Restructuring Canada's Social Welfare System to Hedge against the Risk of Technological Unemployment

CANS 300: Making the Future
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Abstract

Technological disruption of the global labour market is potentially catastrophic to the economic organization of our society today. With the rapid automation of economic production throughout the 20th and early 21st centuries, economic output is decoupling from labour as it increasingly becomes a function capital alone, precipitating a steady decline in wages and a parallel rise in unemployment.

Now, more than ever, our society needs forward-looking policies that hedge the risks of our continued technological innovation, which, according to a conservative estimate by the World Economic Forum, is expected to displace between 5 to 10 million jobs globally in the next 5 years alone. The coming decade is a crucial test in determining whether economies will be able to adapt to this new paradigm, or become irrelevant and left behind.

In this paper we explore the current literature on Guaranteed Minimum Income (GMI) proposals, with the aim of charting Canada's future in a world of high technological unemployment. First, the economic implications of technological advancements in artificial intelligence will be analyzed, followed by an exposition of the current discussion on guaranteed income policies. Second we will reframe the conversation from a Canadian perspective by tracing the history of the discussion around guaranteed income proposals, and reviewing the social welfare programs in place today.

Finally, the paper culminates in a five-point policy proposal designed to ensure adequate preparation for Canada to transition to a post-automation economy, while continuing to ensure a high quality of life for its citizens:

1. A material increase of VAT to hedge against declining wages, neutralized for the average household through an increase in income tax exemption threshold;
2. Implementation of a Strong Basic Income/Universal Demogrant GMI program with a growing benefit-level over a 20-50 year time horizon;
3. Maintenance of current social welfare programs with gradual integration into GMI benefits over the same 20-50 year time horizon;
4. Development of a sovereign wealth fund independent of Executive and Legislative branches, designed to distribute wealth generated from investments in labour-displacing technology per recommendation (5);
5. The acceleration of labour-displacing technology development, through an incentive program that eliminates corporate tax in selected industries and sectors while mandating preferential and non-controlling minority ownership of equity by the sovereign wealth fund;

I. Structural Technological Unemployment (STU)

Karl Marx first characterized the ideal machine as one that lasts forever and costs nothing in a particularly prescient paper titled "The Fragment on Machines". A machine that can be built for nothing without depreciation would, he said, add no value at all to the production process and rapidly reduce the price, profit, and labour costs of everything it touched. He proposed that information would become the main productive force in the economy given the existence of such a machine, and that the primary concern of its participants would shift from "wages and profits" to "ownership of knowledge".[1]

It is abundantly clear that this world envisioned by Marx's thought experiment is no longer hypothetical. Today information is increasingly valuable, software is the ideal productive machine, and factors of inputs to its production such as storage, bandwidth, and processing power are all falling in cost at a rapid pace. Soon enough we will indeed be surrounded by machines that cost nothing, last forever, and require no labour to produce value.

The dichotomy between innovation and employment has always existed as a persistent undercurrent of technological advancement, beginning with the Luddite revolutions in the early 19th century. Economists and politicians alike, have continuously debated against claims of technological unemployment by drawing from the past, nearly always pointing to various ways in which advancements in technology created new jobs rather than eliminated them. Among their arguments, greater needs for servicing and building the new machines, greater production demand through reduction in prices, and greater investment capital to be recycled through the economy, have been relied upon time and time again. [2] Indeed, those crying technological unemployment have thus far been accused of crying wolf - revolutions of the printing press, mechanical loom, steam engines, and computers, have each respectively served as catalysts for accelerated economic and social growth. So why should we expect the next revolution to be any different?

