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Technology Unemployment: Transition to an Entrepreneurial Economy

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Outline

As scientific progress cuts the costs of automation, firms will find it profitable to replace labour with machines. If the economy does not find new uses for labour quickly enough, technological unemployment will be unavoidable (Keynes, 1930).

In this paper, we propose potential solutions to the problem of technological unemployment in the UK. We start with an examination of the phenomenon of technological unemployment in literature as seen in economic models, along with empirical evidence pertaining directly to the UK. Then, we evaluate Britain's current educational, welfare and innovation policies in relation to coping with technological unemployment. Finally, we set out our proposals for the respective policies before finishing off with the concluding remarks.

With the advent of machine learning and big data technology will destroy jobs on a larger scale and for a longer period than ever before. As it stands, we are not ready for these changes. Britain has a historical record of underperforming in both entrepreneurial education and innovation, and the current welfare system is maladapted to such a shift in the nature of unemployment. The measures outlined below seek to maximise the share of the population involving in and profiting from entrepreneurial activity, as it emphasises creativity and innovation, traits that are hard to automate. We propose equipping people with the knowledge and the financial backdrop to start their own business. We also suggest stimulating product innovation in the hope of creating more jobs faster. It is important to note that our proposals interlace: entrepreneurial education will enable R&D to be converted into new business opportunities, financially supported by a universal basic income. With the government being the largest stakeholder in education, welfare and promoting innovation, this paper naturally focuses on what policies the government and its departments should pursue in response to rising unemployment.

Key proposals:

- Promotion of entrepreneurial education at all levels through curriculum changes, business competitions and teacher training
- Piloting and eventually introducing a basic income scheme, universal and unconditional to all citizens
- Enhancement of R&D stimulation through Catapult Centres and British Business Bank

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I. Nature of the problem

In this part, section 1 details a full explanation of technological unemployment and its likely impacts in the UK. In section 2, we review current policy on entrepreneurial education and skills transfer. In section 3, the current welfare system and its treatment of unemployment will be discussed, along with its systemic and structural flaws. Finally, section 4 reviews the current measures to promote and direct research and development.

1. Provenance of the term and problem formulation

The fear of technological progress and its perceived impact on employment has been a problem ever since the rapid industrialisation of the XVIII century. The Luddites are the best-known example of this, but it was a large enough issue in 1960s, too, for J.F. Kennedy to create the Office of Automation and Manpower within the Department of Labor.

The concept of technology unemployment was popularised by the economist John Maynard Keynes in 1930s as “*unemployment [arising] due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour.*”¹ This definition implies that the short-run destructive effects of automation will be offset in the long run by the compensation effects: the advent of new products and thus new jobs made possible with the new technology. New labour-saving processes with better machines also create jobs in the industries producing this equipment². Other compensation mechanisms include a fall in prices in a competitive economy leading to higher demand, or a rise in profits leading to more investment³ and thus job generation. More recently, Aghion & Howitt (1994) have modelled a ‘capitalisation’ effect competing with the Schumpeterian creative destruction effect. In other words, growth-induced job creation (capitalisation) may be offset by the higher job separation and a disincentive to create jobs, leading to higher job turnover and more frictional unemployment (job destruction). Postel-Vinay (2002) points out that, historically, capitalisation has dominated in the short run, but in the long run the equilibrium employment decreases.

However, today the destructive effect is becoming dominant over capitalisation as the price of automation is falling ever more rapidly and the rate of technological progress is ever-accelerating. Nordhaus (2007) points out that in the period 1945-80 cost per computation declined by about 37% p.a., while in the next twenty years the figure was 64% p.a. Moreover, previous technological advances have always had greatest impact on manual tasks leaving cognitive tasks as substantial re-employment segments. The emergence of big data and machine learning means that now even these can be automated. Before workers displaced by technology could join the service sector with low-skill tasks, but soon this will no longer be an option⁴. The capitalisation effect will still take place, but may come after a lag. In the meantime, Andy Haldane suggests that 15 million jobs in the UK are at risk of automation⁵ while Frey and Osborne (2013) suggest that 35 percent of UK jobs are at high risk of being automated within a decade or two.

¹ Keynes, J. M. (1930). Economic possibilities for our grandchildren

² Say, A treatise on political economy or the production, distribution and consumption of wealth

³ (Ricardo, 1821)

⁴ (Autor & Dorn, 2013)

⁵ (Haldane, 2015)

With this evidence, it seems plausible to assume that innovation, thanks to the labour market frictions and the economy adjustment will raise frictional and structural unemployment across most sectors at least in the short to medium run. The purpose of the policy proposals below is not to forcefully reduce job separation and, of course, not to revert or hinder technological advances – but to enhance the capitalisation effect and make the transition to the new economy as smooth as possible. This new economy may even have permanently higher rates of unemployment. All of our proposals work best in the medium term, but have positive impact in the long run, too, should technological unemployment become a persistent reality for years to come. The measures outlined below seek to equip the British population with the knowledge and financial backdrop to engage in entrepreneurialism as the economy of the future will place a premium on hardly automatable traits of creativity and innovation. We also suggest stimulating product innovation in the hope of creating more jobs. To that end, we believe, a reform in education is required as well as a universal basic income scheme, coupled with expansion of the innovation-promoting institutions. We now turn to discussing the state of current policy.

2. Entrepreneurial Education

Entrepreneurial education – i.e. learning about and experiencing enterprising activities – as a solution to technological unemployment focuses on human capital as the capability to adapt to emerging productive technologies⁶. Policy drivers in British education have, for the last half-century, focussed on soft skills to increase employability. However as Lord Young’s report *Enterprise For All* (2014) highlights, these drivers have not evolved with technology influencing the labour market and have consequences for employability. Lord Young’s report is amongst the latest of numerous recent government reports (EEC and beyond⁷) positing entrepreneurial education as a solution to unemployment affected by technology-driven job losses. These suggest that that along with increasing base level numerical and reasoning skills and specialised knowledge, soft skills and entrepreneurial education (often measured as Total Early-Stage Entrepreneurial Activity (TEEA)) are an important – and lacking – resource for not only self-employment and job creation, but for employment and transferring skills between jobs.

Lord Young considers the advent of the Internet to have been so transformative that it drastically changed the scales by which ‘large’ and ‘small’ firms are measured; he states, “Only a few years ago the definition of a small firm was one employing fewer than 500: today 95.5% of firms by number in this country employ fewer than ten.” (2014: 1). Technological advances since 1990 have resulted in fewer available jobs per firm on average (Young, 2014). Notably, statistics on youth unemployment are proxies in highlighting the problems of shorter, zero-hour and flexible contracts, and commensurately the need for learning skills transfer and entrepreneurial behavior. Expectations and morale are low for those affected by technology unemployment in the UK, and self-employment and entrepreneurship could be an empowering solution if harnessed effectively, benefitting all ages and levels of education. For those sectors affected by long-term increases in structural unemployment, such as manufacture, retail and clerical sectors, it would seem that encouraging entrepreneurial education as an essential part of lifelong learning should be a useful place to begin.

⁶ for more, see Schultz (1967) and Nelson and Phelps (1966)

⁷ (Enterprise and Entrepreneurship Education: Guidance for UK Higher Education Providers, 2012) The Quality Assurance Agency (QAA) for Higher Education; Lord Young’s Education For All (BIS, 2014); Forum on Entrepreneurship and Youth Employment white papers (2015); Entrepreneurship Education at School in Europe, European Commission (2012); The Oslo Agenda for Entrepreneurial Education in Europe (2006)

3. British Welfare System: Universal Credit

The current British strategy in dealing with unemployment is to provide the unemployed with benefits temporarily with the aim of supporting them until they can find reasonably paid work. The new Universal Credit (UC) is to be rolled out to over 90% of claimants by 2017 and it alters the current welfare structure in several significant ways, primarily through the grouping of six types of benefit into one monthly payment. UC's key features are described below.

The income that people receive under UC is minimal. The Centre for Research in Social Policy (CRSP) calculate a yearly minimum income standard (MIS)⁸. Under UC, unemployed childless adults would receive only around 40% of the MIS, while families with children get about 60%⁹. In nominal terms, the maximum Jobseekers Allowance is £57 (for 16-24 y.o.) or £73 (25+ y.o.) a week. This is not much different from the current system.

Fig. 1.1 Work incentives under UC for an example single adult (no children or disability, rent of £60/week) - IFS



Additionally, UC allows for the coordination of benefits taper rate. By merging both out-of-work benefits and in-work support, UC can commit to a consistent 65% taper rate¹⁰ that will eliminate the previous inconsistent incentive distortions (see fig. 1.1). It should be noted however, that this 65% taper rate is still relatively high, creating disincentive effects. Furthermore, in the 2015 July Budget cost-saving measures were established that, if implemented, would leave some individuals facing tapers of up to 80%¹¹.

