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How to do industrial strategy

A guide for practitioners

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Introduction: Governments end up with an Industrial Strategy so we might as well try to do it properly

The origins of modern Industrial Strategy in the UK can be traced back to Harold Macmillan's creation of the National Economic Development Council which first met in 1962 and was abolished in 1992. In his diary for September 1961 Harold Macmillan reported a discussion between his ministers about creating the new National Economic Development Council and noted:

> *"a rather interesting and quite deep divergence of view between Ministers, really corresponding to whether they had old Whig, Liberal, laissez-faire tradition, or Tory opinions, paternalists and not afraid of a little dirigisme."*[1]

That division of opinion continues, in some form, to this day. The Treasury are usually sceptical – their objections a typical mix of high economic principles and wariness of a departmental rival in Whitehall shaping policies for the real economy. However there does appear this time to be a genuine Treasury commitment to Industrial Strategy as a key tool for growth. And rigorous Treasury analysis can help focus on the policies with greatest economic returns.

Across the media and politics there is a folk memory of disastrous attempts at picking winners - the collapse of British Leyland forty years ago still hangs over the debate. But, just as in Hollywood, sometimes the sequel can be better. Margaret Thatcher promoted the European Single Market and went to Japan offering subsidies and tax reliefs to their car companies to set up in the UK to access the European market. Getting Honda, Toyota and Nissan here to revitalise the British car industry is a case study in successful industrial strategy.

1 H Macmillan, At the End of the Day: 1961–1963, Macmillan Memoirs Vol. 6, Macmillan, January 1973, pg 37.

Most Governments find themselves operating some kind of Industrial Strategy even if they are initially very reluctant. They may start by thinking that the one and only legitimate form of Industrial Strategy is just to liberalise and open up the economy. Get rid of the controls and regulations holding things back, cut taxes, remove trade barriers and let business get on with it. That is what many businesses say they want. It apparently avoids having to take decisions about particular business sectors and technologies. But gradually they find themselves going beyond that. Even if the aim is 'horizontal' initiatives which apply across the whole economy, many actual decisions slide into being 'vertical': they are about particular places (where exactly to invest in transport links); particular sectors (which sectors are priorities for trade deals); particular regulations (what are the actual regulations holding back key technologies). It makes sense to have some sort of framework for taking these sorts of decisions and that is what Industrial Strategy tries to provide.

When a Government embraces Industrial Strategy and allocates some public money it then faces the next problem – across Whitehall and beyond everyone tries to get money for their programmes by claiming they are Industrial Strategy. But Industrial Strategy should be additional to the normal business of Government – and the OBR will only count it as raising the growth rate if something extra is being done with additional real effects. That means there needs to be some distinctive and well understood purpose for industrial strategy. 'Boosting growth' covers too much. More focus is needed. Sometimes the more specific objective is spreading growth out beyond the prosperous South East. But regional policy is very hard: in the end people tend to move to where the good jobs are, rather than Governments sending the good jobs to where the people are. It is best tried when the economy is already growing strongly. It is a legitimate angle to consider but it cannot be the strategic driver, especially at this stage. The key problem behind Britain's poor growth performance since the Financial Crash is low productivity, a key reason for which is low business investment. Low productivity and low investment afflict the public sector too but Industrial Strategy focusses above all on the private sector.

So to sharpen up Industrial Strategy it should be about boosting business investment to boost productivity.

The Resolution Foundation's Economy 2030 report set out how serious Britain's productivity problem is.[2] We found the UK's productivity gap with France, Germany and the US doubled in the 12 years after the financial crisis, to 18 per cent, costing £3,400 in lost output per person. Virtually all the productivity gap with France is explained by French workers having more capital. Low investment pre-dates the crash – in the 40 years to 2022, total fixed investment in the UK averaged 19 per cent of GDP, the lowest in the G7. If UK business investment had matched the average of France, Germany and the US since 2008 – equating to just over 2 per cent of GDP per year – our GDP would be nearly 4 per cent higher today. That is enough to raise average wages by around £1,250 per year.

That is why boosting investment and productivity should be the key aim of Industrial Strategy.

Industrial Strategy does not claim that Governments can plan the economy – the sheer detail of the National Economic Plan exactly 60 years ago now looks absurd. But there are good arguments of principle for Government playing an active role. Government has the greatest capacity to pool and share risk. That is why it stands behind insurance companies for special risks too great for them, such as terrorism or major flooding. It's also why the welfare state developed when it became clear that friendly societies were not going to be able to bear all the risks of improvements in life expectancy for their members. And Government bears risk in the development of science and tech before it is commercially investible – the US is a conspicuous example of this. Industrial Strategy involves rigorous assessment of the risks Government should bear and the risks it should leave to individuals and business. That key test can be applied specifically to business investment: the aim is to promote genuinely additional investment on top of what would have happened anyway.

2 Resolution Foundation & Centre for Economic Performance, LSE, Ending Stagnation: A New Economic Strategy for Britain, December 2023

Michael Heseltine and then Peter Mandelson led the way in developing modern industrial strategy.[3] The Coalition is a good example of the emergence of an Industrial Strategy. We did not have a plan for one when we arrived in the Business Department in 2010. Vince Cable was an 'Orange Book' Liberal with some wariness of what Government could do. I had begun my career as an official in the Treasury and then Margaret Thatcher's Policy Unit and had all the classic objections to them. But gradually we developed one. Then Greg Clark as Secretary of State produced one of the most rigorous Industrial Strategy White Papers setting out his approach, oriented around challenges.[4] The new Government's Green Paper is a good account of many possible approaches to Industrial Strategy.[5] Now the task is to turn that into a White Paper with a clear strategic purpose and real practical proposals. The Chancellor's speech of 29th January contained an impressive range of specific announcements but there is still a need for a clear strategy. This was reinforced by her Spring Statement which particularly promoted defence spending as a key policy tool. Many key technologies are dual use. The renewed significance of the security angle gives extra purpose to Industrial Strategy.

