

THE POLITICAL ECONOMY OF THE ULTIMATE RESOURCE: ESSAYS ON
INTUITIONS AND ENTREPRENEURSHIP

by

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DEDICATION

This is dedicated to my beautiful and steadfast wife Hayley and our children, Cedar and Wren.

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I would like to thank my relatives who have supported me throughout this process including my mom, Debra Jacobsen, who inspired my desire for learning and by dad, Jon Jacobsen, who unknowingly introduced me to the economic way of thinking. I'd also like to thank my wife Hayley and daughter Cedar and Wren, who sacrificed so I could do what I love. I'd like to thank my economics teachers including David Yaskewich, Natallia Gray, William Weber, and Pete Kerr. I also owe recognition and thanks to my first Economics teacher, Hank Easterling, who taught me that everything goes back to economics. My colleagues are too many in number, but I will do my best to include all. I'd like to thank Bryan Cutsinger and Ennio Piano for long discussions on what economists do. I'd like to thank Henry Thompson, Stuart Paul, Tate Fegley, Clara Jace, Nathan Goodman, and Dillon Tausin for their helpful comments on my research and writing throughout our time at Mason. I'd especially like to thank Louis Rouanet for being a great scholar and a better friend. I'd like to thank my great friend and mentor, Chuck McAllister, for his help before and throughout my graduate career. Lastly, I'd like to thank several faculty members who shaped me while at Mason. First, I'd like to thank Peter Leeson for his encouragement which spurred me to speak up, and his painstaking attempts to help me understand the importance of economic theory. I'd also like to thank Peter Boettke, who reminded me of the importance of looking beyond the blackboard of economics and into the world out the window. I would have been unable to finish without the help of Rosolino Candela, who put confidence in me before I had proven myself. Rosolino has been a great co-author, mentor, and, most importantly, friend to me. Finally, I am eternally indebted to my dissertation chair, Chris Coyne. Chris spent countless hours meticulously looking through my papers and provided me feedback which challenged the worst blind spots in my arguments and writing. More still, Chris serves as an ever-present reminder of the value of individual creativity, around which this dissertation revolves. Soli Deo Gloria.

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ABSTRACT

THE POLITICAL ECONOMY OF THE ULTIMATE RESOURCE: ESSAYS ON INTUITIONS AND ENTREPRENEURSHIP

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This dissertation explores the relationship between the ultimate resource, which is human creativity in the form of entrepreneurship, and the institutional environment which surrounds entrepreneurs.¹

In the first essay, I focus on how humans' entrepreneurial capabilities confound optimal population models and consequent policies. Recent scholarship by natural scientists has renewed the call for population policies in response to climate change. Likewise, economic scholarship has increasingly focused on the optimal population policy given climate considerations. The result of this analysis manifests in models that imply economic growth can be enhanced by population growth reduction. I argue it is impossible for either natural scientists or economists to determine a welfare-enhancing

¹ Chapter two was coauthored with Rosolino Candela and Kacey Reeves and was accepted for publication at the *Review of Austrian Economics*: <https://link.springer.com/article/10.1007/s11138-020-00529-2>. Chapter three was coauthored with Rosolino Candela and was accepted for publication at *Political Economy in the Carolinas*: <http://www.classicalliberals.org/journal/>.

population policy. Creative individuals alert to opportunities in their interest contribute to the economy in ways not captured by the aforementioned models. This chapter examines this relationship between population and economic growth with entrepreneurship considered. The implication is policies seeking to curb population growth may inhibit economic growth by reducing potential entrepreneurs. Politicians cannot measure the opportunity cost of forgone entrepreneurs, and therefore the costs of such policies are unseen. I use a case study involving potentially forgone entrepreneurs to highlight this point.

In the second essay, we answer the question, “does the entrepreneurial market process reflect an equilibrating or disequilibrating tendency in the allocation of resources?” We address this question by utilizing the case of Malcom McLean, who pioneered and introduced container shipping to international trade. By realizing containerization as a lower cost method of shipping goods internationally, we argue that McLean acted simultaneously as a Schumpeterian and Kirznerian entrepreneur, illustrating that these two notions of entrepreneurship are different segments of the same equilibrating market process. Containerization had a disruptive effect on previous methods of ocean shipping, but its adoption was introduced through an act of arbitrage, namely by redeploying existing resources, such as cranes, ships, ports, and storage facilities from lower-valued uses to perceived higher-valued uses. In the process, McLean was able to realize previously unnoticed profit opportunities by correcting previously existing inefficiencies in intermodal transport.

Lastly, we focus on how individuals make decisions when they are embedded in institutions without profit in loss. We focus on Amazon’s HQ2 campaign which drew

both large support at the possibility of job creation and backlash for perceived cronyism.

In this paper we evaluate corporate tax incentive policies in light of the Austrian contribution to the problem of economic calculation. In doing so we highlight the contextual nature of the knowledge problem associated with policy packages and the potential cronyism arising from such a problem. We argue that because political decision-makers lack the knowledge generated via competition in the market process, they are unable to allocate resources in a way that achieves economic growth. In the place of this knowledge, they tend to gain knowledge from the political process which helps them respond to political incentives and rent-seeking behavior by special-interest groups.

MORE THAN LABOR

“In these regions the population must multiply if its members are to achieve the standards for which they strive. It is in their own interest to increase their numbers, and it would be presumptuous, and hardly defensible morally, to advise them, let alone to coerce them, to hold down their numbers.”

-FA Hayek (1988 [1992] 124)

1. Introduction

In *An Essay on the Principle of Population* Thomas Malthus (1798 [1998], 4) made now famous proclamation, “assuming my postula as granted, I say, the power of population is indefinitely greater than the power in the earth to produce subsistence for man”. In January 2020, 11,000 scientists supported a publication recommending that, “the world population must be stabilized—and, ideally, gradually reduced—within a framework that ensures social integrity” since “economic and population growth are among the most important drivers of increases in CO2 emissions” (Ripple et al 2020, 10-11). While the paper highlights the costs associated with climate change exacerbated by population growth, it doesn’t discuss the cost (or what is forgone) from a shrinking population. These prescriptions are reinforced by a literature associating climate change with disproportionately large economic impacts on developing countries (Hallegatte et al 2016; Bierbaum et al 2010). Using this link, some argue that population reduction will curb climate-related damages and spur development. To address this question more directly,

several economists have recently begun to consider an optimal population policy with climate change in mind.

In this paper, I argue that it is not possible for these experts to know a priori whether increased or reduced population growth will bring countries closer to an optimal population which maximizes social welfare. This is because they are unable to account for the true opportunity cost of a forgone individual. In order to do this, models that attempt to account for the opportunity cost treat individuals as homogeneous laborers whose utility depends on a path-dependent wage. However, in doing this, the models find an optimal labor stock, not an optimal population. Since individuals can contribute to the economy as entrepreneurs as well as laborers, any attempt to estimate the cost of a forgone entrepreneur would need to account for both. Because humans are creative, they cannot be summarized simply as allocators (Kirzner 1985; Buchanan 1979; Simon 1989) but must be viewed as entrepreneurial. In making this argument, I draw from and contribute to three literatures.

My first contribution is to the entrepreneurship literature. In order to explore the importance of the forgone entrepreneur I draw on the Kirznerian and Schumpeterian conceptions of entrepreneurship. Entrepreneurship here is an individual acting in the face of sheer uncertainty for the purpose of earning an economic profit (defined as benefit in excess of opportunity cost).⁴ Kirzner (1973) abstracts from uncertainty to highlight the pure entrepreneur who is alert to opportunities for arbitrage which, once discovered, allow resources to flow to more highly valued uses. Entrepreneurial action, therefore, brings the economy closer to equilibrium by exploiting hitherto unexploited opportunities.

⁴ Sheer uncertainty being characterized having no associated probability distribution.

Schumpeter (1949) puts forward the idea of the disequilibrating entrepreneur who introduces technological changes which destroys old markets and creates new ones. As Kirzner (1999) points out, the seeming disequilibrium caused by introduction of new technology is simply a special case of moving towards equilibrium. For example, while the introduction of an automobile led to temporary increases in unemployment and lost capital value in that industry. However, the industry itself was representative of large waste which was corrected when entrepreneurs reorganized resources to higher valued uses in the form of the automobile. The very success of the automobile is indicative of this. Thus, through arbitrage and technological changes, the Kirznerian entrepreneur brings resources to higher valued use.

In both cases, the prevailing markets and market prices do not exist absent the entrepreneur. Rather, entrepreneurs *create* future market conditions in their attempts to capture economic profit. Entrepreneurs attempt to capitalize on what is believed to be an unnoticed profit opportunity, and, in doing so, create the market conditions which are thought to be profitable. Ex post, it may be the case that the belief was in error, but nonetheless the entrepreneur changes market price and conditions (Kirzner 1992). It follows that since the models of optimal population assume a stable equilibrium, the predictions of those models will be constantly changing in the face of new entrepreneurs. I further utilize work by Holcombe (2008) and Baetjer (2000) to highlight how the contributions by entrepreneurs cannot be well-captured by macroeconomic models.

I contribute to this literature with the observation that, although entrepreneurship is a constant category rather than a modifiable stock, varying numbers of individuals

possessing this constant will lead to a variable effect of entrepreneurship in the world. So, although more people doesn't mean more entrepreneurship, it does mean different outcomes from entrepreneurship. My contribution resembles, though is distinct from, that of Julian Simon. In a similar vein, Simon argues that people's creative contributions are often underappreciated by experts. There are a few key distinctions between mine and Simon's contribution. Simon's major thesis (1998) focuses on how population growth leads to problems which cause pressure for an increased number of minds to find solutions which leave us better off. To Simon, population solves the problems it created and then some. Although I do not disagree with Simon's point, my paper emphasizes that even if more people led to more problems, this does not imply that the cost is not worth the benefit. My focus on creativity is not to emphasize how people overcome problems created by population, but rather that it confounds attempts to weigh the costs created population against some homogeneous benefit metric. As such, while Simon often rested his case on long-run data and trends, I focus on the capacity for entrepreneurship. Even if long-run trends did appear to get worse over time (contra Simon), this would not overturn the importance of considering forgone entrepreneurial contributions of potential entrepreneurs. I view this argument as complimentary to Simon's case, though not identical. Interestingly, these differences are like those pointed about by Kirzner (1985 165-167).

Second, this paper contributes to the literature on the optimal size of the population which begins with Dasgupta (1969). This literature considers the decision of a benevolent central planner and manifests in several different ways. Bohn and Stuart (2015) focus on how altruism from parent to child in the face of the fixed common property externality of

climate change will lead to a higher than optimal equilibrium population. Lawson and Spears (2017) consider how even a leader who weights total utility (rather than average) would prefer a smaller population in the face of an exhaustible resource constraint. Harford (1997) finds that a tax on children would be necessary in the face of an environmental externality caused by population growth. I contribute to this literature by arguing that social welfare functions used to determine optimal population by ignoring the entrepreneurial capacity of humans cannot succeed at determining an optimal population or theoretical prescriptions based on varying externalities.

Finally, I contribute to the literature on non-comprehensive planning literature. This literature has origins in the economic calculation debate which occurred in the early 20th century. Ludwig von Mises ([1920] 2016) forwarded the argument that there could be no rational calculation in a socialist economy.⁵ Lavoie ([1985] 2016) pushes the argument made by Mises even further in applying it to national economic planning policies in general. The literature applying this insight is extensive and includes defense (Coyne and Hall [2019] and Duncan and Coyne [2013]), development (Powell [2005]), corporate benefits (Coyne and Moberg [2015]) and (Candela and Jacobsen [2019]), entrepreneurship (Lucas et al 2018), and international aid (Coyne [2013], Easterly (2001; 2014), and Skarbek and Leeson [2009]). I add to this literature by examining the limits of a planning population growth. Often this literature focuses on the opportunity cost of policies as what would have been done with the resources taken to finance a given policy. This cost is part, but not all,

⁵ This is because without property rights over the means of production there are no monetary prices over the means of production. Without prices to guide decision-making, planners cannot economically evaluate alternative uses of scarce capital.

of the considerations of population policies which have a somewhat unique opportunity cost which is not inherent in any other type of policy.⁶ That is, the opportunity cost of a policy aimed at reducing the growth rate of the population includes a person whose very existence is forgone if the policy is to be successful.

The paper proceeds as follows. Section 2 provides an overview of orthodox treatments of optimal population contrasted with an alternative view that considers an additional marginal person as an entrepreneur. Section 3 will provide a case study highlighting how the counterfactual loss from population policies. Section 4 concludes.

2. The Population Brain Versus the Population's Brains

2.1 The Population Brain

Buchanan (1949) lays out a dichotomy that contrasts what he calls the "organismic" theory of government finance versus the "individualistic" concept. Here Buchanan makes the point that a theory of public finance requires a theory of the state which creates such a policy. In the "organismic" theory, the state is considered to be a homogeneous entity that exists for the purpose of maximizing the social utility. The state, on this view, is a benevolent "fiscal brain" which "select[s] the values of these many variables which will maximize social utility" (497). The literature on optimal population works much the same way.

⁶ This insight draws on Buchanan's (1969[1999]) discussion of the difference between the London-Austrian subjectivist view of opportunity cost and neo-classical objectivist conception.

The social welfare function that the population brain seeks to maximize must overcome the problem of different and future generations. It often does this with a function that takes the form of a dynastic utility function as introduced by Becker and Barro (1988) and Barro and Becker (1989). In this function, there are infinitely lived generations who usually have some degree of altruism towards their children. Parent's utility, therefore, is determined by their own consumption as well as the consumption of their children dependent on the degree of altruism parents have towards children. This altruism occurs all the way down, as the utility of the parents (generation 1) depends on the discounted utility of their children (generation 2), whose utility depends on that of their children (generation) for n generations.

Thus, an additional person contributes first to the dynastic utility of the society by the utility they receive from their own consumption. Further, utility is added in that parents receive satisfaction by their children's consumption. Each person is constrained by their wage and inheritance. Wage rates are taken as given and are determined simultaneously with fertility, consumption, and savings decisions in the vein of Ramsey (1928), Cass (1965), and Koopmans (1965). Furthermore, the population brain also weights the importance of total utility relative to average utility.

