THEME 4:

THE CHALLENGES OF GROWTH-RELATED POLICYMAKING IN A MODERN ECONOMY

INDUSTRIAL POLICY AND PRODUCTIVITY

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Poor productivity performance since the financial crisis is a major concern in the UK. Supply-side policies must improve but this is not a reason to abandon completely the stance which served the UK well in the strong growth period pre-2007. A return to the interventionism of the 1970s however, would be a serious error.

Implications of recent productivity performance

Recent productivity performance has been extremely disappointing and is in strong contrast to the more favourable record in the years up to 2007 (Table 1). Subsequent developments have come as a rude shock. In the first quarter of 2018 (Q1), real GDP per hour worked was only 1.7 percent above the pre-crisis peak level seen in Q4 of 2007. It would have been 21.2 percent higher if pre-crisis trend growth had been sustained (ONS, 2018). The pre-crisis peak of labour productivity was only surpassed in Q2 of 2016. This prolonged stagnation in labour productivity growth suggests that it might be time to review supply-side policy.

Table 1: Rates of Growth of Real GDP/Person and Real GDP/Hour Worked (percent per year)

	Real GDP/Person	Real GDP/Hour Worked
1995-2007		
France	1.70	1.77
Germany	1.54	1.70
UK	2.41	2.09
USA	2.18	2.30
2007-2017		
France	0.20	0.50
Germany	0.94	0.73
UK	0.34	0.18
USA	0.75	1.22

Source: The Conference Board (2018)

The post-Thatcher consensus on supply-side policy, which was shared by New Labour and the Conservatives, prevailed up until 2007. Equally, the subsequent productivity slowdown has developed under very similar policies. The financial crisis does not imply that pre-crisis growth was illusory or somehow unsustainable, which might imply a general policy failure, but rather reflects inadequate financial regulation. Regardless of the cause of the crisis, it has had a significant impact on productivity performance over the lost decade since 2008.

Banking crises reflect market failures in the banking sector combined with a failure of regulation to address them effectively. The problems arise from moral hazard and coordination failures in a context of asymmetric information. The typical pre-crisis symptom is rapid expansion of credit coupled with excessive risk taking. The likelihood of bank failures increases as leverage goes up and the ratio of equity capital to assets falls. The financial crisis of 2007-8 in the UK matches this familiar pattern. Regulation was deficient and leverage soared, with the median ratio of total assets to shareholder claims increasing from around 20 in the 1970s to almost 50 at the pre-crisis peak. However, it should not be inferred that pre-crisis growth was predicated on unsound finance, even though the cost of capital would have been higher with resilient bank balance sheets. Miles et al. (2013) estimate that appropriate capital-adequacy regulation would have reduced GDP by only about 0.2 percent.

Financial crises often have permanent adverse effects on potential output. The period in which the levels effect materialises and growth rates are depressed may be quite long. Oulton and Sebastia-Barrel (2017) found a long-term impact on the level of labour productivity of 1.1 percent per year that the crisis lasts. The crisis may also have had significant temporary effects on productivity performance that have not yet completely evaporated. Redeployment of labour appears to have been a key issue, as workers have moved to firms with inferior productivity characteristics (Schneider, 2018). The Office for Budget Responsibility still thinks that eventually the economy will revert to its previous trend rate of labour productivity growth: it is by no means impossible that this might happen.

To summarise, current policy does not need to be completely reconfigured, but supply-side policies could be improved nonetheless. In earlier work (Crafts, 2015), I argued that there are strengths in regulatory and competition policies and weaknesses in education and skills, infrastructure, taxation and innovation policies. A high priority for improved supply-side policy would be to address the latter group.

In Table 2 I report the results of an – admittedly crude – diagnostic check with a benchmarking exercise which on the whole confirms this view.[1]Absorptive capacity, as it relates to technology transfer, is central to the assimilation and diffusion of new technology. Absorptive capacity is underpinned by education, skills and economic competences including organisational effectiveness, appropriate business models and training. Table 2 suggests a mixed but generally rather underwhelming position with regard to absorptive capacity – relatively low R & D spending, mediocre management quality, poor adult skills but strength in intangible investment. Proposals in the Conservative Government's recent white paper on industrial strategy go some way towards addressing these issues.[2]

[1] The scores in Table 2 are based on a distance measure similar to that used by the World Bank in its Doing Business evaluations. Scores indicate what percentage of the difference between the best and worst performers in the peer group has been achieved. A score of zero means that the UK is the worst in class.

[2] For detailed comments, see Crafts (2018).

Table 2: Indicators of Competitiveness

DTF Score	DTF Score	Performance Level
Logistics Infrastructure (2016)	82.96	4.21 (1-5 scale)
Competition Law and Policy (2013)	82.85	0.123 (0-6 scale)
Product Market Regulation (2013)	80.49	1.08 (0-6 scale)
Intangible Investment (average 2000-13)	79.10	9.0 %GDP
Ease of Doing Business (2017)	76.63	7th/190 countries
Employment Protection (2013)	71.23	1.10 (0-6 scale)
Corporate Tax Rate (2017)	69.49	18.5% effective average tax rate
PISA Maths and Science Score (2015)	57.14	500.5 (500 OECD average)
Management Quality (average 2004-14)	53.23	3.033 (1-5 scale)
Adult Literacy and Numeracy Skills (2013)	42.40	267.2 (267 OECD average)
R & D (2016)	30.97	1.69 %GDP
Tangible Investment (average 1997-2017)	0.00	16.7 %GDP
Annual Hours in Congestion (2015)	0.00	41.5 hours/vehicle

Sources: Crafts (2018)

Notes:
Distance to frontier (DTF) is calculated on a similar basis to World Bank (2018), namely, (Worst – x)/(Worst – Best) but on the basis of performance only in 'old OECD' countries.

Competition Law and Policy is an unweighted average of three components: scope of action, policy on anti-competitive behaviour, and probity of investigation.

Industrial policy was defined by Caves (1987) to encompass public sector intervention aimed at changing the distribution of resources across economic sectors and activities. Thus, it includes both horizontal policies which focus on activities such as innovation, provision of infrastructure etc., and selective policies which aim to increase the size of particular sectors.[3] It seems clear that priority should be given to developing better horizontal industrial policies with a strong focus on facilitating the diffusion of productivity improvements.

Since the onset of the financial crisis, however, there has been a renewed interest in selective industrial policy among UK policymakers. This has gathered pace from Labour's *New Industry, New Jobs* (2009) through the Coalition's *The Plan for Growth* (2011) to the Conservatives' *Building Our Industrial Strategy* (2017). Now there is a distinct possibility of a radical change in supply-side policy: a Corbyn-led Labour government would surely think that selective interventionism is an appropriate antidote to poor productivity performance.

Lessons from the 1970s

The case for selective industrial policies has always been controversial. The modern literature highlights pro-growth arguments in their favour, notably including infant-industry related capital market failures and agglomeration externalities. However, in practice support is disproportionately given to declining industries. A strong tendency towards vote seeking rather than economic efficiency is inherent to the political economy of selective industrial policies. In the 1970s selective industrial policy was in vogue and competition policy was framed in terms of interventions based on a public interest criterion. This period offers valuable lessons.

