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SUBJECT CODE **DIGC335**	SUBJECT NAME **Cybercultures**	
ASSIGNMENT NAME **Research Report**		
DATE DUE **2/6/17**	DATE SUBMITTED **3/6/17**	CONTACT PHONE NUMBER **0438 455 549**

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Cybercultures

Learning Assessment Three

Research Report or Digital Artifact

Due Friday Week 13 (2/6/17) by 5pm.

FEEDBACK

Please indicate if you wish to receive feedback for the assessment

YES

Digital Artifact location : Attached

Your work will be assessed according to the following criteria:

1] The thoroughness and quality of the research presented and analysed, especially the linkage of the conclusions to the observations, the use of concepts and/or a theoretical position, the perceptiveness of the points made and awareness of pertinent issues;

2] The structure and organisation of the material presented;

3] The presence of the appropriate referencing and acknowledgement of materials, using the author-date (Harvard) system;

4] The quality of the writing (including expression, spelling & grammar) and adherence to formatting requirements;

5] The degree of adherence to the above instructions.

General Comments:

Mark: /100
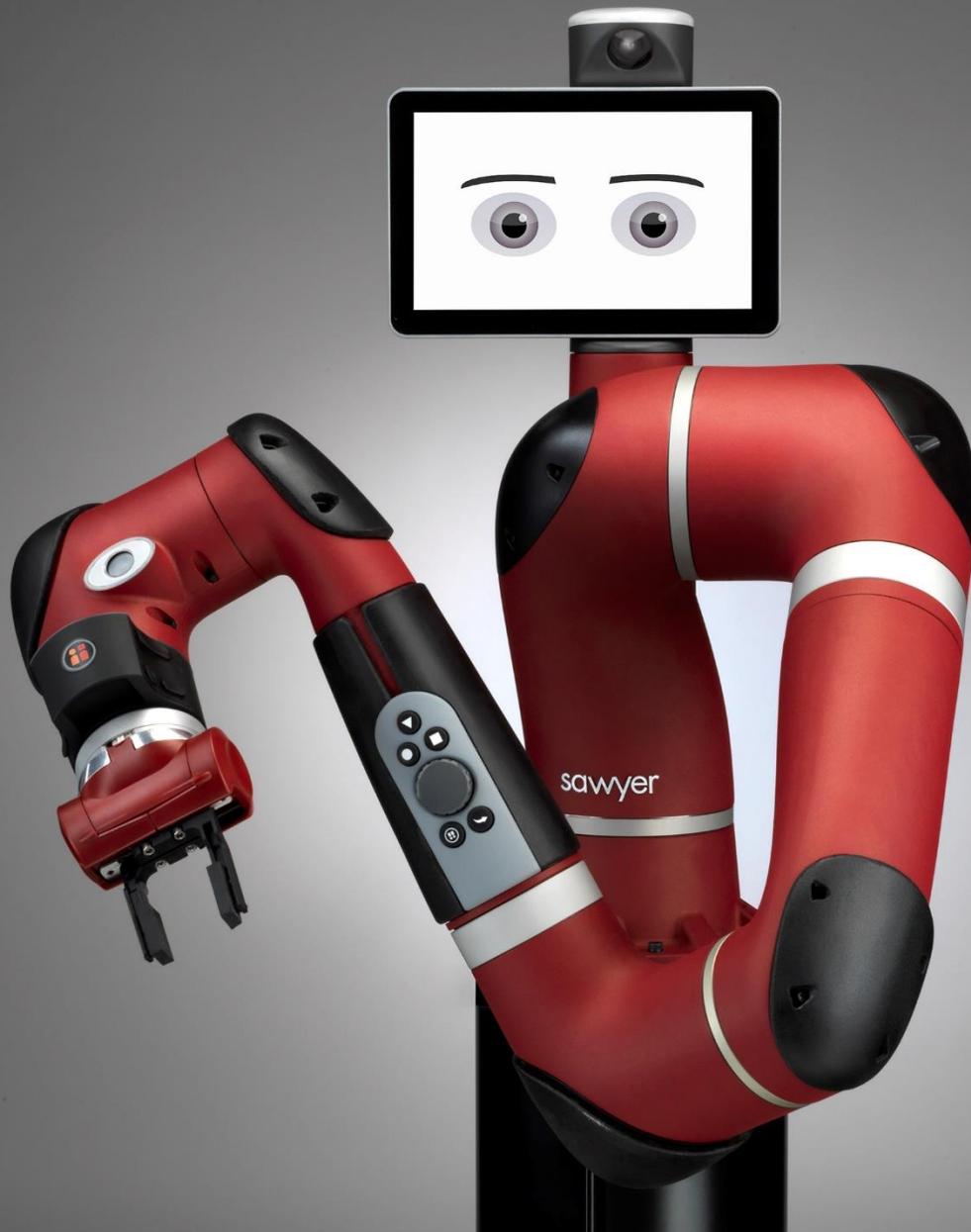
AUTOMATION & THE LABOR SHARE

IS IT DIFFRENT THIS TIME?

This report is a brief, critical exploration of the imminent wave of automation with acknowledgement of past innovations and possible future societal effects and implications.

Contact: @clancycarr

AUTOMATION

IS IT DIFFRENT THIS TIME?

TABLE OF CONTENTS

INTRODUCTION

Luddites

As the machinations of the Industrial Revolution displaced many skilled weavers and textile workers, the Luddite 'labor movement' emerged in 1811, Britain. Pointing blame at technologies such as the automated loom and knitting frames which less-skilled laborers could operate, for putting them out of work, 'sledgehammer-wielding Luddites attacked and burned factories' citing orders of the fictitious 'General Ludd' (Andrews 2015). While aware that the machines themselves weren't solely responsible for their unemployment, the knitting frame having been in use for 200 odd years already (Conniff 2011), the protestors saw them as an easy target. The Luddites despised the poor-quality workmanship that unskilled laborers produced with them, with Conniff (2015) citing that they desired 'machines to be run by workers who had gone through an apprenticeship' and to be paid a fair wage.