The many previous initiatives are a useful resource to draw on because the Treasury has rightly insisted on their evaluation. This paper draws on assessments of an extraordinary variety of policies and programmes, some of which even appear to have worked. There is however the risk of a smorgasbord of different ideas which don't add up to a coherent strategy. A purist focus on one single instrument could however end up excluding quite useful programmes. The approach proposed below is a pragmatic mix of approaches but with a key criterion for ultimate decisions on the policy mix – does it boost investment and productivity?

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3 Peter Mandelson as Business Secretary published New Industry, New Jobs in April 2009. This can be found here: Department for Business, Innovation and Skills (BIS), New Industry, New Jobs, April 2009.
4 UK Government, Industrial Strategy White Paper: Building a Britain fit for the future, November 2017.
5 UK Government, Invest 2035: The UK's Modern Industrial Strategy, October 2024.

1 Business Sectors

Any serious Industrial Strategy has to focus on specific business sectors. But then the problems start. Should it cover most of the economy? Or is it to be restricted to a few specific sectors in which case how are they to be identified and will businesses in other sectors feel left out and under-valued? But Government may not have the resource or capacity to work intensively with lots of sectors simultaneously. And anyway there are business sectors which may just want to be left alone. So it is best to start with a few key business sectors. Their representatives can be asked to come up with practical proposals showing how public and private support can come together to boost the performance of a sector – a so-called sector deal. Sector deals, introduced in 2017 rest on a recognition that there is a joint interest between the government and the firms in particular sectors - and in which both had something to contribute.

The new Government's faces the dilemma of a top-down list of big key sectors or a bottom-up open process where everyone can bid. It should start with a small number of key business sectors which pass some key tests such as research-intensive, high value-added, and with the potential to grow fast. There is a lively Whitehall debate about identifying specific sectors which fall under the eight pillars of the Green Paper. There are limits to how many of these Government can handle, especially at first. And it would be wrong to assume that a comprehensive list is needed for the White Paper. It should identify some now but make it clear that there is scope for adding more in the future if sectors organise themselves and come up with good proposals. That was Greg Clark's approach. He opened the process up and invited business to pitch for sector deals. The trouble was that the Department had more applications than it expected and ran out of funding for them. But there were some real discoveries – for example, a particularly imaginative pitch for the future of the ceramics industry impressed ministers and officials. The rail industry had an excellent pitch and a sector deal was agreed which included a Government commitment to policy stability – not a promise that was delivered.

There is already a useful set of sector growth partnerships which have continued to function through political turbulence of the past decade, notably:

- Aerospace
- AI
- Automotive
- Construction
- Life Sciences

- Creative Industries
- Offshore Wind

These sectors already have some form of leadership council involving business leaders, experts and Whitehall departments. (They are often now renamed advisory councils to emphasise that ultimate responsibility lies with ministers.) The White Paper should announce the creation of a small number of extra sector councils. They need not be uniform. They just should be capable of developing specific proposals to grow their sector faster through boosting investment and productivity.

It should also set out a process for applying for a sector deal but after say a year's delay before any further proposals can be considered.

The UK is unusually oriented towards services and there could be more focus on boosting performance in some key service sectors such as education and architectural/ engineering consultancy. Business services were specifically identified in the Green Paper but were not amongst the sector deals launched in 2017. RF analysis shows our services trade growth has been stronger in unregulated sectors such as PR and advertising than more regulated sectors so that is where particular help may be needed, notably in breaking down trade barriers.[6] Financial Services is an obvious candidate unless the Treasury's role as its sponsor means that it already gets a lot of attention and support.

The White Paper could also identify some specific sub-sectors falling under the overall eight pillar structure of the Industrial Strategy Green Paper such as Space under advanced manufacturing, nuclear under green technologies, drug manufacturing under life sciences.

Opposite numbers

It is much harder to run an industrial strategy for a sector without key large players: primes. There is an understandable objection that limited public resources should go to smaller companies with future growth potential rather than powerful incumbents. But it is possible to do deals with larger companies to invest or do more R&D here. They are keener to invest and innovate if they see some public money alongside them: this helps the British management in global companies win internal competitions for the location of new investment. And these big companies have large supply chains containing many SMEs which can gain from well-targeted initiatives.

There is always the danger of the capture of Government by big incumbents. So one of the most important roles of the new Industrial Strategy Advisory Council is to keep

6 See E Fry, Trading blows: How should Britain buy and sell in a turbulent world?, Resolution Foundation, December 2024

Industrial Strategy honest. It should be assessing the delicate balance between good close relations with major businesses and the need to ensure newcomers have an opportunity too and are not put at a disadvantage. That is one reason why the supply chain agenda is such a good thing.

The Government also needs to build up a trusting relationship with major identifiable business leaders. There have already been some worrying recent incidents of companies deciding not to invest in the UK: Stellantis closing its Vauxhall plant in Luton; AstraZeneca abandoning plans for a £450 million investment in a vaccine manufacturing plant in North of England; BMW pausing its £600 million EV Mini investment in Oxford. These decisions may have been unavoidable. But maybe effective intelligence gathering and targeted intervention could have averted these unfortunate cases of reduced business investment in the UK. Acting effectively to stop this requires good company-specific intelligence about what is being considered. It also involves Government acting at the speed with which business decisions are being taken.

It is great to bring groups of industry players together but they are understandably reluctant to provide too much detail about their specific company. So in addition there needs to be a personal relationship. That means a specific minister tasked to manage the overall Government relations with each individual top company. The Chancellor or the Business Secretary may be too busy to take this on. The No. 10 Business advisor and Minister for Investment do an excellent job, but it cannot just be their responsibility. A range of middle-ranking ministers located in a key department working with the companies should each have responsibility for managing a few of these business relationships and passing on information and advice to No10 and the Treasury.

Spending, skills and supply chains

There are several ways in which Government can contribute to a sector deal. It should not just be a matter of extracting increased public spending. Indeed it would be a good discipline to say that they usually won't involve increased public spending. There's lots that a well-organised sector and an engaged and supportive government can do. One example is for the Government to identify public procurement opportunities and indicate future levels of procurement spend in key areas to give confidence to business and private investors. Helping the MHRA create a best-in-class drug licensing and clinical trials regulatory regime is one of the most impactful measures available to promote the life sciences sector. Another opportunity in a sector deal is for businesses to identify overseas markets with the best opportunities for them and for ministers then to lead specific trade missions there. There may also be ways in which the mission can come equipped with some offers that create good-will and open up wider opportunities such as a research partnership in a key area of shared interest, or increased British

Council activities with more English language-training. That kind of offer can be part of negotiations to lower barriers to trade such as mutual recognition of qualifications which is a barrier to growth of services.

