise our main findings about the effects of different policy packages. We then go through the model in detail; in succeeding sections on its specification, the data used and our estimates of its parameters. We then review its behaviour in response to shocks, and in particular to policy changes. We conclude with a review of our policy recommendations.

1.1 The UK policy context of the North-South model, the model structure and key model policy results

In this paper, we set out a model of North and South that focuses on regional costs and competitiveness as the key elements driving regional growth. These costs are essentially labour costs, that is wages and employment taxes adjusted for labour productivity. Other taxes and supply-side interventions in the labour market have their impact on these through their effect on wages. Production is located in the two regions according to their competitiveness in the sectors where they specialise: mobile capital and management - not explicitly modelled are moved as needed, mainly by multinational corporations, to these locations.

In the past few years a vigorous policy debate has begun over the issue of the North-South imbalance. A central element has been infrastructure. Many people have argued that infrastructure in the North has lagged behind that in the South, especially in transport. This mirrors the usual assumption when the problems of the North are mentioned relative to the South that 'more should be spent' on Northern infrastructure. This however misses the key point. This is that the North needs to achieve stronger cost competitiveness. The South achieves its results because it is highly competitive in world markets. This is certainly partly due to good infrastructure. But mainly it is the result of creating products and services that are in high demand internationally. In our Liverpool Model of the UK as a whole (Marwaha et al. 1984) the level of GDP is governed by UK cost competitiveness. This in turn is the result of the level of tax net of its opposites, regulatory costs on business.

In a parallel piece of work analysing how UK growth occurred during the Thatcher years, Minford and Meenagh (2019) showed that it was related to the cutting back of tax rates and regulation during the 1980s. This led to a surge in entrepreneurship which boosted productivity growth.
Essentially the same ideas apply to the North, as apply to the UK as a whole. The North, after all, is simply one part of the same UK organism.

It is helpful to start by understanding how London itself became such a competitive economy. Plainly much money has been spent on its transport infrastructure. But much of this has been in response to the economic activity it has created. i.e. to its success from other causes. Essentially this success has been tied up with the development of the City of London, the world's top financial centre. This in turn was supported by the provision and development of huge amounts of land in the docklands, feeding a demand for the City's services across the world. This City industry in turn was fed by supplies of skilled labour plentiful in the UK, due to expanding higher education and a liberal approach to skilled immigration. Other supply-side factors were the common law courts which made the UK an attractive place for dispute resolution, and that ample supply of land, that gave the City space to expand.

Trade models give us corroborating insights. After abandoning EU protection of food and manufacturing, it will be the City and other service industries that expand as costs, especially of land, inflated by protection, come down (Minford and Xu 2018).

Looking towards the North, what are the policy implications? Northern cities now have in- creased powers vested in mayors, just as London has had. This gives them an opportunity to think and act strategically to reduce costs and increase their regional competitiveness. If these cities and their cooperating surrounding regions can identify the infrastructure they need to support these moves, they now have a government strongly willing to oblige by providing it

through central government funding. However, to be fair to central government this is not entirely new. Money has flowed from the centre to well-organised northern initiatives for some time. One only has to look at roads around Manchester or expenditures on the old docklands of central Liverpool to be aware that central government has spent liberally on northern development where needs have been identified. Essentially the system for providing infrastructure is demand-led by local needs, these in turn being created by economic growth.

The failures of the North to grow as fast as London cannot therefore be laid solely at the feet of central government unwillingness to spend on northern infrastructure. It looks rather as if it is the failure of the North to grow that has slowed down the associated infrastructure provision.
It might then well be asked: how can central government policy break into this slow-growth Northern equilibrium?
The answer is to be found in the way the Thatcher government broke into the low-growth UK equilibrium - by lowering taxes and similar regulative restraints on cost competitiveness. Lower taxes work across the whole economy. By lowering general taxes and easing economy-wide regulations, economic activity is boosted across the whole economy. But such moves today, with a congested Southern economy, will primarily benefit the North, because that is where there is spare capacity. One can think of the process as a two-stage one. Cutting taxes and regulative costs will boost competitiveness across the UK; but because of Southern congestion, Southern costs will rise in response, while Northern costs will rise much less. Hence the net effect will be to lower Northern costs and raise Northern competitiveness, while leaving Southern relatively unchanged.

It follows that in general the way to boost the North is to cut taxes and regulative costs across the UK as a whole, and then respond in the usual way to the resulting infrastructure demands from the North. It is not artificially to boost spending on Northern infrastructure independently of demand-led needs. The exception would be if some particular infrastructure project would itself stimulate some identifiable development - as could be argued is the case with the High-Speed train programme; however, this has to be carefully evaluated. Too often infrastructure created to 'spur development' creates roads or bridges that 'lead to nowhere', i.e. to areas with little going on. In principle infrastructure spending lowers costs for business by raising productivity. For examples one only has to think back to the way railways promoted development in the USA. But of course the railway era in which this promotion occurred also came to an end once railways went to most places. In the North today transport infrastructure already covers the area. To contribute, new transport links must improve on existing ones by lowering costs.

