

It is now widely accepted that the UK needs some sort of activist industrial strategy to rebalance the economy along several dimensions. Yet there is also much trepidation about industrial policy because it is believed that efforts of the past failed almost uniformly. This collective historical memory is very partial. The aim of this report is to highlight what industrial policy efforts did get right. It starts with a brief theoretical explanation of why all markets are in some way dependent on public action, why the United States is no exception to this rule, and outlines the different types of interventions that governments may undertake as part of industrial policy. The rest of the report shows how the industrial policy efforts of previous British governments, and particularly those of Mrs Thatcher, have been key factors in the contemporary success of the British aerospace and automobile industries. This edition's *Idea for Economic Growth* is that today the Coalition government should be more ambitious in its industrial strategy. The concluding section of this paper highlights what greater ambition may mean for the aerospace and automobile industries.

Picking Winners

How UK industrial policy ensured the success of the aerospace and automobile industries

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■ The inevitability of industrial policy

Critics say advocates of industrial policy discount the spontaneous workings of free markets, which produce efficient outcomes without the need for conscious or explicit rules. The laissez-faire economist Milton Friedman famously pointed out that while it took many different people with different skills to create a pencil, the complicated co-ordination involved occurred purely through the price mechanism without any central planning. The problem with this account, as Dani Rodrik highlights,¹ is it struggles to explain why some countries are better at producing a good or service than others. China has a thriving

pencil industry despite there being better wood in countries like Brazil and better technology in countries like Germany. The reason for this is the plethora of interventions carried out by the Chinese government in the sector, including initial investments in the pencil industry by state-owned firms, tariff protection of domestic producers and generous export subsidies. The truth is that private dynamism does not occur in a vacuum. All successful markets are in part a product of robust government action. Governments have to get involved in industrial policy whether they like to or not, and the economic dynamism of the USA is no exception to this rule.

Despite the country's otherwise strong free

market tradition, the US has always had an interventionist, 'developmental' state. In the twentieth century, US industrial policy has often been hidden under the guise of defence spending. Vernon Ruttan has documented how military research efforts were critical to the subsequent commercialisation of aerospace, information technology, computing and other high-tech industries.² There was a shift in industrial policy from the 1980s away from defence spending to more direct funding of commercially minded civilian research. Rather than consisting of one centralised programme, however, this research activity has been dispersed across hundreds of different organisations, some public, some private and others mixed. This government-funded research network has been critical to America's economic dynamism. In 2008, Fred Block and Ian Keller analysed the top 100 most innovative commercial products introduced in the US over the previous 40 years and found that 89 of these products had depended on public funding in some form.³ The focus is not just on 'basic' research but also on commercialising scientific innovations. Google's search algorithm was funded by a grant from the US National Science Foundation; while Apple received early stage funding from the Small Business Investment Company (SBIC) programme and its products have incorporated state-funded innovations in GPS, touch-screen and artificial intelligence technologies.⁴

■ The industrial policy functions of government

There are several ways in which government intervention lays the groundwork for private sector dynamism. The most important may be engaging in *Schumpeterian entrepreneurship*.⁵ This is a more precise form of entrepreneurship than the more common one of setting up any kind of business. Schumpeterian entrepreneurship involves radical innovation which substantially changes the economy. The early, initial investments in railroads or the internet meet this criteria; property investment generally does not. The returns on these investments are highly uncertain, being characterised by long lead times, a very high ratio of failures to successes, spill-over externalities where the benefits of an investment accrue to parties other than the original investor, and serendipity, where the investment yields a different type of product

to the one originally hoped for. For these reasons, the state has to take the lead in investing in radical new technologies before the private sector can be persuaded to invest. As we shall see below, Britain did not have a civilian aircraft industry following World War Two. The initial investments were made by the state through the Brabazon Committee.