[3] An excellent survey of the literature on industrial policy can be found in Warwick (2013).

Selective industrial subsidies were skewed towards relatively few industries, notably aircraft, shipbuilding and, latterly, motor vehicles. The high expenditure on shipbuilding is striking since the UK had clearly lost its comparative advantage in this industry. The strong bias towards shoring up ailing industries is well reflected in the portfolio of holdings of the National Enterprise Board (Wren, 1996), in the pattern of tariff protection across sectors (Greenaway and Milner, 1994), and also in the nationalisations of the 1970s. Moreover, policies to subsidise UK high-technology industries with a view to increasing world market share were notably unsuccessful in this period in a number of cases including civil aircraft, which by 1974 had cost £1.5 billion at 1974 prices for a return of £0.14 billion (Gardner, 1976), computers (Hendry, 1989) and nuclear power (Cowan, 1990).[4] Attempts to promote national champions resulted in expensive failures.

Control of mergers was the aspect of competition policy which was notably undermined by the public interest test. This was not well specified but encouraged consideration of whatever was deemed relevant. The Monopolies and Mergers Commission (MMC) could only recommend that a merger be blocked on the basis that it would operate against the public interest, i.e., the burden of proof was on the MMC, and could only investigate a merger if a reference was made by the relevant minister. Yet, there was a widespread belief in government circles that mergers were beneficial because they improved the productivity and international competitiveness of UK business such that competition policy was subordinated to industrial policy (Wilks, 1999). Fairburn (1989) reviewed the overall record and noted that only 25 of 326 mergers which created a market share greater than 25 percent were referred while at least half of those creating a market share of over 80 percent were not referred. Only about 1.6 percent of qualifying cases were either blocked or abandoned by the promoters. Yet, the ex-post evidence was that, on average, mergers did not generate significant improvements in productivity performance (Cowling et al., 1980; Kumar, 1984; Meeks, 1977). A “lessening of competition” test would surely have been preferable.

[4] Concorde and the Advanced Gas-Cooled Reactor were egregious policy errors (Henderson, 1977).

Industrial policy and Brexit

Inside the EU the UK still has control over horizontal industrial policies. It is arguable that there is room for considerable improvement in the details of those policies. EU membership does not preclude reforms to these policies. The obstacles are in Westminster, not Brussels, and are related to UK politics rather than constraints imposed by the EU – so Brexit makes little or no difference.

The situation with regard to competition policy is similar. UK and EU law are perfectly aligned and if the UK remains in the European Economic Area under a soft Brexit nothing much would change. Anti-competitive agreements and abuse of a dominant position will still be prohibited and merger control will continue to be based on a substantial lessening of competition test. In the longer term, however, the UK would be able to reform competition policy and diverge from the EU if it trades on the basis of World Trade Organisation rules.[5] This would allow a return to a public interest approach to competition policy in which implications for competition are not the sole criteria. Issues such as impacts on the prospects of realising scale economies or international competitiveness of UK firms, or impacts on regional balance would become relevant, as in the 1960s and 1970s.

There is an interesting trade-off for a government wanting to make interventionist competition and/or industrial policy. This would require a hard Brexit, which implies higher trade costs, lower trade volumes and a higher cost, equating to 3 or 4 percent of GDP every year, in terms of lower productivity in the long run (Ebell and Warren, 2016). A different supply-side policy would have to counter this cost to make it worthwhile. The key message from the experience of the 1970s is that using the policy freedom from Brexit to return to heavy reliance on selective industrial policy and to abandon a lessening of competition test as the basis of merger control would be serious errors. This means that a soft Brexit has the added advantage of providing a commitment technology that removes the discretion to choose this path.

[5] But probably not if there is a trade agreement.

Conclusions

The post-Thatcher consensus on industrial policy has ended but the future direction of travel is not yet decided. Weak productivity performance gives some urgency to re-consideration of supply-side policy for growth, while Brexit potentially opens the door to a return to the interventionist policy stance of the 1970s.

There are good reasons to improve horizontal industrial policies, especially education and skills, innovation and infrastructure. The proposals in the White Paper on industrial strategy represent some progress with a new approach to technical education, increased funding for R&D, and additional infrastructure investment. A greater emphasis on addressing issues of absorptive capacity would be welcome as the policies evolve.

In the past, selective industrial policies have generally not been successful in terms of promoting better productivity performance, and the use of public interest criteria in competition policy had unfortunate consequences. There are good reasons to keep the current competition policy regime.

REFERENCES

Caves, R. E. "Industrial Policy and Trade Policy: The Connections," in H. Kierzkowski (ed.), *Protection and Competition in International Trade: Essays in Honour of W. M. Corden.* Oxford: Blackwell (1987).

Cowan, R. "Nuclear Power Reactors: a Study in Technological Lock-In." *Journal of Economic History,* 50 (1990): 541-567.

Cowling, K., P. Stoneman, J. Cubbin, J. Cable, G. Hall, S. Domberger, and P. Dutton. *Mergers and Economic Performance.* Cambridge: Cambridge University Press (1980).

Crafts, N. "UK Economic Growth since 2010: Is It as Bad as It Seems?" *National Institute Economic Review,* 231 (2015): R17-R29.

Crafts, N. "Industrial Policy in the Context of Brexit." *Fiscal Studies*, 39 (2018): 685-706.

Ebell, M. and J. Warren. "The Long-Term Economic Impact of Leaving the EU." *National Institute Economic Review,* 236 (2016): 121-138.

Fairburn, J. A. "The Evolution of Merger Policy in Britain," in J. A. Fairburn and J. A. Kay (eds.), *Mergers and Merger Policy.* Oxford: Oxford University Press (1989).

Gardner, N. "The Economics of Launching Aid," in A. Whiting (ed.), *The Economics of Industrial Subsidies.* London: HMSO (1976).

Greenaway, D. and C. Milner. "Determinants of the Inter-Industry Structure of Protection in the UK." *Oxford Bulletin of Economics and Statistics,* 56 (1994): 399-419.

Griffith, R., S. Redding, and J. van Reenen. "Mapping the Two Faces of R & D: Productivity Growth in a Panel of OECD Industries." *Review of Economics and Statistics*, 86 (2004): 883-895.

Henderson, P. D. "Two British Errors: Their Probable Size and Some Possible Lessons." *Oxford Economic Papers,* 29 (1977): 159-205.

Hendry, J. *Innovating for Failure: Government Policy and the Early British Computer Industry.* London, MIT Press (1989).

Kumar, M. S. *Growth, Acquisition and Investment.* Cambridge: Cambridge University Press (1984).

Meeks, G. *Disappointing Marriage: A Study of the Gains from Merger.* Cambridge: Cambridge University Press (1977).

Miles, D., J. Yang, and G. Marcheggiano. "Optimal Bank Capital." *Economic Journal,* 123 (2013): 1-37.

Office for National Statistics (2018), Labour Productivity UK: January to March 2018.

Oulton, N. and M. Sebastia-Barriel. "Effects of Financial Crises on Productivity, Capital and Employment." *Review of Income and Wealth,* 63 (2017): S90-S112.

Schneider, P. Decomposing Differences in Productivity Distributions. Bank of England Staff Working Paper No. 740 (2018).