We have embodied these ideas in a Regional UK model, which is derived from the same supply- side approach as originally taken in the Liverpool Model, used to advise Mrs. Thatcher's governments. In this model, each region, North and South, has a labour market which determines employment in general goods/services production. Households determine consumption and employment in a familiar way, responding to income and real wages after tax. Labour supply depends on net of tax wages, adjusted for prices. In the productive firms sector the cost competitiveness of general industries determines their sales success at home relative to imports and in foreign markets; apart from productivity, whose growth is affected by taxes and regulations on entrepreneurs, cost competitiveness depends on wages. A general tax cut e.g. of VAT or income tax - encourages labour supply and so lowers wages, raising cost competitiveness; net exports rise and the economy expands. The percent effect on GDP expansion is higher in the North than in the South because in the North labour is more plentiful, and therefore supply rises more as net of tax wages rise. This greater plentifulness of Northern labour is embodied in the model via a lower response of wage demands to rising employment (equivalent to a 'more elastic labour supply curve', a flatter SS curve in the labour quadrant in the following diagram). The mechanism can be seen in the 4-quadrant diagram that follows.

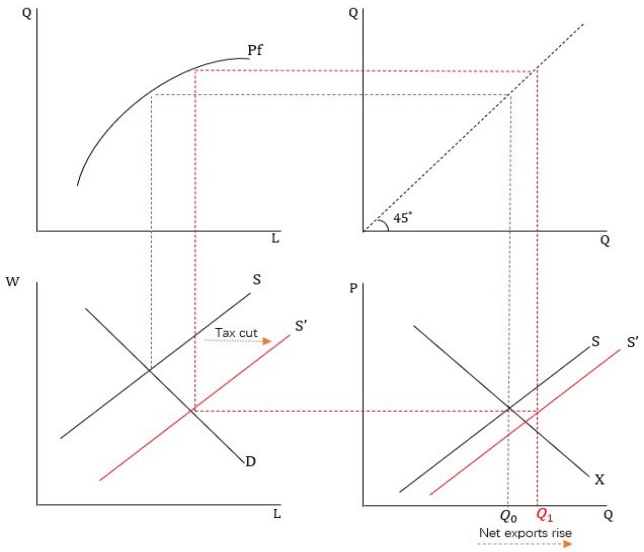


Figure 1: The transmission mechanism of a tax cut

In each region the labour market clears via regional wages; labour is assumed to be immobile between regions, like land. House prices clear the regional market in housing; they are a component in regional consumer prices. Regional firms produce general goods and houses. They sell the housing regionally and the goods nationally. They can borrow at common national interest rates. At the national level exports are determined by foreign demand and UK competitiveness (relative home/foreign prices adjusted for the exchange rate); imports by home demand and competitiveness. Then market-clearing in general goods determines real interest rates. Real interest rates in turn determine the real exchange rate through the Uncovered Interest Parity relationship according to which home real interest returns adjusted for expected real exchange rate

movements and a risk- premium related to net foreign borrowing must equate with foreign real returns. In the long term the real exchange rate generates current account equilibrium to stop the risk-premium moving with new foreign borrowing.

We have fitted this model to UK data, finding the coefficients that get closest to matching the UK facts - this being the indirect inference estimation procedure we describe in Section 4. From a policy viewpoint what interests us is the GDP effect of different tax cuts costing the Treasury the same, set for illustration at £10 billion each in the following Table, repeated here from the penultimate section below on Policy effects.

Table 1: Long run Effects of different tax/regulative measures on North and South (Each package costed at £10 billion p.a.)

Percentage change in	GDP_N	GDP_S
Cut standard rate of income tax or VAT or other general income/consumption tax	1.1	0.5
Cut Corporation tax rate	0.8	0.4
Cut marginal tax rate and regulative burden on Entrepreneurs/SMEs	12	21
Increase infrastructure spending in North	1.6	-

What is immediately striking is two things. First, all these measures bring worthwhile gains in GDP due to their supply-side effects. Second, the biggest gains by far come from cutting the tax and regulative burdens on entrepreneurs. Because these work by improving incentives to innovate and so raise productivity, and because they cost the Treasury relatively little, their effectiveness per pound of taxpayer cost is very high. Furthermore, they have a large effect in the North, while also strongly reinforcing growth in the South, where enterprise is heavily entrenched. These policies remain in absolute terms the best booster for the North, while spreading growth nationally as well.

2. The Model specification- a brief outline

In this model, there are households who live in a region where they also work, for firms. The firms in this region are owned by these households but they produce goods that are sold in the UK and world markets where they compete with goods from other countries; other firms, also owned by these households produce housing which is sold in the region to the households in it. Firms produce, using labour, with a productivity level that is determined by the rate of innovation due to households' entrepreneurial activity; we do not explicitly model investment, assuming for simplicity a labour-only production function.