Tension Between Dystopia and Utopia

Today, we can observe a tangible change in the labor economy as a direct result of technological innovation. With technological innovation, we've historically seen gains for both consumers and companies, but in the background, there's a constant tension between the workers as the status-quo, and factors that threaten to upset this equilibrium. Schneider (p.1, 2011) presents the traditional, ideal model for a worker's wage as such:

$$s_L = \frac{WL}{PY},$$

EQUATION 1 THE LABOR SHARE (SCHNEIDER 2011)

As seen in Equation 1, where 'WL' is the compensation for labor, and 'PY' is sale price and other factors, wage compensation should be straight forward.

However, other factors serve to complicate this; sectors self-employment levels 'may change the labor share significantly', and 'labor demand, labor supply, and the level of output' also have an effect (Schneider p.5). The key thing to note, is that 'technological advances… improves the bargaining power of the firms in markets where wages are not payed by their marginal product, but are bargained over' (Schneider p. 22).

With innovations in automation, workers lose their bargaining power, and wages drop despite employers still seeing a steady rise in productivity thanks to a fruitful human-robotic symbiosis in what's recognized as the 'Harrod-neutral' model. In some sectors, we see companies leveraging this relationship and there's an increase in workers *and* robotics, but others such as transport have the potential to be completely automated are poised to entirely embrace a robotic future.

This report will gather these findings and more to explore whether the globally emerging wave of automation is indeed different from previous technological disruptions in the workforce, as well as consider any implications it will have on workers and consumers.

HUMAN-ROBOTIC SYMBIOSIS

MANUFACTURING & 'HARROD-NEUTRAL'

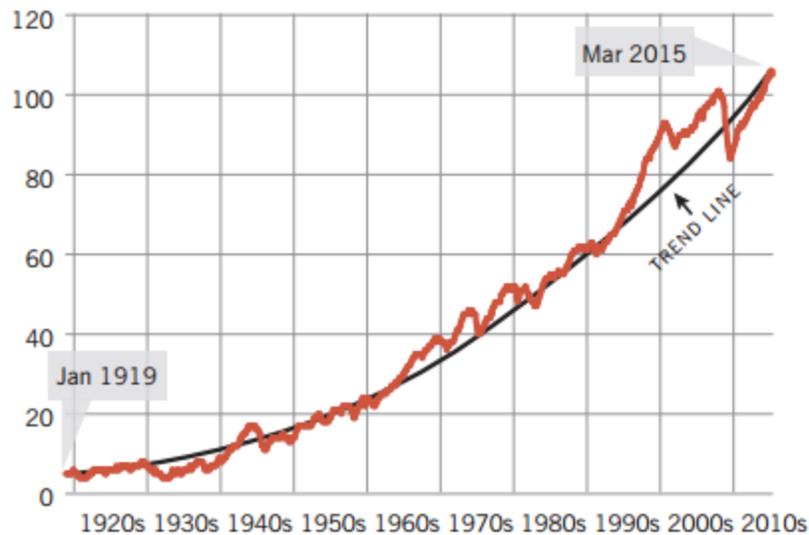In March 1939, John Maynard Keynes stated:

> 'The stability of the proportion of the national dividend accruing to labor, irrespective apparently
> of the level of output as a whole…is one of the most surprising, yet best-established, facts in the
> whole range of economic statistics, both for Great Britain and the United States.' (BLS 2017)

The Bureau of Labor Statistics quips that, would Mr Keynes be alive today, he'd learn that 'facts turn out to be temporary'. This supposed constancy has been upset substantially in recent times with '…phenomenal changes in the techniques of production' causing the labor share to begin declining in the 20th century, accelerating greatly at the beginning of the 21st century (Ibid).

Devaraj & Hicks refute the belief of decline in manufacturing and jobs, noting that growth has been 'constant' throughout the past century and 'decline is factually incorrect' (2017). In fact, it's grown by 17.6 percent between 2006 – 2013, 'or at roughly 2.2 percent per year' (Ibid). While trade accounts for only 13% of perceived job loss, 'automation and streamlining of manufacturing processes had significantly more impact accounting for 88%' (Ibid). Boyle adds that 'U.S. factories are not disappearing: They simply aren't employing human workers', contributing to the 'the decline of the middle class' (2016). Devaraj & Hicks agree that any employment stagnation is due to the 'growth in productivity of manufacturing production processes' requiring less laborers.

To put that into perspective, they elaborate that 'had we kept 2000-levels of productivity and applied them to 2010-levels of production, we would have required 20.9 million manufacturing workers. Instead, we employed only 12.1 million' (Ibid).

FIGURE 1 U.S MANUFACTURING PRODUCTION INDEX, 1919-2014 (HICKS & DEVARAJ 2015)

Clearly recognizable in Figure 1 is the leap in production starting in the 90's. As Schneider describes, 'technological change which is labor-saving and therefore reduces the labor share' is observable in manufacturing industries (p.17, 2011). This phenomenon is described as the 'Harrod-neutral' model of production, whereby 'technological progress which enables long term growth is thought to be labor-augmenting' (Ibid, p.16). Of this 'technological unemployment', Keynes lamented the 'unfortunate [availability] of labour outrunning the pace at which we can find new uses for labour' (1930, p.3). Effectively, less workers are needed to see productivity gains, fundamentally increasing the 'efficiency of labour, so that the... efficiency units increases faster than the number of workers' (Oxford Reference, 2009).

The 'Harrod-neutral' effect can be observed in Figure 2:

Figure 2 Growth of Real Hourly Compensation for Production and Nonsupervisory Workers Versus Productivity (1948–2011)
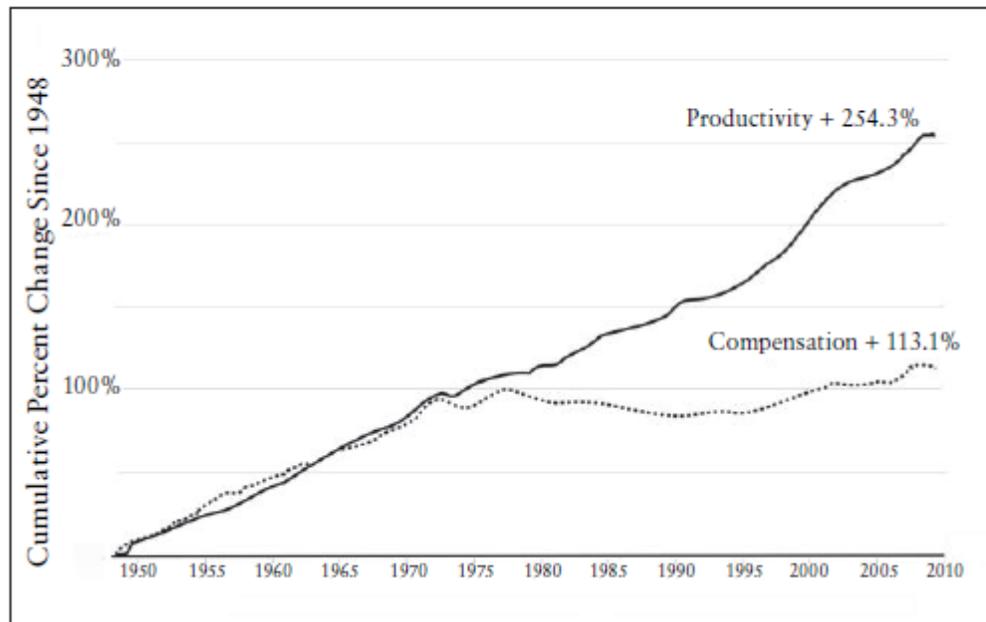
FIGURE 2 GROWTH OF COMPENSATION VS. PRODUCTION (FORD 2015)