It seems the error with this line of argument in the context our our present day realities, is that it fails to consider the nature of labour displacement. Generally speaking, labour may be subdivided into two major categories of manual and knowledge labour. When considering the aforementioned technological revolutions, nearly all of them were technologies displacing jobs in the category of manual labour. As machines displaced humans from these areas, concurrent advances in education helped to absorb the extra labour capacity and repurpose the labour supply to increasingly skilled and intellectual jobs. However, with computers now encroaching labour functions in which humans have historically

[1] Mason, Paul. "The End of Capitalism Has Begun." *The Guardian*. The Guardian, 17 Jan. 2015. Web. 18 Apr. 2016.
[2] Hughes, James J. "A Strategic Opening for a Basic Income Guarantee in the Global Crisis Being Created by AI, Robots, Desktop Manufacturing and BioMedicine." *Journal of Evolution and Technology* 24.1 (2014): 45-61. *A Strategic Opening for a Basic Income Guarantee in the Global Crisis Being Created by AI, Robots, Desktop Manufacturing and BioMedicine*. Institute for Ethics and Emerging Technologies, Feb. 2014. Web. 16 Mar. 2016.

possessed a competitive edge, an untapped category of employment for surplus human labour to migrate towards no longer exists. [3]

While a post-industrial economy would undoubtedly create many new occupations, in each case there is a choice between investments in human labour versus machine automation. In this calculus human labour has been steadily losing over time, with capital investment in machines greatly surpassing investments in human labour. As such, economic production is increasingly becoming a function of capital with the value of labour declining at breakneck speed.

There is plenty of empirical evidence to suggest that this comprehensive revaluation of labour is occurring, and has been for quite some time. Since the early 1990's, despite an information technology explosion in the United States, employment in the manufacturing of computers and electronics has dropped by half. [4] In Italy, a study conducted in 2014 found that even with a growing population and labour market, the proportion of manufacturing labour actually decreased over a 20-year period from 1981 to 2001. In fact while the number of workers in electronic and computer manufacturing shrank, the number of enterprises active in the sector continued to grow. [5]

The stark discrepancy between wage growth and productivity in the United States is also quite telling, with wages stalled at a mere 9% growth while the productivity rocketed skyward at a rate of 73% over a 41-year period between 1973 and 2014. Recessions and various economic turbulence notwithstanding, during the last thirty years, the general trend is a marked decline in industrial employment and a corresponding increase in industrial output. [6]

Projecting these trends of declining labour value and technological advancement towards a more long-term timeline results in a range of scenarios spanning both dystopian to utopian outcomes. [7] Among the dystopian possibilities are the relegation of humanity to slavery under a capitalist elite, and the abolishment of technological advancement in favour of economic and societal reversion. The utopian scenario can be characterized in two ways also: one a social democratic scenario with redistribution based on social policies supported by taxation, and the other a socialist-capitalist arrangement with redistribution of the ownership of robotic industries to citizens. In one way or another, the future we as society should strive for seems to be one in which economic production has been automated and humans are free to live life in leisure. Our challenge then, is how to manage the transition to ensure we arrive at either of the more preferable outcomes.

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[3] Walker, Mark. "BIG and Technological Unemployment: Chicken Little Versus the Economists." *Journal of Evolution and Technology* 24.1 (2014): 5-25. *BIG and Technological Unemployment: Chicken Little Versus the Economists*. New Mexico State University, Feb. 2014. Web. 16 Mar. 2016.

[4] Bureau of Labor Standards. 2014. Computer and electronic goods manufacturing employment. http://www.bls.gov/iag/tgs/iag334.htm#workforce

[5] Campa, Riccardo. "Workers and Automata: A Sociological Analysis of the Italian Case." *Journal of Evolution and Technology* 24.1 (2014): 70-85. *Http://jetpress.org/v24/campa1.htm*. Web. 16 Mar. 2016.

[6] Hughes, 2014

[7] Campa, 2014

II. Current Policy Alternatives to Manage STU

Broadly speaking, the leading policy alternatives proposed in response to future technological unemployment can be organized into two perspectives.

The first group of policies focus on protecting human employment against technological advancement, which often takes the form of: (a) redistributing jobs amongst the labour supply, (b) protecting human employment through quota or regulatory schemes, (c) creating new jobs through federal work programs and grants, or (d) developing education initiatives that aim to retrain displaced workers for newly created jobs. The second set of policies focus on wealth distribution through taxation or social welfare systems, either through a state-managed income scheme, or some version of a sovereign wealth fund through which citizens receive dividend payments.