2.1 The Growth of Productivity

In Producing firms, productivity growth depends on the innovation-enhancing activity undertaken by the households that own them. The idea is conceptually similar to Lucas (1990), where households try to find the balance between time spent in entrepreneurial productivity- enhancing activity and labour supply. We assume that entrepreneurship faces costs in taxation and regulation, τ. The cost of spending time on innovation is the loss of current wages in normal work plus the cost of this tax; while the gain is the discounted future gains of output from the higher productivity applied to the currently projected stream of labour inputs. It follows that the growth in productivity, A(ji), in the jith firm, coming from this time spent on innovative entrepreneurship can be summarized in an equation as follows for the ji-th firm, where τt' is the entrepreneurial tax as a fraction of the wage.

$$\ln A_{ji,t+1} - \ln A_{ji,t} = \phi_{1,ji} - \phi_{2,ji}\tau_t' + \varepsilon^A_{ji,t}$$

2.2 Exogenous Variables

We have explained how households and firms choose to behave; however their actions are impacted by shocks from the economic and policy environment, the exogenous (outside) variables they cannot control. All these shocks, whether regional or national, are stationary (that is, apart from any time trends driving them steadily up or down over time, they return eventually back to their starting point) except the regional productivity shocks in goods and housing sectors — the 'productivity processes' growth is impacted by stationary shocks, whose impact on the level of productivity is therefore permanent, so that these productivity processes are non-stationary — once disturbed by a growth shock they do not revert. Some of the stationary shocks are residuals in the structural equations such as the regional labour supply shock (εl), regional preference shocks (εr), national export shocks (εex), and national import shocks (εim). Some of the shocks are exogenous policy variables such as government spending (Gt), regional infrastructure capital (Ki,t), tax on innovation (τ I), tax on firm (Tft) etc. All the stationary residuals take the following AR(1) form:

$$\varepsilon^k_{(i),t} = a_{k(i)} + b_{k(i)}t + \rho_{k(i)}\varepsilon^k_{(i),t-1} + v^k_{(i),t}$$

where $v^k_{(i),t}$ is an i.i.d mean zero innovation term, and k represents different structural residuals and exogenous variables, i shows North or South.

The complete log-linearised model is listed in Appendix A of the full working paper at http://carbsecon.com/wp/E2020_14.pdf.

3. The Data

According to the ONS, there are 12 regions in the UK. We define London, South East and South West as South, the rest is North. So, the North consists of North East, North West,

Yorkshire, East Midlands, West Midlands, East of England, Wales, Scotland and Northern Ireland. Therefore, the data in North and South are the weighted average of different regions.

The sample is unfiltered UK macroeconomic data from 1986Q1 to 2019Q4. The time series in North and South we have collected and used are: regional output in goods sector, regional output in housing sector, regional labour demand in goods sector, regional labour demand in housing sector, regional labour supply, regional consumption, regional housing demand, regional housing price and regional wage. Figure 2 and Figure 3 plot these time series in North and South. Figure 4 shows the national level data we used in the model. They are real GDP, real total consumption, real housing demand, total labour demand in housing and goods sector, price of goods, foreign price, net foreign assets, exchange rate, real interest rate, imports and exports. The different taxes and regulations shown are the tax on labour income, the tax on firms' income, the tax on innovation/entrepreneurship, the union membership rate (proxying union powers) and unemployment benefit.

For tax on labour, we consider the basic UK income tax rate, the National Insurance (NI) employee's rate, tax on general income and consumption. Another tax, tax on firms, is collected using NI contribution rate by employer. For tax on innovation, τ' , it consists of two key components of the business environment: regulation and tax. On regulation, we focus on the labour market and use collective bargaining coverage from OECD. At the same time, we also consider the income tax and corporation tax in τ'. A detailed description of the data can be found in Appendix B

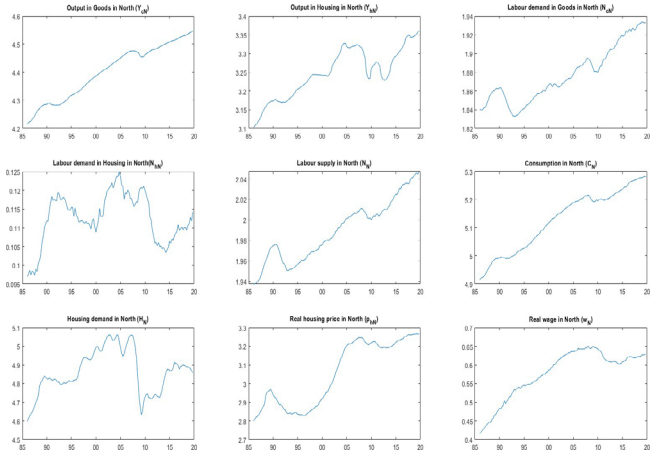


Figure 2: North Data

Figure 3: South Data

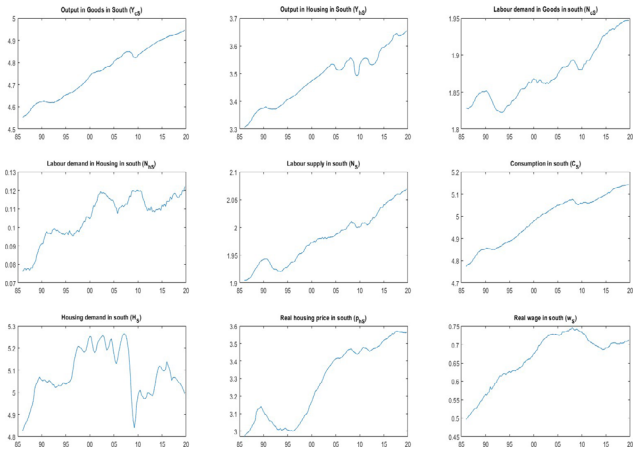
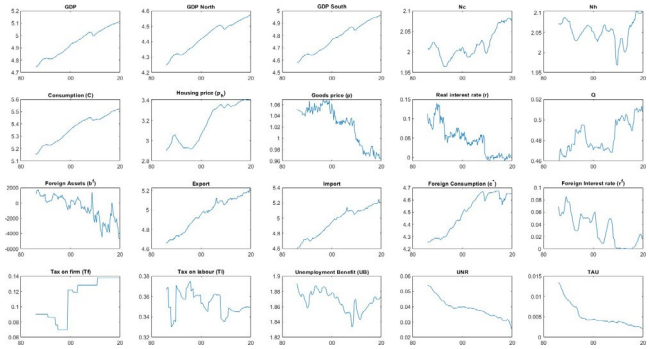