Government can provide *fill-in capital* by subsidising private investments when a company cannot raise enough capital to invest in all the profitable investment opportunities it has available. British Aerospace plc (BAe) relied on government financing for its initial investment in the Airbus programme because its own capital was tied up in other projects. It can also act as an *investor of last resort*. Nationalisation of both Rolls-Royce and British Leyland ensured that crucial capacity and skills were retained which otherwise would have been lost had the market been allowed to take its course and liquidate these firms after bankruptcy. The state can also provide *institutional protection from the capital market* as did the British government to Rolls-Royce through the golden share. Finally, it can *correct co-ordination failures* in the private sector by ensuring that mutually-supportive investments occur. We shall now see in more detail how the UK government has fulfilled these functions in relation to the aerospace and automobile industries.

■ The aerospace industry

The UK aerospace industry is that all-too-rare thing: a world-beating, advanced manufacturing sector based in Britain. It employs over 100,000 people and generated £24.2 billion worth of revenue in 2011, 75 per cent of which was from exports.⁶ The UK has the second biggest share of the global market at 17 per cent, second only to the US, and hosts several indigenous, world-class firms in Rolls-Royce, BAE systems and GKN Aerospace. The UK sector also has key strengths in the design of landing gears and avionics, as well as in the manufacture of advanced helicopters. Aerospace is prominent in the UK because successive British governments have intervened in the sector, fulfilling the industrial policy functions identified above. The rest of this section will document these efforts further, starting with the Brabazon Committee.

In the aftermath of World War Two it was evident that commercial air travel was going to be a growth sector of the future. Britain had little expertise in building civilian aircraft following the Second World War, having focused on building military planes during the war. The government feared that the Americans, who had focused on building transport

planes during the war, would be better placed to dominate the sector. In response, they formed the Brabazon Committee in 1943, named after the Conservative peer who ran it.⁷ The Committee's task was to determine what future requirements the British Empire would have of civilian airlines and propose a plan of national action to achieve it. In their final report, published in 1944, they identified four types of aircraft that the country needed and called for their construction and design. On simple commercial terms, many of these planes turned out to be failures, but what is important is the legacy they left.

Type One was a large transatlantic airliner built by the Bristol Aerospace Company (BAC) in Filton, Bristol. The hundred-passenger plane was the largest aircraft in the world at its maiden flight in 1949 but it was a luxurious, spacious plane aimed at wealthy consumers which made it uneconomic. It received no orders. Type Two was to be a small, short-haul aircraft for UK and Commonwealth domestic services. This led to two successful aircrafts: the Vickers Viscount which sold 445 models and the de Havilland Dove, which sold 542 models. Type Three was a medium-range, multi-stop aircraft called the Bristol Type 75, also made by BAC, but its commercial introduction was delayed until 1957, by which time it was behind the technological curve. Type Four, the de Havilland Comet, was the world's first passenger jet-airliner (an innovation later copied in the Boeing 707 and Douglas DC-8) but a series of deadly accidents shattered the plane's reputation. Neither Type Three nor Four sold very well while American firms Boeing and Douglas would go on to dominate the civilian aircraft industry until Airbus entered the market.

Yet this did not mean that the Committee's efforts were in vain. One characteristic of Schumpeterian entrepreneurship is serendipity. These investments may not have made the government money but they laid important foundations for the later industry. The manufacture of all four types required innovations in production methods that improved skills and capabilities in the British industry. The Type 167 was the first plane to have fully-powered flying controls, air-conditioning and full cabin pressurisation for example; while the Dove pioneered the 'Turbo-prop' engine and the Type 75 was renowned for its lack of noise. Filton, BAC's former site, has today become an industrial

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cluster for Britain's aerospace industry. Airbus, GKN, BAE systems and Rolls-Royce all have key production sites there. The Comet was built in de-Havilland's factory in Broughton, Wales, which is today Airbus's centre of wing-excellence. Had there been no continued public investment in aerospace following the war, the future of both of these sites would have been put in jeopardy. It would also have spelt an uncertain future for British companies like Rolls-Royce and BAC, which were given both a stable market and a chance to develop crucial competences in manufacturing these planes and their components.