Based on this analysis, several papers, discussed in more detail below, have modeled how societies could depart from this "optimal population" in the presence of externalities. For example, in the face of a common pool exhaustible resource, parents will tend to "overproduce" children since they receive a benefit (via altruism) of their children's consumption of the exhaustible resource. Likewise, if parents do not have to internalize the

full cost of pollution put off by their children, they will produce more children than is socially optimal. Many models of optimal population do not take an explicit stand on the “sign” of the externality of the population, though most modern papers focus on negative climate externalities. As a result, optimal taxes, tradeable procreation permits, and other population targeting policies are often suggested as possible remedies to the suboptimal populations caused by externalities.⁷

In these models, it is clear that all utility and individuals receive comes from a path-dependent equilibrium wage or the inheritance they received from an ancestor's path-dependent wage. Since the world is assumed to always be in equilibrium, an entrepreneur could not add to their own consumption or the consumption of others by discovering opportunities that would lead to resources flowing to higher-valued uses. This sort of behavior is ruled out by assumption. Thus, the models seem to be more accurately described as models of optimal homogenous labor than of population. This observation is important when we consider the central planner trying to assess the *economic* impact of an additional person. As Buchanan (1969 [1999]) rightly points out, "any profit opportunity that is within the realm of possibility, but which is rejected becomes the cost of undertaking the preferred course of action". Thus, any theory which seeks to model the choice of a benevolent planner maximizing a dynastic utility function by choosing population would need to consider the costs associated with the loss of not only the wage earned via the person's labor but also the entrepreneurial contribution of the forgone person.

⁷ It's important to point out that while these theoretical policy proposals are put forward, often papers in the literature admit that implementation may be costly.

2.2 The Population's Brains

The other view of the state is the individualistic view of the state. This view entails focusing on the individual decision-makers within a particular institutional setting rather than a benevolent social welfare function maximizer. Unlike the organismic view, where it is assumed the state can maximize social welfare, on the individualistic view government agents can fail to do so due to failures of knowledge or incentive. In the case of deciding an optimal population, the population brain must reckon with determining an optimal number of entrepreneurs. However, entrepreneurs are the agents in the economy who create the market conditions of the economy with reference to equilibrium.⁸ The knowledge of social welfare in a counterfactual world with more entrepreneurs is therefore not something that can be accessed by the population brain because it is non-existent absent those entrepreneurs. As such, models of the population brain must homogenize forgone individuals by necessity in order to create a social welfare function that can be reasonably maximized. The forgone effect of entrepreneurs on their own income, market prices, technology, and product quality is excluded from social welfare functions, but effects these variables in the real world. It is clear that the omission of the capacity for individuals to be entrepreneurs in line with the “population brain” way of thinking is a meaningful omission.⁹

⁸ Whether it is conceptualized as a movement away from equilibrium or towards an equilibrium where resources flow to different uses, the result is a movement away from a previous structure of prices and resource employment.

⁹ This idea runs parallel to Lucas et al (2018) wherein the authors point out that that crafting entrepreneurship policies is undergirded by, “the idea that there is a social welfare function that the state is capable of maximizing” (345). In the same way the failure of this critical assumption undermines entrepreneurship policy, so too does it undermine the possibility of selecting an optimal number of entrepreneurs.

Kirzner (1985, 23-24) points out entrepreneurship is a peculiar economic resource in several aspects. One aspect emphasized by Kirzner is that entrepreneurial alertness is not properly described as a stock which society has access to, rather it is, “something which *somehow emerges at the precise moment when decisions have to be made*” (emphasis original). In this sense, alertness is a sort of constant category of action. However, although entrepreneurial alertness is a constant, it is clear that *entrepreneurs* are variable in number. Alertness, for its part, is not a force that discovers profit opportunities absent any individual entrepreneur. Rather, alertness describes something relevant to a *specific* entrepreneur at a specific time and place. Therefore, if we vary the *specific* entrepreneurs within the world by, for example, removing them for the world, the effect that the constant of entrepreneurship has on the world changes. To summarize, we can say that while an additional person (population growth) will not lead to more entrepreneurship as it is not a stock, we can say population growth leads to a *larger number of entrepreneurs*.

This individualistic view of population therefore exposes four elements which are neglected by the model of the population brain. which are all ignored because none can be properly accounted for in an equilibrium model of homogeneous laborers where all gains from trade are exhausted.

First, when considering the marginal utility of the additional person, models that adapt the Becker-Barro dynastic utility function consider the utility of the additional person consuming as well as the utility that person receives from having altruism towards their descendants' utility. The ability to consume is constrained by the income which comes in the form of a given wage and the endowment that is received. In an equilibrium with no

profit opportunities, this constraint on income makes sense. However, when we recognize both the existence of profit opportunities and the inherent ability of people to discover and seize opportunities, it is clear there is an alternative means of increasing income and therefore consumption and utility. That is, people can seize economic profits which adds to their income by acting as entrepreneurs. These profits are not limited to merely monetary profits either. Individual entrepreneurial action can yield psychic profits which add to utility without contributing to monetary income. The nature of this additional income makes the opportunity cost of forgoing an additional person unknowable in principle. In order to model a priori what the marginal entrepreneur would gain in economic profit, the "population brain" would have to have a model that can estimate the sum of all economic profits and losses made by the entrepreneur. However, without access to the form and quantity of entrepreneurial discoveries of profit opportunities, there is no clear way to make such an estimate. If a model was able to identify a list of available profit opportunities, they would cease to be profit opportunities. The proposed utility function therefore fails by considering utility derived from wages and not profits.

Second, the entrepreneur also changes social welfare by changing prices. As Kirzner (1979, 110) points out, "to win entrepreneurial profits, it is necessary to perceive price divergences that have gone unnoticed". There is no room for such "price divergences" when the economy is viewed as a known function maximized by selecting a few variables exogenously. For example, the market for labor in the social welfare function has a given, equilibrium, path-dependent wage. Now consider the possibility of disequilibrium in the market for labor. If the population grows, and the additional entrepreneur discovered this

departure from the law of one price, the entrepreneur can make a profit by engaging in arbitrage. Notice, though, that because our social welfare function is based on the consumption of all generations which in turn depends on the path-dependent wage, the act of entrepreneurship that brings the wage closer to equilibrium actually changes then consumption and utility of every member of every generation going forward. Although this effect occurs with any market, it is most clearly highlighted by the market for labor since the results of the model are so dependent on the path-dependent wage.

A central planner would need to account for the propensity for individuals to engage in Schumpeterian entrepreneurship whereby new technology is invented.¹⁰ Some may argue that this could be accounted for by mainstream models by simply adapting them in the style of Romer (1990). However, as pointed out by Holcombe (2008) and Baetjer (2000), macro models that attempt to account for technological change do so in a way such that it is inconsistent with the non-equilibrium process of a Schumpeterian entrepreneur. Baetjer summarizes the issue that "because it is based on a general equilibrium framework, there is no room for process: there is no uncertainty, no real time, no need for adjustment, no capital destruction" (167). Technological changes that occur via entrepreneurship can change the hypothetical production function and change the total income (and therefore consumption and utility) of the members of the economy. Models that ignore the propensity of individuals to change technology in a non-deterministic way cannot capture the full

¹⁰ While there is some debate over the compatibility of Kirznerian and Schumpeterian entrepreneurship, I view the two as compatible stories wherein Schumpeterian entrepreneurship is a special case of Kirznerian entrepreneurship. See Kirzner (2009), Boudreaux (1994), and Candela, Jacobsen, and Reeves () for further discussion. Here I discuss the special case of Schumpeterian entrepreneurship in light of the unique implications it has for development.

opportunity cost of forgoing a different individual. This is further exacerbated by the fact that entrepreneurs have a role in developing “new, different, and better heterogeneous capital resources” (Baetjer 2000, 159). This provides the possibility that additional entrepreneurs could change the underlying capital structure which is not at all considered in standard models of optimal population. The underlying production function in the social welfare function requires the ability to compare the technology variable across different populations. However, if entrepreneurs create the state of technology in the world, the knowledge about the state of technology does not exist absent the entrepreneur.

Lastly, entrepreneurial action can lead to increases in well-being not captured by consumption in dollars. Entrepreneurs can re-combine inputs in unique ways and create new goods. The recombination of resources to compete on the margin of better quality rather than lower prices may be immeasurable with standard economic data. This provides an ex-ante issue with a central planner determining what a person will contribute, and it adds further difficulty in trying to estimate the contributions of additional people ex-post. If entrepreneurial contributions include qualities changes, even historical analyses of the effect of additional entrepreneurs will be problematic.

For the above reasons, it seems clear that the optimal population cannot possibly be estimated using orthodox macro-economic models since they cannot capture the contribution of an additional entrepreneur, and that the economic growth created by entrepreneurship implies that the optimal population will be under-estimated.¹¹

¹¹ However, entrepreneurial actions do not always lead to improved well-being. Unproductive entrepreneurship (Baumol 1996) and superfluous entrepreneurship (Kirzner 1985 [1979]) present the possibility for economic deterioration. or superfluous entrepreneurship (which would lead to a lower

3. The Forgone Entrepreneur

In order to illustrate the importance of the forgone entrepreneur, I use a case study examining Alibaba founder, Jack Ma. A case study is used as opposed to standard empirical analysis for the same reason the population brain way of thinking cannot properly capture entrepreneurship. In order to “measure” the impact of a forgone entrepreneur in a standard sense, I would have to have knowledge of forgone entrepreneurial discoveries. However, the very nature of these discoveries is that they are not existent absent the discovery. Although it may be possible to try to quantify historical entrepreneurship using data about patents or business start-ups, these measures capture, at best, historical data about entrepreneurship. However, nothing about the number of discoveries yesterday (even if we could measure the number and impact of them) provides us information about what the trend of discoveries will be. Therefore, a departure from historical averages would not provide a meaningful benchmark for policies by which we can compare the impact of a policy. The case study is meant to be illustrative of the type of entrepreneurship that cannot be anticipated *ex ante* and which would be forgone under population control policies.

Jack Ma is selected not only for his success in entrepreneurship, but as an illustration of what might have been lost had population policy been enacted in a slightly different manner. It is not possible to observe the actual forgone entrepreneurs, but it is easy to imagine conditions being different such that China’s one-child policy would lead to there being no Jack Ma. Although the one-child policy occurred after Ma’s birth in 1964, central

optimal population). Though this complicates the analysis somewhat, it does not contradict our major point that this is not well-captured in the standard social welfare function.

planning of the population was already a goal of the government as early as 1959. Furthermore, had the policy been put in place earlier, it is likely to have led to Jack Ma not being born, as he is the second child in a poor family. Further, although current literature on solving the optimal population problem does not propose using a policy anything like the one-child policy, it is important to note that the policy was being guided by what was, at the time, well-regarded technical forecasts.

The case study will proceed as follows. I will begin by discussing the background of China's family planning program near the time of Jack Ma's birth. This serves to illustrate the realistic counterfactual of Jack Ma not being born. Next, I provide historical detail about Jack Ma's life and his road to founding Alibaba, the largest retailer and e-commerce business in the world. Finally, I highlight how mainstream models that theorize about ideal population policies would be unable to account for Ma's contribution in several different ways.

3.1 Legislating Optimal Population

The infamous one-child policy in China implemented in 1979 was a significant reversal for the Communist regime in China. Mao (1949) in response to the worries of Malthusians declared, "It is a very good thing that China has a big population. Even if China's population multiplies many times, she is fully capable of finding a solution; the solution is production". However, White (2006) lays out a slow evolution in Maoist China of prop population growth in 1949, to the promotion of birth control, to the strategy of "birth-planning" all the way to the one-child policy of 1979. A desire for a policy like the one-child policy became quite clear in 1959 (Whyte et al 2015) when Mao declared:

(Re)production needs to be planned. In my view, humankind is completely incapable of managing itself. It has plans for production in factories, for producing cloth, tables and chairs, and steel, but there is no plan for producing humans. This is anarchism—no governing, no organization, and no rules. This government perhaps needs to have a special ministry—what about a ministry of birth control?

Enforcement of the one-child policy varied greatly, but White (2006) traces out a sort of pattern of enforcement wherein "shock teams" would enter communities and scale up enforcement. Enforcement often meant rewarding those in compliance, barring those not in compliance from certain privileges, fining families out of compliance, and, in the most extreme cases, utilizing involuntary sterilizations and abortions. Fines varied over time but could be as severe as 10% of earnings for 7 years for a second child, though were mostly moved to a flat rate in the early 1980s (White 2006, 120). This essentially provided wealthier individuals the ability to have more children while removing the option for poorer families. Even if parents were willing and able to have a second child they would be a heihazi (or "black child") who had no legal status and therefore could not attend school, hold formal employment, or use government services.

What prompted the concern for population growth to transform into one of the largest centrally planned population policies in history? Although there were surely many factors involved, Whyte et al (2015) argue that a major influence on the technocrats in the Chinese government was the Club of Rome's *Limits to Growth* publication which forecasted the damage associated with very large projections of population growth in the future. Thus, the policies were given scientific justification utilizing the deeply flawed approach utilized by the *Limits to Growth* report. It is not difficult, then, to imagine modern models of optimal population being used in a similar fashion.

3.2 The History of Alibaba and Jack Ma

Jack Ma was uniquely positioned to make the entrepreneurial discovery which led to the development of Alibaba. The first factor which put him in said position was a combination of his exceptional English skills combined with his poor mathematics performance. Ma had to take the preliminary college exam three separate times in order to hit the minimum requirement on the math portion of the exam (Shiying and Avery 2009, 8). This positioned him to begin a job as a university English teacher. He moved on later to start his own English translation business. These ventures and the contacts he made in both opened the door for him. He was selected as an interpreter and mediator in a Hangzhou municipal government business discussion in the US. This came about due to his relationship with the government of Hangzhou municipal government which was formed in his time as a teacher and businessman in the municipality (18). This opportunity put him in the unique position of encountering the internet. This would have been unlikely in China where, at the time, the internet had much smaller penetration.