The key complaints from the Primes in these sectoral discussions is often about the poor quality of their British supply chains. Even if the large company is using latest digital technologies, it is frustrating if it is not also adopted by their SMEs. That is why for example we put public investment into e-infrastructure alongside two key primes – Unilever and Jaguar - as a free service for companies in their supply chains.

Supply chains may also be weak because of the poor quality of British management: research led by John Van Reenen and Nicholas Bloom shows a key part of Britain's productivity problem is under-educated, under-trained managers. They estimate that management accounts for around 30 per cent of the productivity gap with the US.[7] The Manufacturing Advisory Service was created by BEIS to address this. It did appear to improve business productivity, with a net GVA benefit per business of £15,000-£30,000k. But there was no evidence of it promoting longer term growth.[8] It was closed down. Overseas takeovers are the solution we have ended up with for poor management. Business Schools could do far more to help train managers but their incentive structure is wrong - they are rewarded for research excellence which is often far removed from the practical needs of businesses in their area.[9] Well-focussed funding directed to business schools to help local businesses could change this incentive structure and some examples are suggested later.

There are also frustrations at how difficult it is to get programmes of skills and higher education directly relevant to local employers. There are some great local initiatives. Coventry University works for example with Unipart on their excellent training programme. The University of Sunderland runs automotive engineering course directly serving the automotive facilities nearby. Some universities include in their degree programmes elements specifically designed with local business requirements in mind. The Government's new entity, Skills England, should help promote these. It has to work within the fundamental framework of British higher education – it is shaped by student demand not a plan from Government nor direction from employers. Nevertheless there are useful options such as more kitemarking of particular college and university courses valued by the business sector. For example, the Royal Society of Biology kite-marks life sciences courses strong in the wet lab skills which pharma companies say they value. Another way forward would be to invite Business Schools to pitch for the role

7 N Bloom, R Sadun & J Van Reenen, Management as a technology?, NBER Working Paper Series No. 22327, June 2016.
8 Department for Business Innovation & Skills, The Manufacturing Advisory Service (MAS) – Impact Analysis Methodology Study, BIS Analysis Paper Number 246, February 2016.
9 Nicholas O'Regan (ed), The Future of Business Schools (forthcoming).

of allocating training funds under existing public education and training programmes. Business schools could also bid to boost management training in their area, giving them a new more applied role. Centres for Doctoral Training are a great way to train highly skilled workers and get low-cost research for business. Graduates are often keen to work on applied research projects involving business and it boosts their job prospects and is directly relevant. CDTs are co-funded with business It is a great pity that new proposals for new CDTs with substantial business funding have been turned down because of lack of public funding. They are a great example of business investment in key workers and more should go ahead. Sector deals should get these going.

More change please

One of the most important messages from the Resolution Foundation's 2030 enquiry was that Britain needed more economic change. That includes the growth and shrinkage of business sectors, and of individual firms within those sectors. A practical measure to do this is to accelerate change of use in the planning system. The measures set out so far need to be complemented with support for so-called gazelles – rapidly growing companies. Many SMEs are in a stable equilibrium but a small sub-set are growing fast and should be supported. One of the constraints these "scale-up" companies face, identified by Sherry Coutu and the ScaleUp Institute, is the difficulty of accessing scale-up funding.[10] The other key barriers to these companies scaling up are accessing talent, markets, infrastructure and leadership. The Institute's latest report shows there are just over 34,000 scaleups in the UK, that employ 3.2 million people and generate a turnover of £1.4 trillion – 55 per cent of the total turnover of SMEs, of which there are 5.5 million.[11] There are nearly 30 per cent more scaleups than there were in 2013 – but the key constraints identified a decade ago remain. These high-growth businesses are facing barriers in accessing capital to grow, at an estimated cost of £15 billion per year.[12] One possible way of tackling this would be for the new NWF to take a lead in creating a public/private fund for scale-up investment following on earlier stage BBB investment. We will consider this option later in the paper.

The biggest challenge facing incumbents comes from disruptive new technologies and innovations. They are key for the economic dynamism Britain needs and that is what we now turn to.

Policy proposals for the business sector

- 1. Start with a few more business sector deals, particularly in services sectors,

10 A "scale-up" is a company with average annualised growth in employees or turnover greater than 20 per cent per year over a three year period, with more than 10 employees at the beginning of the observation period. See S Coutu, The Scale-Up Report on UK Economic Growth, November 2014.
11 ScaleUp Institute, ScaleUps in the UK, June 2024.
12 ScaleUp Institute, The Future of Growth Capital, August 2020.

and set out a process for gradually extending them. Each deal should include a commitment to boosting investment and productivity with practical proposals to do so a key criterion.

- 2. Task specific ministers to manage Government relationship with specific top companies – No 10 and DBT can't do it all.
- 3. Harness business schools to help with management training especially to strengthen supply chains.
- 4. Promote a public/ private funding mix for education/training in specific skills. Rescue proposals Centres for Doctoral Training where business funding was offered but matching public funding not provided.
- 5. Accelerate change of buildings use in the planning system.

2 General-purpose Technologies

Industrial Strategy is at risk of producer capture by big incumbents. To offset this it needs to promote the industries and businesses of tomorrow. So it makes sense to match a business sector approach with a focus on new general-purpose technologies. They are inherently disruptive. The arrival of a new technology transforming its sector is one of the biggest challenges any business can face. They can make a key contribution to long-term growth because they are great candidates for investment and absorbing new technologies is the main way to boost productivity: productivity growth arises from innovative new products and processes – and the firms quickest to adopt the latest technological advances grow their productivity and market share faster than others.[13] It is also vital to then support the widespread diffusion of these new technologies across the economy.

