

## Reaching Full Employment in the Digital Economy: Lessons Learnt from Michael Polanyi

### Abstract

Is Michael Polanyi's economic hypothesis on achieving full employment relevant today? Polanyi like Keynes argues that full employment can be achieved by injecting enough money into the Money Belt even if that means that governments fund the gap by a budget deficit. He defends the stance of Taxes + Gap = Budget. If Polanyi's work meant simplifying Keynesian economics for all citizens, is it also timeless? Global economies are interlinked and permeated by technological disruptions, which will affect currency, circulation and employment. Furthermore, job loss will become inevitable unless individuals, firms, academia and governments all share responsibility in creating sustainable futures where man and machines will work together. In this paper, keeping in view Polanyi's view of full employment and free trade, I argue that governments should create more inclusivity so that more people benefit from disruptions.

### Introduction

The future of work has many proponents and opponents of technological determinism, which seems to pervade most debates. The coining of the concept of technological determinism has been popularly attributed to Thorstein Veblen, but the ideas were used in Marx's reductionist theory that technology would affect the process of production and thereby social relations.<sup>1</sup> Technological determinism has largely been viewed as "hard" or "soft", with more allowance for human autonomy and cultural variation as a difference between the two. "Hard", or "strong" determinism, as the name suggests, states that technology is either sufficient for social organization and development, or at least a necessary factor that requires other preconditions.<sup>2</sup> Technology is thus seen as an autonomous entity and agent of change, and in such a narrative, an innovation introduced into society "takes on a life of its own" and inevitably shapes and causes far-reaching and irreversible changes in society. Humans have as much free will as technology permits.<sup>3</sup> However, social scientists like Ruth Finnegan have pointed out that an extreme stance like hard determinism can only stand in the absence of exceptions, and in reality exceptions are not impossible to find.<sup>4</sup> "Weak", or "soft" technological determinism, on the other hand, puts more control into the hands of humans. It views the entry of a particular technological innovation as part of a larger narrative with the focus on humans.<sup>5</sup> In this approach, technology takes on a facilitative or enabling role that creates potential opportunities, which society may or may not take up. While generalizability is less likely with the "weak" view, there is more available evidence for it, and it is hence more accepted than the "hard" view by social scientists.<sup>6</sup> That said, Finnegan notes that the

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<sup>1</sup> The term 'technological determinism' was apparently coined by the American sociologist and economist Thorstein Veblen (1857-1929) (Ellul 1964: xviii; Jones 1990: 210; see Veblen's 'The Engineers and the Price System').

<sup>2</sup> Chandler, Daniel. 2002. *Technological or Media Determinism*. [https://www.wolearn.org/pluginfile.php/2185/mod\\_page/content/6/chandler2002\\_PDF\\_full.pdf](https://www.wolearn.org/pluginfile.php/2185/mod_page/content/6/chandler2002_PDF_full.pdf), accessed 23 October 2017.

<sup>3</sup> Smith, Merritt Roe, and Leo Marx (eds.). 1994. *Does Technology Drive History?: The Dilemma of Technological Determinism*, Introduction, pg xi-xii. Cambridge, MA: MIT Press.

<sup>4</sup> Finnegan, Ruth. 1975. 'Communication and Technology'. Unit 8 of the Open University Correspondence Course, Making Sense of Society, Block 3, Communication. Milton Keynes: Open University Press; Smith and Marx (1994), Introduction, pg xii.

<sup>5</sup> Smith and Marx (1994), Introduction, pg xiii.

<sup>6</sup> Chandler (2002).

line between both is blurry, and “it is easy to slide from one to another without realizing quite where one is being led.”<sup>7</sup>