UC also strengthens the role of conditionality. Through a 'claimant commitment', UC raises the requirements for how and when claimants look for work. This is enforced through the threat of tough sanctions: cutting off benefits for between four weeks and three years and leaving them to rely only on minimal 'hardship payments' that the Department for Work and Pensions (DWP) is looking to replace with loans to "ensure a better balance in the system"¹². Sanctions have already proved controversial, with allegations that they are directly connected to over 60 suicides, as well as being linked to deaths arising from faulty fit-to-work assessments.¹³

Above all else, UC is still firmly rooted to the same foundations, namely that, for an individual, unemployment should be temporary and benefits are a stop-gap to ensure that all can bridge the transition between jobs. Some individuals do, of course, find themselves in long-term unemployment, but these are seen as the exception to the rule or 'skivers' leaching off an overly

⁸ "what the public identify as the items and services that households need to reach a minimum acceptable standard of living, covering essential requirements and allowing household members to participate in society" - MIS, CRSP

⁹ Does universal credit enable households to reach a minimum income standard? 2013, Donald Hirsch and Yvette Hartfree, CRSP

¹⁰ Universal Credit: welfare that works, 2010, Department for Work and Pensions, pg 4

¹¹ Creative citizen, creative state, the principled and pragmatic case for a Universal Basic Income, 2015, The Royal Society for the Encouragement of Arts, Manufactures and Commerce

¹² Universal Credit: welfare that works, 2010, Department for Work and Pensions, pg 29

¹³ Suicides highlight the grim toll of benefits sanctions in austerity Britain, 3 January 2015, The Observer

generous system that promotes dependency¹⁴. But this narrative, disregarding its initial flaws, will start to clash with reality more and more, especially if projected trends in technological unemployment are borne out in reality. In short, UC overwhelmingly favours the stick over the carrot. This might be the right choice when you're trying to beat a few stragglers into shape, but not when a large segment of the population sees their jobs taken over by machines. UC's approach is reduce a claimant's quality of life to such a level that he is forced to take up whatever employment arrives. This is not the right strategy for dealing with an economic revolution.

4. R&D, Product and Process Innovations

This section is almost entirely based on Vivarelli, Mastrostefano & Pianta and Vivarelli & Pianta in that it divides innovation into product and process innovations with the former tending to job creation and the latter – to job destruction.

4.1. R&D overview

4.1.1. Product and Process Innovation

The section 1 above shows the links between innovation and unemployment. However, today the structure of innovation is process-driven and so the compensation mechanisms are weaker. Mastrostefano & Pianta (2009) discuss contrasting effects of product and process innovations. The former tends to result from R&D, design and engineering and generally creates jobs, if sufficient demand exists and if product innovation is not to substitute older goods. The latter tend to replace labour with capital resulting in productivity growth and job losses – and is dominant in the XXI century.

4.1.2. Public and Private R&D

R&D can be undertaken both by private companies and sponsored publicly – be the latter civilian or military. When proposing expansion of public spending on R&D, we must be wary of the 'crowding out' effect. This 'crowding out' may take place because an increase in R&D spending increases the costs of R&D inputs, such as the wages of researchers. We should note, though, that even if private sector R&D is crowded out in the short term as wages are pushed up, this may be compensated for somewhat in the long term by an increased preference among young graduates for careers in research: one issue for the UK's level of STEM education is the small proportion of PhD holders in STEM fields who become researchers. Moreover, Guellec and de la Potterie's 2000 study shows that while defence R&D spending in the public sector can 'crowd out' private R&D, this is not the case for civilian public sector R&D spending. The absence of the 'crowding out' effect from civilian public R&D is evidence of positive spillover effects for the private sector cancelling out any increase in industry-wide costs.

4.2 Current Policy on R&D

This subsection reviews the current situation with R&D in the UK as compared to other countries and the government measures to promote innovation in the UK.

4.2.1 Current R&D expenditure in the UK as compared to Europe

Despite the UK's world-class research base, it systematically under-invests in R&D. Its R&D spending is below the EU average¹⁵, and while the UK spent 1.63% of GDP on R&D in 2012,

¹⁴ Skivers and strivers: this 200-year-old myth won't die, 23 June 2015, George Monbiot, The Guardian

¹⁵[http://www.ons.gov.uk/ons/rel/rdit1/gross-domestic-expenditure-on-research-and-development/2013/stb-gerd-2013.html#tab-International-Comparisons-of-GERD-as-a-Percentage-of-GDP--R-D-Intensity- \(Statistics, 2013\)](http://www.ons.gov.uk/ons/rel/rdit1/gross-domestic-expenditure-on-research-and-development/2013/stb-gerd-2013.html#tab-International-Comparisons-of-GERD-as-a-Percentage-of-GDP--R-D-Intensity- (Statistics, 2013))

according to the World Bank, Germany spent 2.88% and 2.81%¹⁶. Tera Allas's research into the UK's comparative R&D performance¹⁷ highlights that this is a structural gap. The UK has consistently invested between 1.6% and 1.7% of its GDP in R&D since the early 1990s; elsewhere, this proportion has risen. For example, South Korea has increased its R&D spend from below 2% in 1992 to 4% in 2011. She also notes that there is little evidence that these other countries are over-investing in R&D. The UK lags behind its competitors in both private and public spending on R&D. Free-riding off others' investment cannot be a sustainable strategy if we consider the effects of automation. In addition to the main, well-documented difficulties of free-riding, such as the flight of talent to places on the technological frontier, we must also consider that operating behind the technological frontier means accepting the time lags associated with innovation, which may dilute the potential for employment growth as a result of new products. Linked to this is its human capital shortfall compared to other nations. Allas's study finds that the UK's low level of R&D spending results from a combination of the smaller size of research-intensive sectors in the UK economy and the lower research intensity within these sectors. Evidence for the former point comes from adjusting the UK's R&D performance for industrial structure. The UK's Business Enterprise R&D (BERD) performance looks much better if we do this: in 2011, its unadjusted figure was 1.1% compared to an international average of 1.9%; adjusted for industrial structure, this becomes 1.4% and the world average becomes 1.6%. The UK's relatively poor performance in STEM education is a contributor to the small size of research-intensive sectors.

4.2.2. Current Schemes for promoting R&D

The government currently has many schemes in place to promote or facilitate R&D spending in the UK. Among these schemes are the 'Catapult Centres' (part 1), the British Business Bank (part 2) and the Enterprise Capital Fund (part 3).

4.2.2.1 Catapult Centres

The Catapult Centres were established as a result of Hermann Hauser's 2010 report *The Current and Future Role of Technology & Innovation Centres in the UK*, having been inspired by Germany's Fraunhofer Institutes. Operated by Innovate UK, they are designed to directly target the UK's historical weakness in commercialising its world-class research by providing a platform where business people, scientists and engineers can collaborate at later stages of R&D. They are similar to traditional business incubators in that they offer a highly skilled workforce, facilities, equipment and expert advice to firms which may not have access to them, thus improving the quality of their start-up ideas and their chances for realisation. However, they differ in that they also have the potential for knowledge-sharing and the accumulation of high-quality contacts, and they offer only technical and operational manufacturing advice, and not general business coaching. Also, unlike incubators, small and large firms alike can use Catapult Centres: for example, Rolls-Royce used the sophisticated machining facilities at the Advanced Manufacturing Research Centre, part of the High Value Manufacturing Catapult, to design more efficient ways of producing turbine blades¹⁸. Moreover, as Hauser noted, by concentrating resources near industry consumers and thus enabling a critical mass to be achieved, Catapult Centres strengthen the UK's overall investment performance. Between 2011 and 2015, nine Centres have been set up, in

¹⁶ <http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS>

¹⁷ 'Insights from international benchmarking of the UK science and innovation system', Tera Allas, 2014

¹⁸ Hermann Hauser, 'Review of the Catapult Network', 2014, URL:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/368416/bis-14-1085-review-of-the-catapult-network.pdf, 25

the areas of Cell Therapy, Digital Technology, Energy Systems, Future Cities, High-Value Manufacturing, Offshore Renewable Energy, Precision Medicines, Satellite Applications and Transport Systems. A tenth, in Medicines Technologies based at Alderley Park, was announced in July 2015.

4.2.2.2 The British Business Bank

Another major issue holding back innovation in the UK is the availability and cost of finance, particularly to small- and medium-sized enterprises (SMEs). The supposed short-termism of the City and its 'neglect' of British business has been a criticism levelled at least since the Macmillan Report of 1931. Before 2014, when the British business bank went into operation, Britain had been the only G8 country without an economic development bank¹⁹ – for 27 years. Examples of such banks are the KfW in Germany and the Business Development Bank of Canada. Finance is linked to R&D because the ONS Innovation Survey has shown that banks' support for businesses can be an issue holding back innovation. The 2011 Innovation Survey showed that 14% of firms saw the availability and cost of finance as a 'high' barrier to innovation, making these the most significant constraints on innovation. 30.6% of non-innovative firms cited constraints as a reason why they did not innovate. Admittedly, this proportion fell to a mere 3.4% in the 2013 survey, but there is still major reason to be concerned, since if R&D is by its very nature a long-term activity, the product of decisions taken in advance by firms. The British Business Bank is modelled on the German KfW. It runs the Enterprise Finance Guarantee scheme, through which the government provides a guarantee of 75% of the total value of loans given to small businesses via commercial lenders. In addition, given its ambition to be a 'one-stop shop' for SMEs looking for funding, it also helps to direct firms towards other channels, such as angel investors and venture capital through schemes such as the Angel CoFund for angel investors. By helping to improve the supply of credit and capital to small firms, the British Business Bank can help to give firms the certainty and cash they need to make long-term investments, such as in R&D. This should help Britain increase its level R&D spending and make its business culture more dynamic.