Employment focused policies are fundamentally regressive however, and do not adequately adapt the underlying economic structure to postindustrial economic realities. For instance, redistribution by way of work-sharing programs assume a constant proportion of jobs in relation to the labour supply. If we are to assume growing technological unemployment over time, a declining pool of jobs will need to be distributed among a constant labour supply, eventually reaching a limit past which it is neither economically or logistically practical to redistribute any further. Employment protection would come under heavy social and economic pressures alike, and any jobs created under a federal work program are more than likely to be trivial and economically irrational.

While these policies are likely important considerations in the transition period from the status quo to our desired utopian scenario, by nature of their focus on maintaining the paradigm of human employment, they are not appropriate for an economy in which employment has been made more or less irrelevant. As such, the long-term focus should be on policies that aim to ensure an acceptable quality of life for citizens in a post-automation economy through wealth distribution mechanisms rather than employment protection.

III. What is Guaranteed Minimum Income?

The idea of a state-managed basic income has existed for some time, known in its various forms as Guaranteed Annual Income (commonly denoted by the acronym GAI), Guaranteed Adequate Income, Guaranteed Livable Income, Basic Income Grant/Guarantee, Citizen's Income, Social/Natural Resources Dividend, or Refundable Family Tax Credit. [8] In general, it is defined as "an income unconditionally granted to all on an individual basis, without a means test or work requirement" [9]

[8] Pasma, Chandra, and Jim Mulvale. "Income Security for All Canadians." Understanding Guaranteed Income (2015): n. pag. Web. 16 Mar. 2016.
[9] Ibid.

There are four principal variables in every Guaranteed Minimum Income policy proposal: (1) the degree of universality, (2) the conditions of entitlement, (3) the benefit level, and (4) the program's position in relation to other social welfare programs.

The first, the question of universality, is the determination of the population range covered by the policy. Whether the eligibility criteria is a function of citizenship, age, wealth, or some other demographic variable, this first criteria takes precedence over the second criteria, that of conditionality. Once the first criteria for eligibility is established, additional conditions of eligibility further narrow the policy target by stipulating requirements such as labour market participation or restricting the use of cash benefits to core living expenses such as rent and food. While conditionality has historically been one of the biggest concerns and obstacles to political implementation of GMI policies, proponents of unrestricted benefit distribution point to the added administrative complexity and costs of enforcing conditions of eligibility to support for their position.

Finally, the determination of an adequate benefit level can also be considered in the context of the fourth variable, the positioning of the GMI benefit in relation to all other social welfare programs and possibilities. A GMI benefit could conceivably replace other welfare programs such as unemployment insurance and public pensions, and this interpretation is often put forth by those with conservative ideologies who see GMI as a path to increasing the efficiency of government infrastructure and reducing its role of in society. In an alternative implementation where the GMI benefit is seen as complementary to existing social welfare programs, the determination of an adequate benefit level is instead an exercise of defining an appropriate quality of life.

The various perspectives on the structure of a GMI programs have led to the development of three primary models [10] of program structure:

1. **Minimalist-libertarian Model**

   The underlying intention of this model is to improve the efficiency of the state social welfare system by combining the costs of funding and managing various benefits into one annual or monthly lump sum payment. These models are characterized by strong universality and unconditionally in that any citizen is usually eligible, although the proposed benefit levels are often far below a living wage as the benefits are intended to replace other welfare benefits and not necessarily be a standalone guarantee for a certain quality of life.

2. **Mixed Welfare Model**

   Consisting of a mixture of social assistance and welfare schemes, this is the most prevalent model today. Partial and conditional benefits are awarded to a smaller subset of the population, conditional on variables such as age, income level, and labour market participation to achieve a

[10] Young, Margot, and James P. Mulvale. "Possibilities and Prospects: The Debate Over a Guaranteed Income." An Economic Security Project Report (2009): n. pag. CCPA. Canadian Centre for Policy Alternatives, Nov. 2009. Web. 16 Mar. 2016.

specific policy objective. It is argued that Canada's social welfare system is a version of this model.