The Conference Board (2018), Total Economy Database.
Available at: http://www.conference-board.org/data/economydatabase/

Warwick, K. Beyond Industrial Policy. OECD STI Policy Paper No. 2 (2013).

Wilks, S. *In the Public Interest: Competition Policy and the Monopolies and Mergers Commission.* Manchester University Press: Manchester (1999).

Wren, C. *Industrial Subsidies: the UK Experience.* London: Macmillan (1996).

DID THE BREXIT VOTE LEAD TO HIGHER UK INFLATION?

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As soon as the result of the UK referendum on EU membership became clear, sterling depreciated sharply. After the vote, UK inflation increased noticeably. How much of the rise in inflation was due to the referendum? In research with colleagues, we find that the referendum result pushed up UK inflation by 1.7 percentage points. This amounts to a permanent annual cost of £404 for the average UK household.

We find that this increase in living costs arose due to the increase in the prices of imported goods. There is little variation across income distribution, with all income groups hit fairly evenly. However, there is regional variation. Northern Ireland suffered the biggest rise in living costs, due to its exposure to trade with the Republic of Ireland, while London suffered the least, due to the high fraction of non-tradable services in the typical London consumer basket.

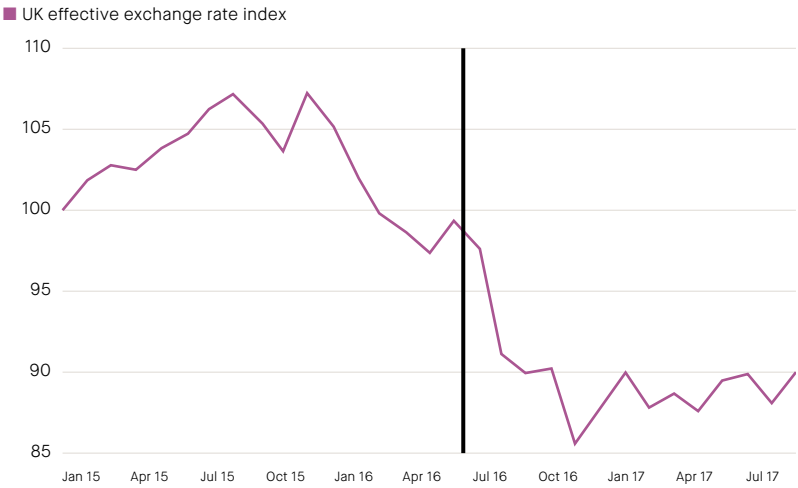
Brexit is forecast to have substantive economic costs for the UK. Most forecasts analyse long-term effects based on the assumption that economic barriers with the continent will increase once Brexit occurs (Aichele and Felbermayr, 2015; HM Treasury, 2016; Dhingra et al., 2017). But it will be many years before the long-term economic consequences of Brexit become clear.

However, this does not mean it is too soon for the Brexit vote to be affecting the UK economy. Economic behaviour depends upon both the current state of the world and expectations about the future. The referendum increased uncertainty and led to a decline in the likely future openness of the UK to trade, investment and immigration with the EU. Consequently, financial markets downgraded their expectations about the UK's economic future, leading to the decline in sterling. Through this channel, concerns about the long-term effects of Brexit have already impacted the UK economy.

Actual costs rather than forecast costs

In recent research (Breinlich, Leromain, Novy and Sampson 2017a), we do not forecast the potential effects of Brexit. Instead, we analyse the effects that *have already materialise*d. We exploit the notion that the result of the referendum vote in June 2016 took most people (including financial markets) by surprise. As soon as the outcome became clear, the pound depreciated sharply. This decline persisted in subsequent months, with sterling still around 10 percent below its pre-referendum value by November 2017, as shown in Figure 1.

Figure 1: Value of sterling, 2015-17



Source: Author's calculations

Notes: Import weighted effective exchange rate calculated using 2013 UK import shares and monthly average exchange rates. Normalised to 100 in January 2015.

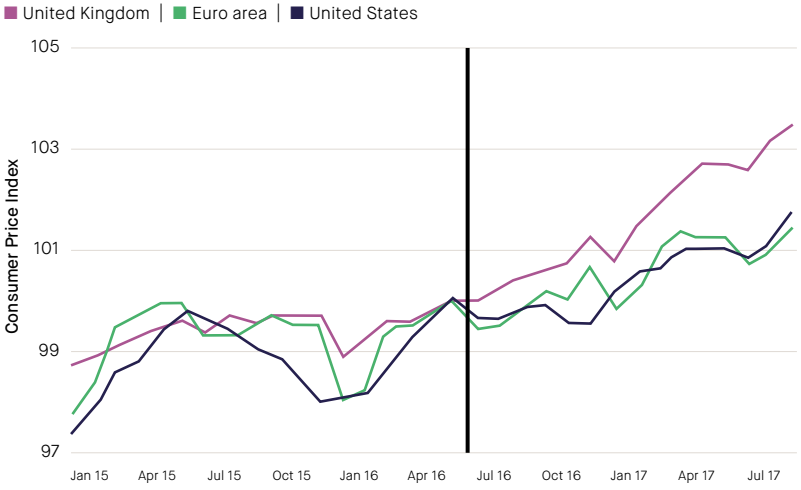
From a researcher's point of view, the referendum and the resulting depreciation of sterling can be regarded as an exogenous macroeconomic shock (a large scale shock unexplained by economic factors) that was sudden, strong and persistent. Our research is the first attempt to trace out the economic consequences of the referendum shock using detailed econometric analysis.

From an exchange rate depreciation to inflation

Economic theory predicts that a strong and sustained depreciation of a country's exchange rate should lead to an increase in inflation. In fact, CPI inflation in the UK rose from 0.4 percent in June 2016 to 2.6 percent in June 2017 and 3.0 percent in October 2017.

But it could be that inflation rose over this period for reasons that are entirely unrelated to the referendum shock, for instance a rise in the global price of oil and other commodities. In fact, inflation also increased in the US and the euro area after June 2016, as shown in Figure 2. It would therefore be wrong to attribute the entirety of the rise in inflation to the referendum shock.

Figure 2: Consumer Price Indices for the UK, Euro area and the US, 2015-17



Source: Eurostat Harmonised Indices of Consumer Prices

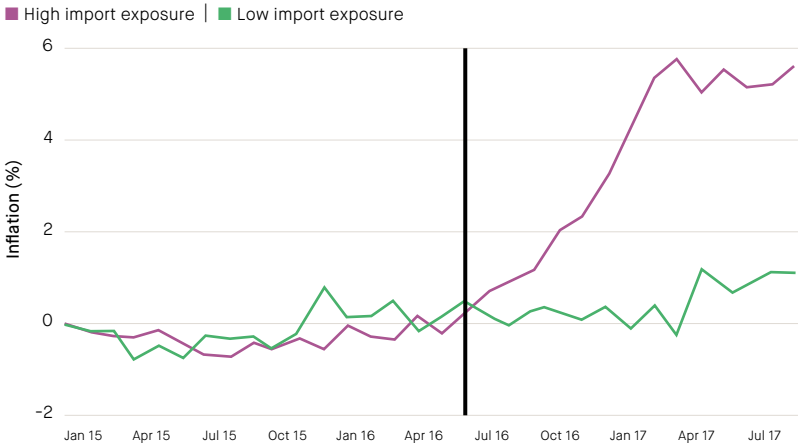
Notes: All indices normalised to 100 in June 2016.