Debates on the future of work now hinge on job losses to robots, loss of social security, the risky sharing economy and deskilling of workers. Governments believe that information and communication technology is clearly the road towards economic progress. We are increasingly plunging into the ‘algorithm economy’, where algorithms and those who write them will determine our choices, our jobs, investments and the flow of money. Those with high end computing power will control employment and trade. Furthermore, nationalist protectionism and to some extent what might become the end of global outsourcing for some industries means free trade is under threat. Globally we are looking at a complex mix of hard technological determinism for some, protectionism and the digital divide for others. Polanyi’s ideal of full employment presents a theoretical utopia, which can be embedded in current reality. Politics and policy need to catch up with economic outcomes and popular sentiments. The emergence of Bitcoins and the proliferation of cryptocurrencies will affect the flow of money and investments. This is because it is still part of an emerging and alternate economy that does not work like regular currency. Bitcoins involve block chains and complex coding. They are not based on any known standard such as gold, and are not part of any major currency exchange. People who use them can take money out of normal economic exchange and use them even for surreptitious activities.<sup>8</sup> They present a huge disruption threat to financial institutions, investments and markets. Should governments therefore allow and adapt crypto currencies or ban them? How will they affect the flow of money when they are not backed by any currency exchange? This paper tries to question the relevance of Polanyi’s theory of money today in the rising algorithm economy, where employment in many sectors is seriously threatened by increases in automation and smart technology and perhaps further if crypto currencies become the norm for many and unusable by many others. Many routine jobs as we know it now will clearly disappear, and new jobs will require upskilling and new management styles by corporations, and quick responses to economic challenges by governments. Those who are left out of the technology race either by accident or deliberately caught in the digital divide will likely be unemployed. In Polanyi’s theory, circulating enough money and balancing it with trade and jobs could solve this problem. Polanyi argues for the correct implementation of Keynesian ideas by correcting the foundations of capitalism and regenerate free competition. If we were to apply this in the current context, we would not want to ban Uber from our cities, nor impede people from generating money from ventures like Airbnb, or investing in cryptocurrencies. Yet, these businesses are a sign of changing times, as employment is no longer fixed or permanent. These businesses are created with the intention to disrupt other businesses and provide part-time opportunities to workers who act as contractors.

Michael Polanyi, the polymath chemist-turned-social scientist is seen as a scientist well ahead of his time. He wrote *Full Employment and Free Trade* which was published by Cambridge University Press in 1945 and an American edition in 1947. This book shows interdisciplinary

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<sup>7</sup> Finnegan (1975, p. 105).

<sup>8</sup> An example of this is the Ponzi scheme operated by Trendon Shavers from 2011 to 2012. He managed to raise some 764,000 bitcoins, at the time of the scheme worth more than \$4.5 billion. He also misappropriated bitcoins for personal gains and pleasure (Raymond, Nate. September 22, 2015. Texan pleads guilty to running bitcoin Ponzi scheme. Reuters. <http://www.reuters.com/article/us-usa-crime-bitcoin/texan-pleads-guilty-to-running-bitcoin-ponzi-scheme-idUSKCN0RL2A920150921>, accessed 1 November 2017.)

thinking and intellectual proves accessible to the lay person about the circulation of money, and its effects on full employment. In the Preface, the author writes “Keynesian economics must be made simpler and cleaner...” He argues that the state can be proactive about creating a healthy economy to foster jobs without having to put into place centralized planning and controls thereby stifling free market enterprise. Some theorists claim that Polanyi brought about a synthesis of Keynesian and Monetarist Economics later associated with Milton Friedman (Craig and Cotts 1971). Polanyi produced a movie called *Unemployment and Money*. There he argued that if there was not enough circulation of money or the Money Belt was not wide enough, unemployment would follow. This was an attempt to simplify Keynesian theory and make it popular. He clearly makes a case for policy to balance both savings and investment to keep the Money Belt wide enough to foster employment, but not excessively, as that would cause inflation.

What exactly is Polanyi’s theory of full employment? This is outlined in the first chapter. Polanyi starts with the Money Circle, which refers to the cyclical process of the movement of money from the spender back to him, with portions going to various stakeholders involved in the same process such as retailers, manufacturers and primary producers. However, this picture works on the assumption of immediacy in spending, wage-paying and other production costs involved. It does not take into account many other factors where money might seep out of the circle, such as private savings and business investments, nor external parties not privy to this circle such as the state, which demands taxes and public expenditure. In order to include employment in this scheme, the impact of increased and decreased expenditure on businesses has to be considered. This is where Polanyi’s Money Belt representation comes in. He describes a variable Money Belt regulating levels of employment, visualised as a revolving belt passing through both homes and businesses and with a width that expands and contracts. The width of the Belt at any time represents the level of employment – at full employment, the Money Belt is equal in width with homes and businesses. Depression, represented by a narrow width, is when not all parts of the homes and businesses are traversed by the Belt, symbolising a limited availability of employment only to those engaged in production. Conversely, a Belt that is wider than both homes and businesses points to a critical point in the availability of employment reached; in this case, full employment is still achieved but the level of production does not expand further, and the result of this is a “general, inflationary, rise in prices”, or inflation.<sup>9</sup>