3. **Strong Basic Income Model**

   The strongest variations of guaranteed income proposals tend to include a minimum level of core income provided on a continuing basis by the state, for which entitlement is not subjective to conditions of personal circumstances, needs, or eligibility. Under such a model, every citizen from an executive to a secretary would receive the same benefit, which may or may not be adjusted later through the income tax structure.

Along with each of the three above models, there are two general ways in with the benefits may be distributed to the beneficiaries:

1. **Negative Income Tax Model**

   Initially proposed by American economist Milton Friedman, [11] the Negative Income Tax Model is administered through the tax system by assigning a tax credit to qualified beneficiaries. Each taxpayer is thus guaranteed a certain income level, with the benefit being reduced by a "tax back" rate for every dollar of additional income received. Since the benefit is paid out selectively and through reduced tax revenue rather than upfront spending, this distribution model is considered more attractive with regards to political feasibility. [12] The most significant downside for beneficiaries under the NIT model, is that the benefits accrue at the end of the tax year when an "income test" is conducted through the filing of income tax. As such, the NIT model is far less responsive to the immediate financial needs of those in the lower-income brackets.

2. **Universal Demogrant Model**

   Originally a proposal by American economist Robert Theobald, [13] the universal demogrant (UD) model consists of a non-taxable payment made to every citizen at regular intervals. While the payment itself is non-taxable, as all additional income is generally taxable at a rate higher than current income tax rates, citizens in higher income tax brackets will end up paying the benefit amount back through their income taxes. Although the upfront cost for the state is greater with a demogrant model compared to an NIT model, the end cost to taxpayers is not necessarily higher since those with higher incomes pay the benefit back through their taxes. In addition, the program would likely be cheaper to administer than an NIT due to the greater simplicity of its administration. [14]

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[11] Pasma & Mulvale, 2016
[12] Young & Mulvale, 2009
[13] Battle, Ken. "Guaranteed Income or Guaranteed Incomes?" Rethinking Income Support: A Guaranteed Annual. (2008): n. pag. Library of Parliament Seminar Series, Sept. 2015. Web.
Bureau of Labor Standards. 2014. Computer and electronic goods manufacturing employment. http://www.bls.gov/iag/tgs/iag334.htm#workforce
[14] Pasma & Mulvale, 2016

IV. Criticisms

The primary concern regarding the implementation of GMI programs is the work disincentive effect of receiving a guaranteed income benefit. Opponents of GMI policies often argue that the receipt of a generous and unconditional benefit will incentivize individuals to opt out of participating in the paid labour market, rewarding those who may contribute nothing to society in return. [15] This concern has resulted in modifications to proposals that most often involve adding some type of employment clause to the eligibility requirements, such that receipt of the benefit is conditional on a demonstrated effort to find or maintain employment.

This particular criticism is mostly concerned with policies that follow the Strong Basic Income Model, and makes the assumption that our current economic and labour market structures will remain unchanged as technological advancements continue. As discussed in length previously, we may very well be facing a world in the not so distant future, in which the labour market supply is dominated by automated machine labour. Imposing an employment condition in such an economy would at best promote the creation of frivolous jobs, and at worst be a crippling perversion of the original intent of the GMI policy.

However, the issues around employment disincentive do merit concern when considering political feasibility. During the transition towards a post-automation economy, it is conceivable to imagine that GMI policies will be implemented unevenly across various economic and state borders such that it creates significant inequality in citizenship benefits. Legal and illegal immigration demand could increase and create a situation similar to the current EU migrant crisis, straining state resources for a prolonged period of time before GMI policy implementation reaches an equilibrium across the global economy.

Financial implications are also often debated as a significant hurdle to realizing basic income policies. Technological unemployment has the potential to not only affect employment, but also erode the tax base through a sharp reduction in income tax revenue. A basic income guarantee would further contribute to this fiscal burden by increasing government expenditure, and through the effects of a reduced labour supply, drive up wages and thus the price of goods and services. [16] There are however, policy proposals that make an effort to neutralize the expenditure through a concurrent increase in VAT, or by financing the expenditure through an expanded public pension system. The common thread among these policies is the increased focus on mechanisms to redistribute some portion of the wealth accruing to owners of economic production functions.