4.2.2.3 Enterprise Capital Fund

The British Business Bank runs as part of its portfolio the Enterprise Capital Fund (ECF) scheme. Under this, public and private money is put towards making equity investments into fast-growing businesses, encouraging venture capitalists to take on firms they would not otherwise. This is aimed at addressing the so-called 'equity gap', the decrease in the amount of risky investments due to information asymmetries. Venture capitalists may be overly cautious and not invest in viable propositions when they cannot accurately value it. This 'equity gap' for the knowledge-intensive sector was recently estimated at between £10-15bn for the UK, with a maximum average of £14.4 million of equity support needed to overcome it²⁰. Early assessments of the ECF scheme have been positive, though given that it takes five to six years before the economic impact of venture capital funds can be definitively ascertained²¹. In 2010, CEEDR found that only 17% of recipients of BIS funds (includes ECFs, the Capital for Enterprise fund, the Aspire Fund and the Future South East Accelerator Fund) would have been able to go ahead with their projects with the same timeframes and scale without BIS funds²². Most of those receiving funds had fewer than 50 employees, produced highly innovative market-leading products, and needed

¹⁹ 'British Business Bank to target SMEs with potential', 5th January 2014, Brian Groom and Patrick Jenkins, Financial Times

²⁰ 'The Equity Gap and Knowledge-based Firms', Nick Wilson and Mark Wright, 2015. See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/442573/Equity_gap_report_exec_summary_030715_final.pdf for the executive summary.

²¹ 'SME access to external finance', BIS, 2012

²² 'Early Assessment of the Impact of BIS Equity Fund Initiatives', CEEDR, 2010

funds for R&D, product development and working capital. Due to a lack of collateral and track record, equity finance seemed to be the best option for these firms. Moreover, seven out of the 12 recipients were able to obtain funding from other sources, increasing their chances of growth. A survey conducted in 2014 was also upbeat, suggesting that the fund helped to narrow the equity gap and develop the UK seed and venture capital markets²³.

²³ 'Interim Assessment of Enterprise Capital Funds (ECFs) and Capital for Enterprise Fund (CfEF)', CEEDR, 2014

II. Proposal: Education

II.1. Entrepreneurial education as a solution

Recent emphasis on entrepreneurial education is based on the premise of empowering the labour force via increasing skillsets and creating understanding of how those skillsets are transferrable. We would thus make the following recommendations:

- 1) Integrate Entrepreneurial Education into Lifelong Learning
- 2) Promote Entrepreneurial Values at All Levels of Education Top-Down
- 3) Facilitate Open Knowledge and Networks to Encourage Entrepreneurial Behaviours

II.1.1. Integrate Entrepreneurial Education into Lifelong Learning

Entrepreneurial capabilities (commonly cited to include confidence to take on alternative careers, creative questioning, willingness to take risks, and readiness for uncertainty and a rapidly changing economy²⁴) have to be developed over time, rather than first appear at the university level. University-level entrepreneurial education is frequently found and encouraged²⁵, but means that many low-medium skilled workers in the manufacturing sector are not reached. This exclusiveness gives rise to the idea that such skills should be considered integral as a part of lifelong learning and thus should be brought into the national curriculum from the primary level onwards.

The basic premise of this idea is that the British schooling system has not adequately prepared for emerging technology and resultant productivity-efficient job-losses. Lord Young details the need to catch up with labour market needs, noting that pre-Internet, “the skills sought by large companies, invariably process-driven, were in those days typified by team sports and conformity and that is what the school system was encouraged to deliver. The world of those now leaving education will be one in which self-reliance and creativity will be rewarded and the education system will have to adapt.”²⁶ It is important to reiterate here that the purpose of entrepreneurial education is not to simply create a generation of start-ups, but to equip students with the awareness, mindset and capabilities for all types of income-generating activities (new ventures and hired labour alike). As such entrepreneurial education may not be called thus at all, but embedded into curricula under age-appropriate alternative names. The QAA Report (2012) builds on the framework set by Gibb (2005), and recommends Enterprise and Entrepreneurship Education may be:

- Delivered by a central institution
- Embedded in curricula by subject specialist educators
- Embedded in curricula under an alternative name
- Delivered via a careers service
- Led or supported by group facilities – e.g. incubators, clubs, societies, etc.

Similar to QAA suggestions are Young’s recommendations, as is evidence from the Nigerian primary education where introduction of entrepreneurship studies into primary school curriculum is

²⁴ Quality Assurance Agency Report, *Enterprise and Entrepreneurship Education: Guidance for UK Higher Education Providers* (2012)

²⁵ QAA Report, 2012

²⁶ 2014: 1

welcomed and backed by teachers and local entrepreneurs²⁷. All recent reports recommend schemes such as work-shadowing, bringing student company programmes into the curriculum, encouraging internship and mentorship opportunities. For example, Lord Young reviews the highly successful Fiver Scheme, which essentially brings optional, co-curricular schemes like Young Enterprise far earlier into the curriculum. Unlike Young Enterprise, which is taken up enthusiastically by independent schools and disproportionately little by state schools, Fiver involves giving state-funded primary school children a £5 note, and seeing what they can make of it in a month. Such a scheme is easily scalable and can be brought into different levels of education with varying levels of complexity, with benefits for all primary stakeholders: students, teachers, local businesses, schools, education inspectorates and potential employers.

Students aside, there is a strong argument for providing teachers with ‘real world’ industry experience by industry-led professional development courses. This not only fosters ties but also keeps educators practically equipped. Moreover as Young recommends, more attention can be given to basic qualitative minimum-standard measures of entrepreneurial education by OFSTED inspectors, as a key component of lifelong, skills-focused and varied learning for all ages. This may be done by means of an electronic record of all types of activities contributing to entrepreneurial education (whether informal or formal learning) in something like an ‘enterprise passport’²⁸

II.1.2. Top-Down Promotion of Entrepreneurial Values at All Levels of Education

The skills associated with entrepreneurial education can – and should – come from and complement any sort of compulsory educational background. With the impact of technology on employment of the labour force, it is important that academic and vocational education experiences are created, transferrable and appropriately valued – such an impetus may need to come from the top down. The Danish Foundation for Entrepreneurship²⁹ was established in 2009 by an inter-ministerial partnership between four ministries (Ministry of Education, Ministry of Science, Ministry of Economics and Business Affairs and Ministry of Culture). The Foundation allocates funding for the further development of education, with a focus on innovation and entrepreneurship at all levels of the education system, whether academic or vocational. In 2013, 63% of Danish primary school pupils who knew other self-employed people wanted to become an entrepreneur; in the same year, three times as many³⁰ entrepreneurship students in further and higher education were involved in business start-up activities. Since the deindustrialisation of Britain, there has been a relative disregard for vocational education, due to its association with problems of quality assurance, over-specialisation and lack of transferrable skills, and thus potential job security. The place of apprenticeships and former polytechnic universities offering applied courses in higher education is markedly lower than those offering more ‘classical’ subjects, resulting in vocational-facing and entrepreneurial skills being lost out following tertiary education. Following the Danish approach, a top-down allocative policy may be needed. To this end Lord Young suggests the publication of a Future Employment and Earnings Record for the assessment of all career prospects, including non-traditional, emerging technology-based areas, to eliminate educational or parental biases in decision-making.

²⁷ Udu and Amadi, 2013

²⁸ Young, 2014

²⁹ <https://ec.europa.eu/growth/tools-databases/dem/initiatives/649/danish-foundation-entrepreneurship-young-enterprise>

³⁰ Kåre Moberg, 2013

Competition and incentivisation into entrepreneurial education and creative ventures can be imbued into the education culture, if they are broad-based, open and well-publicised amongst all types of educational institutions – both academic and vocational. The European Commission (2012) report provides evidence calling for enterprise competitions for ideas and business plans for new ventures – with substantial rewards – to be encouraged, with the view that students need incentive to engage with enterprise to counter biases towards process-driven employment. Enterprise competitions have strong benefits from stakeholders, whether the student or potential venture capitalists (who often fund such ventures). As they presently exist, competitions are recognised to be restricted in their impact thus far, as scale and scope of competitions are small and access is not encouraged by educators, other than for the highest-achieving students (who most likely need not fear technology unemployment in any case). This is certainly an area for improvement; the UK might model its approach on that of Cyprus, which brings together universities, government and secondary students. The Cyprus Ministry of Education and Culture collaborates with the University of Cyprus to conduct an annual business plan competition, the Cyprus Entrepreneurship Competition CyEC for students in their upper-secondary education. Such events are scalable, and in the UK might be a collaborate effort of further and higher education institutes.

II.1.3. Facilitate Open Knowledge and Networks to Encourage Entrepreneurial Behaviour

The flow of information in networks is an undervalued resource when it comes to employability. It is a proven tool for maximising employment opportunity that can never really be replaced by technology in the labour market, and one that should be encouraged. This type of scheme – to include government supported data sharing, business-educator alliances, etc. – would facilitate entrepreneurial thinkers to exchange information, ideas, resources and best practices. This would raise the profile of entrepreneurial role models throughout government and community narratives. Young (2014), for instance, recommends the development of a new national volunteer network of Enterprise Advisers who form the nexus between local business and educators of all levels and styles. Such a policy also addresses the increasing concern in higher education that university-industry collaboration should be strengthened, to maintain the cutting-edge relevance of British institutions. It is important to build ties between education and employers so that education can respond to the problems posed by technological developments.