This model is concerned with the amount of money that is either injected or withdrawn by private individuals and state led authorities. Polanyi argues that controlling the money stream would affect employment, and any money that is withdrawn or spent should be balanced with new investments, so that the Money Belt stays wide, which he believes supports full employment. The budget deficit, the expenditure by state authorities, which is not covered by taxation is showed to have a similar effect as expenditure on new investment. Hence, he supports filling the gap caused by budget deficit. One way the Money Belt is kept somewhat constant even if money is withheld from it in the form of savings is via new business investments. Polanyi emphasizes that a steady level of employment can be achieved by balancing savings and investments. With this understanding, for full employment to take place, the impact of both pumps has to be regulated and balanced, by ensuring a sufficiently high level of monetary circulation that does not induce unwanted inflation.

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<sup>9</sup> Polanyi, M. 1945. *Full Employment and Free Trade*, Cambridge, Cambridge University Press.

He uses the simultaneous pump analogy such as sucking (savings) and squirting pump (investment), stating that the purpose of employment policy is to adjust the two pumps so that in order to maintain a constant inflow and outflow of money, i.e. no expansion or contraction, both pumps have to work in tandem. An excess of either will, through a chain of cause-and-effect reactions, eventually result in the fall in value of the other. But he warns that the circulation should not be too high to cause inflation (p. 10).<sup>10</sup> That said, Polanyi notes a self-regulating mechanism that is akin to the human body's process of homeostasis: an excess in Savings or Investment will set in motion countermoves in an attempt to right the system.<sup>11</sup> This is a self-sealing gap, a set of counter-forces which limit "the decrease and increase of the monetary circulation."<sup>12</sup> Full employment is achieved by filling the gap, which appears when Savings exceed new investment when full circulation is maintained. Polanyi suggests that the State should have a role to play in filling the gap, by using expenditure from loan, a budget deficit that is as substantial as the difference between savings and investment at full circulation. In line with Keynesian economics, he also argues that the state has a part to play in maintaining effective demand, by providing necessary conditions for private enterprises.<sup>13</sup> This is to help bring about a full employment policy.<sup>14</sup>

But to establish full employment, there must be an equilibrium of circulation and production of goods. Circulation (or the national income in terms of money) has to be substantial enough to enable optimal utilization of the country's resources, but not huge enough to threaten financial stability. How this can be achieved is not just merely widening the Money Belt until full circulation is reached, because any activity that circulation undergoes always has an impact on the price level and the wage rate, though to a smaller extent and in the opposite direction for the latter. Polanyi opines that this will cause serious social problems even before full employment is reached. The basis for this assertion is this, that even though decreasing unemployment will bring about higher real earnings for the working class, as well as rising real family incomes and individual earnings, the corresponding decline in real wage rates may affect certain classes of wage earners and salaried people. A possible consequence of this dissatisfaction is an attempt to demand for higher wages in order to counter rising prices, and plausible outcomes of this attempt are the inability to maintain stability of circulation, and an extreme case of unlimited inflation from rising levels of employment.

This is where the government has a critical role to play. It has to acknowledge what it means for the price level when an expansionist policy is put in place, and also reconsider the possible repercussions of suppressing anti-inflationary policies in a bid to limit prices from rising.<sup>15</sup> Not only that, one of the biggest issues to deal with is residual unemployment, which is a certain level of unemployment that is permitted and tolerated that has to exist as a foil against runaway inflation. As it has the potential to seriously undermine social peace if it fails, it has to be dealt with with care. While there are traditionally two kinds of unemployment – cyclical (also called 'general' or 'mass') and structural (also known as 'transitory') unemployment, Polanyi argues that unemployment is always of the second kind,

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<sup>10</sup> J. C. Gilbert provides a detailed analysis of Polanyi's economic policy; Gilbert, J. C. 1946. Professor Polanyi's Full Employment and Free Trade, *The Manchester School*, 14(2): 85-97.

<sup>11</sup> Polanyi (1945).

<sup>12</sup> Gilbert (1946).