At some point in the mid-70's, technological innovation saw productivity rise irrespective of the compensation that workers were receiving.

AMAZON

In 2012, Amazon paid $775 million to buy out Kiva Systems and reform them into 'Amazon Robotics', putting 30,000 to work in their warehouses around the world (Bhasin & Clark 2016). This move both cut off the supply of these automated machines to competitors, and established Amazon as the model of the future human-robotic workplace.

While Obama is adamant that 'Amazon and online sales [are] killing traditional retail, and…is going to be true throughout our economy' (Bishop 2017), Amazon 'downplayed the direct impact of automation on its workforce, as the company's global employment has soared to more than 300,000 people' (Ibid). Speaking with Technology Review, an Amazon spokeswoman described instead 'humans and machines working in carefully coordinated harmony' (Ibid). With current robotics largely incapable of work requiring 'fine manipulation or improvisation' (Ibid), Amazon arguably doesn't have much of a choice, having announced the hiring of another 100,000 people by mid-2018 (Amazon 2017).

Figure 3 Pickers and Packers

The number of warehouse and storage workers, seasonally adjusted, in thousands
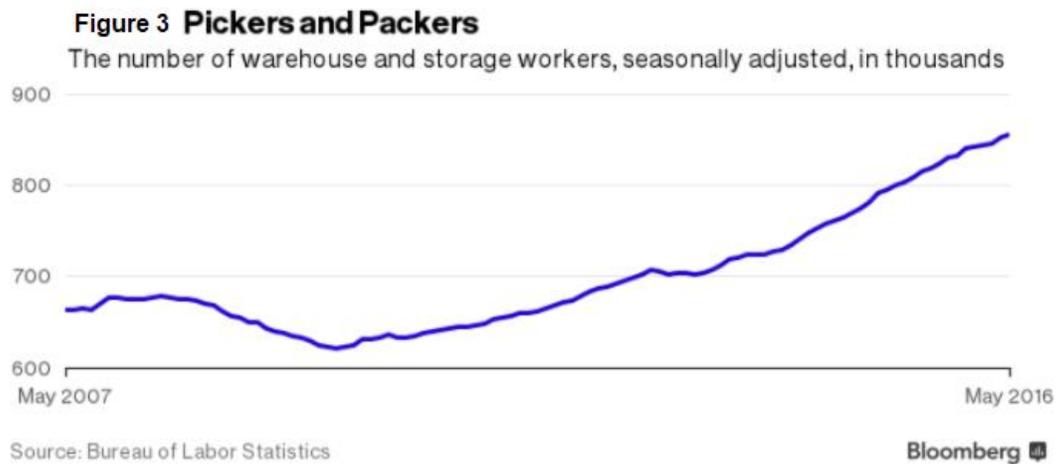

Source: Bureau of Labor Statistics

Bloomberg

FIGURE 3 PICKERS AND PACKERS (BHASIM & CLARK 2016)

Figure 3 backs up Amazon's claims; while they're still heavily investing in 'cloud technology, machine learning, and advanced logistics' (Ibid), the company is targeting a whole range of disciplines. 'From engineers and software developers to those seeking entry-level positions and on-the-job training' (Ibid) workers are sought for the fulfilment centres. With better and cheaper technology, 'robots have become cheaper, safer, and better able to learn new tasks quickly' (Knight 2015) allowing them to become much more useful and reliable in workplaces. While Amazon's automated machines 'allow more products to be packed into a tighter space', humans are still required to perform many of the tasks these machines cannot. At least, not just yet.