Jack Ma's first time using the internet was in 1995 in America. As he recounts, he began by searching for different types of beer online. Ma searched for German beer, American beer, and Japanese beer. Finally, he searched for Chinese beer to no avail. Ma broadened his search time to "Chinese" in general, and again he had no results (28). Ma recognized this opportunity and seized it. Within the year, Ma has begun a small business known as the "Chinese Yellow Pages" in which he received information from Chinese clients, translated that information to English, and had his employees in the US upload the concept to the web.

Ma recognized the importance of the internet as a tool to bring buyers and sellers together with Chinese Yellow Pages. Even more, he recognized the internet as a tool for facilitating business to business (B2B) transactions, and this was only the beginning. After selling the business in 1997, Ma had an important insight into the relative beneficiaries of the internet which was summarized by, “the revolutionary significance of the Internet is that it will enable small enterprises to operate independently” (47). Although seemingly obvious now, this was all but unnoticed in China in 1997. Ma took advantage of this. Instead of focusing on the ultra-large multinationals whose supply routes were so established that the internet was unnecessary, he decided to create a platform that targeted small and medium-sized (SME) businesses to engage in B2B transactions. Ma summarized this strategy by saying:

Small and medium-sized enterprises are like grains of sand on a beach. The Internet can glue them together. It can make them into an invincible force that is able to go up against the big stones. The virtue of the Internet is that it uses small to compete with big, it uses fast to compete with slow.

This idea was the foundation of Alibaba which started in 1999 in Ma’s apartment with, “the entire development team drew a salary of only US\$73 a month” but, “within a short span of 9 years, Alibaba has become a publicly listed multi-national corporation with over 10,000 employees worldwide and an annual revenue of US\$207 million” (Tan et al 2009, 8) and US\$54.1B in 2019 (Alibaba 2019).¹²

Alibaba did not stop innovating with enabling online SME B2B transactions. The company introduced several tools to create a “digital ecosystem” to further enable

¹² Based on the 12/31/2019 exchange rate of 0.14361 RMB for 1 US dollar.

transactions. Tan et al (2015) compiles several of the developments Alibaba made which enabled to the creation of this digital ecosystem. The features are summarized in Table 1 below.

Table 1 Alibaba's Features

Service/Feature	Function
Wangwang	Chat service provided to businesses transacting with one another.
Alipay	Online escrow service
Trustpass	Credit check for businesses
Alimama	Host transactions over online advertising space

3.3 The Entrepreneurial Contribution of Jack Ma

The introduction of Alibaba into the market had several effects which would not be captured simply by considering Ma's forgone lifetime wage. First, there is the added utility Ma himself received by capturing economic profits. While economic profit is not explicitly measured, as they involve subtracting subjective opportunity costs from measurable accounting profit, Ma's long-term commitment to entrepreneurial action within Alibaba seems indicative of positive economic profits. While it is conceivable Ma was making continued economic losses when factoring in his subjective opportunity cost, it seems unlikely he would remain with the company and experience years of economic loss before leaving.

The value added by Ma beyond a forgone wage can also be clearly seen by his act of arbitrage which created economic profits by expanding the gains from trade. Alibaba

has used innovation to expand its market, but it's important to note that the primary insight of Ma did not surround a new technology. In fact, similar businesses to Alibaba already existed in countries with larger levels of internet penetration. Ma's alertness allowed him to discover the unrealized gains from trade that existed in enabling small and medium-sized companies to supply their products internationally. It did so first by lowering information costs. Alibaba essentially used the internet as a tool for lowering information costs for small and medium-sized businesses to engage in transactions with one another just as Alchian's (1969) middleman does.

However, the contribution of Alibaba did not stop only with lowering information costs. Alibaba also developed tools for lowering transaction costs.¹³ One of the primary ways Jack Ma accomplished this was through the use of China TrustPass Membership (Qing 2008). The TrustPass enabled businesses to have verification of the credibility of sellers. This program was especially important for international corporations planning to buy from small to medium Chinese suppliers in a time when it would be difficult to verify credibly otherwise. TrustPass membership was able to grow to 280,0000 members within just six years. Alibaba further enabled transactions via the development of a third-party payment platform, Alipay. Alipay allowed businesses to transact without exchanging sensitive payment information. Transaction costs were further lowered with the introduction of WangWang. WangWang allowed bargaining over prices in B2B

¹³ I define transaction costs here in line with Allen (1999) as, "costs are the costs of establishing and maintaining property rights"

transactions which further enabled firms to engage in mutually beneficial exchanges on terms most agreeable to both sides.

The addition of Alipay, TrustPass, and WangWang also represent quality changes. The price of the good being sold by Alibaba remained the same when these features of the good were introduced, and yet the quality of the good improved. Although these qualitative changes led to more memberships, it's also the case that it improved the welfare of those who were already Alibaba members in a way that is not easily quantifiable. Any transaction that would have occurred absent these quality improvements was improved and therefore welfare-enhancing for the transactors by their addition.

The discovery to use the internet to enable transactions by lowering information and transaction costs proved to be extremely successful. In September 2019 Jack Ma stepped down as the chairman of Alibaba with the company valued at over \$460 billion based on an initial investment by Ma and the other business founders of just \$60,000 (Kharpal 2019). This contribution is one that extends past what is predicted by a model that treats an individual contribution as a homogeneous laborer earning the utility of their equilibrium wage. In such a model, forgoing Jack Ma would simply require using the pre-determined path dependent wage and a particular utility function in order to calculate the lost utility from Ma (and any of his hypothetical descendants). Since Ma created the world wherein these transactions were enabled via his discovery, accessing the knowledge associated with the opportunity cost of this lost discovery is not something the population brain can capture to compare.

This logic extends to all other forgone entrepreneurs which are forgone in a central planner's attempt to achieve an optimal population. The extent to which these forgone entrepreneurs would affect market prices, products, and resource unemployment is not known. Further, even a forgone individual who would have, in contrast with Ma, contributed very little "traditional" entrepreneurship still would be contributing to their own utility (and those who have altruism towards them) via the psychic profits obtained from successful decision-making under uncertainty. Even those forgone individuals who would not start Alibaba would have meaningful profits to consider apart from their path dependent wage.

4. Conclusion

The population brain approach that is pervasive in discussions of "optimal populations" does not account for the entire opportunity cost of having one less individual in the economy. As such, theories that assume certain externalities triggered by population growth, such as those associated with exhausted resources or climate change, will fail to account for the full benefit of an additional entrepreneur and therefore the "optimal" population estimate has no chance of being accurate. There is no reason to expect the models will even be able to say where the current population is relative to an optimal population, let alone provide point predictions about optimal populations or welfare-enhancing policies based on these predictions.

This paper has several implications for policy. One of the implications of models of climate change that show disproportionately large negative impacts of climate change on developing countries is that population growth may need to be slowed to enable

sustainable development. The analysis in this paper suggests that the opposite is true. It may instead be the case that more entrepreneurs like Jack Ma leading resources to their highest-valued uses will lead to faster sustained development. However, this poses the question, what do the entrepreneurs need access to in order to succeed?

Instead of focusing on optimal point predictions for population, I propose that there are gains to be made from focusing on the institutions which surround and influence entrepreneurs. Boettke and Coyne (2003) provide an example of research that explores how differing rules can unleash the productive entrepreneur's role in development. Interestingly, this provides another important channel by which the "population brain" theory should be examined. That is, what effect do population policies have on the incentives of the entrepreneurs who are not forgone? A policy, for example, which changes the incentives of entrepreneurs even further muddles the ability for social welfare functions to capture an "optimal population policy". In this way, there is further work to be done in researching the limits to planning populations.

MALCOM MCLEAN, CONTAINERIZATION AND ENTREPRENEURSHIP

1. Introduction

Since the publication of Israel Kirzner's *Competition and Entrepreneurship* (1973), there has been a continuously growing literature devoted to comparing and contrasting Kirzner's account of entrepreneurship with Joseph Schumpeter's understanding of entrepreneurship, as well as their implications for economic theory. The Schumpeterian account of entrepreneurship emphasizes the creation of profit opportunities through technological innovation. Economic development, according to Joseph Schumpeter, "is a distinct phenomenon, entirely foreign to what may be observed in...the tendency towards equilibrium" (1934: 64). Therefore, the Schumpeterian entrepreneur is an innovator that has a disequilibrating effect on the market process. The Kirznerian account of entrepreneurship, however, has an equilibrating effect on the market process. In effect, the Kirznerian entrepreneur is an arbitrageur who seizes previously unnoticed profit opportunities by realizing the existence of disequilibrium due to prior entrepreneurial errors in the allocation of resources. When he perceives such inefficiency from unrealized gains from trade, the Kirznerian entrepreneur captures pure profit and exhausts gains from trade by redirecting resources from less valued consumer uses to more valued consumer uses.

Given that these two theoretical approaches have different implications regarding the role of the entrepreneur in the market process, this raises an important empirical question: does the market process reflect a disequilibrating or equilibrating tendency in

the allocation of resources? We argue that Schumpeterian and Kirznerian entrepreneurship are distinct, yet complementary activities that drive the market process towards an equilibrating tendency. We do so by utilizing the case of Malcom McLean and the introduction of modern container shipping to international trade.

McLean's introduction of modern container shipping in 1956 makes him, quite arguably, the individual most directly responsible for the modern era of globalization that has surged since then. Yet unlike other entrepreneurs, such as Bill Gates, Steve Jobs, and Mark Zuckerberg, McLean's name remains relatively unknown to the public. However, when we take into account his continued impact on the world economy, he is, perhaps, the most important entrepreneur since World War II. In fact, one could argue that the inventions of other entrepreneurs, such as Gates, Jobs, and Zuckerberg, were only made possible by the extensive gains from productive specialization under the division of labor that containerization made possible.

The impact of containerization on the reintegration of the world economy after the Great Depression and World War II can be seen in two ways, which correspond to the Schumpeterian and Kirznerian accounts of entrepreneurship. First, from a long-term historical perspective, the growth of international trade as a share of world GDP has risen to unprecedented highs (see Fouquin and Hugot 2016). From a Schumpeterian perspective, containerization had a disruptive effect on ocean shipping by unlocking new profit opportunities from innovation and creating new markets that would have not otherwise existed. These changes resulted in the productivity gains in ocean shipping that

have corresponded with the growing share of wealth generated through international trade since the 1950s.

Secondly, the effects of containerization have also been measured by the reduction of transportation costs across the globe. For example, controlling for fluctuations in fuel costs, Hummels (2007: 142) provides a conservative estimate that the price of bulk shipping, measured in real dollars per ton, is roughly half than it had been in 1960, and a third of its price in 1952. However, Levinson ([2006] 2016) estimates that the decline in shipping costs was much larger. Whereas the cost of shipping cargo was roughly \$5.83 per ton in 1956, on the maiden voyage of the first container ship, McLean's Ideal-X, the cost of shipping cargo was merely \$0.16 per ton (Levinson [2006] 2016: 68). From a Kirznerian perspective, though Schumpeter's notion of entrepreneurship actively expands the international scope of productive specialization and trade through innovation, this reduction in costs reveals how entrepreneurs perceive and respond to previously unnoticed profit opportunities.

We argue that by realizing containerization as a lower cost method of shipping goods internationally, McLean acted simultaneously as a Schumpeterian and Kirznerian entrepreneur, illustrating that these two notions of entrepreneurship are different segments of the same equilibrating market process. Though this innovation had a disruptive effect by displacing previous methods of ocean shipping, it also reduced the existing inefficiencies in capital and labor allocation devoted to the international transport of goods. Thus, the adoption of containerization as an innovation was introduced through an act of arbitrage, namely by redeploying existing resources such as cranes, ships, ports,

and storage facilities from lower-valued uses to perceived higher-valued uses. The previously unnoticed profit opportunities that McLean realized came in the form of eroding the high transaction costs associated with intermodal transport, specifically those costs associated with the definition, transfer, and enforcement of property rights over goods between ships, trucks, and trains.¹ In effect, McLean's central insight was an alertness to the fact that such existing inefficiencies in intermodal transport could be eroded and transformed into future profit opportunities that had gone previously unnoticed.²

Our primary contribution will be to the literature on the Austrian theory of the entrepreneurial market process. Though our paper will touch upon entrepreneurship theory more broadly, addressing this voluminous literature in a comprehensive manner would be beyond the scope of our focus. Our contribution specifically addresses that literature which analyzes the relationship between Schumpeterian and Kirznerian entrepreneurship in economic theory (Kirzner 1973, 1979, 1982, 1985, 1997, 1999, 2009; Loasby 1982; McNulty 1987; Boudreaux 1994; Choi 1995; Holcombe 1998; Boettke and Coyne 2003, 2009; Klein and Bylund 2014; Manne 2014; Sautet 2010, 2017).

With the exception of John and Storr (2018), who illustrate how culture and institutions differentially affect Schumpeterian and Kirznerian entrepreneurship in the context of Trinidad and Tobago, the discussion in this literature remains almost entirely

¹ See Langlois (1992), Baird (2000), Foss and Klein (2009), Piano and Rouanet (2020) on the overlapping distinctions in the Austrian tradition and the transaction-cost tradition of market process analysis.

² The erosion of transaction costs, regulatory barriers, and other inefficiencies in the market process is further illustrated in the case of lighthouses and lightships in England prior to the 19th century (see Candela and Geloso 2018, 2019, 2020).

abstract and theoretical. Our contribution builds directly on this literature by providing an empirical illustration of how Schumpeterian entrepreneurship is a distinct, though not separate activity of an overall tendency towards equilibration in the entrepreneurial market process. For example, Boudreaux (1994: 60) argues that the competitive market process as a concept should be broadened to include not only equilibrating tendencies in price adjustments, but also to “include quality adjustments and technological and organizational improvements in addition to price adjustments.” By incorporating non-price variations in technology and economic organization into a broader concept of competition, both “Kirzner’s and Schumpeter’s entrepreneur are equilibrating in this broader sense” (emphasis original; Boudreaux 1994: 57).

Building on these insights, we contribute to this literature by providing an empirical case study that illustrates the complementarity of Schumpeterian and Kirznerian entrepreneurship. To the extent that falling transportation costs allow alert entrepreneurs to realize profit opportunities in international trade via arbitrage, such arbitrage opportunities and potential gains from trade were made available by a transaction-cost reducing innovation, namely containerization. Yet, such an innovation itself was based on McLean’s alertness to exploit a profit opportunity via arbitrage in transportation resources, therefore subsuming both Schumpeterian and Kirznerian entrepreneurship into an overall equilibrating tendency.