<sup>13</sup> Polanyi (1945).

<sup>14</sup> Gilbert (1946).

<sup>15</sup> Polanyi (1946).

and that all levels of unemployment are fundamentally similar to each other, with the difference between them only to a small extent.

Across and within nations, productivity may differ but a less productive country or region that is satisfied with its lower wage level will be able to not only engage in the same extent of full employability, as its more productive counterpart, but also trade or compete on equal terms. However, internal trade differs from international trade in that the latter involves political factors as well as differing currencies. Hence, for free trade to take place, the government has to supply enough money for full employment such that imports are not obstructed.<sup>16</sup>

Polanyi concludes his book with a few conclusions. Firstly, the “principle of neutrality” states that the government’s expenditure of money does not burden the national economy. Gilbert expands on this. When there is a gap created by savings exceeding new business investments, full employment is not achievable. Polanyi’s full employment policy thus entails a budget deficit, created by reducing tax while maintaining public expenditure at an appropriate level in view of the national income at full employment. However, to maintain full employment, Polanyi believes that the stimulating of private investment as well as the reducing of savings should not take place; the full employment policy should be carried out neutrally in what is known as the “Principle of Neutrality”. In this principle, instead of manipulating resources to attain full employment, what should be adapted is the monetary and budgetary policy.<sup>17</sup> Polanyi believes also that the budget deficit should be met by the “employment issue”, or the increase in the supply of money. Government borrowing should not be part of this equation.<sup>18</sup> Secondly, if money were to fulfill the requirements that employment demands, it cannot remain linked to existing gold reserves. Finally, it also stands to reason that the currency of one country should not have any fixed relation to the money of another nation.<sup>19</sup>

In addition, in line with Keynesian economics, Polanyi argues that the state has a part to play in maintaining effective demand, by providing necessary conditions for private enterprises. This is to help bring about a full employment policy. The Keynesian notion of chronic depression is one where the rate of investment falls as capital approaches saturation, while saving rates increase with increasing national income. When business investments decrease, and savings accumulate, a gap is created, but this gap is self-sealed by the downward pressure on national income. Polanyi believes that this situation of chronic depression had plagued Great Britain and the USA for some time in the past.

In looking at full employment in Soviet Russia, economic expansion for war and internal problems of full employment, Polanyi points out that the government, in trying to establish full employment, faces the difficulty of determining the level of monetary circulation that will involve a large enough size of the national income to create the fullest possible utilisation of the country’s resources, yet a level of circulation that does not threaten financial stability.<sup>20</sup>

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<sup>16</sup> Polanyi (1946).

<sup>17</sup> Gilbert (1946).

<sup>18</sup> Gilbert (1946).

<sup>19</sup> Polanyi (1945).

<sup>20</sup> Gilbert (1946).

It has been noted that while the Singapore government used to adopt a strict interventionist approach, in recent years it has begun to be more free-market oriented.<sup>21</sup> Although certain disruptive innovations, notably Airbnb, have yet to establish a firm and legitimate foothold in the country, there are many others that are now a ubiquitous part of life in Singapore.<sup>22</sup> Take for example Uber, which in August 2017 started talks with Singapore's largest taxi operator ComfortDelGro on the possibility of an alliance that will see the latter's cabs being made available on Uber's app. While this is seen to benefit the taxi company in the short term, it is believed that the long-term advantages for Uber include more control over the private-hire vehicle industry.<sup>23</sup>

Polanyi's ideas about employment still resonate today, and are seen in a few ways. Autor talks about Polanyi's (1966) paradox: "We know more than we can tell."<sup>24</sup> A manifestation of it in today's world is the displacement of human labour by machines, which brings to mind labour market polarisation where there is a simultaneous growth of jobs at either end of the education and scale spectrum. Though it is sometimes believed that an increase in labour productivity will result in a decrease in employment due to an oversupply of labour, historically there has been little evidence to support this belief.<sup>25</sup> However, technological advances may just prove to be the exception to this, as the threats it poses to employment has been around since the 20<sup>th</sup> century. Keynes (1930) predicted that technology would eventually reduce the need for labour by up to 75%, and though his view of this was somewhat negative, assigning the term "technological unemployment" to the situation, he also predicted that it would be a "temporary phase of maladjustment", believing that a high standard of living with a 15-hour workweek would be the norm in 100 years' time.<sup>26</sup>