INDUSTRIES

SUPER STAR FIRMS

Speaking with the New York Times, economist David Autor argues that 'labor is getting a shrinking slice of a pie that's not growing very much' (Cohen 2017). While he states that 'labor productivity has grown faster than wages', linking back to the 'Harrod-neutral' paradigm, 'some industries have fared worse than others', particularly mining and manufacturing. This is evident in Figure 4 below:

FIGURE 4 SHRINKING LABOR SHARE (COHEN 2017)

Cohen argues that 'superstar firms', giant companies such as Amazon, have gradually managed to control a 'larger and larger share of [their] market' where once 'mom-and-pop store' competitors also existed (Ibid). By utilising technology to 'exploit smaller competitive advantages', these few large businesses are 'sophisticated and efficient and they don't use as much labor' (Ibid). While 'software platforms and online services…may be expensive to install, [they're not] costly to expand' (Ibid).

This, combined with 'more variety, cheaper prices and convenience', means their profit is split between less employees as a result (Ibid). Rosen wrote in 1981 that there was 'a strong tendency for both market size and reward to be skewed toward the most talented people in the activity' (p. 845). With increasing innovations in automated technology, the labor share will, presumably, continue to shrink.

AUTOMATION IN THE BUYERS MARKET

In some markets, the human is almost entirely replaced by automated software. While Amazon's warehouses might be a human-robotic amalgamation, Mims (2017) writes that company 'Feedvisor' offers a software package for sellers on Amazon 'which claims to use artificial intelligence to learn the market dynamics behind every item in a catalogue'.

Since Amazon allowed individuals and other companies to sell on their platform in 2000, third-party sales now account for '49% of the goods Amazon ships' (Ibid). To gain the 'coveted 'Buy Box', which designates the default seller of an item', the savviest sellers use 'pricing algorithms' to come out on top. Feedvisor's software is 'set it and forget it' in usability; it can even raise prices 'to see if other sellers will follow suit' and then try to beat *that* price while avoiding a bidding war (Ibid). The effect of this automated, highly fluctuating, micro-adjusting software is evident in Figure 5 below:
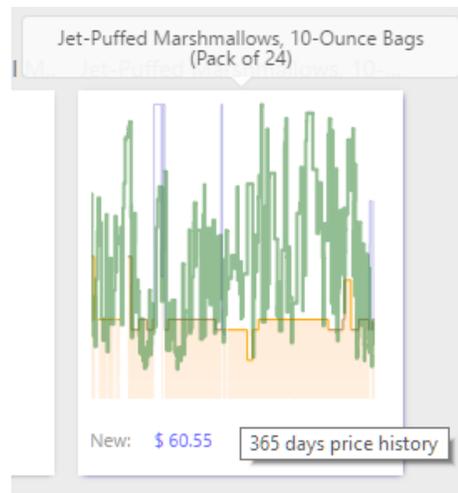

FIGURE 5 PRICE TRACKING VIA KEEPA.COM

Figure 5 demonstrates that automated systems are capable of a much more sophisticated level of 24/7 e-commerce. These systems don't need breaks, don't get tired, and don't cost anywhere near as much as an employee tasked with manually adjusting prices daily.

Rise of the Robots

RETAIL

Eadie (2017) argues that 'the shift toward checkout automation is indicative of the evolving demands of customers', and that the development of automation is particularly favorable for consumers and business owners. Automated systems give the shopper 'more buying power and choice', and is important for 'customers who prefer efficiency'. Ford (2015) writes that virtual assistants at retail stores will be 'instantly available and will rarely, if ever, give an inaccurate answer'. With Amazon's 'Go' shops, 'customers can swipe their app when they enter, pick up items they want off the shelves, and exit without cash registers or lines' (Eadie 2017). While not all retailers are quite there, '325,000' self-service machines have been installed worldwide so-far, no doubt contributing to a decline in retail staff. With these terminals costing less than the yearly salary of a laborer, Ford (2015) agrees that 'labor-saving technology will almost invariably prove to be irresistible' for retailers. On the other hand, human interaction could become a 'key competitive advantage', even a luxury.