V. History of GMI in Canada

[15] Young & Mulvale, 2009

[16] Gajewska, Katarzyna. "Technological Unemployment but Still a Lot of Work: Towards Prosumerist Services of General Interest." Journal of Evolution and Technology 21.1 (2014): 104-12. Web. 16 Mar. 2016.

The idea of guaranteed income has seen the spotlight in a number of occasions in Canada, linked to a diverse range of reform agendas put forth by an equally diverse set of proponents. Over the past 50 years, the Castonguay-Nepveau Commission, the Department of National Health and Welfare, the Royal Commission on the Status of Women, the National Council of Welfare, and the Royal Commission on the Economic Union and Development Prospects for Canada (Macdonald Commission), as well as governments on both sides of the ideology aisle, have made GMI proposals in various forms.

The most significant of earlier efforts was by the Special Senate Committee on Poverty in 1968 chaired by Senator David Croll, which proposed a federal guaranteed annual income program that replaced all other social security programs. The proposal met the Committee's three basic requirements of an adequate benefit level, preservation of incentives for employment, and fiscal feasibility, through a negative income tax system. The benefit would provide a family of four with an income of roughly $3,500, the inflation-adjusted equivalent of roughly $19,224 in 2008 dollars, or 70% of the poverty line set by the committee. Each dollar above the benefit level would reduce payout by 70%, meaning an annual income of $5,000 would reduce the benefit by $1,050. The Committee estimated the cost of the program at $645 million, the equivalent of around $4.1 billion in 2008, which amounted to a 1% increase to the cost of existing income security programs as a proportion of GNP at the time. [17] The proposal was never adopted, falling to criticisms related to cost and the inadequacy of work incentives.

Not long after Senator Croll's proposal, the Basic Annual Income Experiment, or "Mincome", was launched in the mid 1970's as a joint federal-provincial partnership. A seminal experiment on the social effects of a guaranteed income program, the study involved 1,300 families in Manitoba who would benefit from a NIT system with three levels of benefit set at $3800, $4800 and $5800, each adjusted for family size and structure. Three tax-back rates were then applied to all income the family received above the minimum benefit rate at 35%, 50%, and 75%, with the most generous and least generous scenarios excluded from the test. Conducted over a three year span, the study found minimal impact on work incentive, with annual reduction of hours worked ranging from 1-5%. [18]

Additional observations were made during the study, including positive impacts on teenage pregnancy, a reduction in hospitalization rates for mental health and physical injuries, and a marked increase in high school graduation rates. Unfortunately the experiment suffered from runaway administration costs, and deteriorated over a number of years. By 1985, seven years following the conclusion of the study, the positive impacts were reversed and no significant differences between the study participants and control groups could be observed.

More recent examples of attempts to reintroduce the debate into public discourse include reports in 2006, 2008, and 2009 by the Standing Senate Committee on Agriculture and Forestry, the Senate Subcommittee on Cities, and the Special Senate Committee on Aging, respectively, all discussing the potential impacts of a of a GMI program in alleviating poverty in various demographics and geographies. Current advocates for basic income guarantees include Hugh Segal, a Conservative Senator who advocates for a program somewhere in between the Minimalist-Libertarian and Mixed Welfare

[17] Young & Mulvale, 2009
[18] Pasma & Mulvale, 2016

models,[19] and the Green Party of Canada, which campaigned in 2008 to pursue an incremental implementation of a guaranteed income initiated by a federal benefit of $5,000 to every individual on provincial welfare. [20]

VI. Social Welfare in Canada: The Current Picture

Several elements of social policy exist in Canada that, in principle, approach a form of guaranteed income. Often targeted towards citizens who fall outside of the labour pool such as seniors and children, programs like Old Age Security and the Child Tax Benefit are in place to ensure a minimal standard of living for the beneficiaries. These programs are also similar in implementation and distribution systems to GMI proposals, such that Canada's social welfare system is in many ways a variation of the Mixed Social Welfare model.