Sceptics doubt that Governments can successfully identify and back them – a challenge I tested as minister. I identified and supported eight great technologies back in 2013 and ten years on reviewed what had happened – the list by and large stood the test of time and real progress had been made.[14] There have been subsequent attempts at identifying critical technologies. Most recently the previous Government identified five critical technologies: AI, engineering biology, future telecoms, quantum and semi-conductors.[15] It is good to have such an approach. There is significant overlap with the original eight. However the list is a rather odd mix of relatively mature industrial sectors – telecoms and semiconductors – and three genuinely cutting-edge technologies. It only has one technology from the biological sciences. And it does not appear to have emerged from

13 D Coyle, B van Ark, J Pendrill, The Productivity Agenda, Report No. 001, The Productivity Institute, 2023.
14 D Willetts, The Eight Great Technologies 10 years on: An Industrial strategy?, Policy Exchange, 2023
15 Department for Science, Innovation & Technology, The UK Science and Technology Framework, March 2023.

an open public process.. So there is a case for an update, starting with the three cutting edge technologies and adding some more. This could happen as part of the decisions on sub-sectors for the Industrial Strategy underneath two of its pillars: advanced manufacturing and digital, technologies. But a review to improve on the critical five should not hold up more practical action now on the five we've already got.

Councils and catapults

The challenge is to make stuff happen around these key technologies. A good model is commissioning science and technology experts, business players and funding agencies such as research councils and Innovate UK to draft a technology road-map. It identifies the hot areas of advance and where there was private or public funding. That prompts the most effective use of public spending to complement and promote private spending by giving companies confidence to invest as they saw how their own R&D spend could apply publicly funded research. It was a very useful task for a leadership council.

We were short of delivery bodies to mix public and private funding to promote these technologies. Herman Hauser in a report for Peter Mandelson as Secretary of State and James Dyson in a report for the Conservative Opposition both said Britain needed something like Germany's Fraunhofer Institutes. So we created Catapults, loosely connected to these key technologies. The funding model was roughly1/3 public funding, 1/3 private and 1/3 project funding. They were put in the private sector to protect them from excessive public interference the ONS threatening to reclassify them as public bodies is a key barrier to excessive Whitehall control. There are similar very effective initiatives for aerospace and the automotive sector (the Aerospace Technology Institute and the Advanced Propulsion Centre).

Catapults should be a useful template for creating industry-serving co-funded R&D centres removing the need to create individual tailor-made institutions such as the Turing Institute and the Faraday Institute. They are great ideas but it takes longer to set them up if the catapult template is not used. It also helps new creations get started if they under the catapult network. We should also allow provide more support to rare and prized survivors from the model used through much of the twentieth century, the research associations such as NIAB (the National Institute of Agricultural Botany and TWI (formerly The Welding Institute).

There is scope for doing more. We have 9 catapult centres and have not created a further one since 2012. whereas Germany has 76 Fraunhofer Institutes There are several key technologies which are advancing rapidly and where the UK has distinct strengths and we could do more to help them scale up with new catapults such as photonics, quantum, robotic, and sensor technologies. The commitment to ten-year funding programmes

for some science and technology programmes can also signal long-term support for key technologies. They give confidence to private investors and by reducing uncertainly help to tackle the scale up challenge. This network of catapults and leadership councils can also be a useful source of expert advice on regulations obstructing innovative technologies. They should be used for advice to the new Regulatory Innovation Office (which I chair) tackling regulatory barriers to innovative new technologies.

Universities are not universal

Universities play a particularly prominent role in the British innovation system. We have ended up with more of our publicly funded R&D university based and rather less in public sector research establishments than is typical for OECD countries. The amount of control over PSREs including on pay makes it hard for them to compete for international talent. The prestige and autonomy of our universities has given them an advantage. And unlike some other higher education systems there is less power for baronial heads of departments to shape research programmes and more opportunities for younger researchers directly to win research funding. All this creates a culture which is good for innovation and fresh ideas. Our system is strong on autonomy and diversity and our universities score highly in international rankings. Despite this universities were conspicuous by their absence from the Industrial Strategy Green Paper. This is very odd, especially as they are also one of our most successful services export industries.

There are downsides to the university model of research as well. The research which pushes universities up the global rankings is assessed by metrics such as citation rates above the average for research in that discipline. This is an excellent measure of fresh and significant thinking. It is not a measure of application and commercialisation. There are other universities, sometimes former polys or colleges of advanced technology which have a distinct mission of working with businesses on applied research and training people in the skills needed by business sectors. These universities are sometimes wrongly dismissed when they are also an important part of the ecosystem. Every proud reference to our having 4 of top 10 universities rewards a certain model of what excellence is: I wish every such claim was matched with proudly identifying four other less prestigious universities doing a great job in technical education and applied research.

Universities show that their research is being applied by generating start-ups and spin-outs. Counting these has become a measure of how well universities are contributing to innovation. But too many are being created too soon when they should stay as academic research projects for longer. We have lots of vulnerable tiddlers and not enough strong well-managed long term viable entities. This problem is exacerbated by a tendency for universities to take excessive equity stakes which are a barrier to private investment.

They are terrified not of failure but of success – being accused of not making enough from a successful spin-out. One of the important conclusions from the last Government's review of spin-outs was to signal very clearly to universities that they make a wider economic contribution by promoting innovation and do not need to be defensively taking large stakes in individual companies.The university is not the only incubator of start-ups. There have been useful programmes to provide proof of concept and proof of market funding for start-ups through SMART awards which are a popular and well-known part of our innovation system. These are currently paused while they are reviewed: a fresh version of the scheme should be reinstated soon.

Policy proposals for general-purpose technologies

- 6. Produce technology road maps setting out what public and private sectors are doing and where there are gaps and opportunities.
- 7. Create more Catapults.
- 8. Don't count university start-ups as a measure of success.
- 9. Universities should not hold large stakes in their spin-outs as it discourages private investment.
- 10. Remove barriers to start-ups especially emerging outside university– reinstate proof of concept and proof of market funding through SMART grants, currently paused.
- 11. Use advice from leadership councils and catapults on specific regulatory barriers inhibiting innovation.