The falling costs of automation are fast becoming an incentive for firms to replace human labour with automation, especially in routine tasks. However, there are certain tasks that are only possible for human beings to do, without being consciously aware of the rules or procedures for them. This is where Polanyi's paradox steps in, that there are many familiar tasks which cannot be automated because the "rules" for them are unknown to us.<sup>27</sup> These are tasks that require more higher-order thinking skills such as judgement, common sense and flexibility. However, though automation cannot replace human labour in such tasks, it can complement it.<sup>28</sup> The two types of tasks that are not easily substituted by automation are those that are "abstract", requiring problem-solving capabilities, intuition, creativity and

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<sup>21</sup> Lam, Newman M. K. 2000. Government intervention in the economy: a comparative analysis of Singapore and Hong Kong. *Public Administration and Development*, 29, 397-421.

<sup>22</sup> Jamrisko, Michelle. 12 October 2017. Singapore Home-Sharing Quietly Grows Despite the Rules. Bloomberg. <https://www.bloomberg.com/news/articles/2017-10-11/singapore-s-hidden-home-sharing-economy-is-quietly-on-the-rise>, accessed 1 November 2017.

<sup>23</sup> Tan, Christopher. 23 August 2017. ComfortDelGro in talks with Uber on possible tie-up. *The Straits Times*. <http://www.straitstimes.com/singapore/transport/comfortdelgro-in-talks-with-uber-on-possible-tie-up>, accessed 1 November 2017.

<sup>24</sup> Autor, David. 2014. Polanyi's Paradox and the Shape of Employment Growth. NBER Working Paper, No. 20485, Abstract. <http://www.nber.org/papers/w20485.pdf>, accessed 16 October 2017.

<sup>25</sup> Autor (2014).

<sup>26</sup> Keynes, John Maynard. 1933. "Economic Possibilities for our Grandchildren (1930)." *Essays in Persuasion*: 358-373.

<sup>27</sup> Polanyi, Michael. 1966. *The Tacit Dimension*. New York: Doubleday.

<sup>28</sup> Autor (2014).

persuasion, and those that are “manual”, requiring situational adaptability, visual and language recognition, and in-person interactions.<sup>29</sup> Incidentally, these jobs are typically found at either ends of the education and wage spectrum. Hence, it might seem reasonable to predict that it will also be these same jobs thriving when automation takes over other routine jobs, creating what Maarten Goos and Alan Manning termed “job polarisation”.<sup>30</sup>

Statistics indeed show a trend towards Goos and Manning’s (2003) prediction. Consequently, “middle-skill” jobs have fallen in number. This trend is not only observed in the USA, but also in 16 EU economies.<sup>31</sup> While wage polarisation might seem like a natural result of job polarisation, factors such as complementarity, demand elasticity and labour supply limit the possibility of that happening. Complementarity refers to the complementary role that automation plays alongside abstract task-intensive jobs, and if the demand for the latter type of task does not vary, this could mean lower expenditures and wage gains due to the assistance rendered by automation. However, examples in reality, such as medicine, show that it is not the case. Other examples include law, finance, engineering, research and design.<sup>32</sup> Also, the movement of workers into the highly educated professions is greatly tempered by the fact that entry into these professions requires college and graduate degrees, which take some 5 to 10 years to obtain and hence this entry, while possible, is not quick at all.<sup>33</sup> For the other end of the spectrum, manual task-intensive jobs are relatively safe from computerisation, yet be indirectly impacted by computerisation when increasing societal incomes also result in an increase of demand for such occupations. Demand for manual task-intensive occupations are also found to be relatively price- and income-inelastic.<sup>34</sup> Hence, wage polarisation is unlikely to happen except in tight labour markets.<sup>35</sup>

Polanyi’s paradox is still relevant today, even though it seems that workers who are replaced by automation are stuck in a vicious cycle where they do not have the resources to enable their children to profit from technology.<sup>36</sup> However, there are two approaches which are employed to computerise tasks that are “abstract”. The first one, environmental control, is in accordance to Polanyi’s paradox. The other, machine learning, seeks to circumvent it.<sup>37</sup>

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<sup>29</sup> Autor, David H., Frank Levy, and Richard J. Murnane. 2013. “The Skill Content of Recent Technological Change: An Empirical Exploration.” *Quarterly Journal of Economics*, 118(4): 1279-1333.