This paper proceeds as follows. Section 2 provides an overview of the literature on the relationship between Schumpeterian and Kirznerian entrepreneurship, and in doing so, provides a basis for engaging the literature on the economics of containerization.

Section 3 provides an overview of the historical context in which Malcom McLean entered the transport industry. Our primary focus will be on McLean's entrepreneurial alertness to devise container shipping as a transaction-cost reducing innovation. In Section 3, we also trace out that transformation of the transport industry that resulted from McLean's entrepreneurial alertness, with a particular focus on the transaction costs and other barriers to entry in shipping and transport that were eroded as a result of containerization. Section 4 concludes with implications for future research.

2. Entrepreneurship as Creative Arbitrage

In order to understand the nature of the entrepreneurial exploits of Malcom McLean, it is important to first break down the distinction between Schumpeterian and Kirznerian entrepreneurship. According to Kirzner, the perpetual motion of the market process is comprised of two distinct groups of variables. The first group of variables are characterized by *exogenous changes*, changes in preferences, population, resource availabilities and technical possibilities. Kirzner refers to these as *underlying variables* (UVs). The second group of variables, which Kirzner refers to as *induced variables* (IVs), are characterized by *endogenous changes*, which are systematically induced by entrepreneurs who drive the equilibrating tendency in the market process at any given moment. Induced variables consist of the prices, methods of production, and quantities and qualities of outputs, which the market at any given time generates, given the underlying variables (Kirzner 1992: 38-43). Under conditions of equilibrium, the values of the UVs predetermine the values of IVs, squeezing out economic profits and obviating the role of the entrepreneur. Under such conditions, the price of inputs and the methods of production

reflect not only the full cost of production, but also reflect that the least-cost technological possibility has been exploited, given the preferences of individuals. Disequilibrium is characterized by discrepancy in the market values of the IVs and UVs, reflecting that from the array of the available resources and technological possibilities available, there remain a subset of *economically feasible possibilities* that are *unperceived and not yet embraced* by the entrepreneur. “When profitable capital-using methods of production are technologically available, where the flow of savings is sufficient to provide the necessary capital,” it is nevertheless the case that “entrepreneurship is required to ensure that this innovation will in fact be introduced” (Kirzner 1973: 74).

This dichotomization of the forces that drive the market process lends itself to the distinction of Schumpeterian and Kirznerian entrepreneurship. “Whereas Schumpeter highlighted those activities that change the givens, Kirzner’s focus is on the activities that actually establish equilibrium prices given the particular givens” (Boudreaux 1994: 57). As a Walrasian, Schumpeter’s point of analytic departure was a state of general equilibrium. “For Schumpeter,” as Rothbard puts it, “general equilibrium had to be the overriding reality: the realistic starting point as well as the end point of his attempt to explain economic change” (1987: 98). Since, by logical construction, there are no profit opportunities under conditions of equilibrium, the “*only* role for entrepreneurship, by logical deduction, is to innovate, to disrupt a preexisting equilibrium” (emphasis original; Rothbard 1987: 102). The Schumpeterian entrepreneur, therefore, is a disequilibrating force that disrupts the prevailing status quo via a change in UVs.

However, “in the Austrian tradition of von Mises and Kirzner,” where the analytic point of departure is a state of disequilibrium, “the entrepreneur harmoniously adjusts the economy in the direction of equilibrium” (Rothbard 1987: 102). The Kirznerian entrepreneur generates the equilibrative tendency via a change in IVs by the entrepreneurial alertness and discovery of previously unnoticed profit opportunities. “Only in disequilibrium,” Kirzner writes, “are there opportunities for entrepreneurial profit, for the purchase of inputs at a cost lower than the revenue obtainable from the sale of their potential output” (1979: 110). To be clear, Kirzner does not claim that real-world market processes are not interrupted by UV changes or that each and every entrepreneurial discovery will be corrective, and therefore equilibrating (1992: 45). Rather, Kirzner claims that the equilibrating tendency of the market process will continue to occur, even if changes in UVs cease to occur, precisely because no entrepreneurial decision will have perfect foresight to achieve a profit-maximizing outcome,³ and therefore no entrepreneurial decision will ever completely exhaust profit opportunities in the market process. “None of these processes can be expected to proceed to completion. All that we claim is that the forces for mutual discovery, and for the elimination of ignorance, are constantly at work” (Kirzner 1992: 45).

The overall tendency in the literature that has analyzed the differences between Schumpeterian and Kirznerian entrepreneurship has progressed from treating Schumpeterian and Kirznerian entrepreneurship as *mutually exclusive* forms of entrepreneurship, to *identical* kinds of entrepreneurial changes to the market process. For

³ On the relationship between profit-seeking and uncertainty, see also Alchian (1950).

example, Loasby wrote “that Schumpeter’s theory stands in sharp contrast to...that associated with the neo-Austrian school of economists, and expounded in Israel Kirzner’s *Competition and Entrepreneurship* (1973)” (1982: 242). Young Back Choi, however, has written that the “difference between Schumpeter’s entrepreneur-innovator and Kirzner’s entrepreneur-arbitrageur, it appears, is mainly a difference in perspective” which is “similar to the debate of whether a glass is half-full or half-empty” (Choi 1995: 62). Moreover, Holcombe explicitly states that “there is no difference between the actions of Kirznerian and Schumpeterian entrepreneurs” (1998: 57).

Much of the overview that we have provided regarding the relationship between Schumpeterian and Kirznerian entrepreneurship has been developed in greater detail elsewhere,¹⁴ not to mention that Kirzner himself has already attempted to clarify the relationship between his own theory of entrepreneurship and that of Schumpeter (see Kirzner 1982, 1999, 2009). Therefore, our goal here is neither to question the theoretical validity nor to adjudicate the theoretical distinction between the two theories of entrepreneurship *per se*. Rather, what we wish to highlight is that facts are theory-laden, and therefore the theoretical nature of the entrepreneur that we apply will have important implications for how we understand economic change driven by entrepreneurship at a particular time and place in history. If we remove the distinction between these two types of entrepreneurship, their analytical significance in helping the theorist distinguish a technological change via innovation (i.e. change in UVs) from a discovery of previously

¹⁴ See also Boettke and Coyne (2003, 2009) for a thorough exposition of this distinction between Schumpeterian and Kirznerian entrepreneurship in the context of economic development.

unnoticed technological possibilities via arbitrage (i.e. change in IVs) loses its relevance in understanding economic history. The implications of this analytical ambiguity are best revealed when we redirect our attention to the nature of containerization and the role that entrepreneurship played in unleashing the productivity gains in ocean shipping from containerization.

3. Thinking Outside the Box to Discover “The Box”

The story of Malcom McLean as the North Carolina truck driver who revolutionized container shipping provides an excellent illustration not only to reframe the relationship between Schumpeterian and Kirznerian entrepreneurship, but also to illustrate the overall, equilibrating nature of the entrepreneurial market process. Though there is indeed a broad consensus that the productive impact of containerization has been significant from an entrepreneurial perspective, the sources of the increased productivity generated by containerization are generally lumped together under the category of technological change.¹⁵

Though containerization’s overall effect on the costs of international trade has drawn the attention of scholars in managerial economics for decades (see Tombari 1979), some international trade economists (see Krugman 1995; Baier and Bergstrand 2001) have dismissed its impact. In more recent years, however, the excellent economic and historical analysis of McLean and containerization by Levinson ([2006] 2016) has coincided with subsequent research that attempts to quantify the overall effect that containerization had in

¹⁵ The exception to this is Levinson ([2006] 2016).

reducing the costs associated with transporting goods internationally (Hummels 2007; Bernhofen, El-Sahli, and Kneller 2016; Coşar and Demir 2018).

Implicitly, the nature of McLean’s entrepreneurial exploits has been filtered through a Schumpeterian lens. For example, Hummels states that the “decades since World War II have also witnessed significant technological change in shipping, including...the use of containerization in ocean shipping” (Hummels 2007: 131). Like other international trade economists, Bernhofen, El-Sahli, and Kneller (2016) identify two broad explanations for the growth in world trade: trade liberalization in the form tariff reductions and “technology-led declines in transportation costs” (2016: 36). They also state that “containerization resulted in far reaching complementary technological and organizational changes in port and railway services that affected economies’ entire transportation sectors” (2016: 38).

However, there is an important distinction to be made, with regard to gains in productivity in ocean shipping, between *technological change* and *organizational change*, which Douglass North identified in his own study of productivity gains in ocean shipping between 1600 and 1850 (North 1968; see also Geloso 2020).¹⁶ Given that technological change reflects a change in UVs while an organizational change reflects a change in IVs, collapsing one onto the other creates an analytical ambiguity that not only fails to

¹⁶ To reinforce our point, Hummels cites North (1968) as evidence of how economic historians “have documented how *technological change* led to substantial reductions in shipping costs from 1850-1913” (emphasis added; 2007: 131). However, North argued *the opposite*. As he states, the objective of his paper was “to identify as precisely as possible those sources of productivity usually lumped into the general category of technological change. The conclusion which emerges from this study is that a decline in piracy *and an improvement in economic organization account for most of the productivity change observed*” (emphasis added; 1968: 953).

distinguish between the two types of changes, but also fails to distinguish between Schumpeterian and Kirznerian entrepreneurship. We will therefore reframe our understanding of the source of the productivity gains in ocean shipping generated by containerization, specifically by combining Schumpeterian and Kirznerian entrepreneurship into a unified theoretical framework illustrated by MacLean's entrepreneurial exploits. Before doing so, it is important to contextualize the state of the transport industry that existed when McLean pioneered containerization.

3.1 The Transportation Industry Prior to Containerization

From a Schumpeterian lens, it was indeed the case that the introduction of containerization had a massively disruptive effect on the status quo in ocean shipping. Yet, reframing such "disruption" through a Kirznerian lens sheds light on the fact that the prevailing status quo was "nothing but a seething mass of unexploited maladjustments crying out for correction" (Kirzner 1979: 119). Therefore, the innovative effect that McLean had on the transport industry was to expose inefficiencies in existing methods of transporting cargo, such as extensive time in port, dockworker unions, theft and cargo damage, and industry regulation.

Shipping in the 1950s was overwhelmingly done with break bulk cargo. Cargo was placed in canvas bags, tied down to wooden pallets, or packed into barrels. There was no standard weight or shape – every piece of cargo was unique. Longshoremen, also known as dockworkers or stevedores, loaded this cargo by hand into the ship's hull (Talley 2000: 993). This time intensive process forced ships to stay in port for up to 2/3 of their total transit time, causing hefty transport fees and congested ports (Hummels 2007: 241).

Levinson ([2006] 2016: 44) documents a U.S. National Research Council study of the S.S. Warrior cargo ship that contained 194,582 bundles of cargo of various type (e.g. case, carton, drum, bag) weighing 5,015 long tons. This lack of cargo standardization led to a great deal of uncertainty and waiting. Ships would often be stuck at port for a week before they were reloaded and sent back out (Levinson [2006] 2016: 44; Talley 2000: 936). Vigarié (1999: 4) reported that longshoremen gangs in Antwerp needed 15 hours spread over two different shifts to handle 300 tons. He also points out that there was large variance in this number due to the different cargo brought in by different ships. This often led to longshoremen pulling all the cargo out on to deck, sorting it, and putting it in its proper place to be moved to trucks, other ships, or inspected by lengthy customs checks. This costly waiting period had a secondary effect of nullifying the benefits associated with economies of scale of large ships. A ship too large would require several days of shifts, which would increase waiting times even more. Unlike the costs associated with transportation, which benefit the customer by transforming goods spatially, the costs associated with sitting in the port were beneficial to no one. Rather, it was a time where neither the seller nor the buyer was able to take advantage of a mutually beneficial exchange. The heterogeneous and uncertain nature of breakbulk shipping therefore was a maladjustment, which imposed a significant barrier to transactions, providing an unnoticed profit opportunity to McLean.

The uncertainty associated with the size of loads and the length of loading times also incentivized the formation of labor unions, which further created more maladjustments in the form of transaction costs. The relatively low amount of training required to move

cargo led to an abundance of workers, both professionals and laymen, showing up to the docks hours before the workday started in search of work (Levinson [2006] 2016: 28-29; Vigarié 1999: 4). To solve the problems associated with lay competition and uncertain working hours, longshoremen formed powerful unions to act on their behalf. Registration processes limited competition from laborers who did not belong to the union. In New York, hiring for the day was done by a drawing starting with the “A” men who were the most senior members of the union (Levinson [2006] 2016: 30). Due to the perishable and time-sensitive nature of the items being shipped, the unions were able to impose very high costs on shippers. In 1954, just two years before the launch of McLean’s *Ideal-X*, union strikes resulted in a loss of 1.3 million man-days of labor (Levinson [2006] 2016: 35). By successfully limiting outside competition, unions exacerbated the issue of waiting costs even further. The aforementioned study of the S.S. *Warrior* found that cargo handling made up 36.8% of the total cost of the voyage (Levinson [2006] 2016: 45).

The high cost of moving cargo was not strictly limited to time spent in port. Two risks, theft and cargo damage, were also pervasive in the era of break bulk shipping. New York was especially notorious for theft of items including radios, liquor, and coffee (Levinson [2006] 2016: 37). With ships that held nearly 200,000 bundles of items, it was simply too costly to enforce property rights. Damage to items was equally hard to trace back to its cause. Breakable crates, bags prone to tearing, and easily bruised fruits were frequently the victims of unloading. However, damage was not limited to mistakes made while loading and unloading the cargo. Poorly packed ships often led to damage of cargo in transit that could have been avoided. Levinson ([2006] 2016: 26) points out that if ships

were poorly packed such that the weight could shift, a boat could capsize. Theft and damaged goods straightforwardly decreased the gains from trade and increased the cost of insurance, inviting a profit opportunity to minimize such costs.