Big Data

WHITE-COLLAR AUTOMATION

As demonstrated, it isn't just manual factory and warehouse work where automated systems are expanding. Recent innovations in artificial intelligence make it easier to emulate jobs that are 'routine', including paperwork. Ford (2015) writes that 'most jobs are, on some level, fundamentally routine and predictable', and so could be susceptible to the kinds of learning AI developed to analyse patterns and images that, for example, a radiologist would consider their specialty.

IBM's 'Watson' has potential to affect jobs ranging from medical specialists, financial consultants, to chefs. Utilising enormous data sets, Watson can '[find] answers and insights locked away in volumes of data' (IBM 2014). Networked to be constantly up to date with the latest research while possessing the

ability to instantly access and share data, Watson has the potential to completely revolutionise whole industries. Knight (2016) mentions 'roadside assistance, business messaging, and education' are all currently in the process of leveraging Watson. While 'no one has yet worked out how AI is going to fit into many workplaces' (Ibid), IBM is investing Watson heavily in the medical field with their current goal in oncology to 'make precision medicine and tailored therapies available to millions of cancer patients instead of the small number now treated at elite medical centers' (Lohr 2016).

ON THE HORIZON

'BAXTER' & GENERAL-PURPOSE ROBOTICS

Baxter and Sawyer are 'general purpose' robots which can be easily taught to perform new tasks. Where the Kinect, Ford writes, made 'machine vision affordable', Rethink Robotics' standardisation of 'software and hardware building blocks' will allow automation to take off (2015, p.7). The company's 'Intera 5' software networks all the machines and provides a 'gateway to… industrial Internet of Things' (Pittman 2017). This allows the manufacturer to 'control conveyors, equipment and other machines' from one terminal. With the adaptability and sensors of a general-purpose machine, Tuthill has reduced defects in their product by 98% (Ibid) and previously in-automatable processes such as 'machine tending [and] circuit board testing' are now possible (Rethink Robotics 2015). With a growing skill-set, the scope of jobs general-purpose robots can fulfil is constantly expanding.

THE 'BUT'

As Sirkin et al. (2015) writes, it's still more cost effective to employ manual human labourers than it is to 'own, operate, and maintain a robotics system' with limited functionality. However, due to 'prices of hardware and enabling software' inevitably dropping by estimates of 20% in the next ten years, Sirkin et al. predicts 'the current 10% of tasks that automation fulfils will rise to 25% by 2025' (Ibid). Output per unit will be up 30%, while being 33% more cost-effective (Ibid), necessitating a fundamental shift in

skills workers need in the post-automated world. Ford (2015, p.x) reminds that 20th century automation introduced new jobs for 'upgraded skills' and 'better wages'.

The post-WWII economy proliferated under 'Hicks-neutral' advancements; meaning both employment and output increased proportionately. Now, Ford writes, 'machines themselves are turning into workers' instead of our tools (Ibid, p.xii). Current robotics in factories rely on 'precise timing and positioning' to function (Ibid, p.3); but 'general purpose' robots like Rethink Robotics' 'Sawyer' learns tasks and has three dimensional 'vision', making it infinitely more useful for common factory work.

What next?

Marshall McLuhan knew in 1967 that 'total automation is upon us' (Thomas, p.237), and William Gibson famously said that 'the future is already here – just not very evenly distributed'. With a decreasing labor share and the expanding scope of automation, the future *is* here and it looks bleak for workers. With self-driving cars arriving and automation threatening many other sectors of employment, many are looking to the introduction of a 'universal basic income' to try and ease the transition to a post-labor world. Theoretically, the government would pay a flat fee to every adult regardless of their circumstances. Foster (2016) argues that giving the proposed $20,000 annually 'would cost approximately A$380 billion', while Martin (2016) offers 'abolishing the tax-free threshold would pay for a UBI scheme'. Whether this would cause people to then work less as a result, Foster argues, is unclear. Finally, Foster states that universal basic income isn't 'a magic bullet' but countries experimenting with it should be watched keenly.

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