Moreover, the Committee was arguably unlucky, at least with the Comet. The plane experienced consecutive accidents because the metal structure could not withstand the pressure of the unprecedentedly high altitude the plane flew at. Boeing and Douglas subsequently developed various forms of pressurisation testing and also created new forms of extra-tough fuselage skins when designing the 707 and the DC-8.⁸ However, their engineers reportedly told de Havilland privately that they too would not have foreseen the pressurisation problems, and would have very likely made the same mistake had they been the first to market with a passenger jet airliner.⁹ Had that been the case, it may have been the Comet and not the Boeing 707 or the Douglas DC-8 that captured the civilian airline market in its infancy.

The American dominance of the airline market would be broken by the European company Airbus, for which the UK arm has built all the wings since the A300. Today, Airbus UK employs 13,000 people at its two major sites in Filton and Broughton. The company itself claims indirectly to support 100,000 jobs in the UK through an extended supply chain of over 400 companies.¹⁰ However, Airbus would not even have a UK presence if Margaret Thatcher's government had not subsidised the UK's initial investment in the A320 aircraft in the 1980s.¹¹ The West German and French governments had already committed \$2 billion dollars to the project and were prepared to go ahead without British involvement. BAe was Britain's partner company in the Airbus scheme. It felt that investing in capacity to build the wings for the A320 would be economically worthwhile but it lacked funds since,

as Britain's main defence company, its capital was tied to other projects. They managed to persuade Margaret Thatcher's government to fund half of the \$647 million project cost. Simultaneously, her government provided \$14.8 million to state-owned Rolls-Royce to fund its development of the V2500 engine, which was to power the Airbus A300. In this instance, her government used state funds to provide both fill-in capital and to co-ordinate mutually supportive investments.

This was not the first sort of development loan given by the British government to an aerospace firm. The A320 loan was but one instance of the wider policy of 'launch aid' loans provided by successive British governments to the aerospace industry since the mid-1950s. It is important to note that launch aid is not a subsidy from the state but a direct investment. The government would agree to finance a given proportion of the up-front product and R&D costs of a project in return for a defined levy on subsequent product sales. By 1997, over 660 aircraft had been sold under the A320 programme, sufficient to ensure full repayment of the initial funds that BAe received. Thatcher's government would also go on to provide a further £450 million worth of launch aid for the A330 and A340 models, putting the total amount of support that it provided for BAe's Airbus programmes at £700 million.¹² This is a trivial sum compared to Airbus's annual revenue of £1 billion and the economic activity its UK presence generates.

If government intervention helped Airbus UK, it has been essential for Rolls-Royce.¹³ Today the company is a massive success. It is the second largest aero-engine maker in the world behind General Electric; employs 40,000 people worldwide; and generates annual sales of £7.4 billion while investing six to seven per cent of that in R&D. Yet the firm was almost bankrupted when developing the RB211 engine that has been the foundation of its subsequent success. Rolls-Royce had supplied the military aircraft engines during the World Wars but in the 1960s the company's management realised they had to break into the American civilian airline market if they were to secure their future. To achieve this, in 1965 they began developing the RB211, a highly innovative turbo-fan engine. The

firm's breakthrough came in 1967, when American manufacturer Lockheed agreed to purchase 450 RB211 engines. However, Lockheed negotiated very hard, securing a very competitive price and also high compensation in case of late delivery.

Moreover, the development of a radically innovative engine like the RB211, which was more complex than anything Rolls-Royce had produced before, led to unforeseen delays and development costs. For example, the engine fan blades had to be replaced with titanium fan blades, a change that led to further redesign work, while the sheer size of the engine required the construction of testing facilities. These and other problems led to the progress of the programme being delayed while the firm's resources were also put under strain by other projects it was working on, such as the RB207, a larger engine intended for US jumbo jets and Airbus planes.¹⁴ Between 1969 and 1970 the company's position began seriously to deteriorate while its own internal assessments cast doubt on whether production and development targets could be met. The company went into administration in 1971 and was nationalised by the Heath government.

Rolls-Royce lacked sufficient capital to meet all profitable opportunities. Government investment was not so much 'crowding-out' as 'filling-in'.