These measures for open data sharing *use* technology to overcome the problem it poses and use information flows that inspire and provide mutual encouragement for entrepreneurial thinking. In the Flemish Community of Belgium and within the framework of the European Regional Development Fund, the project Proleron aims to raise the standard of entrepreneurial education by business-teacher training of secondary school teachers in entrepreneurship and developing their entrepreneurial attitudes through adopting non-traditional approaches and teaching methods and by using nontraditional pedagogical tools (EC, 2012). At present there is an entrepreneurial elite; studies show that the factor most likely to make one an entrepreneur is if their parents are. The persistence of such an elite concentrates transferrable and creative skillsets and creates entry barriers.

II.1.4. Conclusion

There are clear and well-documented studies recommending promotion of entrepreneurial awareness, mindset, and capabilities via the lifelong learning system. Certainly there are limits to

Technological Unemployment: Transition to an Entrepreneurial Economy

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all of this, of course. Ultimately whether it is about increasing a particular skill and specialising in it, or whether it is about increasing the ability for knowledge transfer and entrepreneurial activity, we cannot assume that a workforce is homogenous and that all have the same capacity for learning and applying these ideas. Moreover, any suggested changes that are implemented today (especially on the national curriculum) will not see any immediate results, but rather with a 10-15 year time lag at least. This is therefore a long-term plan, that should be implemented sooner rather than later to keep pace with technological developments and their impact in the labour market.

III. Proposal: Universal Basic Income

Whilst education, retraining and other measures might help to minimise and curtail the structural unemployment due to technological progress, they will not succeed immediately at preventing a mass rise in unemployment. Thus, a strategy is needed not just to reduce the impacts of technological unemployment, but also to cope with it as a persistent reality. To this end we make the following recommendations:

- 1) Research Universal Basic Income through well-designed pilots in the UK and follow similar European developments closely. In particular, identify the impact on hours worked, productivity, spending and saving, and indicators of health (mental and physical).
- 2) Build a broad base of political support for Universal Basic Income as the key policy solution to technological unemployment, so that when joblessness starts to rise, it can be implemented swiftly and effectively.

Under present policy, unemployment generally prompts insecurity and poverty, and is strongly associated with depression, suicide, mortality, and many other worsened outcomes in overall life chances. Universal Basic Income (hereafter UBI) would give the unemployed a decent quality of life while preserving the 'work-must-pay' imperative. Moreover, it would support entrepreneurs, reinvigorate slackening demand, and bring many other economic benefits. Five main areas of strength are analysed: incentive/disincentive effects; entrepreneurialism and demand preservation; inclusivity and inequality; cost and cost-efficiency; and political action.

III Unconditional Basic Income - the case in favour

III.1. What is UBI?

UBI is extremely simple. It is not means-tested, nor does it require job-searching for the unemployed. There are also no restrictions on how the money is spent. What level of income should be granted is the topic of much discussion and debate, but the aim would be to place it at a lowest point at which those without any other income can enjoy a acceptable quality of life. Using 80% of MIS and the full state pension as reference points would mean an income of £6000 a year. Alternatively, a recent proposal³¹ suggested a citizen's UBI that varied between age groups - including recommendations of £2925 a year for 5-15 year olds; £3792 a year for 25-64 year olds; and £7420 for over-65s.

III.2. Incentive / disincentive effects

One significant economic advantage that UBI has over UC is that it does not use tapering, as it is a flat level of income afforded to everyone. A 65% taper might improve the financial incentives to work, but it by no means solves the issue of low incentives to work. Consider that for every pound a claimant earns only 35p will remain as net income, leaving them earning £2.35 an hour if they get a minimum wage job. (If the 80% taper is implemented, this falls to £1.35 an hour.) UBI does not incur this type of disincentive effect; it ensures that work does pay and that the financial rewards of employment are not distorted by the tapering effect. However, UBI may have different, more severe disincentive effects, usually cited by critics as its insurmountable downfall. In brief, the accusation is that because everyone receives enough to live an acceptable quality of life, there is little to no incentive to go find work. This would pose problems for social cohesion and

³¹ Creative citizen, creative state, the principled and pragmatic case for a Universal Basic Income, 2015, The Royal Society for the Encouragement of Arts, Manufactures and Commerce

economic growth, as well as undermining individual responsibility and increasing dependency on 'government handouts'. But there are two huge weaknesses with this argument.

First, even accepting that people might reduce how much they work, this does not necessarily translate into lower productivity and economic output. Many employees in Sweden are now trialling the switch to a six hour work day, with reportedly rises in productivity and reduced staff turnover³². This is without even considering the higher productivity gains that might be made from having a healthier workforce who can supplement their wage with UBI³³. Better health and wellbeing has been shown to increase productivity in workers³⁴, with many firms now incentivising healthy behaviour from employees to reap these benefits.

Second, there is little evidence to suggest that most people will reduce their work hours. All studies of UBI that have been carried out in developing countries (India³⁵, Namibia³⁶) showed increases in hours worked. Even the most critical of studies in developed countries show either very small (5%) decreases in the number of hours worked³⁷ or none at all. Moreover, those that do reduce their working hours tend to be single mothers and teenagers working to provide for their families³⁸, not exactly the basis of the economy. Moreover, these critical studies had serious experimental flaws, tested a negative income tax (similar but different from UBI), and had very high tapering rates of up to 80%³⁹.

Pilot schemes in developed countries are critically needed in order to make a fuller and better informed appraisal of UBI. In 2015, Finland⁴⁰, Aquitaine in France⁴¹, and Utrecht in the Netherlands⁴² put forward proposals to launch basic income pilot projects, details of which are as yet unspecified. Switzerland is due to have a referendum on UBI in 2016, the results of which could provide good quality data and evidence. But to test UBI's application to the UK, there is no reason it should not follow the same pathway as UC, for which extensive pilot projects were carried out. Notwithstanding the current lack of high-quality data however, all initial signs point contrary to the prediction that UBI would incentivise large-scale worklessness. In fact, mass unemployment will already exist due to technological progress, and so the implication is rather that UBI would not work against efforts to reduce or minimise it. (The Observer, 2015)

³² Efficiency up, turnover down: Sweden experiments with six-hour working day, 17 September 2015, The Guardian

³³ The impact of a wage increase on mental health: Evidence from the UK minimum wage, 2015, Centre for Health Economics, University of York

³⁴ Comparing the Contributions of Well-Being and Disease Status to Employee Productivity, Gandy et al (2014)

³⁵ Basic Income: A Transformative Policy for India, 2015, S Davala et al.

³⁶ Basic Income Grant Coalition: Pilot Project. BIG Coalition Namibia.

³⁷ Improving Social Security in Canada – Guaranteed Annual Income: A Supplementary Paper, Gilles Séguin, Government of Canada, 1994. Canadiansocialresearch.net.

³⁸ The Town with No Poverty—Using Health Administration Data to Revisit Outcomes of a Canadian Guaranteed Annual Income Field Experiment. Evelyn L. Forget (February 2011). University of Manitoba.

³⁹ Lessons from the Income Maintenance Experiments: An Overview, 1986, Alicia H. Munnell,

⁴⁰ Finland considers basic income to reform welfare system, 20 August 2015, BBC News

⁴¹ France: Aquitaine region to conduct unconditional minimum income pilot, Basic Income Earth Network (BIEN)

⁴² Dutch city plans to pay citizens a 'basic income', and Greens say it could work in the UK, 26 December 2015, The Observer

III.3. Entrepreneurialism and demand-preservation

Aside from incentive/disincentive effects, an interesting insight from studies in developing countries is the huge increases in entrepreneurship they saw, with a 300% increase in Omitara, Namibia⁴³, and recipients in Madhya Pradesh, India⁴⁴, three times more likely to start their own business. Due to the aforementioned lack of research, it is yet not known whether such effects will be replicated in developed countries, but there are several reasons they should be. Crucially, UBI gives people the space and financial security to be creative and create value. Without excessive stress, insecurity and worries about whether a minimal budget will last the week, budding entrepreneurs can turn their minds to more gainful endeavours. Ideally, UBI would help create a nation of self-starters where the advantages that humans still hold over machines - creativity, flair and thinking-outside-the-box - can thrive. Moreover, in an era when traditional career paths are dissolving and job insecurity is rife, self-employment becomes more attractive, and UBI would encourage it. Finally, it would also help to counter the concentration of social, financial and human capital⁴⁵, instead choosing a more democratic form of entrepreneurship and creativity⁴⁶. Moreover, UBI would reduce the risk that entrepreneurs feel they take when starting up a business because they always have UBI to fall back on, while a constant predictable income flow will also make it easier to get a loan (due to lenders bearing less risk).