<sup>30</sup> Goos, Maarten and Alan Manning. 2003. “Lousy and Lovely Jobs: The Rising Polarization of Work in Britain.” Center for Economic Performance Discussion Papers dp0604, December.

<sup>31</sup> Autor (2014).

<sup>32</sup> Autor (2014) notes counterexamples to this, such as the “delaying” of management structures because of computerization (Caroli, Eve and John Van Reenen. 2001. “Skill-Biased Organizational Change? Evidence from a Panel of British and French Establishments.” *The Quarterly Journal of Economics*, 116(4), 1449-1492).

<sup>33</sup> Autor (2014).

<sup>34</sup> Baumol, William J. 1967. “Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis.” *American Economic Review*, 57(3), 415-426.

<sup>35</sup> Autor, David H., and David Dorn. 2013. “The Growth of Low Skill Service Jobs and the Polarization of the US Labor Market.” *American Economic Review*, 103(5): 1553-1597.

<sup>36</sup> Sachs, Jeffrey D., and Lawrence J. Kotlikoff. 2012. “Smart Machines and Long-Term Misery.” NBER Working Paper No. 18629, December.

<sup>37</sup> Autor (2014).

Environmental control can be seen in how routine tasks can be manipulated to simplify the environment for robots to work autonomously. Another example is in how roads are levelled to enable automobiles to run on them smoothly. However, jobs that require more physical dexterity and fine motor coordination are much harder to automatise. Therefore, current technology is limited in nonroutine tasks.

In machine learning, Polanyi's paradox again makes an appearance. Tasks that we do not know the "rules" for are hard to computerise, but advances in machine learning have made it possible for machines to master the task through statistics and inductive reasoning, studying other successful examples of the task being completed by others. This is how machine learning can potentially work around Polanyi's paradox. Examples include Google Translate and Netflix's movie recommendations.

Bitcoin, said to be invented by one Satoshi Nakamoto in 2008, is a worldwide, decentralized, anonymous virtual cryptocurrency that employs the use of peer-to-peer technology to manage transactions, without the traditional middlemen of banks or central authority.<sup>38</sup> In the place of the traditional middleman is a blockchain, a public ledger.<sup>39</sup> Bitcoin is by no means the only public ledger platform, though it was the first as well as the best known, and as of 2014 also the largest.<sup>40</sup> Bitcoin circulation has been experiencing a linear increase and as of 22 October 2017, 16,640,325 Bitcoins are in circulation.<sup>41</sup> The first transaction in Bitcoin took place in 2010; a pizza was bought for 10,000 bitcoins, and that date is now celebrated as Bitcoin Pizza Day.<sup>42</sup>

Bitcoin has the following features characteristic of digital currency platforms: it is internet-based instead of other payment platforms that use private secure communication networks such as Visa, it employs the use of a public ledger protocol, which is considered the "key disruptive innovation", the "coin" in Bitcoin refers to the container that carries value on the public ledger (the container is also the smallest divisible unit of the coin; for Bitcoin, it is .00000001 of a bitcoin and is called a satoshi), it offers incentives in exchange for labour, computing power and other resources, it has an open source licensing model, and lastly, there is a platform governance system in place that determines key operating principles, not unlike the governance systems that companies such as Android and Linux have.<sup>43</sup> Because it is meant as a form of reward for participants, it is not intended to replace money, and hence is

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<sup>38</sup> Patron, Travis. 9 November 2014. Who is Satoshi Nakamoto? Diginomics.

<https://www.diginomics.com/2014/11/09/who-is-satoshi-nakamoto/>, accessed 23 October 2017; Bitcoin. n.d. <https://bitcoin.org/en/>, accessed 23 October 2017; Yermack, David. 2013. Is Bitcoin a Real Currency? An Economic Appraisal. NBER Working Paper No. 19747. <http://www.nber.org/papers/w19747.pdf>, accessed 23 October 2017.

<sup>39</sup> Blockchain. n.d. <https://www.blockchain.com/>, accessed 23 October 2017.

<sup>40</sup> Evans, D.S. (2014). Economic Aspects of Bitcoin and other Decentralized Public-Ledger Currency Platforms. Chicago Coase-Sandor Institute for Law and Economics Working Paper No. 685, [http://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=2349&context=law\\_and\\_economics](http://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=2349&context=law_and_economics), accessed 24 October 2017.