The term “container ships” was coined to describe a ship with the purpose of transporting cargo via container, dubbed “the box” amongst shippers. Besides the inefficiencies associated with loading and unloading cargo, the world McLean entered with the box was one of heavy regulation. The Interstate Commerce Commission (ICC) in the 1950s had regulatory authority over all domestic cargo being carried in the United States. This authority extended to railways, trucking routes, and domestic shipping. The ICC had strong oversight and was the ultimate authority on approving 1) what commodities could be carried, 2) what routes companies were allowed to use 3), and what prices (or rates) the companies were allowed to charge. This authority often stifled innovation that would have otherwise led to lower shipping rates. For example, in 1931 the ICC stifled the containerization of railways. The North Shore Line railroad began to offer a purely weight-based rate in their railway containers, rather than the commodity-based rates. This made sense, as the railways mainly spent money hauling commodities due to their weight rather than the individual characteristics of the commodity. However, the ICC ruled against this method as it was deemed unfair that railways be able to charge lower rates for commodities. Thus, the containers would need to be priced at minimum according to the highest rate commodity in the container. As a result of the ICC’s regulations, truckers would often have to bring their trucks back empty (rather than hauling cargo the second half of the trip) because the ICC would approve cargo transport for the initial delivery route but not for the

route back (Levinson [2006] 2016: 51). Businesses who wanted new routes had to engage in expensive legal processes to acquire the rights to routes. Shipping rates were allowed to be significantly lower than truck and rail rates, but an individual who owned a trucking company needed permission to buy a shipping company (Levison [2006] 2016: 57). This oversight gave a significant scope for arbitrary political assignment of property rights, and, again, raising transaction costs.

Regulation and rate fixing were not limited to domestic shipping. International shipping, though significantly smaller at the time McLean entered the industry, was governed by organizations called conferences. Sjostrom (2004) provides a comprehensive survey of the different models of shipping conferences. “Conferences” numbered over one hundred and had a primary role in setting fixed rates and allocating output to their members in the form of “quotas”. Governments sometimes required international shippers to be involved with the relevant conference, but more often conferences were voluntary. However, conferences would often engage in practices to drive independent shippers out of their routes. Commonly, conferences would cut rates when competing independent shippers entered their routes, which drove the independents off the route or out of business (Sjostrom 2004: 120). Rate structures in the world before container shipping were also very different. Before widespread use of containers, rates were determined on the basis of commodities measured in tons (Levinson [2006] 2016: 300-301). This sort of structure would be prohibitively costly for wide-scale containerization as it would require mixed commodity containers to be opened up and commodities to be removed, reweighed, and

replaced. All of these misallocations in transport resources presented a set of profit opportunities waiting to be monetized by an alert entrepreneur.

3.2 Containerization: Creative Destruction Born from the Womb of Arbitrage

According to Kirzner, entrepreneurial decision-making “reflects not merely the manipulation of given means to correspond faithfully with the hierarchy of given ends, but also *the very perception of ends-mean framework* within which allocation and economizing is to take place” (emphasis original; Kirzner 1973: 33). Indeed, the disruptive effect that McLean would have by introducing new methods of transport were a form of what Schumpeter would refer to as “creative destruction” (Schumpeter [1942] 1947: 83), but this creative act of destruction was born out of reshuffling existing means of transportation in a more efficient manner. What McLean perceived was that “railroads, trucks, and ship lines were in the same business – moving freight” (Levinson [2006] 2016: 227). Given that McLean perceived that the common end of these different modes of transport was hauling freight, he perceived the container as a means by which to introduce an organizational change in hauling freight, this change being the unifying of trucks, railcars, and ships into an uninterrupted, intermodal form of transporting freight. Thus, like Kirzner’s pure and penniless entrepreneur, McLean’s role was not defined by ownership of trucks, ships, containers, or other transport resources, but by his alertness to the fact that ownership of such resources could be purchased at a price lower than the price he would secure from the sale of output produced by these inputs, the output in the case being transport services (see Kirzner 1973: 43–52).

McLean's journey to tackling the transaction costs born from uncertainty, unions, damage and theft, and regulatory oversight began with his experience as a trucker. McLean, born 1913 in Maxton, North Carolina, started Mclean Trucking Company in 1934. At that time, his company transported oil twenty-eight miles to gas stations from one town to another. By the end of World War II, McLean had grown his one-man operation into a trucking empire consisting of 162 trucks (Levinson [2006] 2016: 49-50). McLean quickly demonstrated his ability to work around regulations when he opted to buy companies who had approval for the routes he wanted rather than requesting approval from the ICC (Levinson [2006] 2016: 52-53). He continued to work against regulations in 1953 by planning to drop his truck cargo on ships, which would allow him to capitalize on the lower rate allowed by the ICC for shipping (relative to trucking). In order to do this, McLean gave up control of the trucking empire he built and purchased Pan Atlantic Steamship Corporation in order to avoid seeking permission from the ICC, which would have likely been denied (Levinson [2006] 2016: 58-60).

It was at this point "the box" came into view and became a reality. McLean's vision evolved from putting full truck trailers on ships to creating containers that were detachable from the truck trailer, allowing containers to be stacked on the decks of container ships. April 26, 1956 marks the date for the maiden voyage of the *Ideal-X*, sailing from Port of Newark, New Jersey to Houston, Texas. The *Ideal-X* was the first of McLean's fleet of many "container ships" which brought 58 containers of assorted cargo safe and dry to its destination (Mayo and Nohria 2005: 205). The containers carried by ships have varied greatly in appearance and function over the years. For example, the ships that inspired the

name “container ship” were designed to transport wheeled railcars by moving them from track to ship via crane (Klose 2015: 42-43). The containers utilized by McLean’s *Ideal-X* were very different, however. Instead of wheeled railcars, McLean’s containers were flat and stackable. This allowed the 33’ steel containers to be stacked and secured to the retrofitted *Ideal-X*. The containers’ lack of wheels required that they be moved onto the ship another way. The solution, which has evolved over the years, was a system whereby adjacent trucks’ containers were unloaded and then immediately loaded onto ship via crane (Levinson [2006] 2016: 67; 73-75). After the *Ideal-X* proved container ships to be worthwhile, “cells” were included to hold containers in place in such a way that they could be stacked higher. The second group of ships, C-2 ships, would be able to utilize these cells to carry 226 containers (Levinson [2006] 2016: 73).

From that point on, McLean continued to aggressively discover the lowest cost containerization operation possible. Levinson ([2006] 2016) comprehensively documents McLean’s innovations which include, but are not limited to, those surrounding the material of the container (Levinson [2006] 2016: 66), cranes and chassis (Levinson [2006] 2016: 67; 73-75), modifications to store more boxes (Levinson [2006] 2016: 73), ship designs (Levinson [2006] 2016: 76; 290-291; 312-315; 324), routes (Levinson [2006] 2016: 94-96; 217-218; 291), and stacking designs (Levinson [2006] 2016: 74). These modifications, occurring over the course of several years, were designed in part to combat the costly nature of shipping caused by the conditions highlighted in Section 3.1.

Containers continued to evolve over time. In 1964, the International Standards Organization adopted 20’ and 40’ container length standards (Klose 2015: 51-54). The

height and width standards came to be 8'6" and 8', respectively (Levinson [2006] 2016: 184-185; 196), and they now had locking mechanisms that bound them to other containers in a stack. Container varieties still include all-steel boxes, but have also taken on the forms of open top steel containers, flat racks, refrigerated containers, insulated containers, and plywood containers with steel frames. Ultimately, all containers have the same function. They standardize largely heterogeneous bundles of goods in order to streamline the process of moving them.

The increasing utilization of containers and container ships led to the phenomena of containerization, which is the organization of intermodal shipping to and by sea based around a standard container unit. Containerization can be seen plainly in the numbers. Today, there are 10 million containers being transported at any given time, and 400 to 450 million containers were moved in 2007. Container ships also grew in size and number (Klose 2015: 24-25). Today, container ships called "Panamax" ships can hold up to 10,000 20' containers or 5,000 40' containers weighing in at over 200,000 tons of cargo (Levinson [2006] 2016: 5; 315). A single ship carrying this much cargo was unimaginable when *Ideal-X* came to Houston with its 58 containers in 1956.

Due to the large volume of international shipping, containerization is widely recognized as one of the key elements in the movement towards globalization. Most of what containers carry are not consumer goods but, rather, intermediate goods (Klose 2015: 23). Levinson illustrates this by pointing to how modern Barbie dolls are created in several different locations across China and Taiwan using machines from Japan, Europe, and the United States. McLean discovered something that was truly revolutionary not only in terms

of the manner in which goods are transported, but also the manner in which such goods they are manufactured in the first place. The shift in the global division of labor fostered by containerization is what Douglas Irwin refers to as *vertical specialization*, which is “the fragmentation of the production process as intermediate goods and components become a greater part of world trade” (2015: 18). Vertical specialization not only accounts for about half of the growth in U.S. trade since the 1960s, but also roughly a third of the increase in world trade since 1970 (Irwin 2015: 18).

With this historical context in mind, it is clear what Malcom McLean’s contribution was. Klose (2015: 57) puts succinctly in his analysis of the container in shipping that McLean’s main entrepreneurial achievement was the “organizing element” in transporting cargo. McLean’s entrepreneurial alertness did not occur with regards to the physical invention of the shipping container itself, but, rather, McLean discovering a way to organize resources such that they cut the costs of shipping. McLean’s constant innovation to use the container system to cut costs documented above reflected his “fundamental insight” that “the shipping industry’s business was moving cargo, not sailing ships” (Levinson [2006] 2016: 70).

Our main point here is not to highlight how container shipping was a creative innovation, *but that the nature of that innovation was to discover the opportunity to arbitrage from a less efficient form of shipping to a more efficient form of shipping*, both of which had already been technologically available. To say that containerization was not an invention or an act of technological change is not intended to undermine or take away from the importance of McLean’s brilliant achievement, but instead to reinforce how

shocking it is that such an innovation could have existed, but did not exist until McLean perceived it, grasped it, and implemented it. This is the “essence,” as Kirzner puts it, of the entrepreneurial market process. Filtering McLean’s entrepreneurial exploits through a Kirznerian lens puts into perspective what a Schumpeterian entrepreneurship cannot, namely that trillions of dollars of wealth were created simply by realizing unnoticed profit opportunities, which are defined out of existence in a Schumpeterian framework. Moreover, such profit opportunities were realized by monetizing the reduction of transaction costs that had previously precluded the gains from trade through containerization.

3.3 Realizing the Productivity Gains from Containerization

Unifying the Kirznerian and Schumpeterian accounts of entrepreneurship not only reframes our understanding of the nature of the discovery that McLean realized. It also has important implications on our understanding of the source of the productivity gains from containerization. As we explained in the previous section, the nature of McLean’s entrepreneurial innovation was to arbitrage existing, less-efficient modes of transportation, centered around loading and unloading break bulk cargo, to more efficient modes structured around containerization. Longshoremen were replaced by cranes, storage rooms in passenger ships were replaced by the flat beds of container ships, and heavily trafficked port cities, such as San Francisco and Liverpool, were replaced by newcomers like Oakland and Felixstowe, which offered deep-water clearance and state-of-the-art equipment. Similarly, the quality of services offered by the transportation industry were beyond what shippers could have fathomed in the 1950s. Whereas ocean shipping used to be slow,

unreliable, and riddled with fees for lost or broken items, containerization drastically reduced the time and uncertainty involved with ocean shipping. Per Levinson ([2006] 2016: 9), “[Today’s] 11,000 mile-trip from the factory gate to the Ohio warehouse can take as little as 28 days, a rate of 400 miles per day, at a cost lower than that of a single business-class airline ticket.” McLean’s quest for entrepreneurial profit allowed him to view the transportation industry as an interconnected whole, not as separate sectors such as railroads, trucks, or ships.

The implication here is that the source of productivity gains from containerization arose not from reducing transportation costs *per se*, but from reducing transaction costs, specifically the cost “of obtaining the information necessary to enter into and complete bargaining negotiations” (Kirzner 1973: 227). While the current literature surrounding the transportation industry credits the container for the gains from trade generated by globalization, we argue that the source of these gains came fundamentally from reducing transaction costs. Before explaining why this distinction is important, let us first make this distinction explicit and clear.

The total cost of producing a good includes not only the cost of transforming inputs, such as land, labor, and capital, into consumable outputs, but also transaction costs. Transportation costs, the cost of moving cargo from point A to point B, are to be considered “transformation” or “production” costs (Wallis and North 1986: 102; see also Candela 2020). An American consumer, for example, does not purchase a watch in Switzerland, but instead a watch in Switzerland *that is to be delivered to the United States*. The Swiss watch is not “produced” or “transformed” into a consumable output until resources are expended

to transport it. Transaction costs, on the other hand, are the information costs required to secure and exchange property rights over goods being transported (Kirzner 1973: 227; Dahlman 1979: 148; North 1990: 27). As Allen (1991: 9) put it: “Robinson Crusoe bore many [...] costs, but dealt with only transaction costs when Friday showed up.” Transaction costs include the resources foregone to discover trading partners, including the price at which they might agree to an exchange, as well as the resources foregone to monitor and enforce compliance to the terms of an exchange. In a world of perfect foresight, such costs could be priced directly into the output being exchanged, in which case the distinction between transaction costs and transformation costs would become irrelevant.

For our purposes, we can consider transportation costs as *the costs of shipping*, such as the use of labor, capital, fuel, and other physical inputs, which are distinct from transaction costs as *the cost of organizing shipping* associated with uncertainty of time spent at port, union strikes, and regulatory barriers. Given that technology required to implement containerization was “out there” waiting to be discovered, the nature of the reduction in costs associated with transporting cargo was one of perceiving that the opportunity to organize shipping more effectively was already available (Kirzner 1973: 230).