There are three points worth noting about the Heath government's decision to nationalise. Firstly, there was no viable alternative. Private buyers were not forthcoming and liquidation would have had a severe impact on the UK aerospace industry. Secondly, the investment in the innovative RB211 engine was characterised by just the sort of radical uncertainty that was described above. Rolls-Royce's difficulty in financing the engine's development costs is a good example of why the private sector alone struggles to finance innovation. The development costs of the RB211 were uncertain because there were no past precedents of similar investments to use as a reference and as a consequence many of the costs were unforeseen. The market-driven, competitive contract that Rolls-Royce signed with Lockheed simply did not provide sufficient financial resources or time to embark on an innovative project like the RB211. That is what led to the firm's bankruptcy and the need to turn to the government. Thirdly, as with BAe and Airbus, Rolls-Royce lacked sufficient capital to meet all profitable opportunities. Government investment was not so much 'crowding-out' as 'filling-in'.

Nationalisation and government funding allowed Rolls-Royce to keep developing the RB211

engine. From 1971 to 1979, Rolls-Royce received £425 million in state aid and preferential defence contracts; and Margaret Thatcher's government continued to support the firm in the 1980s, providing £437 million worth of launch aid between 1979 and 1988.¹⁵ She also mandated restructuring, with the workforce being cut by 62,000 to 41,000 between 1980 and 1984. By the mid-1980s, Rolls-Royce began to see a substantial reversal in fortunes after the market for turbo-fan engines started to pick up. They started marketing their own engine, the RB211-524D4D, which by then had been developed to very high technical standards, against the equivalent engines produced by GE and Pratt & Whitney. After years of sub-par performance, Rolls-Royce found itself with pre-tax profits of £120 million in 1985 and outstanding orders worth £3.1 billion.¹⁶ The company was privatised only in 1987 when it looked like it could perform well in the private sector. Rolls-Royce's market share of aero-engines was five per cent at the time of privatisation. By only 1990 it reached 20 per cent. The basis of its success post-privatisation has been the technological prowess of the RB211 engine. As Crooks explains:

... the RB211 engine core, whose development costs put the company into receivership, has become the key to its survival and success. Its revolutionary design, using three shafts rather than Pratt and GE's two, has proved so flexible that in successive upgrading since 1971 the engine power has been doubled without incurring the huge expense of significant design changes.¹⁷

In sum, government stewardship over a 17-year period gave Rolls-Royce the space to maintain the development of the RB211 engine and lay the foundations for present-day success. Moreover, Lazonick and Prencipe calculate that the total amount of launch aid given to Rolls-Royce between the beginning of the RB211 programme in the 1960s and privatisation in 1987 was £833 million. This figure is significantly less than the £1.36 billion the government received upon privatisation.¹⁸

Another key factor behind Rolls-Royce's success has been the 'golden share' the government retained in the company upon privatisation. This gave the government the right to veto any takeover attempt, whether from home or abroad. Additionally, foreign ownership of Rolls-Royce shares was limited to 15 per cent, although this limit was raised to 49.5 per cent by 1998 as a result of challenges by the European Commission. Usually, the fear of losing their jobs upon a takeover gives management an incentive to boost the company's

share price in order to deter bids. The golden share insulated Rolls-Royce's management from such pressure. Many might have predicted that, as a result, management would have had insufficient incentive to perform well and poor performance would follow. It is certainly true that Rolls-Royce was a poor stock market performer following privatisation. The average dividend yield between 1998 and 2002 was -1.3 per cent, while the average annual real yield, which includes capital gains on shares held, was even worse at -3.2 per cent.¹⁹ However, its economic performance has been strong. Between 1987 and 2002 it raised its market share of the civil engine market from eight per cent to 30 per cent.²⁰ It has been consistently profitable and, as mentioned above, is now the world's second largest engine maker, employing over 40,000 people in the UK.