<sup>41</sup> Blockchain Luxembourg S.A. n.d. <https://blockchain.info/charts/total-bitcoins>, accessed 23 October 2017.

<sup>42</sup> Gray, Alex. 24 May 2017. What is Bitcoin? World Economic Forum, <https://www.weforum.org/agenda/2017/05/what-is-bitcoin/>, accessed 24 October 2017.

<sup>43</sup> Evans (2014); Nakamoto, Satoshi. 2009. Bitcoin: A Peer-to-Peer Electronic Cash System, <http://bitcoin.org/bitcoin.pdf>, accessed 24 October 2017.

decoupled from credit.<sup>44</sup> The process of using the computing power of specialized hardware in exchange for rewards is called “mining”.<sup>45</sup>

Is Bitcoin a real currency? While it arguably functions as a medium of exchange, which is a key characteristic of currency, it functions less satisfactorily as a unit of account and a store of value. Because the value of Bitcoin is autonomous and not tied to any existing currency of trade, it may be useless in risk management.<sup>46</sup> To illustrate, Bitcoin has a volatility that is more than 15 times that of the euro.<sup>47</sup> While it is perfectly acceptable to hold on to Bitcoins, the large exchange rate volatility and lack of correlation with traditional types of currency means that its store of value is hardly constant.<sup>48</sup> Also, it has been argued that the very characteristic of it as a virtual currency, i.e. it cannot be deposited in a physical bank and is instead held in “digital wallets”, makes it less similar to actual currencies in use.<sup>49</sup> Other limitations of Bitcoin include the restriction on the number of transactions that can be processed within a given time period, and with the increase in Bitcoin transactions around the world, this means there is a slowdown in payments.<sup>50</sup> Also, because of its web-based nature, it is susceptible to cyber-attacks, such as in the WannaCry ransomware attack, which claimed some \$143,000 worth of Bitcoins.<sup>51</sup> The fact that it is valued differently in different countries, and is not accepted in some countries, makes implementing the use of it difficult.<sup>52</sup> Hence, while it is considered a convenient online payment system, the reality is that items are generally purchased on third-party exchanges using traditional currency.<sup>53</sup>

Reception to Bitcoin has been mixed. While countries such as Japan have been supportive, recognizing some 11 firms as authorized cryptocurrency exchange operators in the process of giving it legal tender status, there are countries that are more skeptical.<sup>54</sup> Take China for example, which recently implemented a few measures that threaten the existence of Bitcoin in the country. It put a ban on initial coin offering and closed domestic bitcoin exchanges.<sup>55</sup>

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<sup>44</sup> Weber, Beat. 2013. Can Bitcoin compete with money? Journal of Peer Production, 4, <http://peerproduction.net/issues/issue-4-value-and-currency/invited-comments/can-bitcoin-compete-with-money/>, accessed 24 October 2017.

<sup>45</sup> Bitcoin. n.d. Frequently Asked Questions. <https://bitcoin.org/en/faq>, accessed 24 October 2017.

<sup>46</sup> Yermack (2013).

<sup>47</sup> Evans (2014).

<sup>48</sup> Kroeger, Alexander. 5 April 2016. Why Bitcoin exchanges aren't as straightforward as they seem. World Economic Forum, <https://www.weforum.org/agenda/2016/04/why-bitcoin-exchanges-arent-as-straightforward-as-they-seem>, accessed 24 October 2017.

<sup>49</sup> Yermack (2013).

<sup>50</sup> Gray (2017).

<sup>51</sup> Browne, Ryan. 3 August 2017. Hackers have cashed out on \$143,000 of bitcoin from the massive WannaCry ransomware attack. CNBC. <https://www.cnbc.com/2017/08/03/hackers-have-cashed-out-on-143000-of-bitcoin-from-the-massive-wannacry-ransomware-attack.html>, accessed 24 October 2017.

<sup>52</sup> Gray (2017).

<sup>53</sup> Kroeger (2016).

<sup>54</sup> Graham, Luke. 29 September 2017. As China cracks down, Japan is fast becoming the powerhouse of the bitcoin market. CNBC. <https://www.cnbc.com/2017/09/29/bitcoin-exchanges-officially-recognized-by-japan.html>, accessed 24 October 2017.