At present, the unemployed have extremely low purchasing power. If a large segment of the population fall into this category and income inequality widens, the power of mass consumerism will falter, as it relies on the high-spending (as a proportion of income) lower and middle classes whose numbers will shrink dramatically. This will soon present an inevitable crisis of demand, undermining both economic growth and the incentives to innovate (slowing down the rate of technical progress). Supplies of labour and capital currently exceed demand, as can be seen from stagnant wages and tiny interest rates; yet this era's demand-boosting measure of choice - quantitative easing - has not been especially effective given the vast quantity of money that has been plowed into it⁴⁷. In short, this is because it gives money to the financial sector (the rich) in the hope that it will encourage lending (often to the rich), and in doing so relies in large part on 'trickle-down economics' to boost wider demand. Mainstream economists such as Milton Friedman⁴⁸, Lord Adair Turner⁴⁹, and even Ben Bernanke⁵⁰ have suggested that "helicopter-drops" of money into bank accounts (exactly what UBI does) could be much more efficient and effective in demand stimulation. It is likely that the economy of the future will require permanent stimulation to maintain levels of demand, and in UBI there is an effective and politically palatable strategy to accomplish that.

There are several other ways that UBI will help maintain economic growth in an automated world, though they will not be analysed in depth. First, it would reduce or remove the need for a minimum wage - whose level is usually set fairly arbitrarily - by rebalancing the scales of bargaining power, which would otherwise be shifted hugely in the direction of firms. This would also increase

⁴³ Basic Income Grant Coalition: Pilot Project. BIG Coalition Namibia.

⁴⁴ Basic Income: A Transformative Policy for India, 2015, S Davala et al.

⁴⁵ The Rise of the Creative Class - Revisited: Revised and Expanded, Richard Florida

⁴⁶ Creative citizen, creative state, the principled and pragmatic case for a Universal Basic Income, 2015, The Royal Society for the Encouragement of Arts, Manufactures and Commerce

⁴⁷ The Argument for Universal Basic Income, Tom Streithorst, economics.com

⁴⁸ Optimum Quantity of Money, Milton Friedman (1969), pg 4

⁴⁹ Juncture interview: Adair Turner, Institute for Public Policy Research, 2015

⁵⁰ Some Thoughts on Monetary Policy in Japan, 2003, Ben Bernanke

economic efficiency as compensation would better reflect the attractiveness of a job. Second, there would be better matching of workers to jobs and thus higher productivity because the unemployed would not be forced into the first job they can get, as they are under the current system. Third, it solves the conflict between efficiency and equity. This generally concerns people who can not contribute to society - the unemployed, disabled or elderly - or those who can not cover their essential costs. To rectify this we address them with jobseekers allowance, disability benefits, pensions, housing benefits, child benefits, tax credits, and so on. Instead of these piecemeal interventions, UBI directly and effectively raises the economic floor to a point, below which, pure capitalist efficiency starts to clash with human dignity and basic ethics.

III.4. Inclusivity and inequality

UBI would mark the start of inclusive welfare, which would help to recalibrate the current trends of prejudice and cultural stigma that surround unemployment. Research has highlighted how the prevailing individualised ethic of self-interest induces the demonisation of those in need, leading to a “process of de-socialisation” whereby values such as care, compassion and social responsibility see their influence diminished, with harmful repercussions on social cohesion⁵¹. To maintain social cohesion, the public perception of unemployment will have to undergo a widespread shift in the next few decades, as more and more people fall victim to technological progress and larger and larger segments of society are treated as outcasts from society. There is no doubt that the current system of redistribution plays a large role in producing the current vilification. Inclusive welfare measures like UBI would help to both instigate and enable an opinion change. Furthermore, this change in attitude towards unemployment will have very real benefits for the unemployed, as many ills they suffer - depression, suicide and other mental health issues - are strongly linked to notions of self-worth and societal expectations. As the ranks of unemployed swell improving their health and life satisfaction will grow ever more important.

Inclusivity will also allow welfare to reach all who need it, increasing take-up as it is extremely simple to sign-up for and there are no hoops to jump through to establish eligibility, let alone meet conditionality requirements. A 2014 CESI report⁵² estimated the take-up of JobSeeker’s allowance (JSA) at just 60-67%, Income Support at 77-89% and Housing Benefit at 78-84%. Under UC, reductions in overall complexity - only applying for one benefit instead of six - are expected to increase take-up by £2.6 billion⁵³. But the key factor in take-up is not complexity but conditionality, as can be seen in the current figures for the non-conditional benefits, with take-up at 97% and 96% for the basic state pension and child benefits respectively. These benefits are also those least tainted by social stigma. Thereafter, the inclusive, simple, and non-conditional welfare that UBI provides would ensure that everyone could participate, free of administrative or cultural hurdles.

As technology takes over more jobs, the income of two minority groups is likely to rise: the owners of the technology itself, and the owners of firms who will see their costs shrink from greater efficiency - consider that 27% of global wage costs (\$9tn) are estimated to be saved by 2025⁵⁴.

⁵¹ Strivers vs skivers: Class prejudice and the demonisation of dependency in everyday life, Valentine and Harris (2014)

⁵² Take-up of benefits and poverty: an evidence and policy review, 2014, Centre for Economic and Social Inclusion, Dan Finn and Jo Goodship

⁵³ Universal Credit: Inclusion briefing, 2011, Centre for Economic and Social Inclusion

⁵⁴ Disruptive technologies: Advances that will transform life, business, and the global economy, McKinsey Global Institute, 2013

This will be mirrored by the reverse trend occurring to the majority, as more and more fall out of employment or see their wages shrunk in order to compete with machines. High levels of inequality have been shown to correlate strongly with worse performance in a wide number of social and health indicators, including trust, mental health, drug use, life expectancy, obesity, educational attainment, crime, social mobility, and many more⁵⁵. There is also growing evidence that high inequality harms economic growth⁵⁶. In face of these gloomy predictions, the case for increased redistribution is greatly strengthened. Some form of policy will have to be found to counteract these harmful inequality-widening market forces. UBI presents a method that is efficient, effective and more politically palatable than many other alternatives.

III.5. Cost and cost-efficiency

The second mainstream criticism of UBI is that despite all its advantages, it is simply too expensive. These claims are not wholly unfounded, but are by no means insurmountable. The final cost analysis depends hugely on what the details of the policy are and at how much income is accorded. The previously mentioned RSA report⁵⁷ that varies UBI by citizen's age (and uses a very gentle taper) is estimated to cost around £280bn, only around £16bn (1% of GDP) more than the savings it expects to make from replacing pensions, benefits, tax credits, administration, and other areas. The suggestion in these proposals is that all adults receive just £71 pounds a week. This is a modest aim, leaving the large segment of society replaced by automation surviving on less than half of MIS. If the income granted to all over-18s (including pensioners) was set at £6000 a year, the overall cost would be increased by £80bn - leaving a shortfall of roughly £95bn, equivalent to about 5.5% of current GDP. This is a radical shift of course, but these costs must be viewed in the context of the automation revolution. Mass unemployment will force us to reevaluate assumptions about joblessness and its effects will likely demand a radical shift. As mentioned, unless the inequality is to be left to rise unfettered, redistribution (aka spending) will have to take place on a much larger scale than it currently does. Public spending in 2019 will register at 38% of GDP, growing to 43.5% if UBI was implemented, far from the big European spenders of Finland (55%), Denmark (55%) and France (53%)⁵⁸ and the same as UK's spending in 2012. In addition to these numbers, it might be more useful to characterise UBI in terms of investment rather than simple expenditure. As alluded to, ending material poverty would have knock-on benefits to education, health, crime and entrepreneurialism, all of which would have a monetary rewards through (for example) better skilled workers, fewer visits to hospital, lower incarceration costs, and more innovative start-ups. The value of these investments is hard to accurately predict, but research does provide some clues - for instance, the cost of child poverty is estimated to be at least £25bn a year⁵⁹ (a figure likely to rise with technological unemployment). These estimates also do not take into consideration how much social cohesion is worth, or the moral perspective of whether we should leave a large segment of society entrenched in poverty.

UC simplifies the existing welfare framework, creating savings of £200 million in administration costs and £2.6 billion through reductions in fraud and overpayment. The overall administration costs of the DWP remain significant, at around £7 billion. (4% of DWP's yearly budget) Enforcing conditionality, processing vast quantities of paperwork, and preventing fraud is all very expensive

⁵⁵ The Spirit Level - Why equality is better for everyone. Wilkinson and Pickett (2009)

⁵⁶ Causes and Consequences of Income Inequality : A Global Perspective, IMF (2015)

⁵⁷ Creative citizen, creative state, the principled and pragmatic case for a Universal Basic Income, 2015, The Royal Society for the Encouragement of Arts, Manufactures and Commerce

⁵⁸ The Tories will reduce UK public spending to Estonian levels, 15 April 2015, The Guardian

⁵⁹ Estimating the costs of child poverty, 2008, Joseph Rowntree Foundation

– UBI would have far lower administration costs as it requires much less oversight and micro-management. Moreover, because of its simplicity, implementation would be relatively smooth and cheap, unlike UC whose rollout costs are upwards of £12bn⁶⁰.