Figure 4: National Data



4. Indirect Inference — our estimation and testing method

In this section, we set out and explain our methodology of model testing and parameter estimation: Indirect Inference (II), developed by Le et al. (2011). II is based on the idea that if the structural model is true in terms of both specification and parameters, the properties of the actual data should come from the distribution of the properties of the simulated data with some critical minimum probability.

This method has been in familiar use for many years, in the form of the Simulated Method of Moments, SMM; recent developments have generalised it as Indirect Inference, allowing considerable flexibility in the choice of data features to be matched, known as the 'auxiliary model'. The approach involves hypothesising that the model being estimated is the true data generating mechanism, DGM; the data is then succinctly described by, for example, moments under SMM. If so then the Moments found in the data should come from the model with a probability in excess of the threshold rejection level of 5%, when the usual 95% confidence level is used. To discover the probability distribution of the Moments according to the model, the model is simulated by bootstrapping the random shocks perturbing it many times; the resulting joint distribution of the moments is what the model implies if it is the true DGM.

If the data-based moments have a prob- ability less than 5% according to this distribution, the model is rejected. Estimation by II involves searching over model parameters to find the set that is least rejected above the 5% level - this set is the II estimator.

The data properties can be captured by a simple 'auxiliary model' such as a VAR, impulse response functions or the moments as in the SMM. It turns out (Meenagh et al. 2019) that the results are similar in each case. Define the parameters of the structural model and the auxiliary model as θ and β respectively. We first use the actual data to estimate the auxiliary parameters $\hat{\beta}$. Given the null hypothesis H0: θ = θ0, we simulate S samples using the structural model and estimate the auxiliary parameters using each simulated sample to obtain estimators $\tilde{\beta}_s(\theta_0); s = 1, \dots, S$. To evaluate whether $\hat{\beta}$ comes from the distribution of n $\{\tilde{\beta}_s(\theta_0)\}$, we compute the Wald statistic

$$Wald_\alpha = \left[\hat{\beta} - \overline{\tilde{\beta}_s(\theta_0)}\right]' W(\theta_0) \left[\hat{\beta} - \overline{\tilde{\beta}_s(\theta_0)}\right]$$

which asymptotically follows a χ2(k) distribution where k is the number of elements in β and $W(\theta_0)$ in the distribution of simulated $Wald_s$; $s = 1, \dots, S$ where $Wald_s$ is computed when using the sth simulated sample to estimate $\hat{\beta}$. If $Wald_\alpha$ is less than the cth percentile value of $\{Wald_s\}$ sorted from smallest to largest, H0 c annot be rejected in a c% confidence interval; otherwise the model is false. An alternative way is to compute the transformed Mahalanobis Distance (TMD) and compare it with the critical value of t distribution on the c% confidence interval.

$$Z = T_c \frac{\sqrt{2Wald_\alpha} - \sqrt{2k-1}}{\sqrt{2Wald_c} - \sqrt{2k-1}}$$

where T_c is the critical value of a one-tail t distribution on the c% confidence interval.

Generally, a (linearised) DSGE model can be represented as a VARMA or a VAR(∞) which can be further represented to a VAR(p) with a finite order or even a VAR(1) (Dave and DeJong (2007); Wickens (2014)). However, the long-run solution of our model can only be approximated as a VARX with non-stationary lagged endogenous variables X due to nonstationary productivities. Le et al. (2011), Le et al. (2016) and Meenagh et al. (2019) conduct Monte Carlo experiments to find the power of the test as the variables included and the order of the VAR vary. They find that a VAR(1) in 3 endogenous variables typically has good power, while raising the order or the variable number further can boost the power too far for any hope of finding a tractable model that can pass the test. Hence, we typically use a VARX(1) with 2 or 3 variables, combined with the lagged individual productivities as the "X".

Given the null hypothesis that the structural model is true, one can back out the structural errors from the model and the actual data and then bootstrap these structural errors to obtain simulated samples. II is also used to estimate the parameters by searching for the parameter values such that the relevant Wald or TMD is smallest.

Le et al. (2011) and Le et al. (2016) conduct Monte Carlo power tests on three testing methods on different models: II, the Likelihood ratio test; and the "unrestricted Wald" test (in which the reduced form VAR on the data sample rather than the VAR from the structural model is boot- strapped). II is found to have far more potential power than the other classical testing methods.