Why would insulation from the stock market have helped Rolls-Royce? The reason is to do with the contemporary failings of the public shareholder corporation. It has been long observed that the average period of stock market ownership is in decline. Contemporary shareholders are increasingly less interested in patient, long-term value creation and more in short-term speculation. Arguably, Rolls-Royce has performed well precisely because it has been insulated from such short-term pressures. Investment decisions at the company have been controlled by corporate insiders, most of whom are engineers, who have focused on growing the business rather than boosting the stock price. As Lazonick and Prencipe put it, putting control of investment in the hands of career-managers led to superior investment decisions:

It is career managers, not public shareholders or government bureaucrats, who have the understanding of the technologies, markets, and competitors in a complex-product industry required to make strategic allocation decisions that stand any chance of generating successful outcomes.²¹

The golden share, in other words, gave Rolls-Royce institutional protection from the stock market. It is useful to compare Rolls-Royce with the performance of two other companies, GEC and ICI. At the turn of the 1990s, these three represented Britain's greatest industrial companies. Yet, GEC and ICI lacked similar institutional protection as Rolls-Royce and management in both firms subsequently embarked on a mergers and acquisitions spree to

boost their share price. Unlike Rolls-Royce, neither of these firms still exist.

■ The Automobile Industry

The UK car industry has seen a substantial resurgence in recent years. UK factories built 1.46 million cars in 2012, with a record breaking 1.2 million of these exported.²² The industry employed a total of 720,000 in 2011.²³ Though Britain no longer has any indigenous volume manufacturers, the overseas firms based here – such as Tata, Nissan and BMW – have invested £6 billion in the last two years. This is a profound turnaround since the 1960s and 1970s when the British car industry was failing badly, beset by antagonistic labour relations, low productivity and poor quality products. The standard narrative is that the British car industry was saved by free-market reforms in the 1980s. There is truth in this but it is far from the whole story, as we shall see below.

By the late 1960s the British car industry was lagging behind more productive European and American competitors. The Labour government's response was to encourage the merger of Britain's two major car manufacturers to create a 'national champion', the British Leyland Motor Corporation (BLMC). However, as is remembered all too well, British Leyland would go on to struggle, suffering from terrible labour relations, poor productivity and, perhaps above all, a bewilderingly complicated and difficult-to-manage organisational structure. When the company was formed in 1968, it had over 100 divisions and manufactured a vast range of product lines that included not only cars but also items like refrigerators and construction equipment. The chief executive Lord Stokes did not pursue a much-needed rationalisation strategy but attempted to run the company in an expansionist manner.²⁴ Leyland's market share began to fall rapidly in the early 1970s and the firm couldn't cope with the 1973 oil crisis, which raised its production and debt-servicing costs while reducing its sales.²⁵ By 1974 the firm was struggling financially and was forced to go to the government for financial assistance. It was nationalised in 1975.

The creation of British Leyland was certainly a mistake. Industrial policy should not mean

favouring monopoly over competition. It is worthwhile noting that while the Japanese subsidised and protected their car industry between the 1940s and 1960s, they limited such aid to firms that could survive on the market. Between 1945 and 1960, about 30 companies entered the Japanese domestic car market. Only a few survived more than five years.²⁶ Firms that did not succeed were allowed to go bust. Contrast this with over-centralised British Leyland, with its multitude of divisions which Lord Stokes was intent on expanding rather than rationalising. In July 1974, British Leyland asked for \$1.2 billion from the

four major British banks but was refused.²⁷ At that time it produced a million cars annually, served over a third of the British car market and employed 200,000 people directly.²⁸ The economic impact of letting the firm go into administration would have been very damaging. It was too big to fail.

Margaret Thatcher came to power in 1979. She understood that Leyland was too big to fail but also too inefficient to privatise immediately. She continued state aid but made it dependent on rationalisation. Her

government provided British Leyland with £2.9 billion of taxpayers' money from 1979 to 1988.²⁹ However, she made state aid firmly dependent on rationalisation of the company. For example, over a third of the 12,000 commercial vehicle workforce was cut in 1982 alone. As with Rolls-Royce, here the government function was as an investor of last resort, save that the goal this time was the orderly break-up of British Leyland.