Bernhofen, El Sahli, and Kneller (2016) analyze how world trade grew by a factor of 7 from 0.45 trillion dollars in the early 1960s to 3.4 trillion dollars in 1990. Their results, drawn from a panel of bilateral trade flows for 157 countries, find that containerization contributed more to this growth than free trade agreements or GATT tariff cuts. Cosar and Demir (2018) use micro-level Turkish export data to find that the container decreased

variable shipping costs between 16 and 22%. Even more conservative studies acknowledge the role that the container played in the global economy. While Hummels (2007: 152) maintains that increasing the share of containerized trade will only reduce shipping costs between 3-13%, he stresses that this percentage is heavily impacted by the price of crude oil and that the container's reduction of indirect costs, such as lengthy port stops, was critical to the rise in international trade that occurred from 1950-2004. Admittedly, however, Hummels points out that decreases in shipping costs may not be fully reflected in the data because:

the real gains from containerization might come from unmeasured quality change in transportation services. Containerships are faster than their predecessors, and for loading and unloading are much quicker than with break bulk cargo. In addition, containers allow cargo tracking, so that firms know precisely where goods are en route and when they will arrive... To the extent that these quality improvements do not show up in measured price indices, the indices understate the value of the technological advance. Still, many of the purported improvements of container shipping should have lowered explicitly measured ocean shipping costs, and apparently did not. Why? (Hummels 2007: 144)

McLean's entrepreneurial vision provides an answer. He understood that his goal was moving cargo as cheaply as possible, not moving his ships as cheaply as possible. Therefore, per Levinson ([2006] 2016: 341), "As Malcom McLean had understood back in 1955, it is the sum of [all] costs, not just the published rate of a ship line or railroad, that matters to shippers." This implies that the real productivity gains from containerization came not from technological change, as Hummels suggests, but by the erosion of transaction costs, which allowed existing technology to be used more effectively. The conflation implicitly made by Hummels, yet alluded to by Levinson, in the distinction between *transportation costs* and *transaction costs* in the total cost of shipping, which the

containerization literature uses synonymously, hides the nature of what was perceived and discovered by McLean.¹⁷

By lowering the high transaction costs associated with uncertainty over unloading time at port, union power, the theft and damage of cargo under the breakbulk system, and the regulatory authorities, containerization allowed ships to take advantage of economies of scale (Tombari 1979). The by-product of exploiting economies of scale through containerization lowered the *costs of shipping* by recalibrating the economics of location and establishing inter-connected global trade routes. In doing so, containerization revealed that profit opportunities could be realized by reallocating land, labor and capital to previously unnoticed, higher valued uses. Altogether, these changes laid the groundwork for just-in-time shipping, a phenomenon that has greatly transformed both the manufacturing and transportation industries and allowed for increased global trade.

3.4 Reducing the Costs of Organizing Shipping

When Kirznerian and Schumpeterian entrepreneurship are unified as distinct aspects of the equilibrating market process, such a theoretical framework lends itself to an understanding how the entrepreneurial market process feeds on itself by expanding the scope of previously unnoticed possibilities by disrupting previous methods of shipping. The growth of trade via containerization occurs not because of the availability of new technological possibilities, “but because of expanded awareness of existing opportunities”

¹⁷ Hummels (2007: 141) comes close to making this distinction in his discussion of direct shipping costs (storage, port labor, and fuel) and indirect shipping costs (time spent idle in port). However, Hummels’ “indirect costs” seem to represent production costs, rather than transaction costs. Moreover, the cost of storage associated with holding inventories corresponds more directly to transaction costs, since in a world of zero-transaction costs, holding inventories would be unnecessary. On this point, see Hutt (1939) as well as Alchian (1969).

(Kirzner 1985: 74) to correct previously unnoticed errors in methods of trade. These include not only correcting the manner in which land, labor or capital were allocated throughout the transport industry, but also correcting previous maladjustments by redirecting global trade routes and eroding the impediments erected by regulatory barriers, all of which were brought about by the introduction of containerization.

Reducing time in port. As was mentioned in Section 3.1, goods were transported by a method known as *break bulk* shipping before the advent of the container. McLean, who began his career as a trucker, was used to waiting in long, gridlocked lines before delivering his cargo portside and envisioned the container as a way to alleviate the complicated loading process. His instincts proved correct. While loading loose cargo via longshoremen cost \$5.83 per ton in 1956, loading containers onto McLean's *Ideal-X* cost a mere \$0.16 per ton (Levinson [2006] 2016: 68). Bernhofen, El-Sahli, and Kneller (2016: 38) also affirm the effectiveness of McLean's solution: "The productivity gains from using this container crane were staggering, as it could handle 400 t per hours, more than 40 times the average productivity of a longshore gang." Removing this bottleneck enabled ships to spend less idle time in port and less resources on additional docking fees.

Transforming role of dockworkers. Longshoremen lived in tight-knit communities and relied on collective action to preserve the high wages and long hours that their large numbers would otherwise reduce. While often glorified in historical literature as a tough, adventurous brotherhood that worked one day and fished or swam the next, their work was anything but glamorous. Per Levinson ([2006] 2016: 24):

Copper came from Peru to New York in the form of bars too big for a man to handle. Longshoremen had to move these enormous hunks of metal

across the dock, from the incoming ship to a lighter, or barge, which would transport them to a plant in New Jersey. Because they had to bend over to do that, you'd see this fellows going home at the end of the day kind of like orangutans," a former pier superintendent remembered. "I mean, they were just kind of bent, and they'd eventually straighten up for the next day.

And per Vigarié (1999: 5):

Accidents were frequent and between 1955 and 1966 in Le Havre alone, there were 6000 accidents per year on average, with between 26 and 48 fatalities. The Rochdale Report in Britain indicated that there were on average 46 deaths per year in British docks.

Their labor was also costly. Not only did their wages account for up to half the total expense of an ocean voyage (Levinson [2006] 2016: 26), but the risk of broken or stolen items during the loading process contributed to high insurance premiums and an unexpected dockworker strike could cause a shipper to incur thousands of dollars in fees.¹⁸ "For the shipper," Talley (2000: 936) writes, "containerization meant less pilferage. Containers would be sealed at the origin and not opened until they arrived at the consignee. Also, less handling meant less damage to cargo. The delivery of cargo was faster and more reliable, resulting in substantial reductions in inventories. While a break-bulk ship often took a week to unload and reload, a containership might be in port for only six hours." According to Bernhofen, El-Sahli, and Kneller (2016: 39), between 1965 and 1971 alone, the resulting reduction in insurance costs from containerization along the Australia–Europe trade route fell from an average of 24 pennies per ton to 4 pennies per ton. The container reduced these costs from the shipping process, but not without a fight. It took years of negotiations and lawsuits with the longshoreman unions before the role of the dockworker

¹⁸ When McLean first attempted to expand his containership route to Puerto Rico, longshoremen in San Juan protested for four months and did not unload the ships until McLean agreed to use union-approved twenty-four man longshoreman gangs to unload containerships – even though the role of the longshoreman was obsolete in the process. (Levinson [2006] 2016: 77)

was allowed to evolve from that of the traditional blue-collar laborer to that of the specialized crane technician (Levinson [2006] 2016: 372-374). Between 1970 and 1986 alone, the number of longshoreman employed in the Port of New York fell from 30,000 to 7,400 (Talley 2000: 946, fn. 6). By shifting the traditional labor-intensive stevedoring process to a capital-intensive intermodal process, containerization reduced the uncertainty associated with holdups by labor strikes.

Confronting industry regulation. The most substantial hurdle that McLean overcame was the tangle of federal regulation in the transportation industry overseen by agencies like the now-defunct Interstate Commerce Commission. Laws such as the Motor Carrier Act of 1935 forbid transportation businesses to move freight via railroads, trucks, and ships – a firm could only choose to engage in one mode of transportation. In order for McLean to cross over from the trucking industry to the shipping industry in 1955, he had to maneuver a complicated legal process that involved McLean forming an entirely new company while legally resigning from McLean Trucking all within one hour (Levinson [2006] 2016: 59). After McLean’s shipping company, McLean Industries, was formed, McLean still had to wait months until the ICC approved his plan to employ the use of containers.

Despite these successes, McLean did not win every battle against the ICC. In 1966, he proposed a new vision: an intermodal company that would combine truck and ship routes with railroad hubs in Chicago and St. Louis that McLean would finance himself. McLean estimated that “shippers’ costs for the domestic leg of their international shipment would fall by half” since “trucks would do the short-haul work for which they are best-

suited” and “trains would handle the long haul, where their costs were lowest” (Levinson [2006] 2016: 228). The ICC, strongly swayed by railroad executives, never approved this plan. However, McLean’s dogged pursuit of an interconnected transportation industry countered prevailing norms and laid the groundwork for future deregulation, such as the Railroad Revitalization and Regulatory Reform Act of 1976, the Staggers Rail Act of 1980, and the Motor Carrier Act of 1980 that officially dissolved the ICC.

Recalibrating the economics of location. The container reduced transportation costs by relieving the manufacturing industry of the need to have coastal operations and plants. Instead, firms could now move inland and cheaply transport goods to the coast:

The container turned the economics of location on its head. Now, a company could replace its crowded multistory plant in Brooklyn or Manhattan with a modern, single-story factory in New Jersey or Pennsylvania, could enjoy lower taxes and electricity costs at its new home, and could send a container of goods to Port Elizabeth for a fraction of the cost of a plant in Manhattan or Brooklyn (Levinson [2006] 2016: 133).

This simultaneously allowed coastal property to be allocated to higher valued uses and enabled private businesses to enjoy larger, less costly facilities. Containerization also enabled ports to economize on scale and concentrate freight within a few key terminals:

Whereas in 1965 ships in the (southbound) Australian trade called at any of 11 loading ports in Europe, by 1972 the entire trade was shared among the three ports of Hamburg, Rotterdam and Tilbury” (Bernhofen, El-Sahli, and Kneller 2016: 39).

The emergence of super ports enabled shippers to reduce not only the mileage of their trade routes but also the time spent sourcing freight on the spot market.

Establishing global trade routes. While McLean first took business outside the contiguous U.S. to Puerto Rico in 1958, he did not find a major opportunity to enter foreign markets until the Vietnam War. In the early stages of the war, the United States military struggled with navigating the logistics of Vietnam's narrow ports. Inbound ships stocked full of supplies were forced to wait months in open water until space was made available at the makeshift docks. In need of a solution, the federal government asked leading shipping executives to create proposals for the private handling of military logistics (Levinson [2006] 2016: 238). McLean lunged for the opportunity, outbid the competition by offering to provide the necessary capital (chassis, trucks, and terminals), and saved the Navy over half the cost per ton ([2006] 2016: 245). While each round trip from the United States to Vietnam generated \$20,000 per day ([2006] 2016: 249), McLean was not satisfied. Ships sailed to Vietnam with cargo, but sailed back empty. McLean knew there had to be another profit opportunity, and he found it in negotiations with Japan. Before long, his ships were sailing back from the East loaded with cargo, and he had tapped a new foreign market. Thus, containerization finally pierced global markets – all as a way to minimize overhead costs per voyage.

Altogether, the cost-reducing innovations yielded by the container made it possible for McLean to experiment with around-the-world shipping routes in the 1980s. While such routes had never been attempted due to the risk of delay caused by poor weather or mechanical problems, McLean took a calculated risk in efforts to solve what he considered the “inherent problems” of the industry (Levinson [2006] 2016: 312): “the imbalanced flow

of freight that left some ships sailing full in one direction and half-empty in the other.” In 1982, McLean placed an order for fourteen containerships that would circumnavigate the globe in an eastbound direction. While his new trade route suffered delays and struggled to remain profitable, it shattered the preexisting notions of what many shippers once thought possible. Other companies began to follow suit, and the logistical precision developed by these shippers laid the groundwork for just-in-time shipping, which enabled manufacturers to reduce inventories and experience huge cost savings. Now, countries that have chosen to access these global trade routes boast massive economic gains:

In 2004, the World Bank estimated that if Peru were as effective at port management as Australia, that alone would increase its foreign trade by one-quarter. The Peruvian government took that warning seriously, arranging \$2 billion in port investments over the ensuing decade, which made possible a very large increase in foreign trade. Tanzania, on the other hand, staunchly resisted modernization. If only the port at Dar es Salaam had been as efficient as the nearby port at Mombasa, in Kenya, the average Tanzanian family in 2012 would have saved a stunning 8.5 percent of its annual expenses (Levinson [2006] 2016: 368).

Thus the simple container, paired with McLean’s entrepreneurial vision for an interconnected transportation sector, unleashed a series of innovations that not only transformed the way freight was moved across the world but also generated wealth in sectors far beyond the transportation industry itself.

4. Conclusion

It is no exaggeration to state that McLean’s pioneering innovation changed the face of international trade and fostered the integration of the world economy in the post-WWII era. However, the entrepreneurial brilliance of McLean that we wish to highlight here is that his innovation did not introduce a technological change that had not existed before *per*

se. Rather, the productivity gains that were created by modern container shipping were generated by *discovering and revealing* the massive inefficiencies that had existed in the organization of international shipping before modern containerization. As Levinson states this point, “Malcom McLean’s real contribution to the development of containerization, in my view, had to do not with a metal box or ship, but with a managerial insight. McLean understood that transport companies’ true business was moving freight rather than operating ships or trains. That understanding helped his vision of containerization succeed where so many others had failed” ([2006] 2016: xii). Moreover, the very simplicity of McLean’s idea, and the inefficiencies it exposed, seemed so obvious *ex-post* that it should puzzle us to realize it had not been implemented before, *when the technology and resources had already existed*. Understood this way, an analytic exposition of McLean as an entrepreneur is uniquely suited to illustrating the entrepreneurial market process developed by Israel Kirzner, and how the distinct nature of Schumpeterian entrepreneurship fits into the equilibrating tendencies of the market process.

Our argument has an important implication for future research on the impact that containerization has had on the cost of shipping. To the extent that economists have implicitly filtered the economics of containerization through a Schumpeterian lens, and therefore have regarded it as a technological innovation, the primary focus of analysis has been on measuring the decline of explicit shipping costs due to technological improvements realized through economies of scale, which – as alluded to by Hummels (2007) – underestimates the real productivity gains generated from containerization. Redirecting our analysis through a Kirznerian lens, additional research can be conducted

that measures the reductions in transaction costs, the impact of which indirectly allowed McLean to reorganize existing transportation technology on a massive scale. Though the most recent literature on the economics of containerization has begun to move in this direction through measurements in the decline of insurance costs and waiting time at port, there are two additional avenues of research. One possibility is to take an event study approach that illustrates the Kirznerian rendition of the market process via arbitrage through tendencies towards equalization of world market prices in goods traded internationally. Another possibility would be to observe, after the introduction of containerization, the qualitative effects of containerization through the expanded basket of goods, not only in terms of quantity and variety traded on the international market, but also in terms of the availability of goods less seasonally.