For example, the aforementioned Old Age Security (OAS) is a form of a universal demogrant system, as a guaranteed monthly benefit available to all Canadians over 65 years of age with no work history or retirement conditions. The benefit is fully taxable income, which results in higher income beneficiaries paying part or all of the benefit back through their taxes. Low-income seniors also receive a Guaranteed Income Supplement (GIS), a negative income tax system which supplements OAS as an income-tested and tax exempt benefit. Together, the two programs guarantee an income floor of $13,462 for single seniors and $25,023 for couples as of 2007, [21] which is further supplemented through provincial programs that bring the floor to provincially guaranteed levels. Similarly the Child Tax Benefit, comprised of the National Child Benefit Supplement and the Child Disability Benefit, are tax exempt monthly payments received by parents of children under the age of 18 intended to help with the costs of raising children. [22]

VII. Social Welfare in Canada: Looking Ahead

As progressive as they may be however, Canada's social programs were in large part conceived and implemented with the primary objective of alleviating poverty, often by supporting citizens who fell outside of the labour pool such as seniors and children. As relics of a past era, they require significant reform to meet new demands arising from the rapidly shifting economic, social, demographic, and political landscapes.

Today, the emerging effects of technological unemployment and the increasing pressure from a growing old-age dependency crisis are creating a perfect environment for a serious reconsideration of GMI policies. The following package of policy proposals represent a fundamental and comprehensive restructuring of Canada's social welfare system, encompassing a rethinking of social security, public

[19] Young & Mulvale, 2009
[20] Young & Mulvale, 2009
[21] Battle, 2015
[22] Young & Mulvale, 2009

pension, income taxation, and unemployment assistance programs that marry political perspectives on both sides of the aisle.

1. **A material increase of VAT to hedge against declining wages, neutralized for the average household through an increase in income tax exemption threshold;**

   In a post-automation economy, the increase in unemployment implies a concurrent reduction in income tax revenue. In an environment of rapidly declining wages and incomes, the government must increase its reliance on alternate revenue sources. Therefore a shift in the focus of taxation from income to consumption is needed by increasing the value added tax (VAT) rate, to ensure the government is adequately hedging its revenue sources against the eventual decline of employment income as a proportion of overall domestic production.

   However taxation reform is often considered to be a one-way street, as changes to any part of the tax structure that results in an increase in liability for any demographic tends to spark an uproar among constituents. Many government administrations see a reduction in tax liability as the only politically achievable direction of adjustments in tax rates, and this reality must be considered in any suggestion to change any part of the taxation system.

   As such, an increase to the VAT should also be neutralized through an equivalent increase in the income tax-exemption threshold. If implemented correctly, this change should result in a revenue-neutral shift in the overall tax revenue portfolio from both the government and tax-payer perspectives, while serving as a hedge against future declines in income tax revenue.

2. **The implementation of a Strong Basic Income/Universal Demogrant GMI program with a growing benefit-level over a 20-50 year time horizon.**

   The implementation of a Strong Basic Income and Universal Demogrant GMI will be necessary to ensure a minimal standard of living for Canadians in a post-automation economy. For a GMI policy intended to protect citizens from the eventuality of technological unemployment, the principal challenge in implementation is timing and the accurate identification of technological unemployment.

   Adoption of advanced technologies is uneven across various industries and sectors, such that the impacts of technological unemployment will also be distributed unevenly across the economy. A benefit-level that starts from a relatively low threshold and grows over time, helps in addressing this challenge by making the concerns regarding timing and identification more or less irrelevant.

Assuming that technological unemployment will be a dominant force in the economy by a certain point of time in the future, and that the impacts will be unevenly distributed but also exhibit growth over time, we can also assume that the impact of this trend will change over time, progressively growing larger and larger as we move forward from the present.