3 Improving funding of British Innovation

Innovation is key to boosting productivity. Patrick Vallance has a clear ministerial agenda of promoting innovation by much more effective links between research councils, Innovate UK, departmental procurement, quasi-private funding such as via the British Business Bank, and full commercial funding. Innovation is not always a neat linear process but nevertheless it makes a lot of sense to think of it as a baton being passed in a relay race. We do not hand funding and support on from agency to agency as well as we could. Catalyst Funds were an earlier attempt to tackle this by bringing together research council and Innovate UK funding to provide a single public grant to get a project all the way from lab to marketplace. We started with the Bio-tech Catalyst. It worked well and should be sustained and the template applied to other key technologies. Schemes that provided grant funding for early-stage research had a benefit-to-cost ratio of up to £16 per £1 funding committed, and industrial R&D grants

leveraged an estimated £4 to £5 of private investment per £1 of public spending.[16] It is where Covid vaccine work started.

President Biden's CHIPS and Inflation Reduction Acts allowed the US Federal Government allocated around USD500bn (around 2 per cent of annual GDP) in subsidies and tax credits over 10 years for production and associated scientific research in semi-conductors, renewable energy, EVs and their supply chains. These Acts and this money are now threatened with revocation by President Trump. Meanwhile, the Draghi report proposed measures to increase total investment in high-tech industries in the European Union by hundreds of billions of euros each year, most likely led by public investments of a similar scale. As in the, US one aim is to strengthen and diversify supply chains of critical high-tech products such as semiconductors.

One option would be for the UK to try to follow this model and make public investments on this scale with the aim of onshoring supply chains and achieving leadership across a broad class of technologies. But while the UK has strengths in particular technologies and sectors, it does not have the scale of the US or EU and will not be able to produce as wide a range of highly specialised products. The UK is going to have to rely more heavily on getting distinct niche positions in international supply chains. US and EU actions efforts to onshore critical production could help the UK to near-shore it.

Instead, the Government must power up vehicles for providing debt and equity finance to the private sector – the British Business Bank (BBB) and the National Wealth Fund (NWF). The change in the fiscal target from net debt to net financial liabilities relaxes the constraint on government investment here. The Government should substantially increase allocations to the BBB and NWF in the forthcoming Spending Review. Both entities should be mandated to support the Government's Industrial Strategy through innovative financing at the level of commercial firms and projects, ideally catalysing much larger quantities of private money. The transition from UKRI funding to the BBB and the NWF should be seamless, with no gaps in the allowable ticket sizes, and avenues for sharing data and due diligence as successful firms grow. These entities should collaborate in guiding technologists towards the most effective option.

Procurement and pensions

There is a critique of this model – that promoting VC investment is a route to the sale of UK assets to predominantly American investors. That is a legitimate business decision but the rush to VC investment in the absence of other options is a market distortion.[17] There is a need for other financing models too. One option is non-dilutive financing from

16 Ipsos MORI & G Barrett, Biomedical Catalyst Impact Evaluation: Final Report, June 2019.
17 See the critique of VC model in David Connell and Bobby Reddy: Selling less of the Family Silver: Better UK Innovation and Industrial Policies for Economic Growth, Centre for Economic and Business Research Cambridge, July 2024.

far more ambitious use of public procurement. Public procurement is a great source of non-dilutive funding for business. There should be a much more ambitious attempt to use public procurement to back innovation in general and rapidly growing small business in particular. Implement the proposal that departments produce forward-looking procurement plans so business can see the opportunities for them and indicate future levels of procurement spend in key areas to give confidence to business and private investors. Contracts for Innovation, formerly SBRI, appear to be working well with high impact and returns. Relax under specific conditions of promoting innovative British business the Treasury rule that goods and service can only be paid for after delivery.

There are other patient investors who may be more willing to stick with a growing company for longer than VC investors who will aim for a target return and then sell – as happened with Solexa, the original British company developing genetic sequencing which was sold to Illumina in the US when Illumina was not much bigger than Solexa, enabling Illumina to become the world's leading genetic sequencing company worth billions of dollars. Pension funds are a possible source of long-term financing with a longer time frame than VC funds. But they have been disinvesting from UK companies, both quoted and unquoted. It is important to shift incentives and behaviour. The Pensions and Lifetime Savings Association (PLSA) recommend providing incentives to offset inherent risks of investing in early-stage technology – like government accepting 'first loss' risk or the British Business Bank's LIFTS initiative.[18] The LIFTS initiative has awarded £250 million to create two new investment vehicles that are accessible to pension and other institutional investment. Supported by further £250 million pension investment from Phoenix Group, the investments are expected to generate over £1 billion of investment into UK science and technology companies.

America does this. The US Employee Retirement Income Security Act (ERISA) – which came into effect in 1974 to set minimum standards on pension provision for workers – has continually evolved to reduce friction for investors to allocate capital to private equity. This included capital gains tax incentives for equity investments and clarified investment guidelines for pension funds to allow higher risk investments. As of 2023, US public pension funds had 14 per cent of their portfolio invested in private equity, with 88 per cent of funds having some allocation in private equity.[19] These investments also outperformed other asset classes, with a median annualised return of 15 per cent, compared to 10 per cent for public equity investments. Almost half of Canadian pension assets are concentrated in a small number of large public sector pension funds (called "Maple 8"), with aggregate allocations of total Maple 8 assets in private equity, infrastructure and

18 Pensions and Lifetime Savings Association, Pensions & Growth: Creating a Pipeline of Investable UK Opportunities, August 2024.
19 American Investment Council, 2024 Public Pension Study, July 2024.

real estate making up over 40 per cent of total assets and delivering strong returns.[20] One barrier for the UK is the extreme fragmentation of the system, with UK funds individually on the smaller size meaning lack of scale has implications for net returns. This needs to be tackled with bolder measures to bring our public sector schemes together as proposed in our Economy 2030 report. But this is not the whole story: Australia's DC pension super funds are similar to the UK's Master Trusts system in size and regulation. However allocations to private assets by Australian Super funds are substantially higher than UK DC Master Trusts. Around AUD400bn of Super Funds are managed in default Lifecycle products, which on average allocate 21 per cent to unlisted assets.