III.6. Political action

How then would UBI become enshrined in British policy? A first step would be to recognise its long history since it was first proposed by Thomas Paine in 1797⁶¹, its evolution as a “social dividend”⁶², and the range of advocates that it has attracted from across the political spectrum. Thinkers from John Stuart Mill and Friedrich Hayek to Martin Luther King Jr. and Henry George have, at various points, been proponents of some form of UBI. This heritage should form a basis from which cross-partisan support can proceed. From the right because it restricts the role of government in dictating people’s behaviour, and from left because it lifts the worst off in society out of poverty. However, to reach this point, it must first become part of popular political discourse.

In the UK, support from academics, lobbying groups and public opinion could help raise pressure to inject UBI into serious Westminster policymaking. Indeed, Caroline Lucas MP (Green) has indicated that she will seek a parliamentary debate on the topic in 2016⁶³. She should be supported. Abroad, many European countries (Switzerland, Finland, France, the Netherlands) are putting UBI on the map by initiating pilots, and there is also increasing support from politicians, even in Brussels, where the feasibility of UBI at an EU level was discussed at a conference last year⁶⁴. Thereafter, it is likely that UBI will start to gain momentum as a sincere policy and influence political debate in the UK. Although all this might play a role in shaping Labour’s thinking, it does not seem likely under a Conservative government intent on bolstering conditionality and sanctions to their highest ever levels (rather than removing them). The effects of technological progress on unemployment may then have to become much more explicit before UBI is considered in earnest.

There are also practical challenges that face the political implementation of UBI. If it was designed as a resident’s income, with the free movement of labour upheld by the EU, it could attract much greater migration - pushing it to even higher levels, while the current situation is already deemed ‘unsustainable’ by the government⁶⁵. Yet, if it was implemented as a ‘Citizen’s Income’ it would clash harshly with EU regulations (though admittedly the UK might soon not be in the EU). Moreover, a citizen’s Income would create a potentially harmful interplay between citizens and migrants, both economically and culturally. If citizens on UBI refused to do ‘dirty’ and poorly paid jobs, they would be left to migrants, creating possibilities of social unease. Alternatively, citizens might also undercut migrant wages, as their basic living costs are already covered by UBI. Again, this could create tension between citizens and migrants with the emergence of a two-tier society. These issues must be taken into consideration. To avoid them, it would ideally be granted to all residents in a situation where the UK had greater control over its borders, which would then help boost the UK’s competitiveness.

⁶⁰ Universal Credit will cost taxpayers £12.8bn. 3 June 2013, Mark Ballard, computerweekly.com.

⁶¹ Agrarian Justice, Thomas Paine, 1797

⁶² Who framed 'social dividend'?, by Van Tier, Walter. March 2002. USBIG Conference, CUNY

⁶³ Dutch city plans to pay citizens a 'basic income', and Greens say it could work in the UK, 26 December 2015, Daniel Boffey, The Observer

⁶⁴ EU “has the power” to put in place a universal basic income, 14 April 2014, EurActiv

⁶⁵ UK net migration levels 'unsustainable', says David Cameron, 9 December 2015, BBC News

With the ever-accelerating progress of technology and its associated changes in both the economy and wider society, the inherent flexibility of a policy in addressing new and evolving issues that may not have been explicitly considered during its drafting will become an increasingly crucial element in its success. UBI's strength in this lies in its use of money - the most flexible commodity of all, as it can be exchanged for anything - and in its simplicity, which refuses to impose a specific purpose or objective, aside from increasing the quality of life for all. Moreover, UBI will also empower individuals in their adaptability to new challenges, threats and opportunities in the economy. Targeted policies certainly still have a role to play, but they will need a strong foundation to work upon. At present, such a bedrock does not exist, but in UBI there is great potential to revolutionise not just the fate of the unemployed, but also the fate of policymaking for the politicians of the future.

III.7. Conclusion

The primary aim of government is to maximise standard of living for all. If a large segment of population becomes unemployed, then the only way to achieve that goal is to afford them a basic standard of living. UBI promises an effective, efficient and politically feasible method through which to accomplish this, and one likely to last the test of time compared to other tailored policy solutions whose context might soon evaporate in a world where change and progress are ever-accelerating. It offers many other advantages, including boosting entrepreneurship, maintaining consumer demand, easing social cohesion, and eliminating material poverty. As the emerging entrepreneurs make their first steps with their own business, UBI becomes an invaluable financial backdrop. There are questions to be addressed, to which we should seek the answers as soon as possible, and there are regulatory challenges to overcome. It may be that signs of technological unemployment will have to become explicit for political action to gain traction, which might not be for another decade. Nevertheless, academics, lobbying groups and grassroots support can play a significant role in making UBI part of the mainstream political discourse, while also pushing for the government to fund studies in the UK.

IV. Proposal 3: R&D

This Proposal works in conjunction with Proposal I (Education) in that Britain must increase its level of human capital in STEM sectors to promote R&D and must improve its R&D performance to make innovative entrepreneurship an attractive career path. While Britain has performed well in some research-intensive industries associated with product innovation, such as pharmaceuticals and aerospace, its main growth area has been the finance and business sectors, which are less conventionally research-intensive and tend to focus on process innovation, which leads to unemployment. If we are to stimulate the UK's product innovation capacity and to create jobs, then a crucial step will be to grow the research-intensive sectors, such as in high-value manufacturing and the life sciences. To this end we make the following recommendations:

1. Expand Catapult Centres in size to 20 by 2020 and provide them with budget of £1bn. Introduce on-site business coaching for SMEs at Catapult Centres.
2. Increase the capital reserves of the British Business Bank with the long-term aim of increasing lending to levels similar to those of the KfW.
3. Narrow the 'Equity Gap' by expanding the Enterprise Capital Fund by at least a fraction of the respective amount.

IV.1. Catapult Centres

One potential policy approach could be increasing the performance of R&D by the government itself. There is evidence of a strong positive correlation between public sector and private sector R&D spending⁶⁶, and Mariana Mazzucato's research into innovation and the 'Entrepreneurial State' has shown the importance of government research in spurring innovation: many Silicon Valley firms are reliant on innovations originating from the public sector. In order for policy to have the greatest impact per pound spent, the most promising avenue should be further developing the Catapult Centre programme. There exist numerous case studies where the Catapults have helped spur innovation. For example, the Centre for Process Innovation (CPI), part of the High Value Manufacturing Catapult, helped an SME called PolyPhotonix to develop a treatment for diabetes-induced blindness through the use of its facilities. As a start-up, it would have been financially impossible for it to have accessed the sophisticated equipment needed to do this^{67,68}. Thus the Catapult helped to reduce the direct cost of R&D, which in the wake of the crisis was one of the key factors holding back British R&D performance⁶⁹.

If the UK is to catch up with its rivals, however, the Catapults need to be developed further. Indeed, Allas notes that while foreign policy makers working on innovation are impressed by the Catapult Centres, they have noted their small scale. Both the Fraunhofer and Carnot Institutes (the latter being a Catapult-like French programme) have budgets of around £2 billion, while the Catapult Centres only have access to around £250 million⁷⁰. Thus the first priority is to increase the scale of the project. We suggest increasing the Innovate UK budget to £1 billion so that it can provide funding for new centres, and looking to expand the number of

⁶⁶ Allas, 2014, p.30

⁶⁷ Hauser, Review of the Catapult Network, 2014, p.15

⁶⁸ 'PolyPhotonix LED 'sleep mask' tackles diabetes-related sight loss', High-Value Manufacturing Catapult

⁶⁹ 'First Findings from the UK Innovation Survey 2011 (Revised)', BIS, 2013

⁷⁰ Hauser, Review of the Catapult Network, 2014, p.32

Catapults to 20 by 2020, in line with Hermann Hauser's recommendations. Each new catapult should meet a clear set of criteria, in line with best practice in the Fraunhofer Society: the new centres should be in areas where the UK has a strong base of research, where there is strong potential for growth in that sector and where there is a clear business case for the establishment of a Catapult Centre. Given the need to create jobs using innovation, it may be wise to focus more on product innovation areas such as green technologies. This will minimise automation innovation and will create jobs through product innovation. Nevertheless, we cannot entirely avoid some automation of jobs as a result of Catapult Centres investment, as some of the ground-breaking technologies of the future, such as driverless cars or trains (which are already catered for with the Transport Systems Catapult), will involve some automation of jobs. The manufacture of these new products, it must be noted, will however create jobs. Hauser notes that the Innovation and Knowledge Centres, set up to develop early-stage technologies, could be a potential way for 'incubating' new Catapults. Nevertheless, this highly structured approach does run the risk of responding too slowly to changing circumstances, or missing opportunities. Therefore, we would urge the Governing Board of Innovate UK, and its Catapults Committee, to be proactive in assessing ongoing developments and acting decisively to invest in new Centres or expand existing ones (perhaps by creating new centres of excellence in other parts of the country linked to the main Centre, as has been decided with the Precision Medicine Catapult) if it deems that the criteria are met. Maintaining a mixture of public (via direct grants for long-term investment), private (via contracts from firms) and joint funding (for collaborative projects) will remain essential to keep the Catapults focused on both providing a long-term focus and an interest in commercialising research. Thus Hauser is right that the current funding model, where roughly equal proportions of funding come from each of these sources, must be maintained and is in line with international best practice (similar arrangements are in place at the Fraunhofer Institutes, TNO in the Netherlands and VTT in Finland).