We deal with this challenge in two ways. First, we compare the UK inflation experience to that in the euro area. Second, we use the fact that different types of goods depend to different degrees on foreign imports. For example, imports account for a large share of final consumer expenditure on clothing, footwear and furniture. By contrast, the cost of housing (rents), education, restaurants and hotels is not much influenced by the price of imports. So if the depreciation of the pound was responsible for the increase in UK inflation, we should observe larger increases for goods that are more dependent on imports. To measure import dependence, we calculate the share of imports in consumer expenditure for different products, taking account of both final good imports and imported inputs used by UK producers.

Import exposure and inflation

Figure 3 illustrates our main result. The inflation rate for goods that have a high import exposure shot up after the Brexit referendum (see the solid line). In contrast, inflation for low-exposure goods remained muted (see the dashed line).

Figure 3: Import exposure and inflation, 2015-17



Source: Author's calculations

Notes: High import exposure set includes product groups with import shares above the sample median. Low import exposure set includes product groups with import shares below the sample median. The graph shows the unweighted average inflation rate for each set expressed as the difference from the set average for January 2015.

Econometric analysis confirms the pattern shown in Figure 3. Accounting for differences in product-specific inflation rates that are unrelated to Brexit (such as oil price movements and global inflationary pressures that also led to changes in inflation elsewhere), we find that product groups with higher import shares experienced significantly higher inflation following the referendum. Our estimates imply the Brexit vote increased UK CPI inflation by 1.7 percentage points in the year following the referendum. It would be wise to view the precise magnitude of this effect with some caution, but it is clear that the effect is substantial.

Consequences for households' living standards

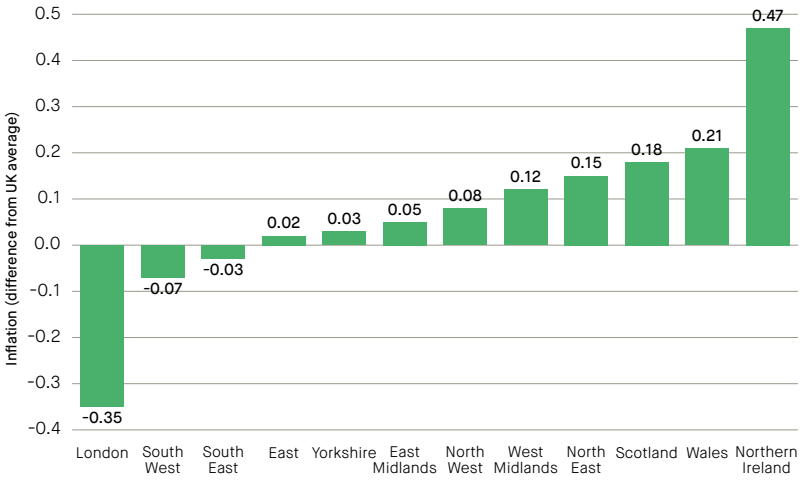
We next look at the impact of higher prices on household expenditure and living standards. We find that the average household has to spend £7.74 more per week, or £404 more per year, to afford the same purchases. By increasing prices without affecting nominal wage growth, the referendum has also reduced real wages, costing the average worker almost one week's wages (4.4 working days' wages, to be precise).

It is clear that the average UK household is already paying the price for voting to leave the EU. But not all households are equally affected. Households that buy a lot of imported goods have faced bigger price rises than households that mostly purchase products produced in the UK. This allows us to study the distributional consequences of the Brexit vote.

We find that the inflation increase is shared evenly throughout the income distribution but not across regions. As Figure 4 illustrates, London is the least affected region with a rise in inflation 0.35 percentage points below the UK average. The increase is smaller for London primarily because Londoners spend relatively more on rent than the average household, which has a very low import share.

In general the north of England has been harder hit than the south. Scotland, Wales, and Northern Ireland were the worst affected areas. Our estimates imply inflation in Northern Ireland increased by 0.47 percentage points more than the UK average because of the Brexit vote. This is because households in Northern Ireland spend relatively more on food and drink, clothing and fuel, which are high import share products, and relatively less on rent and sewerage, which have low import shares.

Figure 4: Inflation differences across regions due to Brexit vote



Source: Author's calculations

Notes: For each region we show the estimated inflation increase due to the Brexit vote minus the average increase for the UK (the average increase is 1.7 percentage points). For example, the inflation increase in London is 1.35 percentage points and thus 0.35 percentage points below the UK average. See Breinlich et al. (2017b) for technical details.

Conclusion and lessons for post-Brexit policymaking

The economic effects of Brexit will depend crucially on the outcome of the ongoing negotiations between the UK and the EU. But our results show that even before Brexit has actually taken place, the referendum shock of June 2016 has already had substantial economic costs. By triggering a sharp depreciation of the sterling exchange rate, the Leave vote has pushed up the costs of imported goods and hence inflation. Our results indicate that higher prices are costing the average household £404 per year. We find that these costs are shared evenly throughout the income distribution but not across regions. London is the least affected region while Scotland, Wales and Northern Ireland experienced the largest increases in consumer prices.

The lesson for policymakers is that Brexit can have unintended consequences for UK inflation. Exchange rates go up and down on a daily basis, and they are typically impossible to predict over short-term horizons. Firms mostly ignore these daily fluctuations. However, major surprises move exchange rates in persistent and quantitatively important ways. The referendum vote to leave the EU is one such example. An unexpected announcement of a hard Brexit without a deal with our European partners would be another one. Thus, the key lesson for policymakers is to avoid sharp exchange rate depreciations as those are most likely to make firms increase prices for consumers.

Of course, exchange rates are not the only way that Brexit can affect UK consumer price inflation. Increases in trade barriers would be another way. This could operate through tariffs imposed on EU imports after Brexit. It could also operate through non-tariff barriers including customs checks and red tape. These would increase costs for UK companies, ultimately feeding into higher prices for UK consumers. Price rises would then be expected both for imported intermediate inputs in the context of pan-European supply chains as well as for final consumer goods.

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REFERENCES

Aichele, R. and G. Felbermayr (2015) "Costs and Benefits of a United Kingdom Exit from the European Union," Bertelsmann Stiftung.

Breinlich, H., Leromain, E., Novy, D., Sampson, T., 2017a. "The Brexit Vote, Inflation and UK Living Standards." Centre for Economic Performance (CEP) Brexit Analysis No. 11, London School of Economics (November).

Breinlich, H., Leromain, E., Novy, D., Sampson, T., 2017b. "The Consequences of the Brexit Vote for UK Inflation and Living Standards: First Evidence." Technical paper, London School of Economics (November).

Dhingra, S., H. Huang, G. Ottaviano, J.P. Pessoa, T. Sampson and J. Van Reenen (2017) "The Costs and Benefits of Leaving the EU: Trade Effects," *Economic Policy* 32: 651-705.

HM Treasury (2016) "The Long-term Economic Impact of EU Membership and the Alternatives," HMSO.