CALCULATION AND CORPORATE TAX INCENTIVES

“New York City is about to get tens of thousands of new, good paying jobs and Amazon is about to meet the most talented workforce in the world in one of the most diverse places on the planet.”

-New York City Mayor Bill de Blasio (Hanbury 2018)

“We rarely agree with socialist Congresswoman-elect Alexandria Ocasio-Cortez, but she's right to call billions of dollars in taxpayer subsidies for Amazon ‘extremely concerning’. These handouts to one of the richest companies in the history of the world, with an essentially zero cost of capital, is crony capitalism at its worst.”

-Wall Street Journal Editorial Board (2018)¹⁹

1. Introduction

The preceding quotes provide a good picture of arguments often made for and against corporate tax incentives. The arguments themselves are based, ostensibly, on well-intended motives, since both are plausibly true. On one hand, when money is used to accomplish some particular goal (i.e. job increases) it can succeed. On the other hand, politicians’ ability to give concentrated multi-billion-dollar tax incentives provide ample opportunity for political exchanges, which concentrate benefits of well-informed special interest groups at the expense of ill-informed taxpayers, upon whom the costs are dispersed. Despite the truth in each of these claims, there is a glaring omission in both.

¹⁹ As this quote illustrates, the terms “corporate tax incentives” and “subsidies” are often considered to be interchangeable. However, Rothbard ([1970] 2009, 1218-1221) effectively differentiates the two concepts. We agree with this differentiation, and we emphasize that corporate tax incentives are a different means whereby politicians encourage companies to take actions that they would not otherwise take. In this way the policies are used to pick winners as will be discussed throughout the paper.

Neither argument directly addresses the solution to the *economic* problem whereby resources are allocated to their most valued uses. Instead, both of these arguments and their relative merits (or lack thereof) can be examined in terms of the problem of economic calculation.

The purpose of this paper is to consider the ability of corporate tax incentives to accomplish identified objectives in light of politicians' inability to engage in economic calculation. Economic calculation refers to a competitive process whereby resources are allocated to their most highly valued uses. This process is generated in the marketplace by entrepreneurs who are lured by expected profit opportunities and disciplined by expected losses (Kirzner 1973).

While Amazon has drawn particular attention in the State of New York and the Commonwealth of Virginia, our argument pertains to the Carolinas as well. Amazon recently declined the North Carolina Triangle Region's \$2.2 billion-dollar incentive package offered to bring HQ2 to the area. While many mourned the loss of the potential HQ2, the analysis offered here paints a brighter picture of the state's inability to draw in Amazon. By not needing to fulfill promised tax incentives, North Carolinians will save an unknowable opportunity cost associated with the deal. Citizens will not be required to support wealth-destroying jobs. Moreover, a potential instability associated with a declining confidence in the rule of law by individuals has been avoided. Finally, the non-intervention that will result will also prevent the diversion of profitable opportunities from productive to unproductive entrepreneurship. Despite the benefits of nonintervention being hidden and dispersed, they are not totally unknowable. Our paper

provides good reason for Carolinians and all others who “lost” the Amazon deal to celebrate the economic opportunities that exist in its stead.

In order to gain a full appreciation of how corporate tax incentives for Amazon relate to the problem of economic calculation, we start by discussing the problem of economic calculation in light of the socialist calculation debate. Ludwig von Mises ([1920] 1975) originally developed the critique that there could be no rational economic calculation within the institutional setting of socialism.²⁰ Outside the context of exchangeable private property rights, there exist no market prices. Without prices, central planners would have no way to obtain the knowledge necessary to determine how to allocate capital to its most valued uses. This is because outside the context of private property, such economic knowledge embodied in market prices and profit and loss signals does not exist. Hayek (1940; 1945) further developed this critique by emphasizing the role prices play in the transmission and use of knowledge. Boettke (1998, 132) restates the Mises-Hayek position on the problem of economic calculation as one of discovering *contextual* knowledge and draws attention to its importance as, “the contribution of twentieth-century Austrian economics to the discipline of political economy”. As Boettke and many other economists recognize, however, the relevance of the question of economic calculation extends far beyond the socialist calculation debate in the twentieth century.

²⁰ Mises points out that because socialist economies lack private ownership of the means of production there is no market by which they are exchanged. Without a market there can be no monetary prices for the means of production. Finally, without monetary prices it is impossible to engage in rational economic calculation regarding the alternative uses of scarce capital goods.

In recent years there has been a deeper existential question posed by politicians and citizens in the United States regarding the ability of a free market to continue to provide economic growth. On the extreme, there have been some who have renewed the calls for the socialist system of economic organization Mises and Hayek debated. There are also seemingly less extreme yet more pervasive calls for engineering of the economy via incentives. Plans to grow the economy via job increases as a result of tax incentives have been created and carried out on the nation and statewide level. The latter policy type can be described as a sort of “non-comprehensive planning”.

Despite these promises of growth, it’s not obvious that these plans utilize economic calculation to solve the economic problem. Thus, a proper understanding of economic calculation is needed to address national and state tax incentive plans such as those associated with Amazon’s HQ2. This paper contributes to a large literature which applies the calculation argument to noncomprehensive planning in general. Lavoie ([1985] 2016) lays the groundwork for this literature by demonstrating the applicability of the socialist calculation debate to national economic planning. Lavoie specifically discusses reindustrialization plans of both Preservationists and Futurists and how the lack of profit and loss signals frustrates these approaches. Coyne (2013) and Skarbek and Leeson (2009) show how the success of international aid is limited by the inability of aid organizations to use economic calculation. Powell (2005) uses this approach to analyze the East Asian miracle and documents growth in those countries coming about as a result of movement away from central planning. Duncan and Coyne (2013) and Coyne and Hall (2019) consider the calculation argument in the context of non-comprehensive planning

in the state provision of defense. Finally, Coyne and Moberg (2015), on a similar line to our own, address noncomprehensive planning associated with state-targeted benefits.

Our paper builds on this literature further by considering the inability of politicians to use economic calculation to allocate resources via tax incentives in an economically efficient way. Since politicians do not have residual claimancy as entrepreneurs do, they lack the knowledge to engage in economic calculation. As such, the opportunity cost of the technical goals they are pursuing is not known. We contribute further by analyzing the fact that policy packages (such as the HQ2 policy) are implemented exclusively and therefore its profitability is not subject to the same sort of contestability available on the market. We then highlight this point with a thought experiment which supposes competing corporate tax incentive policies. Lastly, we examine the knowledge that *is* discovered in the political process, and how it leads to the arguments regarding cronyism often associated with such policies. In doing so, we demonstrate how these arguments, though important, are a consequence of a more fundamental problem regarding the inability to engage in economic calculation.

The rest of the paper is structured as follows. Section II expounds upon the knowledge problem that exists with respect to corporate tax incentive policies. Section III discusses the public choice implications which arise from discovery that occurs in the political process as opposed to the market process. Section IV concludes with implications for incentive policies for Amazon's HQ2 and other related policies.

2. The Knowledge Problem of Corporate Tax-Incentive Allocation

In order to gauge the success or failure of any government program there must be a standard by which we compare it. Thus, one option for such a standard is to take the goals of each program as stated and consider whether the means are sufficient to accomplish said goals. In the case of Amazon HQ2 and corporate tax incentive programs generally, there are often several related claims.

One of the most common appeals by politicians is the increasing number of jobs that could come as a result of the program.²¹ The aforementioned quote by Mayor de Blasio is an oft-repeated refrain regarding these sorts of incentive schemes. The logic often goes that by offering competitive packages for corporations, they will invest heavily in in the area and create long-lasting opportunities for the taxpayer which more than make up for any incentives offered to the company. These goals frequently go hand-in-hand with non-comprehensive industry cluster plans which leverage metaphors such as “a new Silicon Valley” to illustrate a vision of a region built on the foundation of abundant, high-paying employment.

However, programs aren’t often marketed on the basis of jobs alone. It is contended that as a result of the jobs in the region, there will be economic growth. In a press conference regarding Amazon’s HQ2 decision on New York, Governor Andrew Cuomo echoed this sentiment in saying, “this is the largest economic development initiative that has ever been done by the city or the state or the city and state, together” (Soper, Brady, and Goldman 2019). In other words, it is by economic growth these

²¹ Here and henceforth when we refer to politicians attempting to “increase” the number of jobs we refer to attempts to increase in expected employment and not an actual increase in the number of *potential* jobs. Following Alchian and Allen ([1977] 1983, 304-305) we acknowledge the number of potential jobs is unlimited (see also Alchian 1969).

policies are sold, through jobs. Economic growth can then be considered a distinct but inextricably related goal by which success or failure can be evaluated.

One last associated goal can be an appeal to industrial robustness. Corporate tax incentive policies can, on this view, be used to either preserve an existing industry viewed as vital or to accelerate the region into futuristic industries which establish economic security for the years ahead. This is related to Lavoie's ([1985] 2016, 199) aforementioned distinction between "Preservationist" and "Futurist" goals. In this case, politicians attempt to act as an entrepreneur speculating on the success of industries in the future. The futurist take is captured again by a press conference in which governor Cuomo argued in favor of the incentives on the basis that, "Amazon is the technology of the future", and he continued, "either you are part of the economy of tomorrow, or you are a part of the economy of yesterday" (Raskin, 2019).

We first consider the goal of jobs alone. Arguments could be made about whether or not there is net job creation from any given policy empirically. For example, analyses considering factors such as other crowded-out employers could be undertaken to estimate a net job impact. It is important to point out, however, that there is no reason to rule out the possibility of job creation due to corporate tax incentives a priori. Job creation is a *technical* problem. As with any technical problem, re-directing resources to the creation of an output will create more of that output.²² Concretely, we can think of plenty of programs likely to result in job creation. Allocating resources towards pyramid-building

²² We can visualize this is through a simple production possibilities frontier, whereby more of good "Y" can be obtained provided society gives up increasing amounts of all other goods "X".

or window-breaking will lead to the creation of more jobs in architecture and window repair, respectively. In this sense the means of corporate tax incentives are sufficient to bring about the technical goal of job creation. However, this technical problem should not be mistaken for the *economic* problem of calculating the opportunity costs of scarce resources among competing ends. Stated differently, the process of economic calculation, driven by profit-seeking entrepreneurs, tends to sort land, labor, and capital from a set of *technologically viable* projects those projects that are *economically viable*.

To illustrate this distinction, let us consider the production of railroads as was considered by Mises ([1920] 1975, 108-109; [1922] 1951, 121-122). An entrepreneur can choose between producing railroads made from platinum or iron. Generally speaking, however, we tend to see railroads built with iron. From a technological standpoint, it makes sense to produce railroads with platinum, given that it is a harder, more durable metal than iron. Why, then, are railroads not built with platinum? One might say, correctly so, that price of platinum is higher, and therefore entrepreneurs will tend to use less platinum in the production of railroads. But this introduces another question: where do the money prices come from? Such money prices are generated by entrepreneurs bidding for scarce platinum from owners of platinum and redirecting such platinum towards uses that are higher valued by consumers than the production of railroads. Herein lies the fundamental lesson of economic calculation: *within a context of private ownership of the means of production, it is only through the act of exchange that the subjective valuation of scarce resources by consumers are communicated to entrepreneurs as economic knowledge through the price mechanism.*

The price mechanism serves a two-fold role. First, prices serve an *ex-ante* role of guiding expectations about the profitability of a productive activity. Secondly, prices serve an *ex-post* role of assessing previous economic decisions, through profit and loss accounting, whether in fact inputs were allocated to their most valued use (Boettke and Candela, 2017). However, economic calculation is predicated on the idea that entrepreneurs are residual claimants to their decision-making, and therefore respond to the economic knowledge embodied in prices and profit and loss accounting. Therefore, if entrepreneurs accrue profits, such knowledge will incentivize them to produce more of a good or service, whereas if entrepreneurs sustain losses, they will learn to adjust and curtail their production and redirect resources towards more valuable uses. Given that political officials are not residual claimants to their decision-making, resources will be misallocated through the political process. This is not because political officials are malevolent per se, but because they are precluded from capturing profits and absorbing losses, and therefore cannot respond, as entrepreneurs do, to informational signals embodied in money prices. Instead, as we will discuss below, political officials will respond to the knowledge made available to them in the political setting, which is to “learn” how to allocate rents to special-interest groups that value them the most, in exchange for votes.

The economic problem is distinct from the technical problem here in the recognition that increasing some particular output comes at some opportunity cost of what could have been done with the resources used to increase that output. In other words, job creation as a goal comes at a cost. Since resources are scarce and can be used

as means for competing ends, merely maximizing some technical output is not sufficient for the creation of economic growth. Entrepreneurs must also choose an allocation of resources that brings about the economically efficient output that maximizes the value of the output to the individuals in the society.²³ Therefore, there is a problem with considering both job creation and economic growth as goals which are always compatible. Because job creation comes at some cost, tax credits and other incentives to corporations may encourage the employment of scarce labor in less valued productive activities that would have otherwise been foregone absent such incentives. Moreover, policymakers cannot claim that the intended end of economic growth comes about by increased jobs because it's possible that these two goals are antithetical to one another. Deeper still, without residual claimancy in their decision-making, policymakers cannot know all of the information (tacit and explicit) necessary to determine when resources have been allocated to their highest valued use. They are unable to determine if and when corporate tax incentive-based job creation is worth the opportunity cost (i.e. when it is consistent with economic growth). Similarly, a decision to move towards more “futuristic” industries will face the same sort of knowledge problem.²⁴

In the free market, the competitive process characterized by entrepreneurial discovery of previously unnoticed profit opportunities acts as a means of solving the knowledge problem. The central role of the entrepreneur in the market has been

²³ We can think of this “economic efficiency” as a specific point on the production possibilities frontier.