Automotive expert Garel Rhys argues that government support of British Leyland during the 1980s helped ensure the survival of marquee brands such as Land Rover, Jaguar and Mini.³⁰ Jaguar was privatised in 1984 after three years of painful restructuring by its head Sir John Egan. Land Rover reversed a precipitous sales decline of 20 per cent in the 1980/81 accounting year by introducing its highly successful 'Defender' series of utility vehicles during this period, the first of which was released in 1983. Both Jaguar and Land Rover are today owned by Tata Motors under the Jaguar Land Rover brand. In 2012 it earned revenue of £13.5 billion and a record profit of £1.51 billion while employing 21,000 staff in the UK.³¹ Production of the Mini continued, keeping the brand alive until it could be resuscitated by BMW in 2006. The logistics group Unipart, which today has revenues of £1 billion and

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8,000 employees, was also saved.

Another important policy of Margaret Thatcher was enticing Japanese firms to invest in the car industry. The first to agree to invest was Nissan in Sunderland in February 1984. Mrs Thatcher's government effectively subsidised the investment by selling Nissan greenbelt land for discounted prices of £1,800 per acre.³² Where Nissan trod, other Japanese companies such as Toyota would follow. And not just in the car industry. By 1989, there were 100 Japanese manufacturers employing 30,000 Britons. Prior to 1984, large scale investments in Britain would have been too uncertain for Japanese companies because there were no comparable prior investments to act as a reference point, Japan being a very different market culturally and institutionally to the UK. By underwriting Nissan's initial investment, which went on to be successful, Margaret Thatcher's government paved the way for further investments by other Japanese firms. It was another instance, albeit in a more background role, of the state engaging in Schumpeterian entrepreneurship.

The scale of the Coalition's strategy is limited, focused on resolving narrowly defined 'market failures'.

Conclusion

The failures of Britain's industrial policy have loomed much larger in the collective memory than the successes. This report has attempted to redress this imbalance by showing how various government interventions have been crucial to the present day success of the automobile and aerospace industries in the UK. The key policy recommendation to arise here is that the Coalition could and should be more ambitious in its industrial policy. The Coalition has proposed industrial strategies for both the aerospace and automotive sectors. However, the scale of these interventions is limited, focusing on resolving narrowly defined 'market failures'.

The aerospace strategy does involve a range of useful policies from greater R&D funding from government to improving domestic supply chains. However there is no scope in the strategy for the Brabazon-style Schumpeterian entrepreneurship. However this is what the UK needs at a time when countries such as China, Japan and Brazil are investing large amounts of public funds in their aerospace industries. The danger is that this competition will lead to a loss of jobs and production in the UK, which, once lost, are very difficult – if not impossible – to re-establish. Civitas author Christopher Simpson has proposed that the

UK should invest public funds in the development of a short-haul, 100 passenger aircraft to meet the needs of contemporary, low-cost airlines.³³ Such a plane would keep Britain at the forefront of the industry. Unfortunately, it is far from the Coalition's agenda.

There is a similar lack of ambition in the car industry which, despite its recent successes, suffers from a weak supply chain. Karel Williams points out that 35 per cent of the value of UK automotive output is imported.³⁴ The government's industrial strategy for the automotive sector lacks any substantive measures to strengthen the domestic supply chain. One issue for domestic car suppliers is lack of finance. The government could introduce a nationwide public finance scheme designed specifically for automotive suppliers. The scheme could be modelled on the 'launch aid' scheme that has been so successful for the aerospace sector.

These suggestions about the aerospace and automotive industries can serve as reference points for wider discussion. The reason why we have a successful car and aerospace industry today is that previous governments were proactive in shaping a comparative advantage for Britain in these sectors. This is particularly the case for Margaret Thatcher, whatever else the content of her ideology may have been. What is required now is a similar ethos, not of 'big' or 'all-knowing' government but bold government, prepared to take the steps necessary today to ensure economic success tomorrow.

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