THE BALANCING ACT FOR FISCAL POLICY

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In the three recent general elections, political parties have tried to emphasise their fiscal credibility. They apply the logic of household bookkeeping to suggest that balancing the fiscal budget makes them good economic managers. One might imagine that a political consensus around the need to reduce or eliminate public deficits must have a strong basis in economic theory. But that's wrong.

I emphasise three key policy points arising from my research (McMahon, 2017). First, comparing governments running deficits to households living off credit is misleading. Fiscal policy can be sustainable and debt as a percentage of GDP can even fall despite the government running deficits: it could also be the case that the government needs to run a surplus just to maintain current debt levels. Second, the focus on the deficit takes attention away from the fiscal issues that should be the focus of public debate. Third, the current political debates about the need for fiscal soundness are short-sighted. There are fiscal challenges with huge consequences that barely get a mention. If these challenges are not addressed now, the large adjustment burden shifts to the future, which is a clandestine approach to running large deficits today.

Debt sustainability

The recent fiscal focus in the UK is not new. The fiscal strategy of the UK in 1880-1895 was dominated by the idea of 'sound finance' (Offer 2002, Campbell 2004) and a similar idea underpinned much of the opposition to fiscal deficits in the US context (Lerner, 1943). The factors that determine the evolution of fiscal debt have been known for a long time. The bottom line is that deficits can be sustained if there is sufficient economic growth.

This is because the measure of government debt analysed matters. The amount of debt normalised by the capacity of the whole economy to repay it is more important than the Sterling amount of debt (nominal debt). We typically normalise by Gross Domestic Product, giving us the debt-to-GDP

ratio, and use this even though the ratio can be misleading when GDP is fluctuating cyclically.

To explore the drivers of the evolution of the debt-to-GDP ratio, we can use the Domar framework. This framework, explored more fully in McMahon (2017), is a simple accounting framework that emphasises the key roles played by:

- fiscal choices about spending and taxation (the primary fiscal balance);
- the growth of the economy, which depends on far more than the fiscal decisions;
- interest rates on government debt and the financing needs of the government.

Higher deficits, lower economic growth and higher interest rates all contribute to a growing, and less sustainable, debt. As the economic situation changes, so does the predicted path of debt to GDP and hence the fiscal options. It may not be necessary to eliminate a fiscal deficit to reduce a country's debt burden as a percentage of national income if growth offsets the effect of higher deficits.

Using the basic accounting relationship does not allow for feedback between fiscal policies and the macroeconomy: fiscal policy affects the macroeconomy, which itself affects fiscal outcomes. These feedback effects were used to justify austerity and also to criticise it. The concern was that as the UK fiscal position deteriorated the interest rate on UK debt (both public and private) would increase and the debt could grow unsustainably, so austerity was the solution to ensure sustainability. The counterargument was that cutting fiscal expenditure and raising taxes would weaken economic growth, which would make a given path of fiscal deficits less sustainable. In McMahon (2017), I argue that while both are possible outcomes, in the case of the UK in 2010 the counterargument, against austerity, is more convincing.

A simple message that obfuscates the choices voters face

Of course, fiscal policy also reflects political preferences. As Stiglitz said of the then-chancellor, "politicians like George Osborne are driven by ideology; the national deficit is an excuse to shrink the state because that is what he wanted anyway" (Valley, 2013). But Osborne had already made clear that low taxes were a preference of his (and of his party). Speaking before David Cameron's Age of Austerity address at the 2009 Conservative Spring Forum, Osborne (2009) said: "We Conservatives don't need convincing that higher tax rates discourage enterprise and damage economic activity. Like you, I believe in the virtues of lower taxation."

The public were sold the austerity policy as necessary for reasons of sound finances. Using the analogy of deficit-running governments like imprudent households has one big advantage – it is simple and the public can relate to it easily. It certainly helped the Coalition Government to convince the public of the need for austerity, and shift other parties to seek to establish their own fiscal credibility by promising to balance the books too.

Unfortunately, the emphasis on sound finances is one of the more disruptive narratives in UK policy today because it distracts from the real political and fiscal choices. Debt and the cost of servicing debt are important but even if both parties were to aim for the same fiscal outcomes, they differ in terms of the paths and composition of the revenue and expenditure. These differences have very real consequences for the electorate. But the differences are lost in the simple narrative that debt needs to be reduced. The focus on debt reduction as the goal of fiscal policy diverts the discussion away from the important debates on tax and spending that should be clear in every political party's platform.

Today's deficit will have to be paid for by future generations but deficit financing is not, in and of itself, reckless. Discussions of fiscal policy should focus on the proposals on spending and taxation, not just the deficit, so that the electorate can make an informed choice.

A focus on government investment?

The assets side of the government balance sheet merits as much attention as the liabilities side. The government finances deficits by borrowing. The interest rate it will have to pay on the money it borrows depends on the market's judgement about its ability to repay the loan, which in turn depends on whether the market thinks the government is spending on things that will enhance its ability to repay the debt, or lead it down a path of needing to borrow more and more money to cover its liabilities. Debt that comes from acquiring assets is different to debt from financing current spending. Borrowing to fund infrastructure investments with a high economic return is unlikely to cause alarm to financial markets. Such assets should generate a revenue stream (taxes, fees or profits) to cover debt repayments, and/or boost growth. This would make debt dynamics more favourable.

For example, UK government spending on transport infrastructure could make transport faster, reduce the cost of distribution and expand the reach of businesses in terms of factor inputs and markets. If this improves companies' profitability, then tax revenues increase and offset the higher government spending.

The UK lags behind other advanced economies in terms of energy, education, health and transport infrastructure (Offer, 2002). Rising house prices and a shortage of social housing suggest that there is a role for government to spend in ways that would increase the housing supply, either directly or by inducing more private investment.

To the extent that the political parties are aiming for a balanced budget, it is encouraging that both main parties chose to focus on current deficits which exclude government investment. This implies an acceptance that government investment, such as much-needed infrastructure investment, could be financed with debt. But the parties differ in the views about the amount of government investment that is appropriate, so this apparent agreement masks potentially large differences in views of the total deficit, and the desirable ratio of debt-to-GDP.

The deficit-balance narrative which has taken hold in UK politics ignores much of this important issue.

Other longer-term challenges

This narrative also misses other important longer-term challenges that need to be built in to current fiscal policy. For example, adaptation to climate change means adjusting incentives in the tax system as well as preparing for the risks to infrastructure from rising sea levels and increases in the frequency and severity of extreme weather.

Another example is the ageing population, which is driven by longer life expectancy and lower fertility rates. In terms of fiscal policy, spending on health, social care and pensions will increase (see, for example, Amior, Crawford, and Tetlow (2013) and Office for Budget Responsibility (2017)). The Institute of Fiscal Studies (2018) estimates that the UK Government will need to increase real health-related public spending by 2-3 percentage points of GDP by 2033-34. At the same time, with a smaller proportion of the population working, income tax revenue will decline. Together, these demographic pressures will widen budget deficits.

Postponing action on these longer-term challenges is not ideal even if the typical short-horizon of parliamentary cycles encourages it. Postponing action defers the burden of paying for part of the adjustment from today's generation to future generations. In the end this has the same impact as a deficit, even if debt statistics will not record it as such.