²⁴ This is dealt extensively by Lavoie ([1985] 2016) wherein he provides evidence of political decision-makers being unable to identify which industries and businesses would be successful in the future. Even if it were possible for policy-makers to make correct selections about which industries would be successful in the future, it does not follow that spending resources to develop that industries in a particular region would be worth the forgone alternative resource uses.

elucidated by Mises (1949) and Kirzner (1973, 1985). Kirzner emphasizes how prices in the context of the market system transmit information to alert agents. When resources are misallocated then there exists a price discrepancy. By discovering and subsequently exploiting the discrepancy they make a “pure gain” or profit. Since the residual claimancy of profit can be established by the entrepreneur, there is an incentive to discover the misallocation of scarce resources. Therefore, economic growth and the knowledge necessary to achieve it is woven into the fabric of the market process. Ventures which misallocate resources and reap losses instead of profits are consequently abandoned.

It is not the case that this process operates symmetrically in the context of public policy decision-making though. Prices are analogous to a telephone cord whereby consumer demands are communicated to entrepreneurs, who allocate land, labor and capital accordingly. However, in the political process, this cord that transmits knowledge to producers from consumer demands will be severed between policymakers and voter demands. DeCanio (2013) contrasts the different mechanisms of knowledge transmission associated with the market process and political process. DeCanio argues that the market process mimics scientific experimentation whereby several types and iterations of the same good are pitted against one another, and success is determined by profit loss calculations. Alternatively, the political process does not resemble experimentation because government retains exclusive authority over the production of policies. Due to this, citizens have neither the knowledge to effectively compare counterfactual technical proposals for the production of the same good nor can they successfully determine

whether the production of a good is itself an efficient use of resources. Even in the case where differing policies are adopted consecutively or in different locations, the complexity inherent in the economy will render the two situations incomparable. The same is true of choosing not to produce such policies at all. It will be impossible to know the counterfactual of what would have happened given a policy is not adopted. An economy may grow after the adoption of a policy *in spite* of the existence of the policy.

Following DeCanio, we consider a thought experiment whereby we can observe the different knowledge problems encountered by voters. We will first consider two corporate tax incentive policy proposals with the goal of creating more jobs. Utilizing an earlier theme, we can label one proposal Preservationist and one proposal Futurist. The Preservationist policy seeks to attract firms to the state's existing coal mining industry. The Futurist proposal involves an attempt to lure tech industry companies to the state. The first problem voters face is the necessity of a great deal of knowledge about how each proposal would increase jobs to determine which does so more effectively. For example, it may be the case that an increase in mining jobs would cause manufacturers to move closer in proximity in order to capitalize on lower raw material transportation costs. Additionally, the workforce in any given state may be more trained in either the mining or the tech sector. If this is the case, jobs may have to be outsourced to workers in neighboring states, or capital may be used as a substitute for labor, and any job increase estimate would be overly optimistic given this is the case. In order for voters to choose between these policies from a technical perspective, they would have to have an extensive knowledge of the effects the attracted industry has on other industries. They

would have to know details of the training of the workforce in their respective states. If the goal was to increase the number of jobs over a certain amount of time (as opposed to an immediate-run goal of increased jobs today) voters would need to be informed of potential future changes to the industries. Are rival technologies being developed that would make the tech firm in question irrelevant soon? How will a continued relative success of electric cars effect the number of jobs in coal mining? The knowledge associated with these policies and more would be needed for the voter to evaluate the relative technical efficiency of these two proposals.

The problem is exacerbated when we consider the economic problem in the context of exclusive corporate tax incentive packages offered by alternative parties. Voters cannot determine ex ante whether the Preservationist or Futurist proposal will provide some fixed number of jobs utilizing less scarce resources. Nor can they determine if one policy offers perhaps a lower number of jobs at a more acceptable cost to society. This is in stark contrast to the free market where experimentation can occur. If the voters select politicians who opt to provide Futurist corporate tax incentives, they must be able to evaluate the counterfactual knowledge about how the Preservationist policy would have unfolded in practice. Even if voters felt they had enough knowledge to solve both of these problems the problem is made more complex by the fact that the feedback mechanism for politicians of voting does not provide clear information about which policies voters like or dislike. This simple thought experiment sheds light on the enormous difficulty associated with solving the knowledge problem in the political process relative to the market process.

3. The Inventive Problem in the Context of Policy Provision

Policymakers are not the residual claimants of the profits or losses associated with their exclusively provided services. Recognition of this fact leads to several observations. First, politicians must utilize a method of evaluating policies other than the knowledge gained from profit and loss accounting. It follows that self-interested political agents may utilize the political knowledge associated with their monopoly on policy production to cater to special-interest groups in exchange for political support (Boettke, Coyne, and Leeson, 2007). Second, entrepreneurs and firms will respond to the arbitrage opportunities created by rents in the form of corporate tax credits. In addition to these two observations, corporate tax incentive policies are also inherently violations of the rule of law since they involve picking specific winners and losers. This section will examine these three observations in more detail to shed light on the cronyism often associated with corporate tax incentives.

Wagner (1989) emphasizes that the policymaker must be able to do three things in order to improve economic efficiency via correction of market errors. First, there must be knowledge of the market error. Second, there must be knowledge of how to fix said error. Finally, incentives must be compatible such that the policymaker will be willing to properly implement the correction. Until Buchanan and Tullock's (1962) analysis of politics as exchange, the third condition was mostly ignored by economists. In light of the first two conditions being confounded by the knowledge problem, there is even less reason to expect incentives to be based on generating economic efficiency. Alternatively,

politicians may seek to produce policies which will help them retain power. Corporate tax incentive policies fit well into this view of politics.

Following Olson (1965), it is clear that policies such as this will provide very visible concentrated benefits. The workers employed by Amazon are grateful to the politicians for creating the policies. Even more so, those whose assets are appreciated by the presence of Amazon have an interest in securing their presence. Those who benefit from the newly incentivized company see the benefits plainly. The costs are less visible. It is not clear who specifically attains a net loss by the presence of Amazon. There is some sense that the taxpayer bears a burden of the multi-billion-dollar deals, but the cost is dispersed among millions of individuals. Since the forgone alternatives are both unseen and dispersed, it is difficult to imagine a politician being punished very severely relative to the rewards from special interests. Additionally, Wagner points out that the process of information generation about the success and failure of policies itself is contingent on the institutional setting. Unlike the market where losses provide incentives to understand why a project is failing quickly, policymakers may lack an incentive to identify policy failures since they are not residual claimants to their decision-making.

Leeson (2006) points out that even in the case that there are some individual politicians who would meet the condition of incentive compatibility (in this case because they are benevolent), there is reason to believe that they will not behave as such so long as there is a possibility of other politicians who are not perfectly benevolent. Leeson shows that in order for benevolent politicians to prevent themselves from being selected out of the political process by those who aren't benevolent they must be willing to cater

to special interest. This is a complementary, though different, point to the voter-preference extraction problem in democratic systems as highlighted by DeCanio. Both points make clear that political institutions select for politicians willing to create rents and attract rent-seeking behavior regardless of the moral character of the agents within the institution.

Kirzner (1985) criticizes regulation from the perspective of the effect on entrepreneurial discovery. Unlike other critiques of the effects of regulation, Kirzner contrasts the process by which economic inefficiency is corrected by the market versus how regulation supposedly corrects these inefficiencies. Current inefficiencies are future profit opportunities for entrepreneurs, and government regulation rules out the possibility that all worthwhile discoveries have been made. Not only is regulation potentially unfounded when discovery is considered, but the possibility also exists for it to be harmful.

Policy can act as a barrier to discovery. This is very clear in the case of corporate tax incentives. Amazon securing zero state income tax status for over a decade and being provided advantages in receiving grant money significantly reduces the incentive for potential entrepreneurs to enter the market. Any entrepreneur considering entering the market in competition with Amazon via an unexploited discovery will now have to compete with a firm whose costs are made relatively lower, serving as artificial barrier to entry. It may be the case that there are some opportunities that will go unexploited in the face of this enormous advantage, or what Kirzner refers to as “the stifled discovery process” (1985, 141). In the place of these productive entrepreneurial discoveries, there

may be a tendency for new, unproductive discoveries to be created by government intervention that hampers the market process, namely rent-seeking. Kirzner dubs this category as “wholly superfluous discovery” (1985, 144-145). The artificial barriers created by these policies may also give firms monopoly power, which in turn can lead to further calls for intervention to sustain their monopoly privilege. This observation follows Mises ([1926] 2011) theory of interventionism. Candela and Geloso (2018) explore this theory of interventionism as it relates to the knowledge generated by the political process and argue that public policy makers will be incentivized to seize greater regulatory authority in order to cater to special interest groups. In this way the dynamics of interventionism is directly related to the incentive problem resulting from the context of policy provision.

Since government is able to grant monopoly privileges, interference in the market provides new profit opportunities for participants in the capitalist process. Instead of profit calculations being made in the context of benefits to consumers, entrepreneurs now receive knowledge about what is beneficial to politicians, making it more likely that production decisions become based on political demand rather than consumer demand. These unexploited opportunities need not be the intended consequences of regulators. The evolution of corporate tax incentive competition is a perfect example of this. In providing incentives for Amazon to build its headquarters in their own state, it's unlikely policymakers intended to create a situation whereby jurisdictions publicly compete to be the chosen location. Political decision-makers offering Amazon tax incentives must now offer increasingly costly incentive packages to “win” the competition. Absent corporate

tax incentive creation, this opportunity to make city governments compete for Amazon's HQ2 did not exist. The opportunity itself was created by the regulatory process.

The difficulties generated for market decision-makers are compounded when it is recognized that these policies violate the rule of law. Since corporate tax incentives involve dealings with specific companies, there is no generality about them. In this context, the law has the opportunity to serve privileged corporations as opposed to the citizens to whom the law applies. Hayek highlights the importance of the rule of law in saying, “[rules] are instrumental, they are means put at his disposal, and they provide part of the data which, together with his knowledge of the particular circumstances of time and place, he can use as the basis for his decisions” ([1960] 2011, 220). This point underscores the role rules play in the market economy. Businesses who compete with Amazon cannot properly orient their competitive decision-making if the rules of the game are constantly changing for Amazon alone. This effect carries into the future since the use of incentives may signal future incentive schemes to get companies to stay. Coyne and Moberg (2015) document several cases where a corporations' decision to close up in a certain location was reversed due to politicians offering incentives to remain in business. Again, politicians may have an incentive to do this to avoid information of policy failure being created. Boettke and Candela (2014) point out that economic development itself rests on law because of its role in providing the framework whereby all other economic activities are coordinated. Without a proper arrangement of the fifth factor of production (the law), individuals cannot properly coordinate the other four factors (land, labor, capital, and entrepreneurship) in wealth-enhancing ways.

The rent-seeking nature of the political process, the violation of the rule of law, and the consequence of superfluous discoveries made by private companies is recognized by politicians and citizens alike. The very public process of HQ2 made this fact clear. Claims of cronyism and corruption were commonplace after Amazon's selection of New York for one of its two headquarters. The Deputy Leader of the New York City Council, Jimmy Van Bramer voiced these concerns when he claimed, "when Jeff Bezos needed \$3 billion the governor and mayor found it sure damn quick. The governor and the mayor conspired secretly to cut a deal with Bezos to the exclusion of everyone else. This is the ultimate case of 'three men in a room'" (Raskin, 2019). The scrutiny in New York was so intense Amazon has rescinded their acceptance of New York's offer.

The public choice approach coupled with the Austrian account of the entrepreneurial market process and an analysis of the effects of violations of rule of law explains the effects of alleged cronyism well. It's important to recognize that this cronyism has its ultimate source in the knowledge problem. Since politicians and voters cannot fully absorb the profits and losses of policies, they cannot calculate the opportunity cost of the monopoly production of policy. They therefore pursue their own self-interest on other margins (catering to special interest groups). Fundamentally, an inability to engage in economic calculation is at the core of why cronyism results with respect to corporate tax incentives.

4. Conclusion

An understanding of economic calculation is a central component to understanding the effects of offering corporate tax incentives to companies like Amazon. Voters face a knowledge problem with regard to the economic efficiency of alternative policies. This knowledge problem coupled with the inadequate feedback mechanisms associated with the political process means that it is unlikely that policies will be selected that maximize the economic efficiency of any stated goal. However, because job creation is a technical problem of throwing resources to achieve pre-defined goal, there is nothing which prevents authorities from producing more jobs by using more resources. An implication for voters and politicians, due to the difficulties above, is that one should be wary that the best policy, economically speaking, will be one that allows contestation between firms in the market process, not contestation between firms for tax incentives through the political process.

Fundamentally, the stated goal of job creation is a goal separate from (and even antithetical to) economic growth. Since political actors lack the ability to engage in profit and loss accounting, they will suffer from a knowledge problem about the opportunity costs of policy proposals and are therefore unable to determine their impact on economic efficiency and growth. Unlike the technical improvements, which are likely to come about when more resources are used, there is no reason whatsoever to think corporate tax incentives will bring about economic improvements. The policy implication here is clear. Any voter or politician concerned with economic growth should be careful when considering any policy that is sold as creating economic growth by “adding more jobs” or some other technical goal.

Due to politicians' inability to be the residual claimants of profits and losses in the marketplace, they will instead implement policies that are politically profitable, namely by concentrating benefits on well-informed and well-organized special interest groups and dispersing costs on ill-informed and ill-organized masses of voters. Information about policy failure will tend not to be generated, as there is little incentive for politicians to absorb this knowledge. Rent-seeking will therefore be commonplace regardless of the moral character of the politicians. Intervention into the market process by political actors will cause further distortions by creating previously nonexistent profit opportunities which are subject to discovery. This discovery will be "wholly superfluous" and may serve to distort both the market and political process even more. The violation of the rule of law inherent in corporate tax incentives further hinder the market process by confounding the plans of individuals. Economic growth is severely impeded by the obfuscation of the rule of law. This leads to a third implication for voters and policymakers. The common concern for cronyism "polluting the political process" is not the result of political oversight which is not robust enough. Rather, since the incentive issue stems from the problem of economic calculation, rent seeking itself is a natural part of the political process. So long as there is monopoly policy production there is cronyism, as entrepreneurs will compete for privileges in the form of tax credits, subsidies, and other privileges that shield them from market competition. Voters and politicians should be aware of this omnipresence of incentive issues when choosing which policies to support.

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