To evaluate the power of II on our model here, we use Monte Carlo experiments to compute the power of the test against parameter mis-estimation.

3.1 4.1 The power of the test against numerical inaccuracy

We first generate 500 samples from the true model and the actual data. Then treating each simulated sample from the true model as the observation, we test the false model by II and calculate the rejection rate out of the 500 Monte Carlo experiments. Table 2 shows the result of our power test against the false models with mis-estimation where both structural parameters and the AR coefficients of the errors are alternately falsified by $+/-x\%$ each time. The probability of rejecting the false models rises sharply with an increase in the falsity of parameters.

Table 2: Power test against numerical falsity of parameters- using GDP N and GDP S in the auxiliary model

Parameter Falseness	True	5%	10%	15%	20%
Rejection Rate at 5% Level (GDP N and S)	4.45	15.5	44.0	68.9	82.4
Rejection Rate at 5% Level (GDP N and S, C)	5.25	48.0	92.0	98.9	99.8

In order to choose a suitable auxiliary model, we carried out Monte Carlo experiments to check the power of different variables being included in the VECM. We can see that power is acceptable with just the two regional GDPs; and rises very sharply when consumption is added. We decided to choose the one with the two regional GDPs where power is slightly weaker but still substantial.

4.2 Model fit

We test and estimate the regional model using Indirect Inference. Some coefficients such as discount factor, depreciation rate, and growth rate are held fixed on theoretical grounds and the regional tax on innovation φ2,ij and incentives to innovation c1i are fixed as well. We also fix parameters such as market shares and some ratios - see Table 3. For the elasticity in the labour market, we look for a labour supply elasticity $(\frac{1}{\rho_{2i}})$ in the North that is bigger than in South due to a greater relative abundance of labour and housing. All behavioural parameters are estimated. We now go on to show these results.

The empirical results below (Table 4 and Table 5) show that the regional model is rejected using the calibrated parameters from Meenagh et al. (2010), with a p-value equal to 0, implying no match at all to the data behaviour. That means the national behaviour cannot fit the regional model.

Therefore, estimation is necessary. We estimate the regional model and find a set of coefficients can fit the regional data behaviour very well with p-value of 0.12. According to the previous Monte Carlo power test, we believe the results trustworthy and also can provide us the reliability of policy implication.

Table 3: Structural model coefficients fixed throughout study

Definition	Parameter	Calibration	Estimation
Fixed Coefficients			
Quarterly discount factor	β	0.985	FIX
Housing depreciation rate	δ_h	0.015	FIX
Quarterly output growth rate	g	0.005	FIX
Regional tax on innovation	$\phi_{2,ij}$	-0.17	FIX
Incentives to innovation	c_{1i}	0.06	FIX
Share of goods price in CPI	ω	0.7	FIX
Share of housing price in CPI	γ	0.3	FIX
N_{ci}/N	$n1$	0.94	FIX
N_{hi}/N	$n2$	0.06	FIX
Y_c/GDP	$g1$	0.94	FIX
$YhPh/GDP$	$g2$	0.06	FIX
Yc/C	$c1$	1.732	FIX
EX/C	$c2$	0.361	FIX
IM/C	$c3$	0.369	FIX
G/C	$c4$	0.44	FIX
EX/Y	$bf1$	0.208	FIX
IM/Y	$bf2$	0.214	FIX

Table 4: Structural Model Coefficients: 1986Q1-2019Q4

Definition	Parameter	Calibration	Estimation
Estimated Coefficients			
Import demand elasticity	σ	1	3.2692
Elasticity of substitution (Cd, Cf)	σ^F	0.7	7.2505
Risk-premium coefficient	ψ	0.001	0.0064
North			
CRRA coefficient (Ct)	ρ_{1N}	2	0.0155
CRRA coefficient (Nt)	ρ_{2N}	0.5	1.3378
CRRA coefficient (Ht)	ρ_{hN}	1	9.4521
Wage elasticity to union rate	δ_N	1	1.0571
South			
CRRA coefficient (Ct)	ρ_{1S}	2	0.0155
CRRA coefficient (Nt)	ρ_{2S}	1	2.6756
CRRA coefficient (Ht)	ρ_{hS}	1	8.0117
Wage elasticity to union rate	δ_S	1	1.7429
Test Results			
P-value		0	0.12
Wald		2691.61	7.13
T-Wald(GDP_N, GDP_S)		56.60	1.04

5. Empirical Analyses

5.1 How the model behaves in response to shocks and Long Run impacts of different Policy changes

The following graphs show the long run impacts of different policy changes (tax on labour, tax on firm, UNR, tax on innovation). We also explore the long run impacts of productivity shock, taking goods sector in North as an example. We summarise the responses of some key variables below. The impulse response due to all shocks can be found in Appendix D.

We begin with a central tax shock (Figure 5 and 6): a cut of taxes on labour income or consumption, such as income tax and VAT. Because this raises take-home pay in real terms, it leads to a rise in labour supply, driving down real wages and so business costs. There is extra output and employment in goods and housing. The real exchange rate depreciates (competitiveness, Q, rises) to enable this extra supply of goods to be sold at home and abroad; this expected depreciation forces up interest rates to maintain uncovered interest parity in the foreign exchange market. The stock of houses rises in both north and south, with demand stimulated by lower house prices to match the increased housing supply. Owing to greater elasticity of labour supply, the Northern economy expands more than the Southern, though both expand.