Conclusions

Fiscal policy is an important tool that helps to shape the UK economy. Beyond the provision of certain vital public goods, economics does not provide a clear support for either a big government (large amount of public spending) or a small government. People have different preferences about the desirable level and composition of spending and tax today, and how much to defer the burden of today's spending to future generations via deficits.

Voting is supposed to reveal the electorate's preferences but the political narrative in the UK is hampered by a simplistic focus on eradicating the deficit, leaving little for voters to choose between. There are numerous challenges on the horizon for fiscal policy that are not being included in the public discussion. Voters need an informed discussion that gives them a clear choice about the path each party proposes to take on the path to fiscal sustainability.

REFERENCES

Amior, M., R. Crawford, and G. Tetlow. "The UK's public finances in the long run: the IFS model." *IFS Working Papers* W13/29. Institute for Fiscal Studies (2013). Available at: https://ideas.repec.org/p/ifs/ifsewp/13-29.html

Campbell, T. C. "Sound finance: Gladstone and British government finance, 1880-1895." PhD thesis, London School of Economics and Political Science (2004), United Kingdom.

Institute for Fiscal Studies. "Securing the future: funding health and social care to the 2030s," IFS Report (2018). Available at: https://www.ifs.org.uk/publications/12994

Lerner, A. P. "Functional Finance and the Federal Debt." *Social Research* 10:1 (1943): 38-51.

McMahon, M. "`Sound Finances': Strategy or Soundbite." *National Institute Economic Review,* 241:1 (2017): R13–R32.

Offer, A. "Why has the Public Sector Grown so Large in Market Societies? The Political Economy of Prudence in the UK, c. 1870-2000." *Economics Series Working Papers 2002-W44,* University of Oxford, Department of Economics (2002).

Office for Budget Responsibility. "Fiscal sustainability report: Presented to Parliament pursuant to Section 8 of the Budget Responsibility and National Audit Act 2011. January 2017." Office for Budget Responsibility (2017).

Osborne, G. "Shadow Chancellor's Speech." Speech delivered to the Conservative Spring Forum, April 26, 2009. Available at: http://www.politics.co.uk/comment-analysis/2009/04/27/tory-spring-conference-speeches-in-full. Last accessed June 2017.

Valley, P. "Osborne's First Budget? It's Wrong, Wrong, Wrong!" *The Independent*. June 26, 2013. Available at: http://www.independent.co.uk/news/uk/politics/osbornes-first-budget-its-wrong-wrong-wrong-2011501.html

ARE WE DOING ENOUGH TO PREVENT FUTURE FINANCIAL CRISES?

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The decade since the financial crisis of 2008 has been one of unusually poor economic performance in the UK. The loss is immense; 10 years on, the level of UK GDP is somewhere between 15 and 20 percent below the pre-crisis trend and it shows no sign of returning to it. If the income is gone forever, then at a 3 percent real discount rate (very high relative to real gilt yields, but near the official discount rate set by the UK government), the present net loss is between 450 percent and 600 percent of annual GDP.

The cost of the financial crisis has been enormous, so we should be prepared to spend a lot to reduce the chances of that happening again.

The financial crisis was not a general crisis of capitalism. Some believe that it revealed a systematic tendency for free markets to create instability that builds up and causes crashes that greatly reduce living standards – in other words, that capitalism itself is inherently flawed. A better explanation is that the financial crash revealed huge problems that were largely specific to banks, which then caused widespread harm outside the financial sector. Companies outside the financial sector were hit by problems that originated in banks. They were not the source of those problems. The problems were largely to do with massive leverage – a mountain of debt on a sliver of equity capital – in banks that held some unusually risky assets.

The main cause? Lack of capital in banks

When a bank has financed nearly all of its assets with debt – deposits, bonds and loans from other banks – it only takes a small drop in the value of those assets, for those who have financed it to start losing money. Just before the crisis, the average level of gearing (assets to equity) of banks in the UK was not far off 40: some banks had leverage well above 50. When a bank has leverage of 40 it has financed 97.5 percent of its assets with debt and has an equity cushion against losses of only 2.5 percent.

Nearly all of the debt banks held was short term, meaning that depositors could effectively withdraw it within a few weeks. It is rational to withdraw debt funding if you think that a bank may not have enough assets to repay you. This is why, once people began to doubt the true value of assets in banks after the fall of Lehman Brothers in September 2008, bank funding began to dry up. The banking crisis then hit with frightening speed. In its wake, loan availability dried up, confidence took a huge hit, and a recession occurred that in its initial intensity matched the onset of the Great Depression.

If banks had had much more equity funding, fewer people would have withdrawn money and the crisis would have been much less serious. With enough capital there would have been no crisis.

What has been done since?

There have been moves towards requiring banks to have higher capital – and some say the capital requirements are now much higher. But focusing on how much higher bank capital requirements are relative to a system which allowed capital to be wafer thin seems rather misguided. It is the level of bank equity capital that matters. Under the international Basel III system of capital requirements – agreed in the period since the crisis and gradually being implemented by central banks – large banks need to have equity funding that is no less than around 10 percent of their risk weighted assets. But risk weights on many assets are low so equity can be as little as just a few percentage points of total bank balance sheets. A leverage rule is also being implemented that will allow equity of just 3 percent of assets, that is, gearing of just over 33.

By the standards of the vast majority of corporations this is massive leverage. It will still be the case that under the new international agreements a loss of 2 percent or so of the value of assets leaves a bank teetering on the edge of insolvency.

In the UK the Bank of England, as well as implementing the internationally agreed system of bank capital requirements, also undertakes its own stress tests of banks. These tests may replace the Basel III rules as the effective

constraint on banks, which is good since they are a bit tougher. But it would surely be better to get the day-to-day rules right, rather than rely on complicated and data intensive annual tests of whether banks can withstand a particular risk scenario that varies from year to year.

What should be done?

There is a great deal of analysis which finds that Basel III rules generate levels of equity funding of banks far below what would be ideal (see, amongst others, Admati and Hellwig (2013); Admati et al. (2010); Miles et al. (2013); Sarin and Summers (2016); Vickers (2017); and Wolf (2017)). Miles et al. (2013) suggest equity should be at least 20 percent of risk weighted assets (RWA); Admati and Hellwig say more than that is needed. Bank of England analysis suggests that 20 percent of RWA would be right, until allowance is made for the orderly wind down of banks in case of near-insolvency, which brings the figure down to close to the Basel III levels (see Brooke et al. (2015)). But the orderly wind-down of banks, and other rules requiring some debt funding to be bailed-in under stressed conditions, are untried. It seems premature to allow for their effective operation to reduce the amount of equity required of banks. No one doubts that equity is an effective buffer against bank losses and stabilises the banking sector, and thus the whole financial system: bail-in debt that converts to equity or shares in losses ahead of other depositors is untried.

Surely it is better to err on the side of caution as regards equity funding of banks, given the huge costs of financial crises. After all, what is the real resource cost of banks using more equity? Banks say it is huge, but every serious study says that the economic cost of having banks use more equity than the Basel rules specify is small. It is crucial to distinguish between private and social costs of resources: it may be rational for banks to have high leverage, particularly if that debt is partially insured by governments, but not for the rest of us.