In addition, while it is important not to over-complicate matters when the project is still in its infancy, it may be worth studying the demand for and the feasibility of running small on-site business coaching programmes at or near the Catapult Centres. "One-stop shops" for start-ups in any sector where businesses could both improve their products and refine their business models via coaching would encourage start-ups to grow, making the UK's business culture more dynamic. For example, entrepreneurs may be able to take the seeds of an idea from the business coaching programme and develop them in discussion with industry experts at the centres themselves. One way of doing this could be to set up institutions modelled on the USA's Small Business Development Centers (SBDCs). These are funded by the central government and operated by the Small Business Administration, and are mandated to offer business advice (such as development of business plans, and market research services, in addition to manufacturing advice) to any small firm (whether a start-up or not) which needs advice. This could be applied to the UK by tying them into the use of the Catapults. Start-ups using the Catapult's services may be given the right to use of the services of these on-site business advice centres, which can primarily offer development of business plans and market research services. One study has suggested that 90% of users of SBDCs found the advice they received at the centres useful, and that the SBDCs generated \$2.27 in tax revenues for every \$1 spent, potentially making them a worthwhile investment⁷¹. Alternatively, the Government

⁷¹ "Economic Impact of Small Business Development Center Counseling Activities in the United States: 2010-11 (Revised)", James Chrisman, 2012

could consider encouraging partnerships between individual Catapults and private-sector business incubators working in the relevant sector, whereby the incubators could set up branches located next to the Catapults. This would be a relatively low-cost means of providing business assistance, and given that there is a growing network of accelerators and incubators located within the UK, it may make sense to work within this framework.

IV.2. Finance

Another major issue holding back innovation in the UK is the availability and cost of finance, particularly to SMEs. The 2011 Innovation Survey showed that 14% of firms saw the availability and cost of finance as a 'high' barrier to innovation, making these the most significant constraints on innovation, and 30.6% of non-innovative firms cited constraints as a reason why they did not innovate. Admittedly, the former proportion fell to a mere 3.4% in the 2013 Survey, but given that R&D is by its very nature a long-term activity and the product of decisions taken well in advance, improving long-term financing options for firms will be key if we are to increase innovation. This will be particularly important for smaller firms, as in the 2011 survey, financial constraints were more important for smaller firms. Having an economic development bank may be an effective way of dealing with this as it can afford to take a longer-term view, guaranteeing funds lent to firms and thus reducing credit risk for those banks involved. The resultant increase in the supply of reliable credit for firms should increase spending on innovation. This is particularly useful for smaller, growing companies, which lack a track record or collateral and thus are risky propositions. The British Business Bank, which went into operation in 2014, is the UK economic development bank, and it currently supports £2.3bn of finance to small firms⁷². It is hoped that over the first five years of its operation it will be able to unlock up to £10bn. This, though, seems rather small in light of how far the UK is behind its rivals in R&D and general investment. The German KfW lent €17bn in 2008 and €28bn in 2010⁷³. It will, of course, take a lot of time to increase the British Business Bank's size to a level where it can adequately deal with funding issues for firms, but it seems essential as a long-term priority to increase the capital stock of the Bank in stages so that it can do so. One possibility to consider could be to allow the British Business Bank to issue bonds and provide a full, explicit government guarantee on those bonds, like the KfW. The government guarantee would not be absolutely essential. For example, the Italian equivalent, the CDP, has no implicit or explicit guarantee on its bonds. However, at least while the Bank is in its infancy, it may be worthwhile to guarantee this debt to improve take-up. Following Nick Tott's suggestion, we may also consider using funds raised by NS&I to fund the growth of the Business Bank. This would have the advantage of creating an effective depositor base for the Bank.

In addition, we should also look into improving the delivery of funds to firms within the British Business Bank. Perhaps the most effective way to stimulate R&D spending via finance would be to expand the Enterprise Capital Fund (ECF) scheme, which is currently run by the British Business Bank. Under this, public (taxpayer) and private money is put towards making equity investments into fast-growing businesses, encouraging venture capitalists to take on firms they would not otherwise. This is an excellent way of addressing the 'equity gap' outlined in the exposition. Early assessments of the ECF scheme have been positive. Both of CEEDR's surveys in 2010 and 2014 suggest that it was effective in channelling funds into the sort of small, innovative firms needed to improve the UK's innovation performance and quicker

⁷² 'Annual Report and Accounts 2015', British Business Bank, 2015

⁷³ 'The Case for a British Investment Bank: A Report for Labour's Policy Review', Nick Tott, 2011

generate SME jobs. Based on this evidence, therefore, the government should view expanding this scheme as a priority. The estimate of a £14.4 million 'equity gap' perhaps should be treated with some caution, given the recent increase in venture capital investment⁷⁴, but with the current ceiling for ECF investments at £5 million, it would seem a sensible step to increase this to closer to £10 million in light of this evidence. Moreover, the government should consider expanding its total funding for the scheme to £1 billion in order to increase its overall scale. Expanding this scheme should help innovative, small firms avoid the 'valley of death' that they can often fall into, and expand, creating jobs along the way.

IV.3. Conclusion

The best way to improve the UK's product innovation performance will be to make a sustained effort to facilitate R&D by firms and to 'clear the way' for their efforts in innovation. This can be done by improving their ability to acquire the resources with which to invest and giving them the space in which to do so. A better STEM skills base will enable the UK's R&D efforts to grow without running into skills shortages. In addition, better financing for SMEs will be crucial in allowing innovative firms to grow and invest. Having sustained lending facilities open from the British Business Bank will give firms more long-term stability in their finances, giving them the confidence to invest in R&D and the funds with which to do so. Moreover, better funding for the ECF programme will also give innovative firms the funds with which to invest, and will generally promote their ability to turn their ideas into commercial reality. This will be assisted by an expanded Catapult programme, which will aid the commercialisation of research in fast-growing, research-intensive sectors. Through these policies the state can act as a great enabler of innovation, avoiding the twin traps of a top-down, heavy-handed 'picking winners' approach and of a completely laissez-faire microeconomic policy, failing to address clear market failures. Promoting R&D spending will help British firms create new products and successfully imitate and adopt others' product innovations, so that they can grow, bringing jobs with them and helping to offset the job destruction associated with automation and process innovation.

⁷⁴ 'BVCA Private Equity and Venture Capital Report on Investment Activity 2014', BVCA, 2015

V. Recommendations and Concluding Remarks

With frictional unemployment set to reach unprecedented levels, steps must be taken to give workers the necessary transferable skills and the financial safety net as they make their first steps in entrepreneurship

Thus we would like to make the following recommendations:

1. Make entrepreneurial education part of lifelong learning. Promote it among state schools, and embed it into the national curriculum. Expand the Fiver scheme to all levels of education. Introduce the enterprise passport as a measure of entrepreneurial education: an electronic record of all activities, formal or informal. Publish comparative assessment of all internship schemes.
2. Promote entrepreneurial education top-down. Expand and promote entrepreneurial competitions. Have at least one competition sponsored by the government: perhaps channel it through Skills Funding Agency.
3. Promote networks and knowledge exchange. Expand entrepreneurial teacher training, facilitate exchange between them.
4. Research Universal Basic Income through well-designed pilots in the UK and study similar European developments in detail. Specifically, research the impact on hours worked, productivity, spending and saving, and indicators of health (mental and physical).
5. Build a broad base of political support for Universal Basic Income as the key policy solution to technological unemployment.
6. Expand Catapult Centres in size to 20 by 2020 and provide them with budget of £1bn. Assess the number of resident companies and their project expenditure. Assess the options for introducing on-site business coaching for SMEs at Catapult Centres, with a view to trialling it via a pilot scheme. Examine the impact on SME success rates.
7. Assess the best and most sustainable way to increase the capital reserves of the British Business Bank, either through direct investment out of general taxation or NS&I profits, or bond issues, with the long-term aim of increasing lending to levels similar to those of the KfW.
8. Research and refresh the 'Equity Gap' estimate and narrow it by expanding the Enterprise Capital Fund by at least a fraction of the respective amount. Examine the impact on private R&D expenditure.