It follows then, that a static benefit level determined to be appropriate at a certain point in time would be inadequate for all other times at which the actual required benefit level may be lower or higher. At each point in time other than the original reference, the benefit level would generate a net utility surplus or a deficit, and resulting in an inefficient allocation of resources. In an ideal world, the optimal benefit payment would be determined by indexing its value to some statistic that measured technological unemployment. However the uncertainty regarding the growth of technological unemployment and the full extent of its impact on labour markets make defining an appropriate benefit level impossible.

Instead, a growing benefit-level circumvents this challenge by minimizing the lag between the optimal benefit-level at a given point in time, and the actual point in time at which that level is reached. Any surplus would likely be negligible compared to the potential surplus of an aggressively set static benefit level, and any deficit should be covered by existing social welfare programs to ensure incomes remain above a certain minimum level.

For example, suppose that we determine with some degree of confidence that the current rate of technological advancement implies significant technological unemployment in 50 years, by the year 2066. Suppose also, that we believe a reasonable level of income to ensure a standard quality of life in such a world to be the equivalent of $30,000 today. Given these assumptions, an appropriate starting benefit level and real growth rate may be set at $5,000 and 3.70%. This growth rate would be indexed to inflation, resulting in an inflation-protected benefit of $5,000 annually, growing at a rate of 3.70% such that the benefit paid out would be $5,185 in the second year, $5,376 in the third year, and so on until reaching $30,754 in 2016 terms by the year 2066.

By annually adjusting the benefit level over the full progression period of technological unemployment, we ensure work incentives remain while they are necessary, but also that the GMI benefit is approximately matched to the degree to which technological unemployment impacts the labour market. Growing the GMI benefit over time also has the added value of ensuring a natural succession of existing social welfare benefits without necessitating any modifications to current programs.

3. The maintenance of current social welfare programs with gradual integration into GMI benefits over 20-50 year time horizon

While implementing the GMI program, existing social welfare programs should be maintained as part of the overall social welfare package. This is to ensure that the current floor of income is maintained while the GMI benefit is still close to the initial starting level, which will be far below

the minimum standard threshold until sometime after the program is implemented.

Once the GMI benefit reaches a sufficient level, the income-tests and taxation features of existing social welfare programs will activate for beneficiaries receiving a combined social welfare income greater than the minimum income threshold. For example, the $5,000 starting benefit level growing at 3.70% annually would reach the Old Age Security and Guaranteed Income Supplement income floor for individual seniors of $13,462 by 2043. Since every citizen 18 years or older will be receiving the GMI benefit at this point, there will be no one left to claim benefits from the OAS and GIS programs and they can subsequently be phased out.

The gradual growth of the GMI benefit beyond the income-test threshold of other programs ensures that initially co-existing social welfare programs may be retired without any political intervention, while still serving their purpose as necessary during the transition period.

4. The development of a sovereign wealth fund independent of Executive and Legislative branches

As the benefit-level of the GMI policy grows, so too will the funding requirement to cover the increase in government expenditure. While the starting level of benefit payments could reasonably be absorbed given the current economic output of the Canadian economy, a $30,000 annual benefit by 2066 would amount to an expenditure of just under $800 Billion, representing over 50% of the economic output in 2016 terms. Even assuming strong economic growth in the interim leading up to 2066, it will be impossible to capture such a significant proportion of output through just consumption and income taxes. A new sustainable source of revenue is needed to ensure adequate funding of the GMI benefit for decades to come.

In a post-automation economy where profits accrue nearly exclusively to owners of the technology governing economic production, a redistribution mechanism must be in place to divert at least a portion of such profits for public benefit. This redistribution mechanism must also be designed with care to ensure that incentives for continued innovation and production remain for entrepreneurs and private investors. This objective could be achieved with the development of a sovereign wealth fund that participates in the ownership of these technologies and the companies that manage them, and does so alongside actors in the private market rather than in replacement of them.