Alternatives and speculative futures

Requiring banks to use more equity funding seems a better way forward than other radical and untried alternatives, such as reducing the uses banks

make of their funding to the safest government bonds and reserves at the central banks. Under a narrow banking option, who would replace banks in their role as lenders to companies and households?

There is an alternative route that the advocates of narrow banking want us to use, and that might be followed if central banks offer accounts to households. This could mean that the great majority of payments by companies and households would be settled directly between accounts held at the central bank. It is possible that a majority of people would want a central bank deposit account linked to payments, made feasible by massive advances in IT – one aspect of which is blockchain technology. But what would commercial banks then look like?

Will they offer risky savings vehicles but only for the risk lovers who want something beyond the safe central bank facility? Could we then get rid of deposit insurance? Would banks become more like mutual funds? Maybe this would be an efficient way to finance mortgage and corporate lending. Yet asymmetry of information between banks and providers of funding might make more conventional bank debt – with some form of deposit insurance – the only feasible option.

Back to steps to take now...

All that is a bit speculative. What is more concrete is the advantage of moving towards much higher equity use by banks *now.* Some progress has been made on this but we are still painfully short of where we should be, 10 years after the crisis.

One of the stranger possible impacts of the UK leaving the EU is that a transition towards much higher bank capital becomes easier. This is because when Basel III passed into EU law it became, bizarrely, a maximum harmonisation directive. That meant that a rule that was too soft became one that countries in the EU had to stick to *and could not go beyond*. If the UK leaves the EU – which obviously poses economic risks – at least we might no longer need to use those work-arounds.

REFERENCES

Admati, A and M. Hellwig. *The Bankers New Clothes: What's Wrong with Banking and What to Do About It.* Princeton University Press (2013).

Brooke, M., O. Bush, R. Edwards, J. Ellis, B. Francis, R. Harimohan, K. Neiss, and C. Siegert. "Measuring the macroeconomic costs and benefits of higher UK bank capital requirements." Bank of England Financial Stability Paper No. 35 (2015).

Miles, D., J. Yang, and G. Marcheggiano. "Optimal bank capital," *The Economic Journal,* vol 123 (2013): pp 1-37.

Sarin, N. and L. Summers. "Understanding Bank Risk Through Market Measures." Brookings Papers on Economic Activity. Fall 2016.

Vickers, J. "Banking reform nine years on." CEPR Policy Portal. September, 2017.

Wolf, M. "Banking remains far too undercapitalised." *Financial Times*. September, 2017.

THE MACROECONOMICS OF UNCERTAINTY

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Economic decisions to invest time, money or other resources are usually made on the basis of expected outcomes. Firms build manufacturing plants on the basis of expected demand for goods; individuals relocate on the basis of expected well-being; investors direct funds to R&D on the basis of expected gains in innovation and productivity and ultimately profit. However, if there are conditions that might confound the expected outcomes, then these parties will invest with less confidence, commit fewer resources, or not invest at all. Uncertainty about future demand for good, services, labour and the overall level of economic activity is normal in a complex world subject to random variation but also can have negative macroeconomic effects.[1]

In particular, *policy* uncertainty can be detrimental to the economy. Some uncertainty is outside of the control of policymakers and likely irreducible, which is why economic forecasting is hard. Other uncertainty is a direct result of government policymakers changing views, or a change in who is making the policy.[2] Policy uncertainty occurs when a policy is clearly needed, for example, where investors know they will be subject to regulations, but the government doesn't make the regulations in time. Investment will likely be delayed until there is clarity about the regulatory policy.

The impact of uncertainty can be seen in capital and labour investment decisions, household decisions, and financial prices. Studies have used a range of different measures of uncertainty such as stock market volatility measured by the VIX index (Bloom, 2009), perceived uncertainty measured using reports in the media (Baker, Bloom and Davis, 2016), and forecaster uncertainty and disagreement (Scott, 2013, and Jurado, Ludvigson and Ng, 2013). The challenge in empirical analysis of uncertainty is that it tends to

[1] One important caveat concerns the academic use of the term uncertainty to apply to Knightian uncertainty. In this discussion, I shall use the lay definition of uncertainty which is sometimes what some academics call risk (something that is not certain to happen but for which it is possible to assign probabilities to the possible outcomes, or known unknowns), and sometimes it is what is called Knightian uncertainty (the unknown unknowns).

[2] This is true in the case of other macroeconomic policies such as monetary policy as discussed in Husted, Rogers and Sun (2017).

rise during recessions, so researchers have to account for possible reverse causation (endogeneity) problems. The aforementioned studies do this in different ways.

Investment channels

The main channel of uncertainty is identified as investment in seminal work by Dixit and Pindyck (1994). They highlighted the "option value" of uncertainty: in uncertain times, it is beneficial to wait until more information about a project is available before making a partially-irreversible decision. Or, where a firm can choose between different locations in which to invest, the decision may be made in favour of the area which offers greater certainty.[3]

Conversely, some argue that in the presence of substantial time to build and with opportunity to abandon projects, uncertainty may induce a race to invest (Bar-Ilan and Strange, 1996). The return to an investment depends on the future price of the output. Greater uncertainty, over a longer horizon, increases the likelihood that future prices will rise very high. Because there is a long lead time between investment and products reaching the market (the assumed time to build), those producers already in the market when prices are high will extract large returns. This means that in the face of uncertainty, and so long as the investment can be easily abandoned, it makes sense to initiate the project and then abandon it as more certainty about the future output price develops. While this may be the effect in a few industries, the empirical evidence is that the negative effects of uncertainty dominate.

[3] *The Guardian* (2018) reports the case of a Bristol-based sports clothing company which has decided to invest abroad in the face of Brexit uncertainty. "In anticipation of no deal, he has opened an office in Bucharest with seven staff and he is poised to sign the final paperwork on a new warehouse in Nuremberg to allow him to continue importing and exporting to the continent tariff-free."

The race-to-invest result hinges crucially on the balance of upside and downside risks, as well as on how easily the project can be abandoned. Bernanke (1983) focused on the effect of downside uncertainty. His idea was of a bad news principle such that investors, contemplating an irreversible investment decision, will focus on the potential unfavourable outcomes. This suggests that there is a difference between a negative skew and a mean-preserving increase in uncertainty, which is relevant for the UK today because the negotiations on Brexit have carried much more economic downside risk than upside risk.

Also relevant is the decision between short- and long-horizon investments, and the potential to switch between them. Investment in new products and new processes that take longer to realise a return may be more likely to be delayed. But to the extent that such investments deliver productivity enhancement, uncertainty can be particularly damaging. Barrero, Bloom and Wright (2016) find that policy uncertainty reduces R&D investment. This damages current growth a little and future growth a lot.

As discussed in Harford (2011) and Alvarez (2018), there is also potential for unintended positive spillovers from trying to innovate. The idea is that sometimes in trying to do something different, you discover a new market or process that traditional searches for investment opportunities would have missed. The $2000-a-night Ice Hotel in Sweden is an example of such a discovery, as are many innovations in military strategy.

Employment channel

The same effects influence labour decisions. Reducing investment in staff can lead to higher costs in the future, if innovation or expansion is hampered by staff shortages, or skill deficiencies.