<sup>55</sup> Choudhury, Saheli Roy. 4 September 2017. China bans companies from raising money through ICOs, asks local regulators to inspect 60 major platforms. CNBC.

Not only that, opinions in the financial world have been mixed too. Industry insiders such as JPMorgan Chase CEO Jamie Dimon and Ray Dalio from Bridgewater Associates are openly critical about Bitcoin and digital currency in general, with the former calling it a “fraud” and believing it will eventually be closed down, and the latter thinking it is just a “bubble” because of its volatility and it being a speculative market.<sup>56</sup> On the other hand, financial giant Goldman Sachs is taking a contrasting approach: it is looking into launching a new trading operation that is focused on cryptocurrencies such as Bitcoin.<sup>57</sup> A similar positive sentiment is expressed by Morgan Stanley CEO James Gorman, who opines that cryptocurrencies are “more than just a fad”, and that digital currencies such as Bitcoin, as a “natural consequence of the whole blockchain technologies”, is not “inherently bad”.<sup>58</sup> Even the academic field has weighed in. Like Dalio, Ken Rogoff, Professor of Public Policy and Professor of Economics at Harvard University believes that while the technology of Bitcoin will thrive, the price of Bitcoin will “collapse” due to concerted efforts by governments to regulate virtual currencies.<sup>59</sup>

### Conclusion

The Algorithm economy has become both the driver of innovation and is also being driven by innovation. It is taking over many aspects of how we work, play, and even live. Proponents argue that it will bring about more jobs because it has enabled sharing services and freelance work such as Uber, Airbnb, Mechanical Turk and the like. Not only that, our social lives are increasingly influenced by algorithms – just look at how our social network and dating sites are throwing up suggestions for news stories and potential love matches based on our behavior and preferences.<sup>60</sup> We are however unable to imagine the impact of subversive uses of computer coding in the remaking of money and currency exchange. Bitcoins speculation has escalated globally. It works on trust of its creators and referral systems. It may either fall through and fizzle out, or it will become the biggest disrupter of the flow of money the world has ever seen. Some companies and countries ban it, and others embrace it, because they know that if they do not embrace it, their business might be eventually disrupted. For now, we are still largely controlled by currency exchange markets regulated by central banks and governments. While cryptocurrencies are too hard to supervise or to be banned, governments

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<https://www.cnbc.com/2017/09/04/chinese-icos-china-bans-fundraising-through-initial-coin-offerings-report-says.html>, accessed 24 October 2017.

<sup>56</sup> Imbert, Fred. 12 September 2017. JPMorgan CEO Jamie Dimon says bitcoin is a ‘fraud’ that will eventually blow up. CNBC. <https://www.cnbc.com/2017/09/12/jpmorgan-ceo-jamie-dimon-raises-flag-on-trading-revenue-sees-20-percent-fall-for-the-third-quarter.html>, accessed 24 October 2017; Kim, Tae. 19 September 2017. Ray Dalio, founder of the world’s largest hedge fund, says ‘bitcoin is a bubble’. CNBC. <https://www.cnbc.com/2017/09/19/ray-dalio-says-bitcoin-is-bubble.html>, accessed 24 October 2017.

<sup>57</sup> Cheng, Evelyn. 2 October 2017. Goldman Sachs exploring bitcoin trading operation. CNBC. <https://www.cnbc.com/2017/10/02/goldman-sachs-exploring-bitcoin-trading-operation-report-says.html>, accessed 1 November 2017.

<sup>58</sup> Cheng, Evelyn. 27 September 2017. Morgan Stanley CEO Gorman differs with Dimon, says digital currencies are ‘more than just a fad’. CNBC. <https://www.cnbc.com/2017/09/27/morgan-stanley-ceo-gorman-differs-with-dimon-says-digital-currencies-are-more-than-just-a-fad.html>, accessed 1 November 2017.

<sup>59</sup> Browne (2017).

<sup>60</sup> Parmar, Bidhan L. and R. Edward Freeman. 2016. Ethics and the Algorithm, pp. 16-17. MIT Sloan Management Review, Vol. 58, No. 1. Cambridge, MA: MIT Sloan School of Management.

need to ensure that full employment and free trade is possible despite technological disruption.

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