Most of Britain's Defined Benefit (DB) schemes are now closed to new members. That trend over the past twenty years is the key source of the problem. As the members of those schemes grow older pension funds invest more in bonds rather than equities. If instead they had been kept open to young new members, with reduced entitlements to make them affordable, their investment priorities would have been very different. Merging them into larger schemes may offset some of these pressures but is unlikely to be a game-changer. Moreover, these schemes are now going into surplus as interest rates rise. As a result many of them may now be bought out by insurance companies from their company sponsors. The regulatory regime for these insurance company models does not favour more equity investment.

The growth now is in Defined Contribution (DC) schemes. The Mansion House Compact (MHC), the voluntary and non-legally binding industry initiative, aims to achieve a minimum of 5 per cent allocation to unlisted equities through DC pension funds by 2030. Meeting this target could in time amount to £50 billion invested in UK growth companies.[21] But progress is very slow. As of July 2024, MHC providers had invested 0.4 per cent of the total value of their DC default funds in unlisted equity – £790 million out of £220 billion.[22] These signatories also hold £5.7 billion infrastructure assets structured as unlisted equity in their default funds, which are not included in the Compact. The City of London and EY report that supportive public policy and collective action by the pension industry is necessary to allow schemes to effectively invest in unlisted equities.[23]

One option is mandating these DC schemes to invest more in unlisted equities. At the moment trustees face difficult legal questions in following any guidance to invest more in particular assets such as British equity. Their over-riding duty is to invest in the financial interest of their members and some suggest that this points to substantial investment in higher growth economies abroad. A legal obligation to achieve the Mansion House target

20 T Nangle, Achieving critical mass: How Master Trusts can use scale to enhance member outcomes in private market assets, People's Partnership, 2025.
21 City of London, Mansion House Compact, July 2023.
22 Association of British Insurers, The Mansion House Compact: Year one progress update, July 2024.
23 City of London & EY, Powerful Pensions: Unlocking Defined Contribution capital for UK tech growth, March 2023.

would overcome these issues. There could be a gradual step-by-step process. This would change the conversation from not whether funds should be doing this, but to how they best can. But there are other options too – such as making current tax reliefs conditional on investing more in British equities or creating more generous tax reliefs to reward such investments. The Government should for now focus on pressurising pensions funds to move on the journey up toward 5%. But if no progress is made there is a case for either more of an incentive, or more of a requirement, or both.

There are also options for using the tax system to promote rapidly growing small and medium-sized companies. They account for over half of SME turnover despite being less than 1% of the business population. Corporation Tax could be rebalanced to favour young rather than small companies, for example by treating the carry forward of losses more generously.

Policy proposals for funding British innovation

- 12. The Government should substantially increase allocations to the BBB and NWF in the forthcoming Spending Review and link them better to the companies promoted by support from agencies such as Innovate UK and in key technologies.
- 13. Use public procurement much more as a non-dilutive funding for innovation
- 14. Pursue bolder measures to bring our public sector schemes together and encourage pension funds to meet the 5% commitment to invest in British innovative companies with the prospect of legislation if there is not significant progress to 5%.
- 15. Identify and support the gazelles – fast-growing companies facing the scale-up challenge. They should be a priority for support from BBB. Rebalance Corporation Tax to favour them.

4 Challenges – Not Technology push but mission pull.

The most dramatic intervention in the Industrial strategy debate over the past decade has come from the charismatic Marianna Mazzucato. She is an eloquent advocate of Missions and challenges. She would say that the focus so far on business sectors and technologies is too focussed on push whereas we need to focus on pull through. I greatly enjoyed co-chairing with her a Commission on Mission Oriented Innovation and Industrial Strategy in which we thrashed these issues out.[24]

24 See the Commission's report: UCL Commission for Mission-Oriented Innovation and Industrial Strategy, A Mission-Oriented UK Industrial Strategy, Policy Report, UCL Institute for Innovation and Public Purpose, May 2019.

Setting Challenges is another powerful tool of Industrial Strategy. However they do need to be carefully defined. They cannot just emerge from a group of people sitting around thinking 'it would be nice if….'. Designing good challenges is very similar to designing good prize competitions, on which there is a useful economic literature. The US often uses them not to by-pass technologies but using a deep understanding of where technology is going to formulate a prize or challenge to speed it up and give it a focus. President Kennedy's original moon-shot was preceded by a lot of investment in Saturn V rockets.

A very effective compromise model is Industrial Strategy Challenge Funds. These very ingeniously brought together a key technology and a key challenge. They evaluated well. The biggest challenge by far is of course Climate Change. This is where Challenge approach can be particularly effective. One good example is the Prospering from the Energy Revolution Industrial Challenge Fund (PFER) that launched in 2018 with £100 million, aiming to prove scalable local business models that establish UK leadership in integrated energy provision, at a time when energy policy and regulation lacked specific provisions for place-based approaches.[25] PFER has contributed to building significant momentum around local energy and local planning for delivering Net Zero, shown by the growing number of place-based strategies (that were non-existent before), notably including the West Midlands and Greater Manchester. The programme increased the evidence base around Smart Local Energy Systems (SLES), with one project leading to creation of an open energy data platform that helps innovators to address challenges. Firms that were awarded funding by the programme generated an additional £68 million in income directly attributable to it, and also raised £1.26 billion of external funding, with an estimated £94 million to £225 million directly attributable to the programme. The funding also led to 26 Intellectual Property (IP) rights awarded to projects across the portfolio and the commercialisation of seven SLES technology products. There a very strong case for a set of these. Indeed such revamped schemes could bring together technology push and challenge pull.

Policy proposal for addressing challenges

16. Deploy an up-dated version of Industrial Strategy Challenge Funds

5 Place: Cities and Clusters

The UK's lagging national productivity can particularly be be attributed to the relative underperformance of our large cities – especially Birmingham and Manchester - which do not create as many high productivity jobs as would be expected for their size.[26] An effective industrial strategy therefore needs to be shaped around addressing this fundamental challenge.

25 Ipsos MORI & Technopolis Group, Industrial Strategy Challenge Fund: Prospering from the Energy Revolution, August 2023.
26 A Breach & P Swinney, Climbing the Summit: Big cities in the UK and the G7, Centre for Cities, June 2024; P Swinney, So you want to level up?, Centre for Cities, June 2021.