VI. Bibliography

- Adair Turner, I. f. (2015, September 27). Juncture interview: Adair Turner, Institute for Public Policy Research. (D. o. Josh Goodman, Interviewer)
- Aghion, P. a. (1994). Growth and Unemployment. *61* (3), 477-94.
- Allas, T. (2014). *Insights from international benchmarking of the UK science and innovation system*. Department for Business, Innovation & Skills.
- Autor, D., & Dorn, D. (2013). The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market. *103* (5), 1553-597.
- Ballard, M. (2013, June 3). Universal Credit will cost taxpayers £12.8bn. *computerweekly.com* .
- Basic Income Earth Network. (2015, December 20). France: Aquitaine region to conduct unconditional minimum income pilot.
- Basic Income Grant Coalition. (2009). *Basic Income Grant Coalition: Pilot Project*.
- BBC News. (2015, August 20). Finalnd considers basic income to reform welfare system.
- BBC News. (2015, December 9). UK net migration levels 'unsustainable', says David Cameron. *BBC News* .
- Bernanke, B. (2003, May 31). *Some Thoughts on Monetary Policy in Japan*. From The Federal Reserve: <http://www.federalreserve.gov/boarddocs/speeches/2003/20030531/>
- British Business Bank. (2015). *Annual Report and Accounts*.
- BVCA. (2015). *BVCA Private Equity and Venture Capital Report on Investment Activity 2014*.
- Centre for Economic and Social Inclusion. (2011). *Universal Credit: Inclusion briefing*. Centre for Economic and Social Inclusion.
- Centre for Health Economics. (2015). *The impact of a wage increase on mental health: Evidence from the UK minimum wage*. University of York.
- Chrisman, J. (2012). *Economic Impact of Small Business Development Center Counseling Activities in the United States: 2010-11 (Revised)*.
- Cowburn, A. (2015, January 3). Suicides highlight the grim toll of benefits sanctions in austerity Britain. *The Observer* .
- Crouch, D. (2015, September 17). Efficiency up, turnover down: Sweden experiments with six-hour working day. *The Guardian* .
- Davala, S., Jhabvala, R., Mehta, S., & Standing, G. (2015). *Basic Income: A Transformative Policy for India*. Bloomsbury.
- Department for Business, I. a. (2012). *SME Access to External Finance*.
- Department for Business, Innovation and Skills. (2011). *UK Innovation Survey*.
- Education, Audiovisual and Culture Executive Agency. (2012). *Entrepreneurship Education at School in Europe: National Strategies, Curricula and Learning Outcomes*. European Comission, Education, Audiovisual and Culture Executive Agency.
- European Commission. (2012). *Final Report of the Thematic Working Group on Entrepreneurship Education*.
- European Commission. (2006). *The Oslo Agenda for Entrepreneurship Education in Europe*. Retrieved January 13, 2015 from http://ec.europa.eu/enterprise/policies/sme/files/support_measures/training_education/doc/oslo_agenda_final_en.pdf

- Finn, D., & Goodship, J. (2014). *Take-up of benefits and poverty: an evidence and policy review*. Centre for Economic And Social Inclusion.
- Florida, R. (2014). *The Rise of the Creative Class - Revisited: Revised and Expanded*. Basic Books.
- Forget, E. L. (2011). *The Town with No Poverty—Using Health Administration Data to Revisit Outcomes of a Canadian Guaranteed Annual Income Field Experiment*. University of Manitoba.
- Frey, C., & Osborne, M. (2013, September 17). *The future of employment: how susceptible are jobs to computerisation?* Retrieved January 13, 2016 from OMS Working Papers: http://www.futuretech.ox.ac.uk/sites/futuretech.ox.ac.uk/files/The_Future_of_Employment_OMS_Working_Paper_0.pdf
- Friedman, M. (1969). *The Optimum Quantity of Money*. Macmillan.
- Gandy, W., Coberley, C., Pope, J., Wells, A., & Rula, E. (2014). Comparing the Contributions of Well-Being and Disease Status to Employee Productivity. *Journal of Occupational & Environmental Medicine* , 56 (3), 252-257.
- Gibb, A. (2005). The future of entrepreneurship education – Determining the basis for coherent policy and practice? In P. & Kyrö, *The dynamics of learning entrepreneurship in a cross-cultural university context* (Vol. 2, pp. 44-67). Hämeenlinna: Hämeenlinna: University of Tampere, Research Centre for Vocational and Professional Education.
- Groom, B., & Jenkins, P. (2014, January 5). British Business Bank to target SMEs with potential. *FT* .
- Guellec, D., & van Pottelsberghe de la Potterie, B. (2000). The Impact of Public R&D Expenditure on Business R&D. *OECD Science, Technology and Industry Working Papers* , 4.
- Haldane, A. (2015, November 15). *Labour's Share*. Retrieved January 13, 2016 from Bank Of England's Website: <http://www.bankofengland.co.uk/publications/Pages/speeches/2015/864.aspx>
- Hauser, H. (2014). *Review of the Catapult Network*. Department of Business, Innovation and Skills.
- Hauser, H. (2010). *The Current and Future Role of Technology & Innovation Centres in the UK*. Department for Business, Innovation and Skills.
- High-Value Manufacturing Catapult. (2015). *PolyPhotonix LED 'sleep mask' tackles diabetes-related sight loss*.
- Hirsch, D., & Hartfree, Y. (2013). *Does universal credit enable households to reach a minimum income standard?* CRSP. CRSP.
- IMF. *Causes and Consequences of Income Inequality : A Global Perspective*. 2015.
- Joseph Rowntree Foundation. (2008). *Estimating the costs of child poverty*.
- Kåre Moberg, L. V. (2013). *Impact of Entrepreneurship Education in Denmark*. The Danish Foundation for Entrepreneurship.
- Keynes, J. M. (1930). Economic Possibilities for our Grandchildren. In J. M. Keynes, & D. M. Elizabeth Johnson (Ed.), *Collected Writings* (pp. 321-332).
- Mastrostefano , V., & Pianta, M. (2009). Technology and jobs. *Economics of Innovation and New Technology* , 18 (8), 729-741.
- Mazzucato, M. (2013). *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. Anthem Press.
- McKinsey Global Institute. (2013). *Disruptive technologies: Advances that will transform life, business, and the global economy*.

- Middlesex University London. (2014). *Interim Assessment of Enterprise Capital Funds (ECFs) and Capital for Enterprise Fund (CfEF)*. CEEDR. Middlesex University London.
- Milewska, T. (2014, April 14). EU “has the power” to put in place a universal basic income. *EurActiv* .
- Monbiot, G. (2015, June 23). Skivers and strivers: this 200–year–old myth won’t die. *The Guardian* .
- Munnell, A. H. (1986). Lessons from the Income Maintenance Experiments: An Overview. *Federal Reserve Bank of Boston: Conference Series, 30*, pp. 1-21.
- Nelson, R., & Phelps, E. (1966). Investment in Humans, Technological Diffusion and Economic Growth. *American Economic Review* , 56 (2), 69-75.
- Nordhaus, W. D. (2007). Two Centuries of Productivity Growth in Computing. *The Journal of Economic History* , 67 (1), 128-159.
- North, D., Baldock, R., & Ekanem, I. (2010). *Early Assessment of the Impact of BIS Equity Fund Initiatives*. CEEDR. Middlesex University Business School.
- Office for National Statistics. (2013). *Gross Domestic Expenditure on Research and Development*. From Office for National Statistics: <http://www.ons.gov.uk/ons/rel/rdit1/gross-domestic-expenditure-on-research-and-development/2013/stb-gerd-2013.html#tab-International-Comparisons-of-GERD-as-a-Percentage-of-GDP--R-D-Intensity->
- Paine, T. (1797). *Agrarian Justice*.
- Painter, A., & Thong , C. (2015). *Creative citizen, creative state: the principled and pragmatic case for a Universal Basic Income*. The Royal Society for the Encouragement of Arts, Manufactures and Commerce. The Royal Society for the Encouragement of Arts, Manufactures and Commerce.
- Pickett, K., & Wilkinson, R. (2009). *The Spirit Level - Why equality is better for everyone*. Penguin.
- Postel-Vinay, F. (2002). The Dynamics of Technological Unemployment. *International Economic Review* . , 43 (3), 737-760.
- QAA. (2012). *Enterprise and Entrepreneurship Education: Guidance for UK Higher Education Providers*. Quality Assurance Agency for Higher Education. QAA.
- Ricardo, D. (1821). *On the Principles of Political Economy and Taxation* . John Murray.
- Say, J.-B. (1971). *A treatise on political economy or the production, distribution and consumption of wealth*. Augustus M. Kelley.
- Schultz, T. W. (1967). The Rate of Return in Allocating Investment Resources to Education. *Journal of Human Resources* , 2, 239-309.
- Seguin, G. (1994). *Improving Social Security in Canada Guaranteed Annual Income: A Supplementary Paper*. Canadian Social Research.
- Streithorst, T. (2015, December 20). *The Argument for Universal Basic Income*. Retrieved January 13, 2016 from Evonomics: <http://evonomics.com/argument-for-universal-basic-income/>
- The Guardian. (2015, April 15). The Tories will reduce UK public spending to Estonian levels.
- The Observer. (2015, December 26). Dutch city plans to pay citizens a ‘basic income’, and Greens say it could work in the UK.
- The Rt Hon Iain Duncan Smith MP. (2010). *Universal Credit: Welfare that works*. Department for Work and Pensions.
- The World Bank. (n.d.). *Research and development expenditure (% of GDP) data*. From <http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS>

Tott, N. (2011). *The Case for a British Investment Bank: A Report for Labour's Policy Review*.

Udu, C., & Amadi, U. (2013). Integrating Basic Entrepreneurship Studies into Primary Education Curriculum: Platform for Sustainable National Development. *Academic Journal of Interdisciplinary Studies* , 2 (5), 69-73.

Valentine, G., & Harris, C. (2014). Strivers vs skivers: Class prejudice and the demonisation of dependency in everyday life. *Geoforum* , 53, 84-92.

Van Tier, W. (2002). Who framed 'social dividend'? *USBIG Conference*. CUNY.

Wilson, N., & Wright, M. (2015). *The Equity Gap and Knowledge-Based Firms*. HM Revenue & Customs.

Young, L. (2014). *Enterprise for All*. Department for Business, Innovation & Skills.