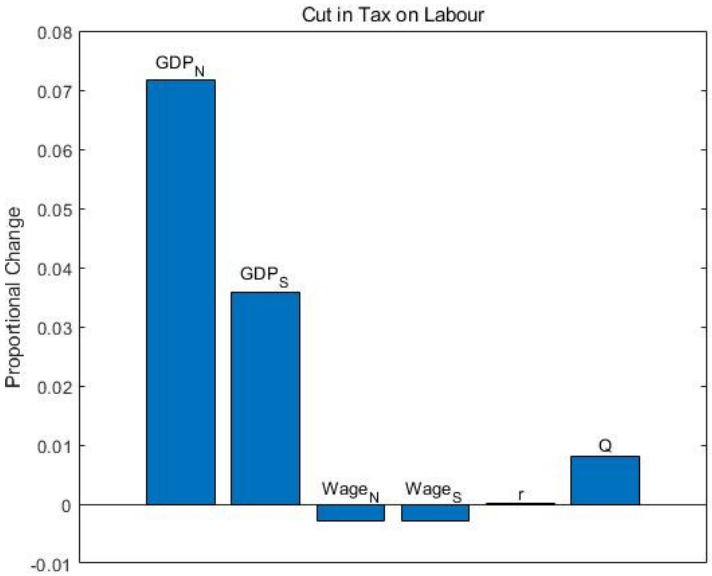


Figure 5: Permanent Tax on Labour Shock (Standard error: 0.1)

This description of the transmission of a labour tax cut is mimicked by a cut in the tax on firms' costs, such as corporation tax - see Figure 6. Here the stimulus in the labour market is to firms' demand for labour as profits rise. This stimulus drives up wages, and so employment and output, from the demand side of the labour market. Other effects that flow from this are essentially the same.

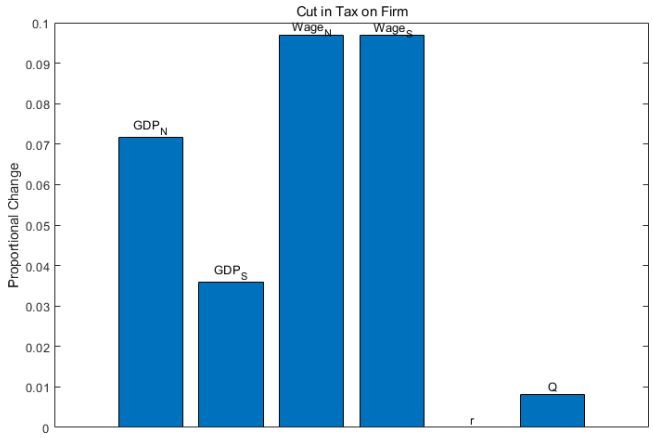


Figure 6: Permanent Tax on Firm Shock (Standard error: 0.1)

When we turn to our index of labour market regulation (Figure 7), UNR (the unionisation rate proxies these regulative costs), we find the transmission is the same as for a cut in labour taxes: the fall in costs lowers the wage costs paid by firms (included in wages in the model) for a given level of employment. Wages fall, triggering an employment and output rise from firms' demands. The other effects flow as above in the goods and housing markets.

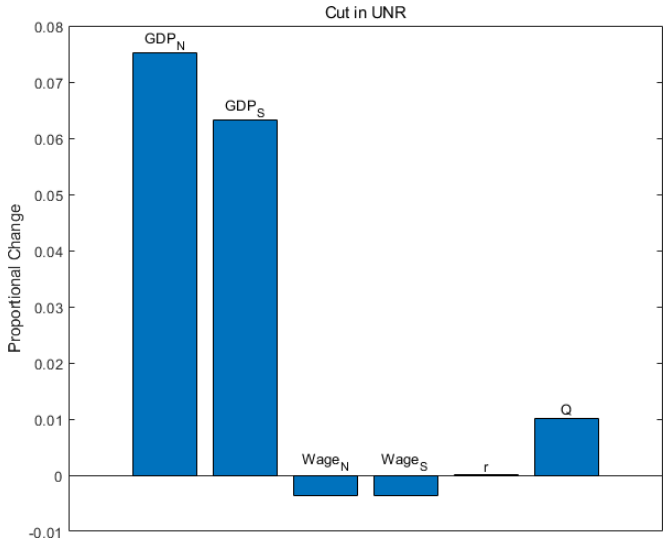


Figure 7: Permanent UNR Shock (Standard error: 0.1)

Next, we come to a cut in tax/regulatory-cost for entrepreneurial time (Figure 8). This cut dies away gradually, following our modelling of the cost process. But each period while it is lower than it was it triggers productivity growth higher than the baseline. Hence there is a cumulative rise in productivity over the period in both North and South. This drives up demand for labour and wages with it, with output stimulated both by this and the rise in productivity. According to the model estimates, the marginal utility of house space falls with rising income, so that faced with much higher productivity of house production, it takes a substantial fall in house prices to induce a matching rise in housing demand. This seems at odds with casual empiricism but it does emerge from the model's estimation. It is this tax cut that has the biggest effects on GDP in both regions, and a steady accompanying rise in competitiveness across the UK.