Successive Governments promise to move high quality jobs to where the people are. But it often turns out that people have to move to where the high-paid jobs are. And economists advise that productivity is boosted by agglomeration effects of large numbers of people working close to each other and easily trading, learning, and moving jobs. This points to starting with our major cities and towns.

The importance of Manchester and Birmingham

The Resolution Foundation's Economy 2030 enquiry showed the importance of focussing on our twin second cities of Manchester and Birmingham as a route to national productivity growth. Both city-regions are rich in industrial clusters and have the potential to benefit from agglomeration effects, but unlocking this growth will require a broader view of urban development.

The number of residents in Manchester and Birmingham who can get to the city centre within half an hour is much lower than for comparable cities so it is hard to achieve the productivity benefits of agglomeration. Manchester in particular has a comparatively small public transport network relative to similar sized European cities, but a big portion of the problem is also residential density – fewer people live close to the centre of near good public transport connections in both cities.[27]

HS2 has suffered such policy instability that Governments have not fully harnessed it as an opportunity for a smart place-based strategy. Well over £50 billion is being spent on the first new railway line north of London in 100 years. As with the Oxford to Cambridge arc (more on this below), we should be making sure every pound of economic advantage is wrung out of this committed spend. There should be much more liberal development rules around stations on the route and the radial links in Birmingham and Manchester that would achieve the agglomeration benefits. Every pound being spent on it should be leveraged to maximum effect.

Unlocking the Golden Triangle

The Golden Triangle is a global centre for Innovation and the Government has been right to promote it. The Oxford to Cambridge arc provides £111 billion contribution to the UK economy and has created 55 unicorns since 1990.[28] The Chancellor's announcement of the Government's commitment to the Oxford Cambridge railway link was very welcome. The OxCam corridor could even become a regulatory test bed for new technologies such as autonomous systems.

27 G Rodrigues & A Breach, Measuring up: Comparing public transport in the UK and Europe's biggest cities, Centre for Cities, November 2021.
28 D King & S Aristodemou, London Research: The golden triangle, Consulco.

There is no shortage of commercial funding to invest in Cambridge with a shortage of nearly a million square feet of lab space.[29] There are three main constraints on growth in Cambridge: a weak radial transport system with serious traffic congestion and more investment in railways and local stations needed; the difficulty of linking up to the electricity grid; and environmental regulation on water depletion making it hard to put up new buildings. It is deeply frustrating that this key global centre for 21st century technology is held back by the inability of the British state to deliver basic 20th or even 19th century technologies. (It does now look as if at least the water depletion problem, a key obstacle to planning consent, has at last been tackled.) All of these constraints affect other growth centres across the country and tackling them is a priority for Industrial Strategy.

Oxford and Cambridge argue their growth helps other parts of the country too. Cambridge has created a partnership with Manchester. Their research on semi-conductors is linked to advanced manufacturing facilities in Durham. But more needs to be done for other parts of the country.

The potential in the UK's smaller cities

Universities have transformed the economies of towns and cities such as Lincoln, Worcester, or Bournemouth. But many of their graduates then gravitate to big cities, notably London, the only region with a net "graduate gain" – in all other English regions the share of 27-year olds with degrees who live in the region is lower than the share of 27-year olds with degrees who come from that region.[30]

Cities like Leeds and Newcastle can't feel they are written off by their government because they are not as big or promising as Manchester or Birmingham. The UK's major cities and city-regions should be empowered through enhanced devolution to set out a vision for their place in UK industrial strategy. They can be encouraged to prepare local growth strategies with the involvement of government – and the tools available to them are improving.

Much more sophisticated access to more data sets to identify clusters is now possible so that tricky decisions on backing high tech growth hot-spots can be based on sophisticated granular analysis. DSIT has developed a map of nearly 3,500 innovation clusters (of 10 or more firms) across the UK. It's analysis identified four types of clusters, found that the "R&D collaborating" clusters where there was strong evidence of collaboration were correlated with higher average turnover across a wide variety of

29 Cambridge Network, Data shows an 850,000sq ft shortfall of lab space in Cambridge as science and technology take up hits record high, February 2024.
30 A Stansbury, D Turner & E Balls, Tackling the UK's regional economic inequality: binding constraints and avenues for policy intervention, Journal of the Academy of Social Sciences, August 2023.

sectors, but the number of clusters per sector and average turnover were not, suggesting size is not an indication of success or potential.[31] Sectors that were obvious supply chain partners were more likely to co-locate and collaborate, while some sectors tended to co-locate but not collaborate due to similar location needs - for example energy generation and logistics and freight in coastal areas. That can then be followed up with policies to promote clusters where a particular technology or sector is buzzing. The Launchpad model was developed for Tech City and subsequently applied elsewhere such as the Oxfordshire/Northamptonshire high performance automotive cluster. It is a very useful model which could be applied elsewhere.

Innovation Vouchers address practical questions facing small business such as "What are the properties of this new alloy?" "What is the best software to deliver this task?" There have been a range of successful experiments in which businesses are given a voucher to take to a local university or research centre which has the capacity to allocate say £10,000 of time of staff and kit to help the company answer its questions. We should set up a national fund for Innovation vouchers – local economic agencies or business schools could apply to run such a scheme in their area, giving it a suitably place-based quality.

There is also some encouraging evidence that sustainable energy comes disproportionately outside the Southeast. Offshore wind has boosted the economy of Hull. Carbon capture and storage uses industrial plant and North Sea installations further North. Our leading research centre for Wave and tidal power is in the North of Scotland.

The promise of devolution

A focused, well-executed national industrial strategy is the necessary foundation for effectively setting missions and prioritising RDI funding. However, when it comes to enabling growth at the local level, industrial strategy often requires a broader toolkit and an understanding of the characteristics of the places where it will happen.

English devolution provides an opportunity for local leaders to play a much stronger role in making the industrial strategy a success than has been the case in our recent history. Local leaders often have better understanding of the strengths and challenges present in their local areas and are well placed to build practical partnerships with employers and education providers.