It is also important to emphasize that such a fund should be created and managed independently from the Executive and Legislative branches of government, with a relationship similar to that between the United States Government and the Federal Reserve. The government should have no part in managing or allocating the accumulated funds, so as to avoid the accumulated profits to be seen or used as a source of revenue to finance government expenditures. This structural and legal separation cannot be stressed enough, as it is imperative to avoid inviting any temptation for governments to use the money for any other purpose than to ensure an adequate quality of life for its citizens.

5. The acceleration of labour-displacing technology development, through an incentive program that eliminates corporate tax in selected industries and sectors while mandating preferential and non-controlling minority ownership of equity by the sovereign wealth fund

For any state that undertakes the implementation of a GMI program and develops a concurrent sovereign wealth fund, if its policy objectives are to address the welfare need created as a result of technological unemployment, it should also simultaneously make a serious and concerted effort to accelerate the development of labour-displacing technologies.

In a multi-state global economy, the first state that begins to provide a GMI benefit and establishes a sovereign wealth fund to profit from the advancement of labour-displacing technology, will both insulate its citizens from the impacts of technological unemployment, and ensure that they benefit from profits produced by labour-displacing technologies. The first-mover economies will thus have a significant developmental advantage in the post-automation economy, not unlike the advantage enjoyed by Western nations as a result of colonialism.

Therefore, any governments creating a sovereign wealth fund only benefits its citizens by encouraging the development of labour-displacing technologies through an investment and entrepreneurship incentive program. To align the incentives of such a program with the ownership mandate of the fund, one possibility is to completely eliminate all corporate taxes for certain target sectors and industries as the incentive, exchanging this benefit instead for a preferential, and non-controlling minority ownership stake in these companies. The aim is to create a global focal point for technological development in the post-automation economy, and by doing so, capture profits from both domestic and foreign entrepreneurs far greater in value than the foregone tax revenue.

However, much like the countless legal strategies with which corporate taxes are evaded today, there may be attempts by companies to evade profit remittances to the state fund through various corporate structures and exploitation of legal loopholes. Such behaviour might be prevented by mandating the exact same compensation structure for the state fund as the best terms accorded to any of the other private investors or owners.

This policy serves two purposes. First, it aligns public and private interests by taking a minority ownership of the companies under the same terms as private investors. The second and perhaps more significant benefit, is that it allows the state fund to develop a strong equity portfolio without any initial outlay of capital. While many proposals suggest an expansion of the public pension system as a way to achieve public ownership of economic production, the initial investment required to develop any meaningful portfolio requires billions of dollars to seed the

fund. Trading a perpetual relief of corporate tax, which have an upper bound due to economic competition, for theoretically unlimited capital gains and dividends for citizens, could have a significant positive impact on the future economic and social prosperity of Canada.

VIII. Conclusion

In this paper, we first discussed the economic implications of a world in which advances in technology leads to a structural displacement of labour in favour of machine automation of economic production functions. We argued that in such a post-automation economy, a Guaranteed Minimum Income (GMI) policy is needed to maintain an adequate standard of living for a majority of the population who will be unemployable.

The various models of past GMI policy proposals were identified, with program structures ranging from (a) Minimalist-libertarian, to (b) Mixed Welfare, and (c) Strong Basic Income models, and the distribution systems of either a (1) Negative Income Tax, or a (2) Universal Demogrant benefit. We then charted the history of GMI policies in Canada, and developed an understanding of current social welfare systems in place.

Finally a total of five policy recommendations were presented, as a comprehensive social welfare reform package designed to secure an adequate standard of living for all Canadians in the transition towards a post-automation economy. The package consisted of: **(1)** An increase in VAT to hedge against declining wages, neutralized through a corresponding increase in the income tax exemption threshold; **(2)** the implementation of a GMI program with a growing benefit-level over a 20-50 year time horizon; **(3)** the maintenance of current social welfare programs with integration into GMI over the same 20-50 year time horizon; **(4)** the development of a sovereign wealth fund independent of Executive and Legislative branches; and **(5)** the acceleration of labour-displacing technology development by exchanging the elimination of corporate tax for certain sectors and industries, in return for preferential and non-controlling minority ownership of equity by the sovereign wealth fund;

VII. Citations

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