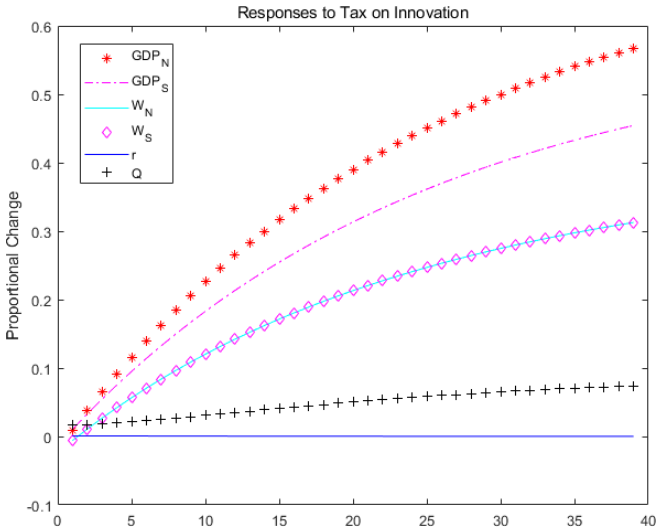


Figure 8: Tax on Innovation Shock (Standard error: 0.1)

Finally, Figure 9 shows the effect of a one-off rise in Northern productivity in the goods sector (but not in housing), such as might be produced by an addition to Northern infrastructure. The transmission is similar to those from the ongoing rise in productivity of the last paragraph, except that it is both confined to the North and one-off rather than continuing. Output, employment and wages rise in the Northern goods sector. The rise in incomes and consumption again induces a fall in housing demand; but as this is smaller than the shift of labour out of housing into the more productive goods sector, driving down house production, house prices must rise to push back on this greater contraction in supply.

5.2 How the economy's shocks have impacted the economy and the regions

Variance Decomposition

Table 6 shows the variance decomposition of national GDP and GDP in North and South at different horizons (short run; medium run; and long run). By this is meant the average share of each shock in the variation of different model variables. We group these different shocks into 9 categories, technology shocks and demand shocks in North and South, regional labour market shocks, tax, regulation and other supply-side policy shocks, international shocks and 'other' shocks. While from a policy viewpoint we naturally focus on tax and supply-side shocks, from a business cycle viewpoint output will be heavily influenced by demand, especially consumption. Under perfect competition with prices set at longrun marginal costs, output will respond to demand through market clearing.

Consumption will also affect labour supply and so longrun resource availability. By their effects on imports and the balance of payments they affect the longrun real exchange rate and via this the real wages of households and so again labour supply. The model also implies spillover effects across regions via this transmission mechanism.

From the following table, we can see that demand shocks play a significant major role in the short run and medium run, while technology shocks dominate in the long run. The demand shocks in North contribute 34% to GDP North variance in the short run, falling to 8% in the long run. Demand shocks in the South contribute 6–36% of the volatility of GDP South at different horizons. Both N and S demand shocks spill over considerably across the regional border. Regional labour market shocks account for 12–19% of long run GDP variance in the North and 8–23% in the South. The regional technology shocks dominate the volatility of regional GDP in the long run, accounting for 51% in the North and 57% in the South, though much less in the short run: only 4% in the North and 8% in the South. Tax and supply-side policy shocks explain 20% of national GDP variance in the short run; but only 6% in the North and 3% in the South; this highlights the main thrust of the model, which is that policy reforms have more impact (roughly double) in the North than in the South. The full shocks data is shown in Appendix C.

Table 5: Variance Decomposition

	TFP N	Dem. N	Lab. N	TFP S	Dem. S	Lab. S	Policy	Internat	Other
Short run									
GDP	7.56	13.12	20.05	3.14	16.68	3.31	20.50	3.29	12.36
GDP N	4.59	34.11	12.17	0.00	37.55	0.00	6.56	1.05	3.96
GDP S	0.00	39.62	0.01	8.06	36.85	8.45	3.51	0.56	2.94
Medium run									
GDP	14.82	5.66	27.37	6.17	7.13	5.37	16.36	1.60	15.51
GDP N	13.41	21.90	24.76	0.01	24.01	0.01	7.76	0.76	7.40
GDP S	0.01	24.58	0.01	22.82	22.94	19.83	4.11	0.39	5.31
Long run									
GDP	40.56	1.64	15.01	16.91	2.06	6.94	10.05	0.51	6.33
GDP N	51.66	8.91	19.11	0.02	9.76	0.01	5.87	0.34	4.32
GDP S	0.02	6.58	0.01	57.92	6.14	23.76	3.34	0.12	2.11

Notes:
Dem. =Demand shocks; Lab.=Labour market shocks; Policy=Tax, regulation and other supply-side policy shocks.