The new crop of mayors and combines authorities will be vested with powers over spatial planning, strategic transport links, skills budgets and business support. Industrial

31 Department for Science, Innovation and Technology, Analytical Report: Identifying and describing UK Innovation clusters, DSIT Research Paper Number 2024/001, February 2024.

strategy therefore necessarily needs to become a partnership between these local leaders and national government.

Integrated settlements and enhanced powers for strategic authorities should be prioritised based on the potential of local growth plans to address the challenges and unlock the opportunities of the high potential cities and clusters in their region.

Policy proposals for Place

- 17. Use the Innovation clusters map to promote clusters using a Launchpad model plus Innovation vouchers. Business schools could apply to run such a scheme in their area.
- I8. Invest in radial transport links to boost the travel to work area of Manchester and Birmingham and use the housebuilding expansion to build residential density in these cities and provide opportunities for other cities to pitch growth proposals.

6 Ensuring Government has the capacity – and bringing in the security angle

These five distinct but complementary approaches add up to quite a well-balanced Industrial Strategy.

There are risks and obstacles. One problem has been occasional paroxysms of anxiety about the very idea of Industrial Strategy which make sustaining it difficult. So for example after the 2015 Election the new Secretary of State Sajid Javid tried to remove as much of this activity as he could. The UKCES, which had been doing a useful job monitoring skills and productivity, was abolished. The Manufacturing Advisory Service went. The budget of Innovate UK was cut and technologies were not to be mentioned, though the five year funding for the Eight Great Technologies survived. He was then followed by Greg Clark who reconstructed a lot of what had been temporarily lost and produced one of the most important accounts of Industrial Strategy in his White Paper. He also created a structure around it notably with the Industrial Strategy Council: it was then abolished by Kwasi Kwarteng. But other initiatives survived notably Industrial Strategy Challenge funds. It is good news that an Industrial Strategy Council is now being re-created. Its most valuable role should be to keep Industrial Strategy honest. That means avoiding producer capture and assessing what works. The Treasury are always keen on evaluations but do not always follow the evidence. The Council can be a powerful advocate for policies and programmes that work and an informed critic of those that don't.

Political risk gets the most attention but there are other problems in Governmental capacity which need to be tackled. It is not clear that we yet have the right analytical tools to assess Industrial Strategy propositions. The intellectual model for Business Cases is market failure. But Mariana Mazzucato is right that strategic decisions cannot always be reduced to market failure.

The security angle

In particular, the biggest change in industrial strategy and innovation policy over the past decade is the rise of the security perspective. Many people have not heard of Sheffield Forgemasters or Octric Semiconductors. That is significant. They are high tech companies which have been nationalised by the MoD with no significant controversy. The UK used to see part of our comparative advantage as our open market for corporate ownership. That was changed with the National Security and Investment Act of 2021. That is why it is very welcome that the Green Paper has a pillar specifically for Defence. The security people think of industrial strategy in a distinctive way. Own, Collaborate or Access is a different model than promoting private investment. The big analytical challenge is combining classical CBA and security thinking about strategic autonomy in a single commensurable model – nobody has managed to do this yet.

Whitehall also needs to build up expertise. Civil Service careers have been remodelled so there is less weight to building up domain specific expertise and more stress on generic skills as officials move from department to department. This has empowered external consultants who can end up in practice deciding important issues of substance. Reliance on external consultants should be reduced and classic Whitehall expertise built up again. That also means tackling the vetting problem by increasing the number of officials working in civil science and tech policy with the vetting to engage with security issues– cuts in numbers of domestic civil servants getting higher levels of vetting have made linking commercial and security angles harder.

Overall, the rise in significance of the security angle is a good thing. It has helped push technology up the agenda and brought more subject expertise in. Policy analysis used to assume technology was fixed for the 3 or 5 years covered by the policy decision. That is no longer the case – promoting use of new technology has become part of the solution to many technology problems. However, security people have often been happy to buy American which they see as payback for the American security umbrella. This feeds through into a wider British inferiority complex about the US and willingness to sell to the US rather than do things ourselves. There are British alternatives which merit support, especailly in today's changed world.

Policy proposals for Government capability

- 19. Increase the number of officials working in civil science and tech policy with the vetting to engage with security issues.
- 20. Treat dual use as an opportunity. Combine classical CBA and security thinking about strategic autonomy in a single commensurable model for appraising business cases.

Conclusion: Outline list of possible proposals

There is a lot of economic analysis of Industrial Strategy. There is also rigorous appraisal of particular initiatives and spending programmes. But then ministers have to decide what to do and how to do it. Previous successes – and failures – are a useful guide to action. Here is a cut-out- and-keep list of twenty tools to deliver Industrial Strategy.

1 Business Sectors

- 1. Start with a few more business sector deals particularly in services sectors and set out a process for gradually extending them. Each should include a commitment to boosting investment and productivity with practical proposals to do so a key criterion.
- 2. Task specific ministers to manage Government relationship with specific top companies – No 10 and DBT can't do it all.
- 3. Harness business schools to help with management training especially to strengthen supply chains.
- 4. Promote public/ private funding mix for education/training in specific skills. Rescue proposals Centres for Doctoral Training where private funding was offered but matching public funding not provided.
- 5. Accelerate change of use in the planning system.

2 Technologies

- 6. Produce technology road maps setting out what public and private sectors are doing and where there are gaps and opportunities.
- 7. Create more Catapults
- 8. Don't count university start-ups as a measure of success.
- 9. Universities should not hold large stakes in their spin-outs as it discourages private investment.

- 10. Remove barriers to start-ups especially emerging outside university– reinstate proof of concept and proof of market funding through SMART grants, currently paused.
- 11. Use advice from leadership councils and catapults on specific regulatory barriers inhibiting innovation and identify areas where the UK can take a lead in setting standards.

3 Funding Innovation

- 12. The Government should substantially increase allocations to the BBB and NWF in the forthcoming Spending Review and link them better to the companies promoted by support from agencies such as Innovate UK and in key technologies.
- 13. Use public procurement much more as a non-dilutive funding for innovation
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- 20. Treat dual use as an opportunity. Combine classical CBA and security thinking about strategic autonomy in a single commensurable model for appraising business cases.

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