Misallocation effects

Allocation of resources, shown to be an important determinant of aggregate productivity (Fernald and Neiman, 2011; Baqaee and Farhi, 2018), may also be adversely affected. In uncertain times there is less reallocation of resources from low to high productivity firms. The challenge in the UK, as highlighted by the work of Bloom, van Reenen and others is that the productivity differences between the UK and the US or Germany are not at the top end, but at the bottom end of the productivity distribution. This has a knock-on effect on employees who may otherwise benefit from working with better technology and the training that goes with it.

Financial channel

Uncertainty about an investment means that the range of possible gains or losses is bigger. Investors will only commit if the expected payoff justifies the risk, and lenders may ration credit (Stiglitz and Weiss, 1981). Firms that are already under financial constraints may be particularly affected, meaning that these firms might not be able to augment investment projects if they face unexpected costs, or to undertake new opportunities that arise (Arellano, Bai, and Kehoe 2012, and Christiano, Motto, and Rostagno 2014).

And this is especially problematic for smaller firms that typically have no alternatives to bank financing. The Bank of England Inflation Report from August 2018 stated: “Weak demand for investment appears to have been reflected in slowing growth of bank lending to companies since mid-2016.” Larger firms can access the bond market for funding.

Household channel

Uncertainty is not just a business phenomenon; it also affects household behaviour, especially saving. Households tend to save more as uncertainty increases, which has knock-on (multiplier) effects on the macroeconomy, through reduced consumption and residential investment demand (Bansal and Yaron 2004). Giavazzi and McMahon (2012) showed that delaying pension reform led to higher saving and even some labour supply response in the affected population in Germany.

While some might argue that such effects actually boost the economy in the longer run (through higher capital investment), this ignores how the preceding channels affect the financial intermediation of funds into investment and the reduced investment demand. Moreover, some of the increased saving is invested in foreign countries (Fernández-Villaverde, Guerrón-Quintana, Rubio-Ramirez, and Uribe, 2011).

Policy uncertainty

While some uncertainty is a defining feature of the macroeconomic landscape, policy choices can exacerbate or dampen this uncertainty. For example, monetary policy reacts to economic conditions. But financial markets may be uncertain about how policymakers will react to economic conditions, which becomes a source of economic uncertainty. An expensive and highly uncertain planning process in some areas of the UK may discourage residential investment despite a clear undersupply of housing.

Uncertainty about Brexit has likely affected investment in the UK. Because the UK economy is so interconnected with other EU nations, the uncertainty has affected every aspect of firms' business environment: many firms are discovering for the first time how exposed their business is to membership of the EU.[4] Impacts include uncertainty about continued participation in global supply chains, the supply of labour across the range of skill levels, and access to services and critical inputs of goods – especially those that are highly perishable or strictly regulated, such as food and medical supplies. However, the UK government has not only failed to reduce the

[4] For example, the City of London is reliant on the hospitality sector for hotels and restaurants used as a by-product of the type of business deals conducted.

uncertainty about the outcome of Brexit negotiations, but has occasionally exacerbated uncertainty by proposing policy that is clearly impossible under any current or future legal framework. For example, the UK cannot have frictionless trade with the EU and an independent trade policy in goods with countries outside the EU.[5] Firms that trade with the EU and the rest of the world have been left wondering what will happen, while the Government has pursued a policy that most in industry or policy know can't happen. This is additional policy-generated uncertainty.

However, economists and policymakers are not, typically, the best at communicating the uncertainty attached to their views or the effects of their policy, and politicians rarely want the uncertainty revealed. Lyndon Johnson is said to have told an economist conveying uncertainty around a forecast that "Ranges are for cattle. Give me a number."[6]

It is impossible to remove all economic uncertainty. The key message of this article is that we should all remember that reducing the elements of policy uncertainty that are more subject to control by policymakers can actually benefit the UK economy. This is especially important for politicians and policymakers to remember as we enter a prolonged period of negotiation with the EU on the post-Brexit economic relationship, as well as a period of negotiating trading relationships with other countries. Steps should be taken to try to eliminate as much of the self-imposed damage from policy uncertainty as is possible.

[5] https://www.ft.com/content/6dca820a-6979-11e8-b6eb-4acfcfb08c11

[6] https://harvardpress.typepad.com/hup_publicity/2013/01/public-policy-in-an-uncertain-world-manski.html

REFERENCES

Alvarez, S. (2018) "Knightian Uncertainty, Entrepreneurial Rents, and Competitive Advantage." Presentation at Rebuilding Macro Conference, London, October 2018.

Arellano, C., Y. Bai, and P. Kehoe (2012) "Financial Markets and Fluctuations in Uncertainty." Federal Reserve Bank of Minneapolis Research Department Staff Report: March 2012.

Bank of England (2018), Inflation Report August 2018.

Bansal R., and A. Yaron (2004), "Risks for the Long Run: A Potential Resolution of Asset Pricing Puzzles." *The Journal of Finance,* Vol. 59(4). Pages: 1481-1509.

Baqaee, D. R. and E. Farhi (2018), "Productivity and Misallocation in General Equilibrium." Centre for Macroeconomics Working Paper.

Barrero, J. N. B. and I. Wright (2016) "Short and Long Run Uncertainty," mimeo, Stanford University.

Christiano, L. J., R. Motto, and M. Rostagno (2014). "Risk Shocks." *American Economic Review,* Vol. 104, No. 1. Pages: 27-65.

Cieslak, A., S. Hansen and M. McMahon (2018) "The Sources and Effects of Monetary Policy Uncertainty," work in progress, University of Oxford.

Dixit, A. K. and R. S. Pindyck (1994) *Investment under Uncertainty,* Princeton University Press: Princeton, New Jersey.

Fernald, J. and B. Neiman (2011). "Growth accounting with misallocation: Or, doing less with more in Singapore." *American Economic Journal: Macroeconomics* 3(2), 29-74.

Fernández-Villaverde, J., P. Guerrón-Quintana, J. F. Rubio-Ramírez and M. Uribe (2011) "Risk Matters: The Real Effects of Volatility Shocks." *The American Economic Review,* Vol. 101, No. 6, October 2011.

Giavazzi, F. and M. McMahon (2012) "Policy Uncertainty and Household Savings." *The Review of Economics and Statistics,* 94(2):517-531, May 2012.

Harford, T. (2011), *Adapt,* Farrar, Straus and Giroux, May 2011.

Husted, L., J. Rogers, and B. Sun (2017), "Monetary Policy Uncertainty." FRB International Finance Discussion Paper No. 1215.

Knight, F. H. (2009). *Risk, Uncertainty, and Profit.* John McClure, ed. Kissimmee, Fla.: Signalman Publishing.

Manski, C. F. (2013) *Public Policy in an Uncertain World.* Harvard University Press.

O'Carroll, L. (2018) "'Brexit is a business bankrupter': small firms brace for no deal." *The Guardian,* 18 December. https://www.theguardian.com/politics/2018/dec/16/brexit-is-a-business-bankrupter-small-firms-brace-for-no-deal

Stiglitz, J. E. and A. Weiss (1981). "Credit Rationing in Markets with Imperfect Information." *The American Economic Review,* Vol 71, No. 3, June 1981. Pages: 393-410.