5.3 The model's variation over time due to shocks

Historical Decomposition

Figure 10 below shows how these shocks contributed historically over the sample period to GDP in North and South. What we see here as expected is that the dominant contributor to the evolution of output in North and South is their own productivity shocks. We can identify contributions from supply-side policy shocks, but these are minor compared with the exogenous productivity that we do not explain. We can also see how the variations in regional GDP around this evolving (stochastic) trend were stimulated by demand shocks such as during the financial crisis. What we can see from the analysis above is that productivity movements accumulate over time accounting for the trends in North and South output. Around this 'stochastic' trend, other shocks create business cycle variation. These shocks come from consumer preferences and also labour supply and demand shocks from households and firms respectively. Through all this, policy shocks are crucial in changing the direction of the economy from time to time. But they are few and far between so they do not cause much business cycle variation.

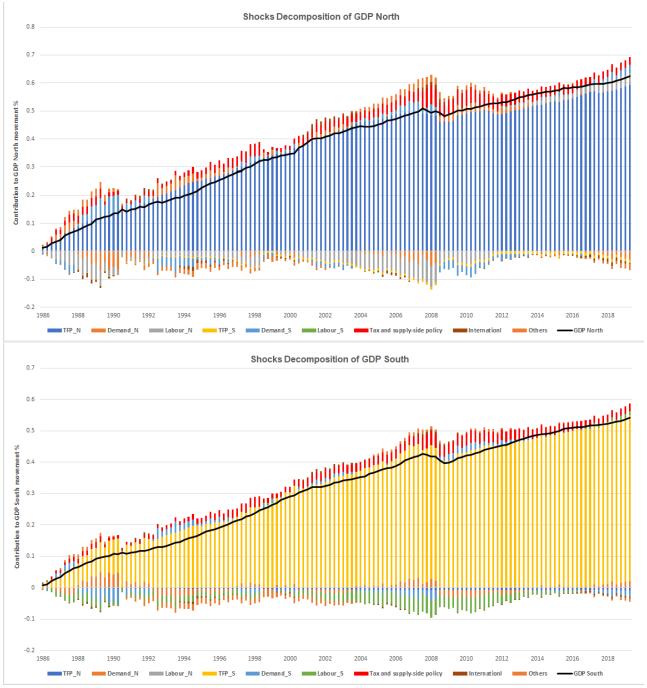


Figure 9: Shocks Decomposition of GDP in North and South

5.4 Key policy effects and fiscal costs

We can summarise the effects of the policy shocks reviewed in the last section in a Table that shows these long-run effects harmonised around a £10 billion p.a. fiscal cost (about 0.5% of GDP). What emerges strongly when set out this way is the very large effect per tax cost of regulatory reform and cuts in marginal tax rates on entrepreneurs. The former has no fiscal cost at all; as for the latter the key marginal tax rates are the very top ones, whose tax yield is known to be negligible, with the highest even negative, due to 'Laffer Curve' effects, whereby they stimulate reduction in hours and emigration (Minford and Ashton 1991). This work reveals that the best way to 'soak the rich' is to keep marginal tax rates on them right down; even though this might seem politically difficult, it would 'play well' in the politically important North because of its effects on growth. If accompanied by other general tax cuts, the effects would be larger still and politically highly palatable. For example, a general income tax cut of £10 billion would be fiscally affordable in the long run, as it would raise GDP by 0.8%, bringing in extra tax of about £10 billion (the average marginal tax rate in the UK is about 0.6); hence in the long run roughly paying for itself. The long run tax yield of regulatory reform plus cuts in top marginal rates is far higher

still: with a boost to GDP of about 15%, the gain in tax is an astonishing £180 billion.

In gauging the effect of infrastructure spending of £10 billion per year, we have assumed that this adds to the capital stock by £100 billion over ten years; according to the ONS' latest (2019) Blue Book, the UK ratio of capital to GDP is 2.0. Spent across the UK in proportion to GDP, this new spending would raise the capital stock by 2.5%; the capital income share of 0.3 is also the elasticity of productivity to capital in a Cobb-Douglas production function (assumed to underlie our labour-only specification); hence productivity in response would rise by 0.8%. Applied solely to the North, with half the GDP and capital stock, the productivity rise would be double.

Table 6: Long run Effects of different tax/regulative measures on North and South (Each package costed at £10 billion p.a.)

Percentage change in	GDP_N	GDP_S
Cut standard rate of income tax or VAT or other general income/consumption tax	1.1	0.5
Cut Corporation tax rate	0.8	0.4
Cut marginal tax rate and regulative burden on Entrepreneurs/SMEs	12	21
Increase infrastructure spending in North	1.6	-

Conclusion

We set up a two-region model to study the policy challenge of bringing the North's income up to the level of the South in the UK. The model focuses on labour costs as the driver of output gains through the international competitiveness channel. The empirical results show that the regional model behaviour fits the regional UK data behaviour over the period of 1986Q1 and 2019Q4 by using the demanding Indirect Inference method. We also carry out a Monte Carlo power test, which shows the empirical results we obtain are trustworthy and can provide us a reliable guide for policy reform.

This paper suggests a policy solution for the problem of relatively slow growth in the North. The empirical results from this model suggest that cutting taxes and easing regulation across the whole economy primarily benefits the Northern economy because it has a higher relative supply elasticity of labour: it is relatively labour-abundant. The model's Impulse Response Functions show that in response to tax cuts and labour market reforms GDP in the North increases almost twice as much as GDP in the South. Given that a broad programme of tax cuts and regulatory reform would more than pay for itself in the long run, it must be considered as a highly attractive political agenda.

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